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SouthCoast Wind Project Final Environmental Impact Statement

November 2024

Volume II: Appendices

Bureau of Ocean Energy Management

Appendix A: Required Environmental Permits and Consultations

A.1 Required Environmental Permits

Table A-1 includes a summary of federal, state, and local permits or approvals that are required for the SouthCoast Wind Project's (Project) implementation.

Table A-1. Required environmental permits and consultations for the proposed Project

Agency/Regulatory Authority	Permit/Approval	Status
Federal (Portions of the Project within Federal Jurisdiction)		
Bureau of Ocean Energy Management (BOEM)	Construction and Operations Plan (COP) Approval	COP filed with BOEM February 15, 2021. Updates to the COP were submitted August 30, 2021, October 28, 2021, March 17, 2022, December 22, 2022, September 10, 2023, and July 31, 2024.
Department of Defense (DoD)	Informal Project Notification Form	Submitted May 2020.
National Marine Fisheries Service (NMFS)	Marine Mammal Protection Act Incidental Take Regulations and Letter of Authorization	Letter of Authorization Application for offshore construction and operations filed March 18, 2022, and deemed Complete by NMFS September 19, 2022.
U.S. Army Corps of Engineers (USACE)	Clean Water Act Section 404 and Rivers and Harbors Act Section 10 Individual Permit	Submitted December 2022; application deemed complete by USACE February 2, 2023.
U.S. Coast Guard (USCG)	Private Aids to Navigation authorization	Planned.
USCG	Local Notice to Mariners per Ports and Waterways Safety Act	Planned.
U.S. Environmental Protection Agency (USEPA)	Clean Air Act Outer Continental Shelf Air Permit	Submitted November 23, 2022; application deemed complete by USEPA April 7, 2023.
USEPA	National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activities	Submitted October 31, 2022; application deemed complete September 29, 2023.
USEPA	NPDES General Permit for Construction Activities (onshore at Brayton Point)	To be determined.
Federal Aviation Administration	Determination of No Hazard, if required	It is not currently anticipated that a Determination of No Hazard will be required for offshore structures in the lease area due to their location outside of 12 nautical miles (22 kilometers). Nor will this be required for the

Agency/Regulatory Authority	Permit/Approval	Status
		onshore substation or converter stations due to the maximum height of these structures. SouthCoast Wind Energy LLC continues to engage with the Federal Aviation Administration regarding whether any review and/or authorization is required for offshore equipment deployed to support horizontal directional drilling installation of the export cables.
Bureau of Safety and Environmental Enforcement	Oil Spill Response Plan	Filed with the COP February 15, 2021.
State (Portions of the Project within State Jurisdiction)		
Massachusetts Executive Office of Energy and Environmental Affairs (EEA)	Massachusetts Environmental Policy Act (MEPA) Environmental Notification Form (ENF) and/or Environmental Impact Report (EIR) and Certificate of Secretary of EEA	Project 1: Brayton Point ENF filed August 12, 2022. ENF certificate issued October 11, 2022. Project 1 Final EIR filed July 21, 2023. Supplemental Final EIR filed October 31, 2023. Certificate from EEA Secretary issued December 15, 2023. Project 2: ENF, Draft EIR, and Final EIR filings planned for Q1 2025.
Massachusetts Energy Facility Siting Board (MA EFSB)	Siting Petition pursuant to General Law (G.L.) c. 164, 69J and Certificate of Environmental and Public Need	Project 1: Brayton Point MA EFSB filed May 27, 2022. Decision anticipated in Quarter 1 2024. Project 2: Filing planned for Q4 2024.
Massachusetts Department of Public Utilities	Section 72 petition pursuant to G.L. c. 164, 72 and Zoning petition pursuant to G.L. c. 40A, 3	Project 1: Filed May 27, 2022, for Brayton Point. Project 2: Filing planned for Q4 2024.
Massachusetts Department of Environmental Protection	Chapter 91 Waterways License/Permit for dredge, fill, or structures in waterways or tidelands	Project 1: Filed December 20, 2023. Project 2: Filing planned for after completion of MEPA review.
	Section 401 Water Quality Certification	Project 1: Filed December 20, 2023. Project 2: Filing planned after completion of MEPA review.
Massachusetts Office of Coastal Zone Management	Coastal Zone Management Consistency Determination	Projects 1 and 2: Submitted February 15, 2021. Updates provided January 13, 2022. Consistency Determination anticipated in April 2024. Executed a third stay on November 8, 2023, extending the deadline for Coastal Zone Management's Federal Consistency Decision on or before April 10, 2024. Executed a fourth stay agreement on March 26, 2024, extending the deadline for Coastal Zone Management's Federal Consistency Decision on or before May 31, 2024. Executed a fifth stay agreement on

Agency/Regulatory Authority	Permit/Approval	Status
		May 15, 2024, extending the deadline for Coastal Zone Management's Federal Consistency Decision on or before July 31, 2024.
Massachusetts Department of Transportation	State Highway Access/Easement/Right-of-Way Permits (if required)	Projects 1 and 2: Filing planned prior to construction, if needed.
Massachusetts Historical Commission	Project Notification Form/Field Investigation Permits (980 Code of Massachusetts Regulations 70.00)	Projects 1 and 2: Brayton Point Project Notification Form submitted July 26, 2021. Brayton Point Terrestrial Archaeological Resources Assessment (Phase 1A Report) filed March 14, 2022.
	Section 106 Consultation	Projects 1 and 2: Initiated October 1, 2021. Notice of Intent provided November 1, 2021.
Massachusetts Board of Underwater Archaeological Resources	Section 106 Consultation	Initiated September 29, 2021. NOI provided November 1, 2021.
Massachusetts Fisheries and Wildlife – Natural Heritage & Endangered Species Program (NHESP)	Conservation and Management Permit (if needed) or No-Take Determination	Projects 1 and 2: Massachusetts's NHESP issued letter identifying state-listed protected species in proposed Brayton Point Project Area April 28, 2022 (NHESP Tracking No. 19-38917); determined that site is not mapped as Priority or Estimated Habitat.
Rhode Island Coastal Resources Management Council (RICRMC)	Coastal Zone Management Consistency Determination	Federal Consistency Concurrence issued December 19, 2023.
RICRMC	Freshwater Wetlands Permit	Project 1: Filed February 24, 2023. Updated filing March 6, 2023. Project 2: Planned.
RICRMC	Category B Assent and Submerged Lands License	Project 1: Filed February 24, 2023. Updated filing March 6, 2023. Project 2: Planned for Q4 2024.
Rhode Island Energy Facility Siting Board (RI EFSB)	Certificate of necessity/public utility	Project 1: Filed May 31, 2022. Project 2: Planned for Q4 2024.
Rhode Island Historical Preservation and Heritage Commission (RIHPHC)	Archaeological Permit	Projects 1 and 2: Phase 1 permit issued December 17, 2021. TARA (Phase 1A/1B Report) filed March 14, 2022. Marine Archaeological Resources Assessment submitted March 16, 2022.
RIHPHC	Section 106 Consultation	Initiated November 1, 2021.
Rhode Island Department of Environment	Water Quality Certification and Dredging Permit	Project 1: Filed March 17, 2023. Application deemed complete November 15, 2023. Secured

Agency/Regulatory Authority	Permit/Approval	Status
		401 Water Quality Certificate and Marine Dredge Permit March 14, 2024. Project 2: Planned.
Rhode Island Department of Environment	Rhode Island Pollution Discharge Elimination System General Permit for Stormwater Discharge Associated with Construction Activity	Projects 1 and 2: Planned.
Rhode Island Department of Transportation	Utility Permit/Physical Alteration Permit	Projects 1 and 2: Planned.
Local (Portions of the Project within Local Jurisdiction)		
Cape Cod Commission	Development of Regional Impact Review (if needed)	Planned (if needed).
Martha's Vineyard Commission	Development of Regional Impact Review (if needed)	Planned (if needed).
Falmouth, Somerset Planning and Zoning Boards	Local Planning/Zoning Approvals (if needed)	Falmouth Zoning Board: MA EFSB Zoning exemption petition filed November 17, 2021. Planned (if needed). Somerset Planning and Zoning Board: MA EFSB Zoning exemption petition filed May 27, 2022. Decision anticipated in Quarter 4 2024.
Somerset Conservation Commissions	Notice of Intent and Order of Conditions (Massachusetts Wetland Protection Act and municipal wetland non-zoning bylaws) (if needed)	Project 1: Filings planned for Quarter 1 2024. Project 2: Planned.
Swansea Conservation Commission	Notice of Intent and Order of Conditions (Massachusetts Wetlands Protection Act)	Notice of Intent filed on March 8, 2024.
Portsmouth Planning and Zoning Board(s)	Local Planning/Zoning Approval(s) (if needed)	Planned (if needed).
Falmouth, Edgartown, Oak Bluffs, Tisbury, and Nantucket Conservation Commissions	Notice of Intent and Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non-zoning bylaws) (if needed)	Planned (if needed).
Falmouth, Portsmouth, and Somerset Department of Public Works, Board of Selectmen, and/or Town Council	Street Opening Permits/Grants of Location	Planned.

A.2 Consultation and Coordination

A.2.1 Introduction

This section discusses public, Tribal, and agency involvement leading up to the preparation and publication of the Final Environmental Impact Statement (EIS), including formal consultations, cooperating agency exchanges, the public scoping comment period, the Draft EIS public comment period, and correspondence. Interagency consultation, coordination, and correspondence throughout the development of this Final EIS occurred primarily through virtual meetings, teleconferences, and written communications (including email). BOEM coordinated with numerous agencies throughout the development of this document, as listed in Section A.2.5.2, *Cooperating Agencies*.

A.2.2 Consultations and Authorizations

The following section provides a summary and status of each consultation. The Bureau of Safety and Environmental Enforcement (BSEE), U.S. Army Corps of Engineers (USACE), and U.S. Environmental Protection Agency (USEPA) are co-action agencies for the Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSA), and National Historic Preservation Act (NHPA) consultations.

A.2.2.1 Coastal Zone Management Act

The Coastal Zone Management Act requires federal actions within the coastal zone or within the geographic location descriptions (i.e., areas outside the coastal zone in which an activity would have reasonably foreseeable coastal effects) affecting any land or water use or natural resource of the coastal zone be consistent with the enforceable policies of a state's federally approved coastal management program. A portion of the Project, specifically the export cable components, is within Massachusetts's and Rhode Island's designated coastal zone and will require a federal consistency review under the Coastal Zone Management Act. SouthCoast Wind Energy LLC's (SouthCoast Wind's) Construction and Operations Plan (COP) (SouthCoast Wind 2024) provided the necessary data and information under 15 Code of Federal Regulations (CFR) 930.58. The state's concurrence is required before BOEM may approve or approve with conditions the SouthCoast Wind COP per 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 United States Code [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 the National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Service (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 consulted on the proposed activities considered in this Final EIS with both NMFS and USFWS and prepared Biological Assessments for listed species under their respective jurisdictions. Consultation with USFWS and NMFS pursuant to Section 7 of the ESA concluded with the issuance of Biological Opinions from each agency in September 2023 and November 2024, respectively.

A.2.2.3 Government-to-Government Tribal Consultation

Executive Order 13175 commits federal agencies to engage in government-to-government consultation with Tribal Nations when federal actions have Tribal implications, and Secretarial Order No. 3317 requires U.S. Department of the Interior agencies to develop and participate in meaningful consultation with federally recognized Tribal Nations where a Tribal implication may arise. A June 29, 2018, memorandum outlines BOEM's current Tribal consultation policy (BOEM 2018). This memorandum states that "consultation is a deliberative process that aims to create effective collaboration and informed federal decision-making" and is in keeping with the spirit and intent of the NHPA and National Environmental Policy Act (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.

From September 29 to November 1, 2021, BOEM initiated formal consultation with eight Tribal nations under the NHPA and invited them to be NHPA Section 106 consulting parties to the Project through individual letters mailed and emailed to Tribal leaders with the Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, The Delaware Nation, The Narragansett Indian Tribe, The Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah). Five Tribal nations responded that they would like to participate as consulting parties to the Project: Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, The Narragansett Indian Tribe, The Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah). The Delaware Tribe of Indians and Mohegan Tribe of Connecticut did not respond to BOEM's initiation of consultation; however, BOEM has included these Tribal Nations in all consulting party communications and considers them consulting parties.

On October 8, 2021, BOEM sent a Memorandum of Understanding to the Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, The Delaware Nation, The Narragansett Indian Tribe, The Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah) to establish a cooperating agency relationship with the purpose of preparing an EIS. One Tribe, the Delaware Nation, declined the invitation to be a consulting party on October 13, 2021.

On November 2, 2021, BOEM sent another set of letters and emails to Tribal leaders notifying them that the Notice of Intent (NOI) to prepare an EIS for the Project was issued that day and noted that the scoping comment period was open until December 2, 2021. The letter also offered a government-to-government consultation meeting to discuss the public scoping information for the Project and to request input regarding alternatives for consideration, the identification of historic properties, potential effects to historic properties, and potential measures to avoid, minimize and/or mitigate impacts on environmental and cultural resources to be analyzed in the EIS. BOEM held a government-to-government meeting with the Tribal Nations that responded—Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, and Wampanoag Tribe of Gay Head (Aquinnah)—on November 19, 2021. The Tribal Nations expressed interest in continuing consultation for offshore wind and emphasized the importance of early consultation in Project development.

On May 2, 2022, BOEM held a government-to-government meeting specifically with the Chairwoman, Tribal Historic Preservation Officer, and council members of the Wampanoag Tribe of Gay Head (Aquinnah). In the meeting, BOEM introduced and discussed the overall renewable energy program and process and summarized details and status of projects off the coast of New England. Topics identified for future discussion included cumulative visual simulations and resource impacts, the transmission process that is part of a lease, decommissioning process and oversight, proposed mitigation plans and agreements, and the Tribal capacity-building initiatives.

On June 1, 2022, BOEM held a government-to-government meeting with the Chairwoman and Council members of the Wampanoag Tribe of Gay Head (Aquinnah). This meeting was a follow up to the May 2, 2022 meeting to continue the collective conversation on various topics and Tribal concerns related to offshore wind development off the New England coast.

On June 2, 2022, the BOEM Director met in-person with the Mashpee Wampanoag Tribe to provide the Tribal Council with an overview of the current state of wind farm permitting off the coast of New England, including the Gulf of Maine; discuss and receive feedback on project and regional biological and economic concerns and potential mitigation strategies; discuss and receive feedback on cumulative visual impacts and simulations; discuss and receive feedback on other programmatic topics including transmission as part of a lease and capacity-building initiatives.

On September 1, 2022, BOEM held a government-to-government meeting with members of the Mashpee Wampanoag Tribe, the Wampanoag Tribe of Gay Head (Aquinnah), and the Mashantucket Pequot Tribal Nation. The meeting provided an overview of the SouthCoast Wind Project, including benthic habitat impacts, and overall concerns related to offshore wind permitting.

On January 17, 2024, BOEM held a government-to-government meeting with the Chairwoman of the Wampanoag Tribe of Gay Head (Aquinnah). This meeting was held in response to a letter sent on January 12, 2024, articulating concerns about offshore renewable energy. The meeting covered multiple offshore wind projects located off the New England coast. On February 7, 2024, BOEM held a government-to-government meeting with the Tribal Historic Preservation Officer from the Mashpee Wampanoag Tribe to discuss mitigation measures in the Section 106 Memorandum of Agreement.

On October 25, 2024, BOEM staff met with the Tribal Historic Preservation Officers from the Mashantucket Pequot Tribal Nation and the Wampanoag Tribe of Gay Head (Aquinnah) to discuss the SouthCoast Wind Section 106 Memorandum of Agreement. On November 1, 2024, BOEM staff met with the Tribal Historic Preservation Officers of the Mashantucket Pequot Tribal Nation, the Wampanoag

Tribe of Gay Head (Aquinnah), and the Mashpee Wampanoag Tribe to continue discussion about the SouthCoast Wind Section 106 Memorandum of Agreement.

A.2.2.4 National Historic Preservation Act

Section 106 of the NHPA (54 USC 306108) and its implementing regulations (36 CFR 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 wind turbine generators (WTGs) and offshore substation platforms (OSPs), installation of interarray 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 Project may adversely affect those historic properties.

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 this EIS and the Record of Decision (ROD) to comply with Section 106. Appendix I of this Final EIS contains BOEM's Determination of Effect for NHPA Section 106 Consultation, which includes a description and summary of BOEM's NHPA Section 106 consultations. BOEM will continue consulting with the Massachusetts Historical Commission (the Massachusetts State Historic Preservation Officer [SHPO]), the Rhode Island Historical Preservation and Heritage Commission (RIHPHC), the Rhode Island SHPO, the Massachusetts Board of Underwater Archaeological Resources (BUAR), ACHP, federally recognized Tribal Nations, and other consulting parties regarding the Finding of Adverse Effect and the resolution of adverse effects.

BOEM has conducted five Section 106 consultation meeting(s) regarding the identification of historic properties, BOEM's Finding of Adverse Effect, and resolution of adverse effects on July 7, 2022; March 16, 2023; January 24, 2024; July 15, 2024; and October 8, 2024. 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 2022), available on BOEM's Project-specific website, summarizes comments on historic preservation issues.

On September 29, 2021, BOEM initiated consultation with eight federally recognized Tribal nations: Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, The Delaware Nation, The Narragansett Indian Tribe, The Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah) (Section A.2.2.3, *Government-to-Government Tribal Consultation*). The following five Tribal Nations notified BOEM of their interest in participating as a consulting party: the Mashantucket (Western) Pequot Tribal Nation on October 19, 2021; Mashpee Wampanoag Tribe on October 6, 2021; The Narragansett Indian Tribe on November 1, 2021; The Shinnecock Indian Nation on February 4, 2022; and Wampanoag Tribe of Gay Head

(Aquinnah) on November 1, 2021. The Delaware Tribe of Indians and Mohegan Tribe of Connecticut did not respond to BOEM's initiation of consultation; however, BOEM has included these Tribal nations in all consulting party communications and considers them consulting parties. One Tribe, The Delaware Nation, declined the invitation to be a consulting party on October 13, 2021. BOEM requested information from Tribal consulting parties on sites of religious and cultural significance to the Tribal nations that the proposed Project could affect, and BOEM offered its assistance in providing additional details and information on the proposed Project to the Tribal Nations.

From September 29 to October 7, 2021, BOEM corresponded with governments and organizations by mail and email to provide information about the Project and extend an invitation to be a consulting party to the NHPA Section 106 review of the COP. BOEM also used this correspondence to notify of its intention to use the NEPA process for Section 106 purposes, as described in 36 CFR 800.8(c), during its review. On November 1, 2021, BOEM notified consulting parties of its issuance of a NOI to prepare an EIS consistent with NEPA regulations to assess the potential impacts of the Proposed Action and alternatives. For additional information on Section 106 consultation and coordination, see Appendix I, Section I.2.2.3, *NHPA Section 106 Consultations.* Participants that have accepted consulting party status for the NHPA Section 106 Consultation are listed in Table A-2. During the consultations, additional parties were made known to BOEM and were added as they were identified; these additional parties are included in this list.

Table A-2. NHPA Section 106 consulting parties

Government or Organization Type	Participating Government or Organization Name
Federal agencies or facilities	ACHP BSEE National Park Service Naval Facilities Engineering Systems Command (NAVFAC) HQ USACE US Navy, Naval History and Heritage Command
Federally recognized Tribal Nations	Delaware Tribe of Indians Mashantucket (Western) Pequot Tribal Nation Mashpee Wampanoag Tribe Mohegan Tribe of Connecticut The Narragansett Indian Tribe The Shinnecock Indian Nation Wampanoag Tribe of Gay Head (Aquinnah)
SHPOs and state agencies	BUAR Massachusetts Historical Commission RIHPHC
Non-federally recognized tribes	Chappaquiddick Tribe of Wampanoag Nation
Local governments	Cape Cod Commission City of East Providence, Rhode Island City of New Bedford and New Bedford Port Authority, Massachusetts Martha's Vineyard Commission

Government or Organization Type	Participating Government or Organization Name
	Nantucket Historic District Commission Nantucket Historical Commission Nantucket Planning & Economic Development Commission (represented by Cultural Heritage Partners [CHP]) Town of Aquinnah, Massachusetts Town of Barnstable, Historical Commission, Massachusetts Town of Bristol, Rhode Island Town of Falmouth, Massachusetts Town of Jamestown, Rhode Island Town of Middletown, Rhode Island Town of Nantucket, Massachusetts (represented by CHP) Town of Somerset, Massachusetts, Historical Commission Town of South Kingstown, Rhode Island Town of Swansea, Massachusetts Town of Warren, Rhode Island Town of Westport, Massachusetts
Nongovernmental organizations or groups	Alliance to Protect Nantucket Sound Gay Head Lighthouse Advisory Board Nantucket Preservation Trust Oak Grove Cemetery Association of Falmouth, Inc. The Maria Mitchell Association
Lessee	SouthCoast Wind Energy LLC

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 Essential Fish Habitat (EFH). NMFS regulations implementing the EFH provisions of the MSA can be found at 50 CFR 600. As provided for in 50 CFR 600.920(b), BOEM has accepted designation as the lead agency for the purposes of fulfilling EFH consultation obligations under Section 305(b) of the MSA. Certain Outer Continental Shelf (OCS) activities authorized by BOEM may result in adverse effects on EFH and, therefore, require consultation with NMFS. BOEM prepared and submitted an EFH Assessment to NMFS, which was deemed complete for EFH consultation to initiate on June 24, 2024. NMFS issued EFH conservation recommendations on September 23, 2024. BOEM will respond to NMFS regarding how it will proceed with the action, and relevant terms and conditions will be incorporated into the ROD.

A.2.2.6 Marine Mammal Protection Act

Section 101(a) of the Marine Mammal Protection Act (MMPA) (16 USC 1361) 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. Entities seeking to obtain authorization for the incidental take of marine mammals under NMFS jurisdiction must submit such a request (in the form of an application). Incidental Take Authorizations may be issued as either (1) regulations and associated Letters of Authorization, or (2) an Incidental Harassment Authorization. Letters of Authorizations may be issued for up to a maximum period of 5 years, and Incidental Harassment Authorizations may be issued for a maximum period of 1 year. NMFS has also promulgated regulations to implement the provisions of the MMPA governing the taking and importing of marine mammals (50 CFR 216) and has published application instructions that prescribe the procedures necessary to apply for an Incidental Take Authorization. Applicants 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 immitigable impact on their availability for taking for subsistence uses. NMFS must also prescribe the "means of effecting the least practicable adverse impact" on the affected species or stocks and their habitat, and on the availability of those species or stocks for subsistence uses, as well as monitoring and reporting requirements.

SouthCoast Wind submitted an application for incidental take regulations and a Letter of Authorization to NMFS on March 18, 2022. The application was reviewed and considered complete on September 19, 2022. NMFS published a Notice of Receipt in the *Federal Register* on October 17, 2022. NMFS published the proposed Incidental Take Regulations in the *Federal Register* on June 25, 2024.

A.2.3 Clean Water Act and Rivers and Harbors Act

Under Section 404 of the Clean Water Act (CWA), USACE regulates the discharge of dredged or fill material into the waters of the United States, including wetlands. A permit from USACE is required regardless of whether a discharge of dredged or fill material is temporary or permanent. Under Section 10 of the Rivers and Harbors Act (RHA), USACE regulates construction of any structures and work that are located in or that affect navigable waters of the United States and prohibits obstructions to the navigable capacity of these waters. USACE's authority to prevent obstructions to navigation in navigable waters of the United States was extended to artificial islands, installations, and other devices located on the seafloor, to the seaward limit of the OCS, by Section 4(f) of the Outer Continental Shelf Lands Act of 1953 as amended (43 USC 1333; 33 CFR 320.2). A permit from USACE is required for structures that would be located on the seafloor of the OCS, as well as for structures or work that would affect the course, location, or condition of a navigable water of the United States. SouthCoast Wind submitted a Department of the Army permit application to USACE under Section 404 of the CWA and Section 10 of the RHA on February 2, 2023.

A.2.4 Clean Air Act

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 Clean Air Act Section 328. SouthCoast Wind submitted an OCS Air Permit application to USEPA on November 23, 2022. USEPA deemed the application complete on April 7, 2023.

A.2.5 Development of Final Environmental Impact Statement

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

A.2.5.1 Scoping

On November 1, 2021, BOEM issued an 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 60270). The NOI commenced a public scoping process for identifying issues and potential alternatives for consideration in the EIS. The formal scoping period was from November 1 through December 1, 2021. Three virtual scoping meetings were held on November 10, 15, and 18, 2021. During this timeframe, federal agencies, state and local 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 measures to analyze in the EIS, as well as provide additional information. BOEM also 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), 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. The NOI requested comments from the public in written form, delivered by mail, or through the regulations.gov web portal. The public could also submit oral comments at the three virtual scoping meetings hosted by BOEM.

A Scoping Summary Report (BOEM 2022) summarizing the submissions received and the methods for analyzing them is available on BOEM's website at https://www.boem.gov/southcoast-wind. In addition, all public scoping submissions received can be viewed online at http://www.regulations.gov by typing "BOEM-2021-0062" in the search field. As detailed in the Scoping Summary Report, the resource areas or NEPA topics most referenced in the scoping comments include NEPA/Public Involvement Process; recreation and tourism; mitigation and monitoring; commercial fisheries and for-hire recreational fishing; birds; demographics, employment and economics; and others.

A.2.5.2 Cooperating Agencies

BOEM invited other federal agencies and state, Tribal, and local governments to consider becoming cooperating agencies in the preparation of the Final EIS. According to Council on Environmental Quality

(CEQ) guidelines, qualified agencies and governments are those with "jurisdiction by law or special expertise" (CEQ 1981). 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 asked agencies to consider the "Factors for Determining Cooperating Agency Status" in Attachment 1 to CEQ's January 30, 2002, Memorandum for the Heads of Federal Agencies (CEQ 2002). BOEM held interagency meetings on August 6, 2021, September 23, 2021, January 5, 2022, March 8, 2022, October 28, 2022, and July 24, 2024, to discuss the environmental review process, schedule, responsibilities, consultation, and alternatives.

The following federal agencies and state governments have supported preparation of the Final EIS as cooperating agencies.

- NMFS
- USACE
- BSEE
- USEPA
- U.S. Coast Guard (USCG)
- Massachusetts Office of Coastal Zone Management
- Rhode Island Coastal Resources Management Council (RICRMC)
- New York State Department of State

NMFS is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involve activities that have the potential to affect marine resources under its jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to the MMPA, as amended (16 USC 1361 et seq.); the regulations governing the taking and importing of marine mammals (50 CFR 216); the ESA (16 USC 1531 et seq.); and the regulations governing the taking, importing, and exporting of threatened and endangered species (50 CFR 222–226). In accordance with 50 CFR 402, NMFS also serves as the Consulting Agency under Section 7 of the ESA for federal agencies proposing action 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 MSA and 50 CFR 600 when proposed actions may adversely affect EFH. The MMPA is the only authorization for NMFS that requires NEPA compliance. NMFS intents to adopt BOEM's Final EIS if, after independent review and analysis, NMFS determines the Final EIS to be sufficient to support the regulatory decision.

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 USACE's jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to Section 404 of the CWA and Sections 10 and 14 of the RHA of 1899. 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 3.5 miles (3 nautical miles [nm]), as measured from the baseline of the territorial seas. The baseline from which the 3.5-mile (3-nm) limit of the territorial seas is measured is generally the line on the shore reached by the ordinary low tides but may also lie across the mouth of bays or elsewhere when the coast is not in direct contact with the open sea. The limit of Section 404 jurisdiction in non-tidal waters (33 CFR 328.4(c)) is as follows: (1) In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark, or (2) 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. Under Section 10 of the RHA, USACE regulates construction of any structures and work that are located in or that affect "navigable waters of the U.S." In tidal waters, the shoreward limit of navigable waters extends to the mean high water mark while the seaward limit coincides with the limit of the territorial seas. USACE's authority to prevent obstructions to navigation in navigable waters of the United States was extended to artificial islands, installations, and other devices located on the seafloor, to the seaward limit of the OCS, by Section 4(f) of the Outer Continental Shelf Lands Act of 1953, as amended (43 USC 1333; 33 CFR 320.2).

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; and safety, compliance, and enforcement issues. Pursuant to a December 2020 Memorandum of Agreement between BOEM and BSEE, BSEE conducts activities, consults, and advises BOEM on safety and environmental enforcement for renewable energy projects.

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 its jurisdiction by law and special expertise, including air quality and water quality. USEPA will also be providing authorization for an OCS air permit, an NPDES permit, and using the analysis of the EIS as information in the permit process.

USCG is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect navigation and safety issues that fall under its jurisdiction by law and special expertise. USCG is the Federal On Scene Coordinator for spills in the Lease Area. USCG encourages coordination with all stakeholders to ensure information regarding worst case discharges and response strategies are incorporated into the Area Contingency Plan.

Massachusetts Office of Coastal Zone Management, RICRMC, and New York State Department of State are serving as cooperating agencies pursuant to 40 CFR 1501.8 because they have special expertise with respect to potential impacts that may occur as a result of the Proposed Action.

A.2.5.3 Distribution of the Draft Environmental Impact Statement for Review and Comment

On February 17, 2023, BOEM published a Notice of Availability for the Draft EIS. The Draft EIS was made available in electronic format for public viewing at https://www.boem.gov/southcoast-wind. Hard copies and digital copies of the Draft EIS were delivered to entities as requested. The Notice of Availability commenced a 45-day public review and comment period of the Draft EIS. On April 4, 2023, BOEM announced a 15-day extension to the comment period, which concluded on April 18, 2023. 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 "Mayflower 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-2023-0011," and submitting a comment.
- By attending one of the public meetings on the dates listed in the notice of availability 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 N, *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-2023-0011" in the search field.

A.2.5.4 Distribution of the Final Environmental Impact Statement

The EIS is available in electronic form for public viewing at https://www.boem.gov/southcoast-wind. 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, operation, and eventual decommissioning of the Project. Notification will be provided as indicated in Appendix M, *Distribution List,* of the Final EIS.

A.3 References Cited

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Council on Environmental Quality (CEQ). 1981. *Memorandum to Agencies: Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulation*. Amended 1986. Available: https://www.energy.gov/sites/prod/files/2018/06/f53/G-CEQ-40Questions.pdf. Accessed: August 2021.

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SouthCoast Wind Energy LLC (SouthCoast Wind). 2024. *SouthCoast Wind Construction and Operations Plan*. Available: https://www.boem.gov/southcoast-wind.

Appendix B: Supplemental Information and Additional Figures and Tables

B.1 Wetlands

Table B-1 summarizes National Wetland Inventory (NWI) wetland communities in the Massachusetts part of the wetlands geographic analysis area. Table B-2 quantifies the potential wetland impacts based on NWI data for the Falmouth onshore components for the SouthCoast Wind Project (Project). These tables are similar to Table 3.5.8-1 and Table 3.5.8-3 in Section 3.5.8, *Wetlands*, respectively, but show NWI data instead of Massachusetts Department of Environmental Protection (MassDEP) wetland data. Note that the NWI GIS data were used for the analysis in Rhode Island in Section 3.5.8, *Wetlands*, including the impacts disclosed for Alternatives C-1 and C-2, so that information is not repeated here.

Table B-1. NWI wetland communities in the Massachusetts part of the geographic analysis area

Wetland Community	Falmouth Onshore Project Area	Percent of Total
Estuarine and Marine Wetland	4,901	34%
Freshwater Emergent Wetland	992	7%
Freshwater Forested/Shrub Wetland	8,600	59%
Total	**14,493**	**100%**

Source: USFWS 2021

Table B-2. NWI wetland impacts in the Falmouth Onshore Project area—Proposed Action

Onshore Project Component	Wetland Community	Impact (acres)	% Relative to Wetlands in GAA	Duration
Falmouth Onshore				
Onshore Export Cable Routes				
Worcester Avenue Route	N/A	0	0	N/A
Shore Street Route Eastern Option	N/A	0	0	N/A
Shore Street Route Western Option	N/A	0	0	N/A
Central Park Route	N/A	0	0	N/A
Lawrence Lynch to Cape Cod Aggregates Route	N/A	0	0	N/A
Paper Road – Thomas B Landers Road Deviation	N/A	0	0	N/A
Onshore Substation Locations				
Lawrence Lynch	N/A	0	0	N/A
Cape Cod Aggregates	N/A	0	0	N/A

Onshore Project Component	Wetland Community	Impact (acres)	% Relative to Wetlands in GAA	Duration
Underground Transmission Route and Point of Interconnection				
Underground Transmission Route from Cape Cod Aggregates to POI	Freshwater Forested/ Shrub Wetland	0.06	<0.1	Long term (> 5 years)
Point of Interconnection (Falmouth Switching Station)	N/A	0	0	N/A

Source: USFWS 2021
Note: The disturbance area used to calculate the potential wetland impact areas from export cables is based on a 40-foot-wide corridor along the cable route, except for the cable route from Cape Cod Aggregates to POI, which is a 100-foot-wide corridor.
GAA = geographic analysis area; N/A = not applicable; POI = point of interconnection

B.1.1 Characteristic Wetland Communities in the Falmouth Onshore Project Area

B.1.1.1 Red Maple Swamp

Red maple (*Acer rubrum*) swamps are the most common forested wetlands in Massachusetts (COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024). Within these wetlands, red maple is the dominant species in the tree stratum. The shrub layer within red maple swamps in Eastern Massachusetts typically includes sweet pepper-bush, highbush blueberry, northern arrow-wood (*Viburnum dentatum*), spicebush, and greenbrier (*Smilax rotundifolia*). Ferns are typically abundant with cinnamon fern (*Osmundastrum cinnamomeum*) being the most common. Other ferns include sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), marsh fern (*Thelypteris palustris*), and spinulose wood fern (*Dryopteris carthusiana*). Skunk cabbage (*Symplocarpus foetidus*) is one of the most common herbaceous species (COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024).

B.1.1.2 Atlantic White Cedar Bog

Atlantic white cedar bogs are semi-forested, acidic, dwarf-shrub wetlands (Natural Heritage and Endangered Species Program [COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024]). Short (6–30 feet [2-10 meters]) Atlantic white cedar (*Chamaecyparis thyoides*) trees dominate the open canopy. An open to nearly continuous, low (3 feet [1 meter]) shrub layer often includes small Atlantic white cedars. Scattered red maple may be present with occasional associates including white and pitch pine, grey birch (*Betula populifolia*), and black spruce (*Picea mariana*). Scattered tall shrubs may be present and include highbush blueberry and swamp azalea. A dense low shrub layer is frequently comprised of leatherleaf, sheep laurel (*Kalmia angustifolia*), black huckleberry, rhodora (*Rhododendron canadense*), and bog rosemary (*Andromeda polifolia var. glaucophylla*). There is typically a well-formed sphagnum moss (*Sphagnum spp*.) layer below the shrubs, and large and small cranberry (*Vaccinium macrocarpon and V. oxycoccos*), sundews (*Drosera* spp.), and pitcher plants (*Sarracenia purpurea*) may be present (COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024).

B.1.1.3 Kettlehole Level Bog

Kettlehole level bogs are unique peatland ecosystems that develop in valley bottoms without inlets or outlets. Species composition in this ecosystem includes sphagnum moss blueberries, leatherleaf (*Chamaedaphne calyculata*), and species of laurel (*Kalmia spp*.). The Natural Heritage and Endangered Species Program identifies this ecosystem as Imperiled (COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024).

B.1.1.4 Shrub Swamp

Shrub swamps are shrub-dominated wetlands and often occur within overhead electric utility rights-of-way as a result of previous tree clearing for installation of the utility and subsequent integrated vegetation management activities that targets removal of tree species while allowing for continued growth and establishment of low-growing species, such as shrubs. The species composition of shrub swamps is highly variable and can include meadowsweet (*Spiraea alba var. latifolia*), steeplebush (*Spirea tomentosa*), swamp azalea, silky dogwood (*Swida amomum*), winterberry (*Ilex verticillata*), sweet gale (*Myrica gale*), and arrowwood. Low-growing, weak-stemmed shrubs include dewberry (*Rubus hispidus*), water-willow (*Decodon verticillatus*), and Canadian burnet (Sanguisorba canadensis). The herbaceous layer often includes common arrowhead (*Sagittaria latifolia*), skunk cabbage, ferns, sedges (*Carex* spp.), bluejoint grass (Calamagrostis canadensis), bur reed (*Sparganium* spp.), virgin's-bower (*Clematis virginiana*), swamp candles (*Lysimachia terrestris*), clearweed (*Pilea pumila*), and turtlehead (*Chelone glabra*). Sphagnum moss is often abundant. Invasive species include reed canary-grass (*Phalaris arundinacea*), glossy buckthorn (Frangula alnus), common buckthorn (*Rhamnus alnifolia*), and purple loosestrife (*Lythrum salicaria*) (COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024).

B.1.1.5 Emergent Marsh

The deep emergent marsh wetland type occurs along rivers, streams, lakes, ponds, and other waterbodies. Water depths are less than 3 feet (1 meter), though some depth of water is usually always present in most years and influences the vegetation present. Often this wetland type is part of a wetland mosaic with shrub swamp and forested wetland bordering the emergent portions of the wetland. Vegetation consists primarily of herbaceous species and graminoids. These often include broad-leaved cattail (*Typha latifolia*), sphagnum moss, wool-grass (*Scirpus cyperinus*), common threesquare (*Schoenoplectus pungens*), bluejoint grass, reed canary-grass, rice cut-grass (*Leersia oryzoides*), tussock-sedge (*Carex stricta*), arrow-leaf tearthumb (*Persicaria sagittata*), beggar-ticks (*Bidens* spp.), bedstraw (*Galium* spp.), common arrowhead, slender-leaved goldenrod (*Euthamia caroliniana*), marsh-fern, marsh St. John's-wort (*Triadenum virginicum*), Joe-Pye-weeds (*Eutrochium* spp.), bonesets (*Eupatorium* spp.), and water-horehound (*Lycopus* spp.). Areas with more permanent open water often support floating-leaved plants like water-lilies (*Nymphaea odorata and Nuphar* spp.). Shrubs can include red osier dogwood (*Swida sericea*), leatherleaf (*Chamaedaphne calyculata*), sweet-gale, meadowsweet, steeplebush, and highbush blueberry; however, shrub cover is sparse (COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024).

B.1.1.6 Highbush Blueberry Thicket

Highbush blueberry thickets are peatlands that host tall shrubs and sometimes small red maple trees. Common species within this ecosystem include the namesake highbush blueberry along with other common blueberry species including swamp azalea (*Rhododendron viscosum*), winterberry (*Ilex verticillata*), and sweet pepperbush (COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024).

B.1.1.7 Vernal pools

Vernal pools are temporary pools or ponds, typically occurring within wetlands, that fill with water in the fall or winter due to rainfall and seasonal high groundwater levels and remain ponded through the spring and into summer. Often vernal pools dry up completely by the middle or end of the summer, or at least every few years, which prevents fish populations from becoming established within the pool. The absence of fish is critical to the reproductive success of many amphibian and invertebrate species that rely exclusively on vernal pools to provide breeding habitat, including wood frog (*Lithobates sylvaticus*), mole salamanders (*Ambystoma* spp.), and fairy shrimp (*Eubranchipus* spp.). For this reason, vernal pools are a unique and sensitive aquatic habitat, and have specific protections under both the Massachusetts Wetlands Protection Act regulations (310 Code of Massachusetts Regulations [CMR] 10.00) and the U.S. Army Corps of Engineers New England District's General Permits for the Commonwealth of Massachusetts for activities subject to Corps jurisdiction in waters of the U.S., including wetlands (COP Appendix J, Section 4.1.4.1; SouthCoast Wind 2024).

B.2 Climate and Meteorology

The Atlantic seaboard is classified as a mid-latitude climate zone based upon the Köppen Climate Classification System. The region is characterized by mostly moist subtropical conditions, generally warm and humid in the summer with mild winters. 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. During the winter, the main weather feature in the northeastern United States is the northeaster (cold-core extratropical cyclone). During the summer, convective thunderstorms occur frequently. The Atlantic hurricane season runs from June 1 to November 30.

The National Climatic Data Center (NCDC) defines distinct climatological divisions to represent geographic 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 Action is located within the Massachusetts coastal division (NOAA 2021).

B.2.1 Ambient Temperature

According to NCDC data for the Massachusetts coastal division, the average annual temperature is 50.5 degrees Fahrenheit (°F) (10.3 degrees Celsius [°C]), the average winter (December–February) temperature is 31.7°F (-0.2°C) and the average summer (June–August) temperature is 69.6°F (20.9°C), based on data collected from 1987 through 2019. Table B-3 summarizes average temperatures at the individual recording stations within the general area of the proposed Project area. Data for some stations as seen in the table are reflective of different years of weather observations; however, the general pattern shows little difference across the listed locations.

Table B-3. Representative temperature data

Station	Annual Average °F/°C	Annual Maximum °F/°C	Annual Minimum °F/°C
Coastal Division	50.5/10.3	59.2/15.1	41.8/5.4
Nantucket	50.7/10.4	57.6/14.2	43.9/6.6
Martha's Vineyard	51.2/10.7	59.1/15.1	43.2/6.2
Hyannis	51.1/10.6	58.8/14.9	43.4/6.3
Buzzards Bay Buoy	50.4/10.2	N/A	N/A
Nantucket Sound Buoy	52.4/11.3	N/A	N/A

Sources: NOAA 2019a (Coastal Division 2019 data; Nantucket 2019 data; Martha's Vineyard 2019 data; Hyannis 2019 data), NOAA 2019b (Buzzards Bay Buoy 2009-2019 data; Nantucket Sound Buoy 2009-2019 data).
°C = degrees Celsius; °F = degrees Fahrenheit; N/A = not available.

B.2.2 Wind Conditions

Prevailing winds in the middle latitudes over North America flow mostly west to east ("westerlies"). Westerlies within the Lease Area vary in strength, pattern, and directionality. Extreme wind conditions on the U.S. East Coast are influenced by both winter storms and tropical systems. Several northeasters occur each winter season, while hurricanes are rarer but potentially more extreme. The tropical systems, therefore, define the wind farm design, based on extreme wind speeds (those with recurrence periods of 50 years or more).

Table B-4 summarizes wind conditions in the Massachusetts coastal division. This table 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 (mph) (19.27 kilometers per hour [km/hr]) in July to a high of 17.02 mph (27.38 km/hr) in January. The monthly wind peak gusts reach a maximum during November at 21.23 mph (34.17 km/hr). The one-hour average wind gusts reach a maximum during October at 64.65 mph (104.04 km/hr).

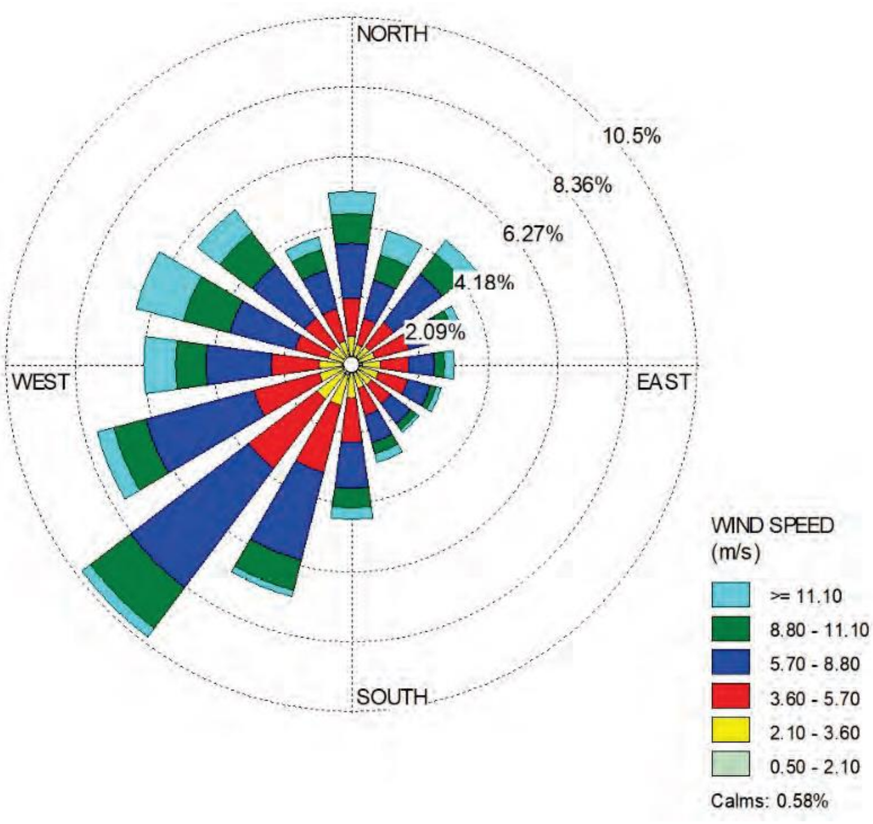
Table B-4. Representative wind speed data for the Massachusetts coastal division

Month	Monthly Average Wind Speed		Monthly Average Peak Gust		Peak One-Hour Average Gust	
	mph	km/hr	mph	km/hr	mph	km/hr
January	17.02	27.38	20.97	33.75	61.29	98.64
February	15.77	25.38	19.35	31.15	63.53	102.24
March	15.91	25.61	19.44	31.29	64.42	103.68
April	14.90	23.97	18.12	29.16	49.21	79.20
May	13.14	21.14	15.89	25.58	58.16	93.60

Month	Monthly Average Wind Speed		Monthly Average Peak Gust		Peak One-Hour Average Gust	
	mph	km/hr	mph	km/hr	mph	km/hr
June	12.31	19.81	14.93	24.03	44.52	71.64
July	11.97	19.27	14.49	23.32	57.04	91.80
August	12.48	20.08	15.14	24.37	59.95	96.48
September	13.92	22.40	17.08	27.48	51.90	83.52
October	16.45	26.48	20.40	32.82	64.65	104.04
November	17.01	27.38	21.23	34.17	57.71	92.88
December	15.99	25.73	19.84	31.93	59.50	95.76

Source: NOAA 2019b (National Data Buoy Center, Nantucket Sound Station 44020, 2009–2019).
km/hr = kilometer per hour; mph = miles per hour.

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



Source: NOAA 2019b.

Figure B-1. 5-year (2015–2019) wind rose for Nantucket Sound

B.2.3 Precipitation and Fog

Data from NCDC show that the annual average precipitation is 49.75 inches (126.37 centimeters) in the Massachusetts coastal division. Table B-5 shows monthly variations in average precipitation, which ranges from a high of 5.59 inches (14.20 centimeters) for October to a low of 3.30 inches (8.38 centimeters) in May.

Snowfall amounts can vary quite drastically within small distances. Data from the Martha's Vineyard Station (KMVY) shows that the annual snowfall average is approximately 23 inches (58.4 centimeters), and the month with the highest snowfall is February, averaging around 8 inches (20.3 centimeters).

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 located in Buzzard's Bay, approximately 25 miles (40 kilometers) from the Project area; and from 2007 to 2009 at the Martha's Vineyard Coastal Observatory (MVCO) meteorological station located 2 miles (3 kilometers) south of Martha's Vineyard (Merrill 2010). The data show that fog is most common in the 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.

Table B-5. Representative monthly precipitation data for the Massachusetts coastal division (2009–2019) [a]

Month	Average Precipitation	
	Inches	Centimeters
January	4.04	10.26
February	3.86	9.80
March	4.67	11.85
April	4.14	10.51
May	3.30	8.38
June	4.20	10.67
July	3.72	9.44
August	3.67	9.33
September	3.56	9.03
October	5.59	14.20
November	4.15	10.53
December	4.87	12.36
Annual Average	49.75	126.37

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.

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 (6°C), 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 at any time from April through October.

B.2.4 Hurricanes and Tropical Storms

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 Wind Farm Area without making landfall. The latest hurricane that made a direct landfall was Hurricane Bob in 1991. Out 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 Wind Farm Area without making landfall in Massachusetts, one was Category 2, one was Category 1, and three were tropical storms when they passed through the Wind Farm Area (NOAA 2018). The most recent of these storms was Beryl in 2006. The National Oceanic Atmospheric Administration (NOAA) 2019c defines the winds speeds and typical damage associated with each category of hurricane.

In addition to hurricanes, northeasters may occur several times per year in the fall and winter months. Wind gusts during the strongest northeasters can cause similar damage to a Category 1 hurricane, although northeasters typically are larger and last longer than hurricanes.

B.2.5 Mixing Height

The mixing height is the altitude above ground level to which air pollutants vertically disperse. The mixing height affects air quality because it acts as a lid on the height pollutants can reach. Lower mixing heights can allow less air volume for pollutant dispersion and lead to higher ground-level pollutant concentrations than do higher mixing heights. Table B-6 presents atmospheric mixing height data from the nearest measurement locations to the Project area (Nantucket and Chatham, Massachusetts). As shown in the table, the minimum average mixing height is 389 meters (1,276 feet), while the maximum average mixing height is 1,421 meters (4,662 feet).

Table B-6. Representative seasonal mixing height data

Season	Data Hours Included [a]	Average Mixing Height (meters/feet)	
		Nantucket	Chatham
Winter (December, January, February)	Morning: no-precipitation hours	780/2,559	668/2,192
	Morning: all hours	905/2,969	655/2,149
	Afternoon: no-precipitation hours	791/2,595	774/2,539
	Afternoon: all hours	890/2,920	747/2,451

Season	Data Hours Included [a]	Average Mixing Height (meters/feet)	
		Nantucket	Chatham
Spring (March, April, May)	Morning: no-precipitation hours	588/1,929	681/2,234
	Morning: all hours	734/2,408	664/2,178
	Afternoon: no-precipitation hours	746/2,447	1,218/3,996
	Afternoon: all hours	827/2,713	1,110/3,642
Summer (June, July, August)	Morning: no-precipitation hours	389/1,276	569/1,867
	Morning: all hours	448/1,470	568/1,863
	Afternoon: no-precipitation hours	609/1,998	1,421/4,662
	Afternoon: all hours	667/2,188	1,295/4,249
Fall (September, October, November)	Morning: no-precipitation hours	625/2,051	586/1,923
	Morning: all hours	739/2,425	583/1,913
	Afternoon: no-precipitation hours	765/2,510	1,036/3,399
	Afternoon: all hours	831/2,726	945/3,100
Annual Average	Morning: no-precipitation hours	595/1,952	620/2,034
	Morning: all hours	707/2,320	618/2,028
	Afternoon: no-precipitation hours	727/2,385	1,121/3,678
	Afternoon: all hours	804/2,638	1,028/3,373

Source: USEPA 2021.
[a] Missing values are not included.

B.2.6 Potential General Impacts of Offshore Wind Facilities on Meteorological Conditions

A known impact of offshore wind facilities on meteorological conditions is the wake effect. A wind turbine generator (WTG) extracts energy from the free flow of wind, creating turbulence downstream of the WTG. The resulting “wake effect” is the aggregated influence of the WTGs for the entire wind farm 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 (2 to 20 kilometers) 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 (70 kilometers).

Under certain conditions, offshore wind farms also can affect temperature and moisture downwind of the facilities. For example, from September 2016 to October 2017, a study using aircraft observations accompanied by mesoscale simulations examined the spatial dimensions of micrometeorological impacts from a wind energy facility in the North Sea (Siedersleben et al. 2018). Measurements and associated modeling indicated that measurable redistribution of moisture and heat were possible up to 62 miles (100 kilometers) downwind of the wind farm. However, this occurred only when (a) there was a strong, sustained temperature inversion at or below hub height and (b) wind speeds were greater than approximately 13.4 mph (6 meters/second) (Siedersleben et al. 2018). Typically, air temperature will decrease with height above the sea surface in the lower atmosphere (i.e., the troposphere), and air will freely rise and disperse up to the mixing height (Holzworth 1972; Ramaswamy et al. 2006). A temperature inversion occurs when a warmer overlying air mass causes temperatures to increase with height; a strong inversion inhibits the further rise of cooler surface air masses, thus limiting the mixing height (Ramaswamy et al. 2006). Therefore, the North Sea study suggests that rapidly spinning turbines with hub heights at or above a strong inversion may induce mixing between air masses that would otherwise remain separated, which can significantly affect temperature and humidity downwind of a wind farm.

As shown in Table B-6, the minimum average mixing height in the region is much higher than the height of the top of the proposed WTG rotors (780–1,066 feet [238–325 meters]) or the WTG hubs (419–605 feet [128–184 meters]). Therefore, WTG hub heights are expected to remain well below the typical mixing height and associated temperature inversions over the open ocean in the Project region. Accordingly, the redistribution of moisture and heat due to rotor-induced vertical mixing, and any associated shifts to the microclimate, would be limited to the immediate vicinity of the Project.

B.3 Marine Mammals

There are 38 species of marine mammals within the Northwest Atlantic Outer Continental Shelf (OCS) region and 31 that have been documented or are considered likely to occur in the Project area (Table B-7). Species' federal protection status, occurrence in the geographic analysis area and Project area, critical habitat, population size trends, and mortality data must be considered to understand the potential impacts and their magnitude from the Proposed Action, action alternatives, and the No Action Alternative. The West Indian manatee (*Trichechus manatus*) is considered extralimital and rare and is not expected to occur in the Project area; thus, this species is not considered further. In addition, six species within the toothed whales and dolphins group were considered to have "hypothetical" occurrence and were excluded from the assessment of the Proposed Action (BOEM 2014). For an in-depth discussion of marine mammals in the vicinity of the Project area and the analysis of impacts, refer to Chapter 3, Section 3.5.6, *Marine Mammals*.

Table B-7. Marine mammal species documented or likely to occur in the Project area and their stock information

Species	Scientific Name	Stock	Best Population Estimate [a]	Status under MMPA [b]	Status under ESA	Relative Occurrence in Project Region [c]	Population trend [d]	Reference for Population Data
Baleen Whales (Mysticetes)								
Blue whale	*Balaenoptera musculus*	W. North Atlantic	402 [e]	Strategic	Endangered	Rare	Unavailable	Hayes et al. (2020)
Fin whale	*Balaenoptera physalus*	W. North Atlantic	6,802	Strategic	Endangered	Common	Unavailable	Hayes et al. (2021)
Humpback whale	*Megaptera novaeangliae*	Gulf of Maine	1,396	Non-Strategic	Not Listed	Common	+2.8%/year	Hayes et al. (2021)
Minke whale	*Balaenoptera acutorostrata*	Canadian East Coast	21,968	Non-Strategic	–	Common	Unavailable	Hayes et al. (2021)
North Atlantic right whale	*Eubalaena glacialis*	W. North Atlantic	338 [f]	Strategic	Endangered	Common	Decreasing	Hayes et al. (2023)
Sei whale	*Balaenoptera borealis*	Nova Scotia	6,292	Strategic	Endangered	Common	Unavailable	Hayes et al. (2021)
Toothed Whales (Odontocetes)								
Atlantic spotted dolphin	*Stenella frontalis*	W. North Atlantic	39,921	Non-Strategic	–	Rare	Decreasing	Hayes et al. (2020)
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	W. North Atlantic	93,233	Non-Strategic	–	Common	Unavailable	Hayes et al. (2020)
Common bottlenose dolphin	*Tursiops truncatus*	W. North Atlantic, Northern Migratory Coastal	62,851	Strategic	–	Common	Decreasing	Hayes et al. (2021)
Pantropical spotted dolphin	*Stenella attenuata*	W. North Atlantic	6,593	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
Risso's dolphin	*Grampus griseus*	W. North Atlantic	35,215	Non-Strategic	–	Uncommon	Unavailable	Hayes et al. (2020)

Species	Scientific Name	Stock	Best Population Estimate [a]	Status under MMPA [b]	Status under ESA	Relative Occurrence in Project Region [c]	Population trend [d]	Reference for Population Data
Short beaked common dolphin	*Delphinus delphis*	W. North Atlantic	172,974	Non-Strategic	–	Common	Unavailable	Hayes et al. (2021)
Striped dolphin	*Stenella coeruleoalba*	W. North Atlantic	67,036	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
White-beaked dolphin	*Lagenorhynchus albirostris*	W. North Atlantic	536,016	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
Harbor porpoise	*Phocoena phocoena*	Gulf of Maine/Bay of Fundy	95,543	Non-Strategic	–	Common	Unavailable	Hayes et al. (2021)
Blainville's beaked whale	*Mesoplodon densirostris*	W. North Atlantic	10,107 [g]	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
Cuvier's beaked whale	*Ziphius cavirostris*	W. North Atlantic	5,744 [g]	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
Dwarf sperm whale	*Kogia sima*	W. North Atlantic	7,750[h]	Non-Strategic	–	Rare	Increasing [i]	Hayes et al. (2020)
Gervais' beaked whale	*Mesoplodon europaeus*	W. North Atlantic	10,107 [g]	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
Killer whale	*Orcinus orca*	W. North Atlantic	Unknown	Non-Strategic	–	Rare	Unavailable	Waring et al. (2015)
Long-finned pilot whale	*Globicephala melas*	W. North Atlantic	39,215	Non-Strategic	–	Uncommon	Unavailable	Hayes et al. (2020)
Pygmy sperm whale	*Kogia breviceps*	W. North Atlantic	7,750 [h]	Non-Strategic	–	Rare	Increasing [i]	Hayes et al. (2020)
Short-finned pilot whale	*Globicephala macrorhynchus*	W. North Atlantic	28,924	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
Sowerby's beaked whale	*Mesoplodon bidens*	W. North Atlantic	10,107 [g]	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
Sperm whale	*Physeter macrocephalus*	North Atlantic	4,349	Strategic	Endangered	Uncommon	Unavailable	Hayes et al. (2020)
True's beaked whale	*Mesoplodon mirus*	W. North Atlantic	10,107 [g]	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)

Species	Scientific Name	Stock	Best Population Estimate [a]	Status under MMPA [b]	Status under ESA	Relative Occurrence in Project Region [c]	Population trend [d]	Reference for Population Data
Earless Seals (Pinnipeds)								
Harbor seals	*Phoca vitulina*	W. North Atlantic	61,336	Non-Strategic	–	Common	Unavailable	Hayes et al. (2021)
Gray seals	*Halichoerus grypus*	W. North Atlantic	27,300	Non-Strategic	–	Common	Increasing	Hayes et al. (2021)
Hooded seals	*Cystophora cristata*	W. North Atlantic	Unknown	Non-Strategic	–	Rare	Unavailable	Hayes et al. (2020)
Harp seal	*Phoca groenlandica*	W. North Atlantic	7.6 million	Non-Strategic	–	Uncommon	Unavailable	Hayes et al. (2020)

[a] Unless otherwise noted, best available abundance estimates are from NMFS stock assessment reports (Hayes et al. 2020, 2021, 2023).
[b] The MMPA defines a "strategic" stock as a marine mammal stock (a) for which the level of direct human-caused mortality exceeds the potential biological removal level; (b) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; (c) which is listed as a threatened or endangered species under the ESA; or (d) is designated as depleted.
[c] Data from SouthCoast Wind COP Volume 2.
[d] Increasing = beneficial trend, not quantified; Decreasing = adverse trend, not quantified; Unavailable = population trend analysis not conducted on this species.
[e] The minimum population estimate is reported as the best population estimate in the most recently updated 2021 draft stock assessment report (SouthCoast Wind 2024).
[f] This estimate is based on the 2022 U.S Atlantic and Gulf of Mexico Marine Mammal Stock Assessments (Hayes et al. 2023).
[g] This estimate includes Gervais' beaked whales and Blainville's beaked whales for the Gulf of Mexico stocks, and all species of *Mesoplodon* undifferentiated beaked whales in the Atlantic.
[h] This estimate includes both dwarf and pygmy sperm whales.
i Increasing trend should be interpreted with caution (Hayes et al. 2020)
ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act

B.4 Finfish

There are a variety taxa of state- and federally managed fishes managed finfish within the Northeast Continental Shelf Large Marine Ecosystem that have essential fish habitat (EFH) designated in the Project area (COP Volume 2, Section 6.7.2.2.1, Table 6-49 through Table 6-51; SouthCoast Wind 2024) or recorded catch in (COP Appendix V, Section 2.2, Table 2-5; SouthCoast Wind 2024) or in and around (COP Appendix V, Section 2.1, Table 2-1; SouthCoast Wind 2024) the Project area. These species are listed in Table B-8.

Table B-8. Relevant managed fish taxa in the Northeast Continental Shelf Large Marine Ecosystem

Taxa		
Acadian redfish (*Sebastes fasciatus*)	Albacore tuna (*Thunnus alalunga*)	Coastal and non-coastal sharks (for full list of shark species see COP Volume 2, Section 6.7.2.2.1, Table 6-51; SouthCoast Wind 2024)
American eel (*Anguilla rostrata*)	American plaice (*Hippoglossoides platessoides*)	Goosefish (*Lophius americanus*)
American shad (*Alosa sapidissima*)	Atlantic cod (*Gadus morhua*)	Hickory shad (*Alosa mediocris*)
Atlantic croaker (*Micropogonias undulatus*)	Atlantic halibut (*Hippoglossus hippoglossus*)	Ocean pout (*Macrozoarces americanus*)
Atlantic herring (*Clupea harengus*)	Atlantic mackerel (*Scomber scombrus)*	Pollock (*Pollachius pollachius)*
Atlantic menhaden (*Brevoortia tyrannus)*	Atlantic striped bass (*Morone saxatilis)*	River herring (*Alosa* spp.*)*
Atlantic sturgeon (*Acipenser oxyrinchus)*	Atlantic wolffish (*Anarhichas lupus)*	Scup (*Stenotomus chrysops)*
Barndoor skate (*Dipturus laevis*)	Black sea bass (*Centropristis striata*)	Cobia (*Rachycentron canadum*)
Bluefin tuna (*Thunnus thynnus*)	Bluefish (*Pomatomus saltatrix*)	Haddock (*Melanogrammus aeglefinus*)
Butterfish (*Peprilus triacanthus*)	Clearnose skate (*Raja eglanteria*)	Little skate (*Leucoraja erinacea*)
Skipjack tuna (*Katsuwonus pelamis)*	Smooth skate (*Mustelus canis)*	Offshore hake *(Merluccius albidus)*
Spanish mackerel (*Scomberomorus maculatus)*	Spiny dogfish (*Squalus acanthias)*	Red hake *(Urophycis chuss)*
Spot (*Leiostomus xanthurus)*	Summer flounder (*Paralichthys dentatus*)	Rosette skate (*Leucoraja garmani*)
Swordfish (*Xiphias gladius)*	Tautog (*Tautoga onitis*)	Silver hake (*Merluccius bilinearis)*
Thorny skate	Tilefish	Witch flounder

Taxa		
(Amblyraja radiata)	(*Caulolatilus microps and Lopholatilus chamaelonticeps)*	*(Glyptocephalus cynoglossus)*
Weakfish (*Cynoscion regalis*)	White hake (*Urophycis tenuis*)	Winter flounder (*Pseudopleuronectes americanus*)
White marlin (*Tetrapturus albidus)*	Windowpane (*Scopthalmus aquosus)*	Winter skate (*Leucoraja ocellata*)

Source: SouthCoast Wind 2024.

B.5 Environmental Justice

The U.S. Census tracts with environmental justice communities in the geographic analysis area, as described in Section 3.6.4, *Environmental Justice*, are presented in the following tables. Table B-9 presents the tracts for Massachusetts based on Massachusetts Executive Office of Energy and Environmental Affairs data. Table B-10 presents the tracts for Rhode Island, Connecticut, Maryland, South Carolina, and Texas based on U.S. Environmental Protect Agency's Environmental Justice Screening and Mapping Tool's data.

Table B-9. U.S. census tracts with environmental justice populations in Massachusetts

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
Barnstable County									
010100	Block Group 5		1						1
010208	Block Group 1		1						1
010304	Block Group 2		1						1
010304	Block Group 3		1						1
010400	Block Group 2		1						1
010700	Block Group 4		1						1
010800	Block Group 2		1						1
011200	Block Group 3		1						1
011400	Block Group 4		1						1
011600	Block Group 1						1		1
011600	Block Group 2		1						1
011700	Block Group 3		1						1
012002	Block Group 1				1				1
012101	Block Group 2				1				1
012101	Block Group 4				1				1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
012102	Block Group 1		1						1
012102	Block Group 3		1						1
012102	Block Group 4				1				1
012502	Block Group 2						1		1
012502	Block Group 3					1			1
012502	Block Group 4				1				1
012601	Block Group 1				1				1
012601	Block Group 2				1				1
012602	Block Group 1						1		1
012602	Block Group 2							1	1
012602	Block Group 3				1				1
012602	Block Group 4						1		1
013900	Block Group 1		1						1
014002	Block Group 3		1						1
014100	Block Group 1						3		3
014500	Block Group 3		1						1
014600	Block Group 2		1						1
014700	Block Group 2		1						1
014800	Block Group 1		1						1
014800	Block Group 3		1						1
015002	Block Group 2				1				1
015300	Block Group 1						1		1
015300	Block Group 2						1		1
015300	Block Group 3						1		1
Bristol County									
610204	Block Group 2				1				1
610204	Block Group 3				1				1
613100	Block Group 1				1				1
613400	Block Group 2				1				1
613600	Block Group 1						1		1
613600	Block Group 2				1				1
613600	Block Group 3						1		1
613700	Block Group 2						1		1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
613800	Block Group 1						1		1
613800	Block Group 2				1				1
613800	Block Group 3				1				1
613800	Block Group 4						1		1
613901	Block Group 1				1				1
613901	Block Group 2						1		1
613902	Block Group 1				1				1
613902	Block Group 2				1				1
614000	Block Group 1						1		1
614000	Block Group 2				1				1
614000	Block Group 3						1		1
614101	Block Group 1				1				1
614101	Block Group 2						1		1
630101	Block Group 1				1				1
630101	Block Group 2		1						1
630102	Block Group 2		1						1
630102	Block Group 4		1						1
630400	Block Group 3				1				1
631101	Block Group 3		1						1
631102	Block Group 2		1						1
631102	Block Group 4				1				1
631200	Block Group 3		1						1
631300	Block Group 3				1				1
631400	Block Group 1						1		1
631400	Block Group 2						1		1
631500	Block Group 1				1				1
631600	Block Group 1						1		1
631600	Block Group 2				1				1
631600	Block Group 3						1		1
631800	Block Group 4				1				1
640100	Block Group 1				1				1
640100	Block Group 2						1		1
640100	Block Group 3				1				1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
640100	Block Group 4				1				1
640100	Block Group 5		1						1
640201	Block Group 1						1		1
640201	Block Group 2						1		1
640202	Block Group 1						1		1
640202	Block Group 2						1		1
640202	Block Group 3						1		1
640300	Block Group 1						1		1
640300	Block Group 2		1						1
640300	Block Group 3						1		1
640400	Block Group 1							1	1
640400	Block Group 2		1						1
640500	Block Group 1						1		1
640500	Block Group 2						1		1
640500	Block Group 3						1		1
640500	Block Group 5						1		1
640600	Block Group 1						1		1
640600	Block Group 2						1		1
640600	Block Group 3				1				1
640600	Block Group 4						1		1
640800	Block Group 1				1				1
640800	Block Group 2						1		1
640901	Block Group 1						1		1
640901	Block Group 2						1		1
640901	Block Group 3						1		1
640901	Block Group 4					1			1
640901	Block Group 5						1		1
641000	Block Group 1						1		1
641000	Block Group 2							1	1
641000	Block Group 3							1	1
641101	Block Group 1						1		1
641101	Block Group 2						1		1
641200	Block Group 1						1		1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
641200	Block Group 2						1		1
641300	Block Group 1							1	1
641300	Block Group 2						1		1
641300	Block Group 3						1		1
641300	Block Group 4				1				1
641300	Block Group 5						1		1
641400	Block Group 1							1	1
641400	Block Group 2						1		1
641400	Block Group 3						1		1
641500	Block Group 1			1					1
641500	Block Group 2						1		1
641600	Block Group 1		1						1
641600	Block Group 2		1						1
641700	Block Group 1		1						1
641700	Block Group 4		1						1
641800	Block Group 1						1		1
641800	Block Group 2		1						1
641900	Block Group 1						1		1
641900	Block Group 2						1		1
642000	Block Group 1				1				1
642000	Block Group 2			1					1
642000	Block Group 3						1		1
642100	Block Group 1				1				1
642100	Block Group 2						1		1
642200	Block Group 1		1						1
642200	Block Group 2						1		1
642200	Block Group 3		1						1
642200	Block Group 4				1				1
642400	Block Group 1		1						1
646101	Block Group 3		1						1
650102	Block Group 1						1		1
650102	Block Group 3				1				1
650201	Block Group 2				1				1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
650201	Block Group 3				1				1
650300	Block Group 2				1				1
650300	Block Group 3						1		1
650400	Block Group 1				1				1
650400	Block Group 2						1		1
650400	Block Group 3						1		1
650400	Block Group 4				1				1
650500	Block Group 1						1		1
650500	Block Group 2						1		1
650500	Block Group 3						1		1
650600	Block Group 1						1		1
650600	Block Group 2							1	1
650600	Block Group 3						1		1
650700	Block Group 1						1		1
650700	Block Group 2							1	1
650800	Block Group 1				1				1
650800	Block Group 2						1		1
650800	Block Group 3							1	1
650800	Block Group 4							1	1
650900	Block Group 1						1		1
650900	Block Group 2						1		1
650900	Block Group 3						1		1
651001	Block Group 1				1				1
651001	Block Group 2				1				1
651002	Block Group 2				1				1
651100	Block Group 1							1	1
651100	Block Group 2						1		1
651100	Block Group 3				1				1
651100	Block Group 4						1		1
651200	Block Group 1							1	1
651200	Block Group 2						1		1
651300	Block Group 1						1		1
651300	Block Group 2						1		1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
651400	Block Group 1							1	1
651400	Block Group 2				1				1
651400	Block Group 3						1		1
651400	Block Group 4				1				1
651500	Block Group 1						1		1
651500	Block Group 2				1				1
651500	Block Group 3						1		1
651600	Block Group 1						1		1
651600	Block Group 2				1				1
651600	Block Group 3				1				1
651600	Block Group 4						1		1
651700	Block Group 1						1		1
651700	Block Group 2						1		1
651800	Block Group 1						1		1
651800	Block Group 2						1		1
651900	Block Group 1						1		1
651900	Block Group 2							1	1
652000	Block Group 1						1		1
652000	Block Group 2						1		1
652000	Block Group 3						1		1
652100	Block Group 1				1				1
652100	Block Group 2				1				1
652100	Block Group 3				1				1
652300	Block Group 1							1	1
652300	Block Group 2						1		1
652400	Block Group 1							1	1
652400	Block Group 2							1	1
652500	Block Group 1				1				1
652500	Block Group 2						1		1
652600	Block Group 1						1		1
652600	Block Group 2						1		1
652700	Block Group 1						1		1
652700	Block Group 2							1	1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
652700	Block Group 3						1		1
652700	Block Group 4						1		1
653101	Block Group 1		1						1
653102	Block Group 2				1				1
653301	Block Group 2		1						1
654200	Block Group 2		1						1
655200	Block Group 3		1						1
655200	Block Group 4		1						1
985500	Block Group 1				1				1
985500	Block Group 2				1				1
Dukes County									
200100	Block Group 1		1						1
200100	Block Group 2				1				1
200100	Block Group 4						1		1
200200	Block Group 2				1				1
200200	Block Group 4						1		1
200200	Block Group 5				1				1
200400	Block Group 5				1				1
Essex County									
202104	Block Group 4			1					1
202104	Block Group 5	1							1
203200	Block Group 1		1						1
203301	Block Group 3		1						1
204101	Block Group 2				1				1
204101	Block Group 3				1				1
204102	Block Group 2				1				1
204200	Block Group 1						1		1
204200	Block Group 2				1				1
204200	Block Group 3				1				1
204200	Block Group 4				1				1
204200	Block Group 5		1						1
204300	Block Group 1		1						1
204300	Block Group 2						1		1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
204300	Block Group 3							1	1
204400	Block Group 3	1							1
204500	Block Group 1				1				1
204500	Block Group 2		1						1
204600	Block Group 2				1				1
204600	Block Group 4				1				1
204701	Block Group 1				1				1
204701	Block Group 2				1				1
204701	Block Group 3					1			1
204702	Block Group 1						1		1
204702	Block Group 2				1				1
204702	Block Group 3				1				1
204702	Block Group 4				1				1
205100	Block Group 1				1				1
205100	Block Group 2				1				1
205100	Block Group 3					1			1
205100	Block Group 4				1				1
205100	Block Group 5				1				1
205200	Block Group 1				1				1
205200	Block Group 2				1				1
205200	Block Group 3				1				1
205200	Block Group 4				1				1
205200	Block Group 5					1			1
205300	Block Group 1				1				1
205300	Block Group 2				1				1
205300	Block Group 4				1				1
205400	Block Group 3				1				1
205500	Block Group 1				1				1
205500	Block Group 2				1				1
205600	Block Group 1						1		1
205600	Block Group 2				1				1
205600	Block Group 3				1				1
205600	Block Group 4				1				1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
205700	Block Group 1				1				1
205700	Block Group 2				1				1
205700	Block Group 3						1		1
205700	Block Group 4				1				1
205700	Block Group 5				1				1
205800	Block Group 1				1				1
205800	Block Group 2							1	1
205800	Block Group 3					1			1
205900	Block Group 1				1				1
205900	Block Group 2				1				1
205900	Block Group 3				1				1
206000	Block Group 1							1	1
206000	Block Group 2					1			1
206100	Block Group 1							1	1
206100	Block Group 2					1			1
206200	Block Group 1					1			1
206200	Block Group 2				1				1
206200	Block Group 3				1				1
206300	Block Group 1				1				1
206300	Block Group 2				1				1
206300	Block Group 3				1				1
206300	Block Group 4				1				1
206400	Block Group 1							1	1
206400	Block Group 2				1				1
206400	Block Group 3				1				1
206400	Block Group 4				1				1
206500	Block Group 1						1		1
206500	Block Group 2							1	1
206500	Block Group 3						1		1
206600	Block Group 1				1				1
206600	Block Group 2						1		1
206600	Block Group 3				1				1
206600	Block Group 4				1				1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
206700	Block Group 1				1				1
206700	Block Group 2				1				1
206700	Block Group 3				1				1
206700	Block Group 4							1	1
206800	Block Group 1					1			1
206800	Block Group 2							1	1
206900	Block Group 1							1	1
206900	Block Group 2						1		1
206900	Block Group 3							1	1
206900	Block Group 4					1			1
207000	Block Group 1							1	1
207000	Block Group 2							1	1
207100	Block Group 1							1	1
207100	Block Group 2					1			1
207100	Block Group 3				1				1
207200	Block Group 1						1		1
207200	Block Group 2							1	1
208101	Block Group 2				1				1
208101	Block Group 3				1				1
208101	Block Group 4				1				1
208102	Block Group 1				1				1
208102	Block Group 2				1				1
208102	Block Group 3				1				1
208102	Block Group 4				1				1
208200	Block Group 3		1						1
208301	Block Group 1		1						1
208302	Block Group 1	1							1
208401	Block Group 1				1				1
208402	Block Group 2				1				1
210301	Block Group 2		1						1
210302	Block Group 1				1				1
210302	Block Group 4				1				1
210401	Block Group 1						1		1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
210401	Block Group 2				1				1
210600	Block Group 1				1				1
210700	Block Group 1				1				1
210700	Block Group 2						1		1
210700	Block Group 3						1		1
210700	Block Group 4				1				1
210800	Block Group 1				1				1
210800	Block Group 2						1		1
210800	Block Group 3					1			1
210800	Block Group 4						1		1
210900	Block Group 1				1				1
211100	Block Group 1		1						1
211100	Block Group 2		1						1
211401	Block Group 3						1		1
215101	Block Group 4				1				1
215102	Block Group 4		1						1
217101	Block Group 2		1						1
217102	Block Group 1		1						1
217300	Block Group 1				1				1
217300	Block Group 3				1				1
217300	Block Group 5				1				1
217401	Block Group 2		1						1
217401	Block Group 3		1						1
217402	Block Group 1						1		1
217402	Block Group 2		1						1
217601	Block Group 2		1						1
220101	Block Group 3		1						1
221400	Block Group 1		1						1
221400	Block Group 2		1						1
221400	Block Group 3		1						1
221500	Block Group 1		1						1
221600	Block Group 1				1				1
221600	Block Group 3		1						1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
221700	Block Group 1		1						1
250100	Block Group 1							1	1
250100	Block Group 2							1	1
250200	Block Group 1				1				1
250200	Block Group 2						1		1
250200	Block Group 3				1				1
250300	Block Group 1							1	1
250300	Block Group 2					1			1
250400	Block Group 1						1		1
250400	Block Group 2							1	1
250400	Block Group 3							1	1
250500	Block Group 1						1		1
250500	Block Group 2							1	1
250500	Block Group 3							1	1
250600	Block Group 1							1	1
250600	Block Group 2						1		1
250600	Block Group 3							1	1
250600	Block Group 4					1			1
250700	Block Group 1						1		1
250700	Block Group 2					1			1
250700	Block Group 3					1			1
250800	Block Group 1						1		1
250800	Block Group 2				1				1
250800	Block Group 3						1		1
250800	Block Group 4						1		1
250800	Block Group 5							1	1
250900	Block Group 1							1	1
250900	Block Group 2							1	1
251000	Block Group 1							1	1
251100	Block Group 1							1	1
251100	Block Group 2							1	1
251100	Block Group 3					1			1
251200	Block Group 1							1	1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
251300	Block Group 1							1	1
251300	Block Group 2						1		1
251300	Block Group 3						1		1
251400	Block Group 1							1	1
251400	Block Group 2				1				1
251400	Block Group 3							1	1
251400	Block Group 4				1				1
251500	Block Group 1					1			1
251500	Block Group 2							1	1
251500	Block Group 3						1		1
251500	Block Group 4				1				1
251500	Block Group 5							1	1
251600	Block Group 1				1				1
251600	Block Group 2					1			1
251600	Block Group 3							1	1
251600	Block Group 4							1	1
251700	Block Group 1				1				1
251700	Block Group 2					1			1
251700	Block Group 3							1	1
251700	Block Group 4							1	1
251800	Block Group 1				1				1
251800	Block Group 2						1		1
251800	Block Group 3				1				1
251800	Block Group 4				1				1
252101	Block Group 1				1				1
252101	Block Group 2				1				1
252101	Block Group 3				1				1
252102	Block Group 3				1				1
252201	Block Group 1				1				1
252201	Block Group 2				1				1
252300	Block Group 1				1				1
252300	Block Group 2						1		1
252300	Block Group 3				1				1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
252300	Block Group 4				1				1
252300	Block Group 5							1	1
252300	Block Group 6				1				1
252400	Block Group 1				1				1
252400	Block Group 2						1		1
252400	Block Group 3							1	1
252501	Block Group 1				1				1
252501	Block Group 2				1				1
252501	Block Group 3				1				1
252502	Block Group 1				1				1
252502	Block Group 2				1				1
252502	Block Group 3				1				1
252502	Block Group 4						1		1
252601	Block Group 1				1				1
252601	Block Group 2				1				1
252601	Block Group 3				1				1
252601	Block Group 4				1				1
252602	Block Group 3				1				1
252603	Block Group 1				1				1
252603	Block Group 2				1				1
253100	Block Group 4				1				1
253100	Block Group 5				1				1
253202	Block Group 2				1				1
253202	Block Group 3				1				1
253202	Block Group 4				1				1
253204	Block Group 1				1				1
253204	Block Group 2				1				1
254402	Block Group 4				1				1
260100	Block Group 1						1		1
260100	Block Group 2						1		1
260100	Block Group 3							1	1
260100	Block Group 4				1				1
260200	Block Group 1						1		1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
260200	Block Group 2						1		1
260402	Block Group 2				1				1
260402	Block Group 3				1				1
260500	Block Group 3				1				1
260600	Block Group 1				1				1
260600	Block Group 2				1				1
260600	Block Group 3				1				1
260700	Block Group 1				1				1
260700	Block Group 2				1				1
260800	Block Group 1						1		1
260800	Block Group 2				1				1
260900	Block Group 2						1		1
260900	Block Group 3						1		1
260900	Block Group 4						1		1
261000	Block Group 1						1		1
261000	Block Group 2				1				1
261102	Block Group 1				1				1
262100	Block Group 3		1						1
266300	Block Group 1		1						1
266400	Block Group 2		1						1
268300	Block Group 1		1						1
268300	Block Group 3		1						1
Nantucket County									
950201	Block Group 1				1				1
950201	Block Group 2				1				1
950202	Block Group 1				1				1
950202	Block Group 2				1				1
950400	Block Group 1				1				1
950400	Block Group 2				1				1
Plymouth County									
501204	Block Group 3		1						1
502101	Block Group 2				1				1
502101	Block Group 4				1				1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
502102	Block Group 3		1						1
502200	Block Group 2		1						1
503102	Block Group 4		1						1
506102	Block Group 5		1						1
510100	Block Group 1				1				1
510100	Block Group 2				1				1
510100	Block Group 3				1				1
510100	Block Group 4				1				1
510200	Block Group 1				1				1
510200	Block Group 2				1				1
510200	Block Group 3				1				1
510200	Block Group 4				1				1
510300	Block Group 1					1			1
510300	Block Group 2							1	1
510400	Block Group 1						1		1
510400	Block Group 2						1		1
510400	Block Group 3							1	1
510400	Block Group 4						1		1
510501	Block Group 1						1		1
510501	Block Group 2				1				1
510501	Block Group 3				1				1
510503	Block Group 1						1		1
510503	Block Group 2						1		1
510503	Block Group 3				1				1
510504	Block Group 1				1				1
510504	Block Group 2							1	1
510505	Block Group 1						1		1
510505	Block Group 2						1		1
510600	Block Group 1				1				1
510600	Block Group 2				1				1
510600	Block Group 3				1				1
510700	Block Group 1						1		1
510700	Block Group 2				1				1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
510700	Block Group 3							1	1
510700	Block Group 4				1				1
510700	Block Group 5				1				1
510800	Block Group 1					1			1
510800	Block Group 2				1				1
510800	Block Group 3							1	1
510800	Block Group 4				1				1
510800	Block Group 5				1				1
510800	Block Group 6				1				1
510900	Block Group 1							1	1
510900	Block Group 2							1	1
511000	Block Group 1				1				1
511000	Block Group 2						1		1
511100	Block Group 1				1				1
511100	Block Group 2				1				1
511100	Block Group 3				1				1
511200	Block Group 1							1	1
511200	Block Group 2				1				1
511200	Block Group 3						1		1
511301	Block Group 1						1		1
511301	Block Group 2				1				1
511301	Block Group 3				1				1
511302	Block Group 1				1				1
511302	Block Group 2						1		1
511302	Block Group 3				1				1
511400	Block Group 1				1				1
511400	Block Group 2				1				1
511400	Block Group 3				1				1
511400	Block Group 4						1		1
511500	Block Group 1					1			1
511500	Block Group 2							1	1
511500	Block Group 3				1				1
511500	Block Group 4						1		1

Tract	Block Group	English isolation	Income	Income and English isolation	Minority	Minority and English isolation	Minority and income	Minority, income and English isolation	Grand Total
511601	Block Group 1				1				1
511601	Block Group 2				1				1
511601	Block Group 3						1		1
511602	Block Group 1				1				1
511602	Block Group 2					1			1
511602	Block Group 3						1		1
511701	Block Group 1				1				1
511701	Block Group 2				1				1
511701	Block Group 3				1				1
511701	Block Group 4				1				1
511702	Block Group 1				1				1
526100	Block Group 4		1						1
530200	Block Group 1		1						1
530300	Block Group 2		1						1
530500	Block Group 2		1						1
530600	Block Group 5				1				1
542302	Block Group 3		1						1
544200	Block Group 1		1						1
544200	Block Group 3		1						1
545100	Block Group 1		1						1
545200	Block Group 1				1				1
545300	Block Group 1		1						1
545400	Block Group 4		1						1
545400	Block Group 5		1						1
561100	Block Group 4				1				1
561400	Block Group 2				1				1
980200	Block Group 1				1				1
980300	Block Group 1						1		1
Total Tracts		**3**	**89**	**3**	**252**	**25**	**160**	**69**	**601**

Source: MAEEA 2021.

Table B-10. U.S. census tracts with environmental justice populations in Rhode Island, Connecticut, Maryland, South Carolina, and Texas

Tract	Low Income	Low Income and Minority	Minority
Rhode Island – Newport County			
040200	1		
Rhode Island – Providence County			
000101		1	
000102		1	
000200		1	
000300		1	
000400		1	
000500		1	
000600		1	
000700		1	
000800	1		
000900	1		
001000		1	
001100	1		
001200		1	
001300		1	
001400		1	
001500			1
001600			1
001700		1	
001800		1	
001900		1	
002000		1	
002101			1
002102			1
002200		1	
002500			1
002600		1	
002700		1	
002800		1	
002900			1
003700	1		

Tract	Low Income	Low Income and Minority	Minority
010800		1	
010900		1	
011000		1	
011100		1	
014100			1
014700			1
015000			1
015100		1	
015200		1	
015300		1	
015400			1
015500			1
016000			1
016100		1	
016300			1
016400		1	
016600			1
016700			1
017100			1
017400		1	
017600		1	
017900	1		
018000	1		
018100	1		
018300	1		
Total Tracts – Rhode Island	**9**	**31**	**16**
Connecticut – New London County			
690300		1	
690400		1	
690500		1	
690700		1	
690800		1	
696100	1		
696400	1		
696700		1	

Tract	Low Income	Low Income and Minority	Minority
696800		1	
697000		1	
702500	1		
702800	1		
709200	1		
870200	1		
870300	1		
Total Tracts – Connecticut	**7**	**8**	**0**
Maryland – Baltimore County			
408503		1	
408506		1	
408507			1
411408	1		
411412		1	
420301	1		
420401	1		
420600		1	
420701	1		
420702	1		
420900	1		
421000	1		
421101	1		
421102	1		
421200	1		
430101		1	
430300		1	
430900	1		
440300			1
440400	1		
440701			1
440702			1
440800			1
440900			1
441000			1
450501	1		

Tract	Low Income	Low Income and Minority	Minority
450503		1	
450504		1	
450800			1
451100			1
451300	1		
451401			1
451402		1	
451500	1		
451801	1		
452500	1		
490303	1		
490304			1
490605	1		
490900	1		
491300		1	
491401		1	
491402			1
491600		1	
492300	1		
492401			1
492402			1
492500		1	
492700		1	
Total Tracts - Maryland	**22**	**26**	**45**
South Carolina – Charleston County			
003300			1
003400		1	
003700			1
002401			1
002402			1
002701			1
002702			1
003104		1	
003105		1	
003106			1

Tract	Low Income	Low Income and Minority	Minority
003107			1
003108			1
003110		1	
003111			1
003113			1
003115		1	
003116			1
003800			1
003900			1
004000		1	
004300		1	
004400			1
005002			1
005300			1
005400		1	
005500		1	
Total Tracts – South Carolina	**0**	**9**	**17**
Texas – Nueces County			
000500		1	
000700		1	
000800		1	
000900		1	
001000		1	
001100		1	
001300		1	
001400		1	
001500		1	
002101		1	
002200		1	
002400		1	
002500	1		
003500		1	
003601		1	
003602		1	
003700			1

Tract	Low Income	Low Income and Minority	Minority
001601		1	
001602		1	
002002		1	
005900		1	
000601		1	
000602		1	
001201		1	
001202		1	
001702		1	
001703		1	
001704		1	
001801		1	
001802		1	
001903		1	
001904		1	
001905		1	
001906		1	
002001		1	
002301		1	
002303		1	
002304			1
002601		1	
002602		1	
002603		1	
002703		1	
002705			1
002706			1
002707		1	
002708	1		
003002	1		
003003		1	
003004		1	
003202			1
003204			1
003205		1	

Tract	Low Income	Low Income and Minority	Minority
003206		1	
003303		1	
003304		1	
003305		1	
003306		1	
003401		1	
003402		1	
003603			1
005103	1		
005104	1		
005404			1
005406			1
005407			1
005408		1	
005409			1
005410		1	
005411			1
005412			1
005413			1
005414			1
005415			1
005416			1
005417			1
005603		1	
005604			1
005605		1	
005606			1
005803		1	
005804			1
006000		1	
006100		1	
006300		1	
006400		1	

Tract	Low Income	Low Income and Minority	Minority
Texas – San Patricio County			
010800		1	
010900		1	
011000		1	
011100		1	
011200		1	
010201	1		
010202		1	
010301	1		
010302		1	
010500		1	
010601		1	
010700			1
011300		1	
Total Tracts - Texas	**7**	**69**	**22**

Source: USEPA 2022.

B.6 Water Quality

SouthCoast Wind filed a National Pollutant Discharge Elimination System (NPDES) permit application for the high voltage direct current (HVDC) converter offshore substation platform (OSP) for Project 1 in October 2022 and revised applications on December 12, 2022, April 10, 2023, and August 25, 2023 (TetraTech and Normandeau Associates, Inc. 2023). An overview of the characteristics of the cooling water intake structure (CWIS) in the HVDC converter OSP is provided in Table B-11. Figure B-2 shows the indicative location of the HVDC converter OSP for Project 1. Figures B-3 to B-6 depict results of the modeled scenarios with the maximum seasonal temperature delta between ambient and thermal effluent during four seasons (Scenario 1: fall, Scenario 2: winter, Scenario 3: spring, and Scenario 4: summer) at the outfall location.

Table B-11. Characteristics of one SouthCoast Wind HVDC converter OSP

Configuration Parameter	SouthCoast Wind HVDC Converter OSP
Water Source	Atlantic Ocean
Cooling Water Intake System (CWIS)	Non-contact, once-through cooling. Each of the three intakes pipes (caissons) operates independently with its own seawater lift pump. No common entrance or shared piping between each intake caisson. Typical operations utilize no more than two seawater lift pumps, with the third serving only as a backup to the other two pumps (no operating scenario will utilize three seawater lift pumps simultaneously).

Configuration Parameter	SouthCoast Wind HVDC Converter OSP
Configuration of intake	Three, approximately 28-inch (0.7-m)-diameter vertical-shaft intake caissons, with flared ends to accommodate intake velocity requirements, set perpendicular to the seafloor, in the middle portion of the water column, located within the jacketed foundation structure. The discharge is in the middle portion of the water column. They are separated so that heated discharge is not withdrawn into the intake. The three intake caissons on the OSP are separated by approximately 3.3 feet (1 meter) distance from each other, with the first caisson located approximately 91.9 feet (28 meters) distance from the center of the platform coordinates. Note that the three intake caissons are independently operating structures with no common intake or entrance.
Configuration of discharge	The cooling water discharge includes one 36-inch (0.91-meter)-diameter vertical-shaft discharge caisson, located in the middle portion of the water column, and set perpendicular to the seafloor, located within the jacketed foundation structure. The discharge depth is 42.7 feet (13 meters) below the surface and the location of discharge is within a 20-meter radius from the center of the platform coordinates. This location/depth ensures sufficient distance is maintained between the lift pump caisson and the overboard water caisson.
Trash/debris bar rack	The intake caisson(s) will be equipped with a stainless steel trash or debris bar rack. The bar rack will consist of stainless steel bars approximately 0.8 inch (20 millimeters) wide, or similar, fixed to the bell mouth opening of the intake caisson. SouthCoast Wind will require the bar rack to be incorporated into the specific design elements of the OSP fabricator. However, the use of trash or debris bar racks is not optimal for a seawater lift pump caisson installed in an offshore environment. The use of a bar rack at the intake of the pump caisson will create maintenance concerns over time; the bar rack will biofoul with encrusting/fouling organisms and will require direct access to the pump caisson intake periodically for cleaning campaigns. The original design did not include a bar rack for this reason, but a bar rack will be added for compliance requirements of the NPDES permit application. SouthCoast Wind is considering a distance of 5 inches (12.7 cm) spacing between bars. The configuration details will be refined during the detailed design stage, which will include consultations with USEPA and other agencies to ensure appropriate spacing of bars is protective of marine organisms, as applicable within engineering constraints (e.g., flow velocity, biofouling).
Pump screens/strainers	Each seawater intake caisson is equipped with an in-built pump strainer with a typical outer screen size of 3/8 inch (9.5 millimeters), intended to protect the seawater lift pump impeller from debris in the water column. The strainers are retractable on the seawater lift pump for cleaning. At deck level 1 of the OSP, each pump flowline is also equipped with a dedicated filter (typical mesh size of 250 micrometers), intended to protect the equipment and ensure reliable operation of the CWIS. The filter is provided with an automated backwash cleaning system. No chemicals are involved in the cleaning cycles.
Number of traveling screens/ screen wells	N/A – no traveling screens
Water depth of withdrawal, below surface at MLLW	Proposed 74 feet (22.6 meters) below the water surface at MLLW and contingent on NPDES permit requirements.

Configuration Parameter	SouthCoast Wind HVDC Converter OSP
Water depth of withdrawal, above seafloor	Proposed 81 feet (24.7 meters) above seafloor and contingent on NPDES permit requirements.
Through-screen velocity (calculated from Design Intake Flow [DIF])	**Intake velocity will not exceed 0.5 feet (0.2 meters) per second** to meet the velocity-based impingement compliance option. A maximum velocity of less than or equal to 0.5 feet (0.2 meters) per second will be integrated into the engineering design of the CWIS to ensure compliance. The intake velocity of 0.5 feet (0.2 meters) per second (or less) will be ensured to be the design limit velocity at the bar rack, accomplished by ensuring the CWIS intake bell mouth diameter is sized in relation to the lift pump maximum flow rate (i.e., determined at the maximum power of the motor driving the pump or the pump curve, whichever is greater) and that the bell mouth face velocity is not exceeding 0.5 feet (0.2 meters) per second. See NPDES permit application Section 6.2 (Tetratech and Normandeau Associates Inc., 2023) for intake velocity calculation, based on parameters below, including pump data from a submersible seawater lift pump deployed on another project with a similar cooling duty requirement of 50.16 Btu/h (14.7 megawatts): • Maximum cooling seawater flow required DIF: 9.9 MGD (2 x 780 m^3/h = 1,560 m^3/h), including contingency • Selected pump maximum operational flow (Qmax): (780 m^3/h), based on representative pump data • CWIS intake bell mouth diameter: 4.74 ft (1.445 m) • CWIS intake bell mouth area: 17.66 ft^2 (1.64 m^2) • CWIS intake velocity (face velocity): < 0.5 ft/s (0.15 m/s) • Cross-sectional open area of caisson inlet = 17.65 ft^2 (1.640 m^2), adjusted for the area occupied by the bar rack (0.936 ft^2 [0.087 m^2]) = 16.72 ft^2 [1.553 m^2])
Seawater lift pumps (intake pumps)	The seawater cooling system is a once-through (open loop) system. The maximum heat duty of the offshore substation platform (OSP) is 50.16 Btu/h (14.7 MW). This maximum heat duty of 50.16 Btu/h (14.7 MW) requires a maximum seawater flow of 9.9 MGD (i.e.,1,560 m3/h, including contingency) for cooling. Up to two raw seawater vertical lift pumps are required to fulfill the cooling duty. Each seawater lift pump has a rated maximum nameplate flow capacity of 900 cubic meters per hour, but maximum operational flow would not exceed 780 cubic meters per hour per pump, resulting in a maximum design intake flow (DIF) of 9.9 MGD, with two pumps operating. Only two of the three pumps would be used under normal operating conditions, with the third pump only serving as a spare/backup. Each seawater lift pump supplies once-through, non-contact cooling water to a plate heat exchanger, to facilitate heat exchange/cooling with the seawater cooling system (of 7.35 megawatt heat duty capacity per heat exchanger). Internal cooling flow is controlled with the use of a 3-way valve while maintaining a constant speed with seawater once-through (open loop) cooling. In addition, a variable frequency drive (VFD) on each of the seawater lift pump motors, to accomplish the following: 1. The seawater lift pumps are equipped with VFDs for slow start-up of the seawater supply lines. 2. Fine-scale control of the flow volume, based on cooling requirements.

Configuration Parameter	SouthCoast Wind HVDC Converter OSP
	3. In order to prevent freezing of the standby line, a VFD is used to operate the standby seawater lift pump at minimum flow capacity during the winter season (still within the maximum 9.9 MGD DIF for the facility)
Maximum Discharge Temperature	**86°F (30°C)**
Total DIF	**9.9 MGD** = maximum design intake flow required for cooling of the OSP. Two of the seawater lift pumps operating at approximately 87% of their rated nameplate capacity will provide up to 9.9 MGD (DIF) during normal operating conditions (up to 4.95 MGD each to supply the required cooling water. During normal operating conditions, each individual seawater lift pump will provide up to 4.95 MGD to ensure reliable, safe operating conditions at the unmanned OSP. Seawater Lift Pump settings can be controlled with or without variable frequency drive. Internal cooling flow is controlled by use of a 3-way valve while maintaining a constant speed with the seawater once-through (open loop cooling). The system is designed for a rated nameplate capacity of each seawater lift pump of 900 m^3/h. However, SouthCoast Wind is seeking 9.9 MGD maximum design intake flow (DIF) in the NPDES permit to align with the expected maximum operational conditions (two pumps operating at up to 780 m^3/h each), as the seawater lift pumps are not designed to operate at 100% of their total rated nameplate capacity to meet the cooling needs of the OSP.
Flow Reduction from Design Capacity	While 9.9 MGD is the DIF, a 50% flow reduction potential from DIF could be achieved by use of single-pump operation (4.95 MGD), or dual-pumps each operating at reduced capacity during low-load operating conditions.
Closed-cycle recirculating cooling	None. Closed-cycle (closed-loop) cooling using air or seawater is not an available technology for SouthCoast – Project 1.
Monitoring parameters and sensor locations	The three intake structures will include the following instrumentation: • Temperature & water conductivity monitoring devices installed at the seawater lift pump intake. • The intake seawater flowline has an inline flow meter installed upstream of the seawater filter at the topside of the converter station. • Temperature and flow monitoring devices are installed at the feed line and at the discharge outlet of the seawater heat exchanger. Mechanical sampling connections located at the return line of seawater.
Chlorination System	The CWIS is equipped with an antifouling system to prevent marine growth in the pump caissons and the Seawater System, which consists of Hypochlorite Generator Packages. The Hypochlorite Generator Packages produces Sodium Hypochlorite (NaOCl) by seawater electrolysis. The hypochlorite is injected into the pump caissons near the suction level of the Seawater Lift Pumps. Hypochlorite Generator Packages are designed to achieve a hypochlorite solution flow rate of sufficient concentration, corresponding with a 1 to 4 ppm equivalent free chlorine concentration in the seawater intake lines. This method of continuous injection into the pump caisson is preferred because at a low dosage of NaOCl (i.e., 2 mg/l, 95 kg/day), the residual free chlorine at the outlet would be negligible and oxidized in the water with no negative impact.

Source: TetraTech and Normandeau Associates, Inc. 2023

Btu/h = British thermal unit per hour; CWIS = cooling water intake structure; DIF = Design Intake Flow; °F = degrees Fahrenheit; °C = degrees Celsius; cm = centimeter; ft = feet; ft/s = feet per second; GPM = gallons per minute; m/s = meters per second;

m = meter; m² = square meter; m³/h = cubic meter per hour; MLLW = Mean Lower Low Water; MGD = million gallons per day; NaOCl = sodium hypochlorite; NPDES = National Pollutant Discharge Elimination System; OSP = offshore service platform

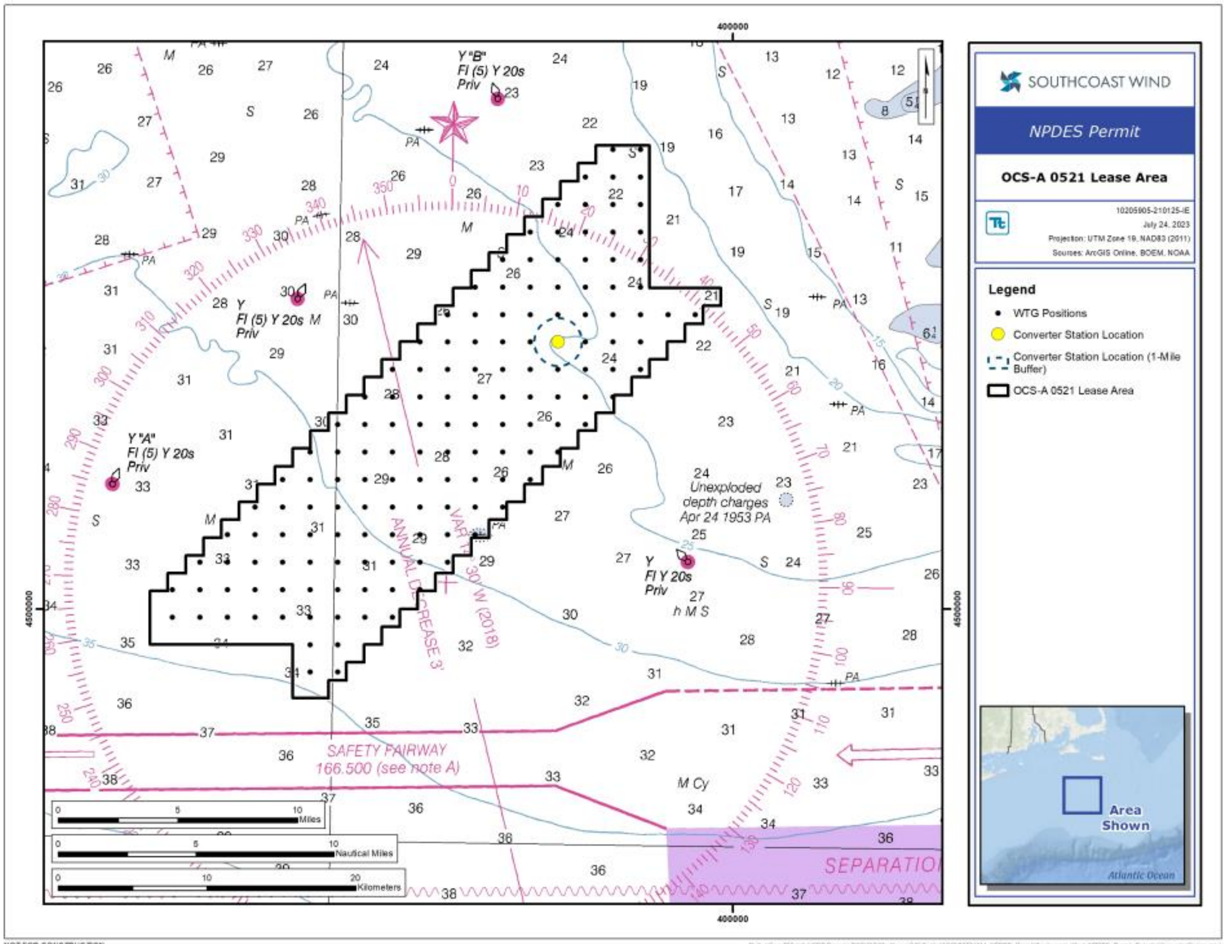


Figure B-2. Indicative location of the Offshore Substation Platform with Converter Station for Project 1 within the Lease Area

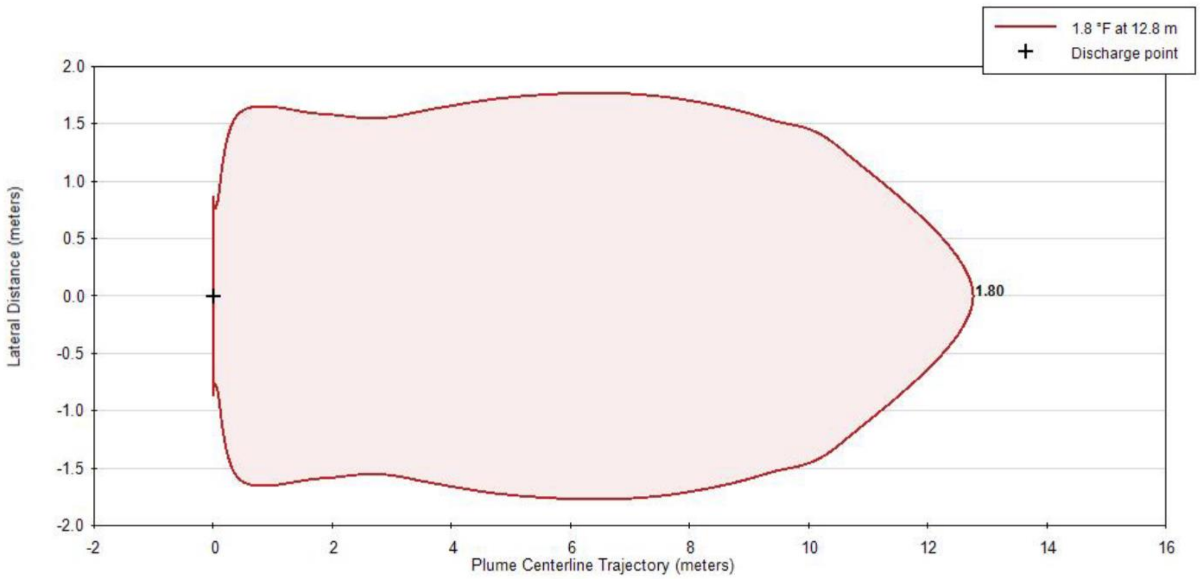


Figure B-3. 1.8°F (1°C) temperature delta isoline for Scenario 1: Fall

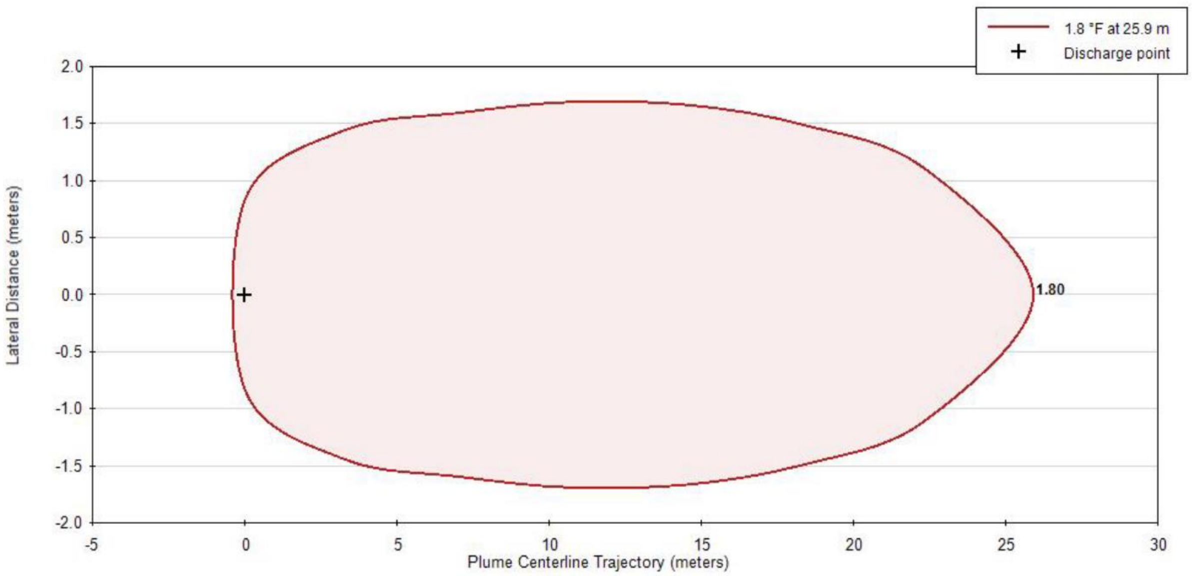


Figure B-4. 1.8°F (1°C) temperature delta isoline for Scenario 2: Winter

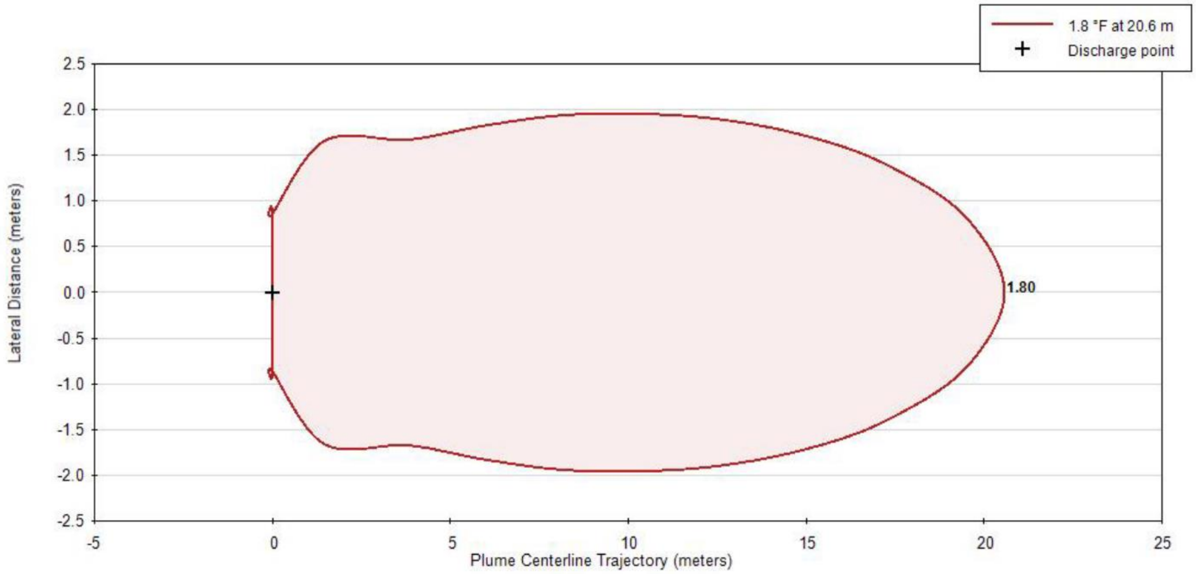


Figure B-5. 1.8°F (1°C) temperature delta isoline for Scenario 3: Spring

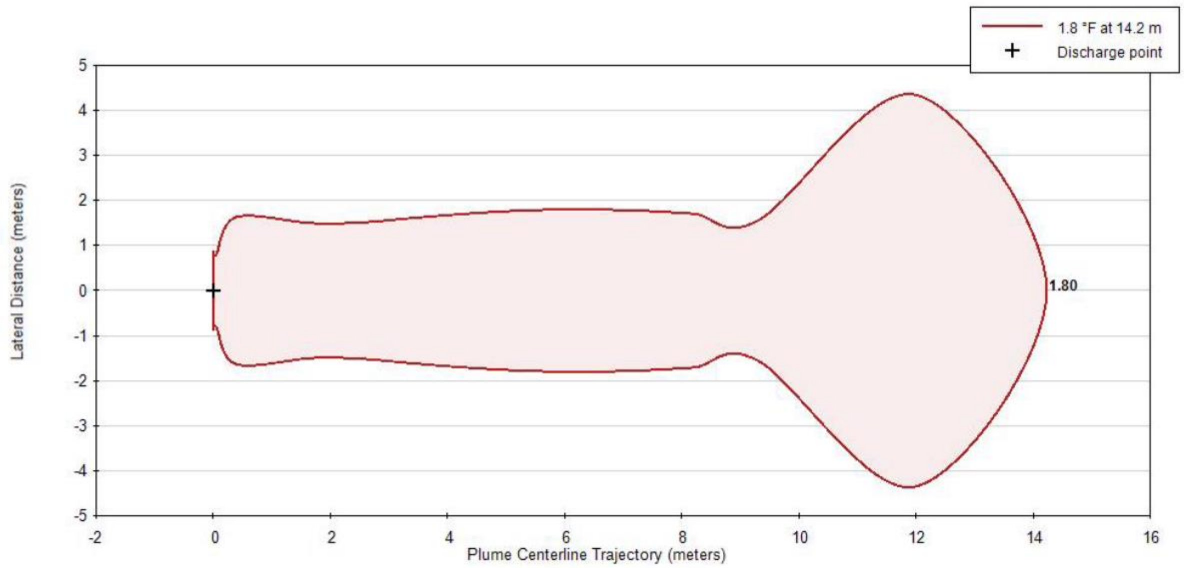
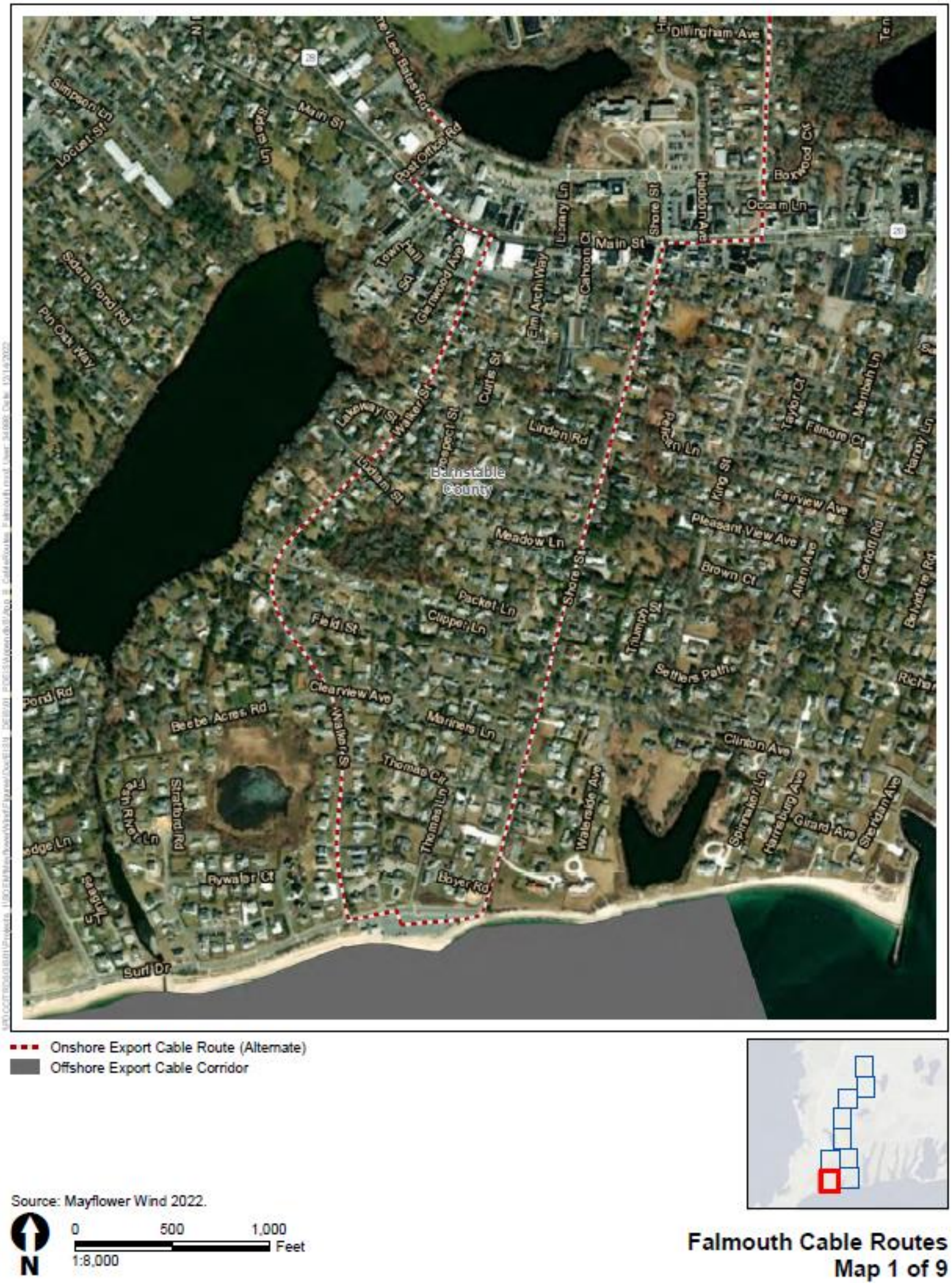


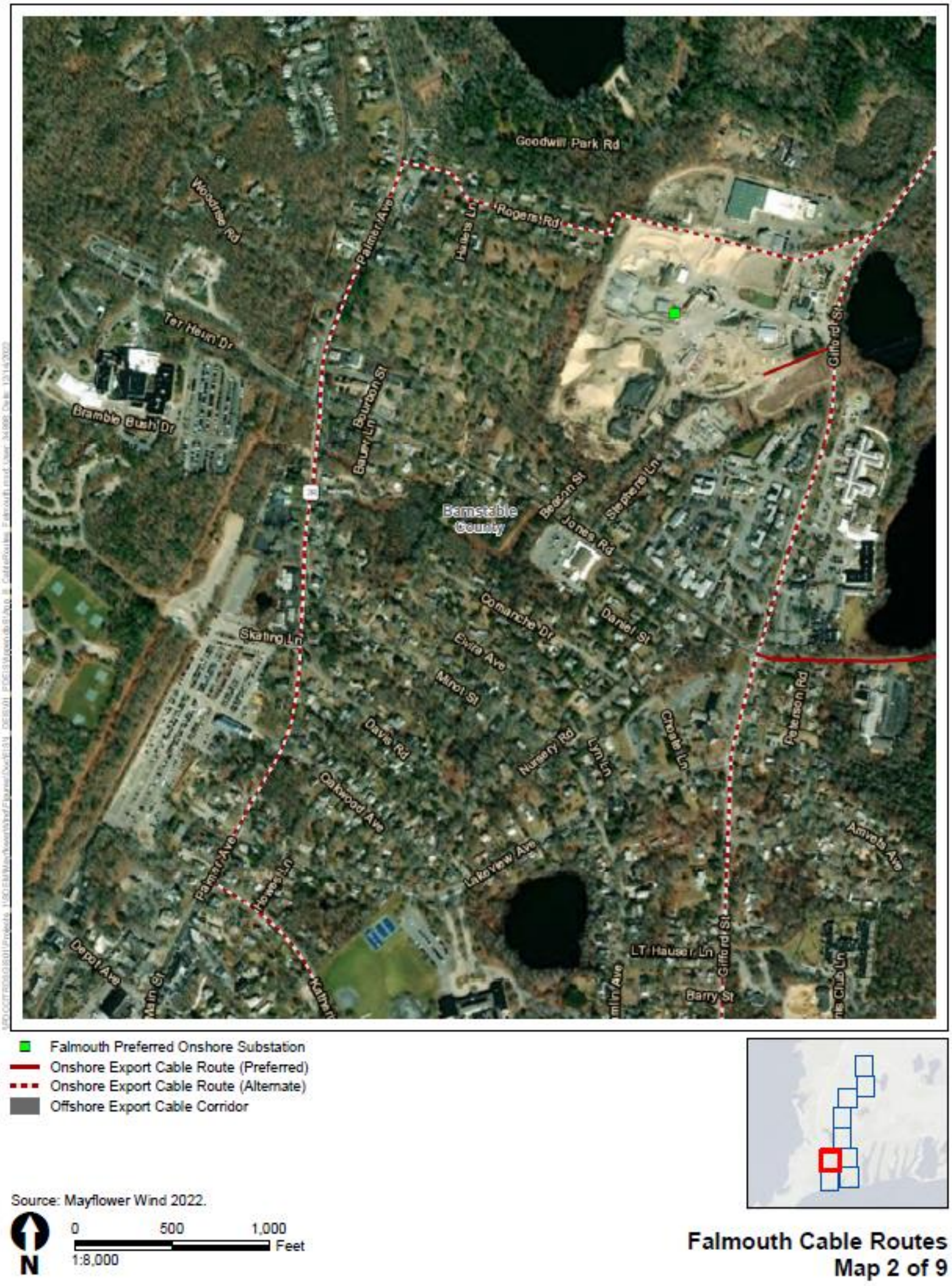
Figure B-6. 1.8°F (1°C) temperature delta isoline for Scenario 4: Summer

B.7 Onshore Cable Route Maps

This section contains detailed maps of the onshore cable routes analyzed in this EIS, as described in Chapter 2, *Alternatives*.

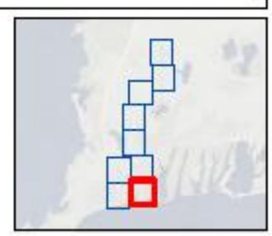
B.7.1 Proposed Action - Falmouth Onshore Cable Routes





Falmouth Cable Routes
Map 2 of 9

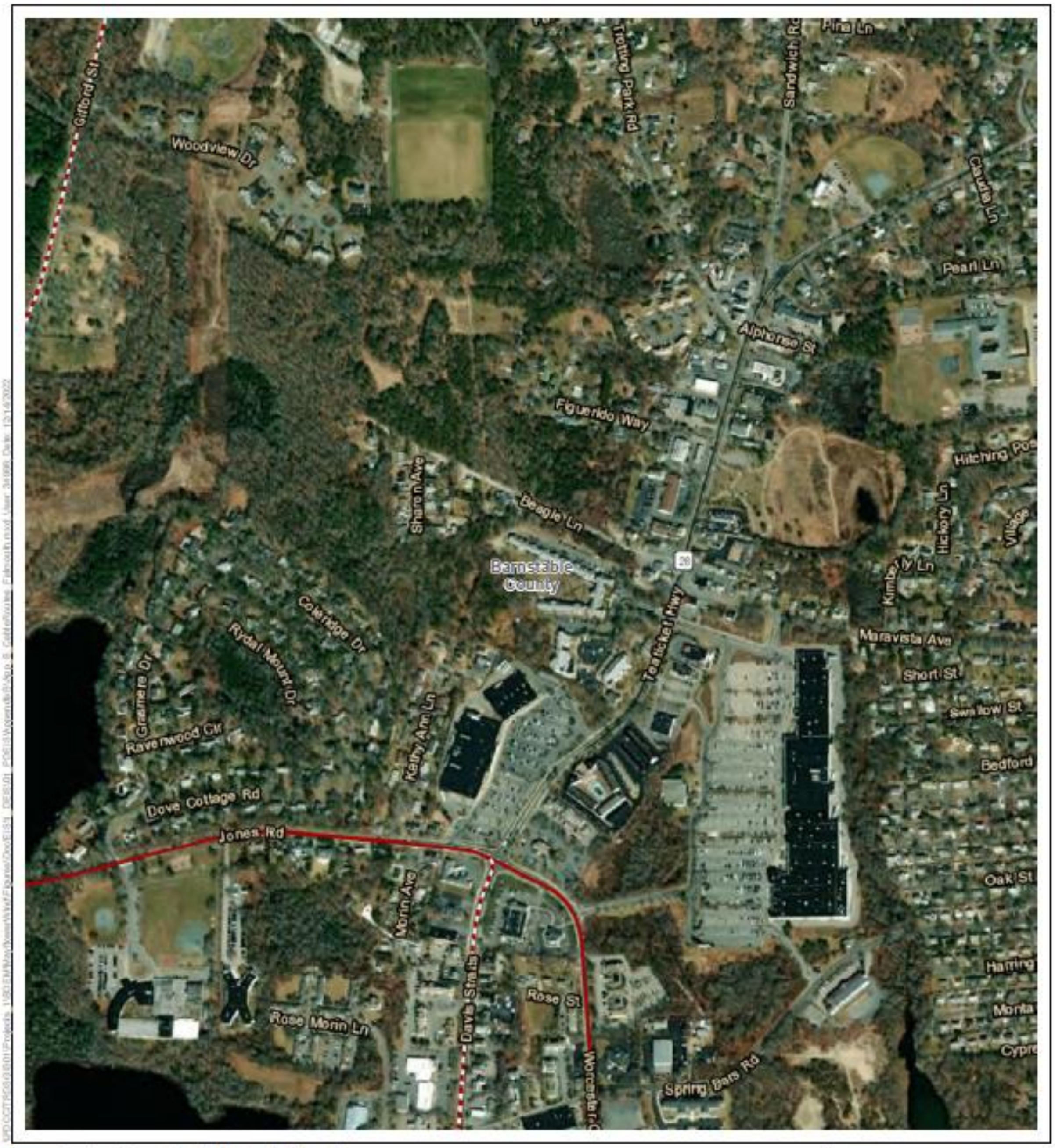
- Onshore Export Cable Route (Preferred)
- Onshore Export Cable Route (Alternate)
- Offshore Export Cable Corridor



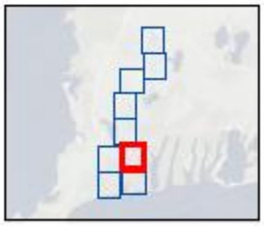
Source: Mayflower Wind 2022.

N 0 500 1,000 Feet 1:8,000

Falmouth Cable Routes
Map 3 of 9



Onshore Export Cable Route (Preferred)
Onshore Export Cable Route (Alternate)
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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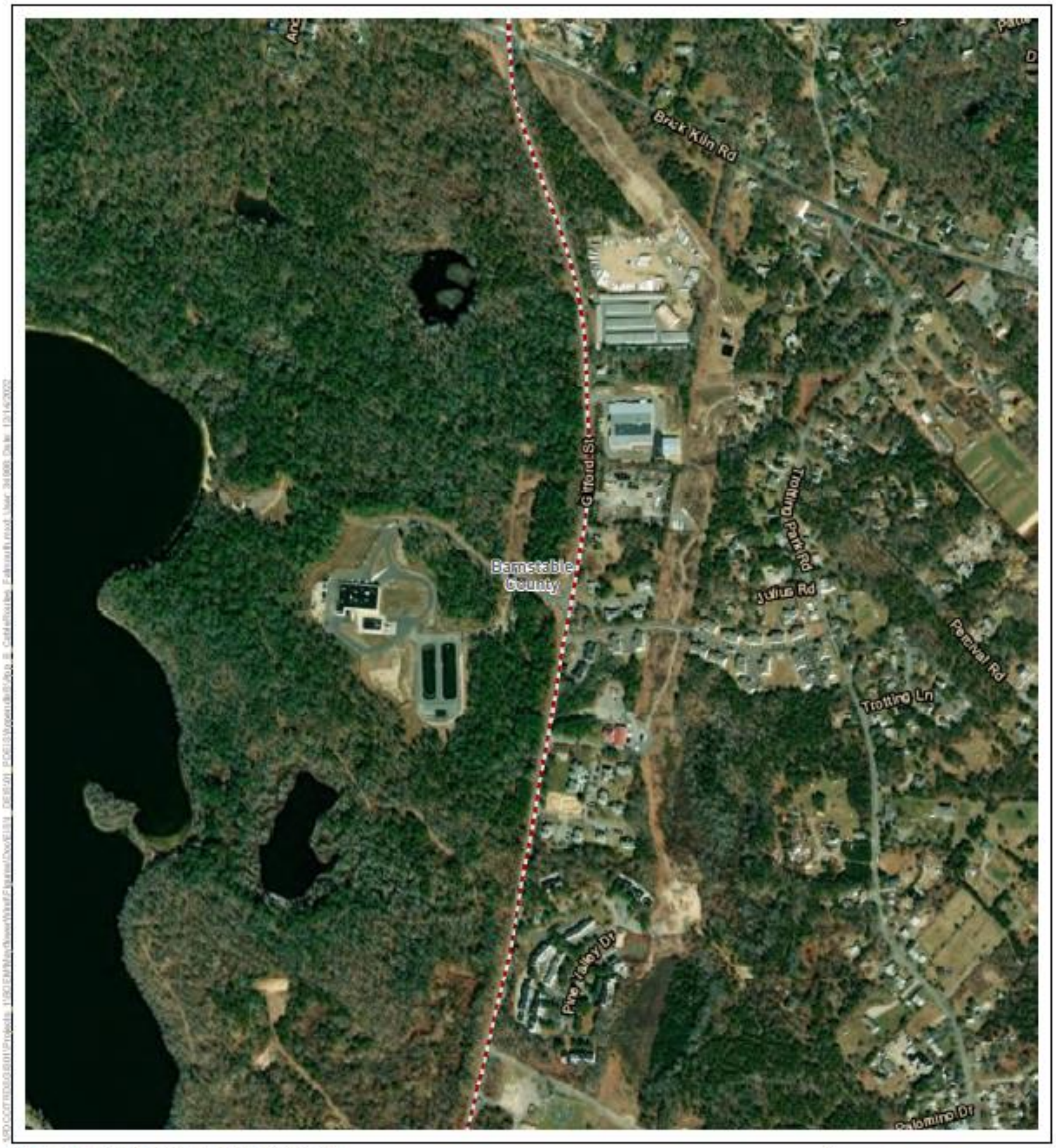
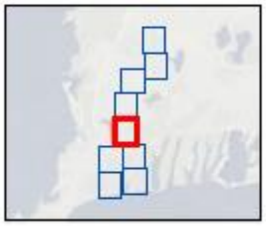
Falmouth Cable Routes
Map 4 of 9



Onshore Export Cable Route (Alternate)
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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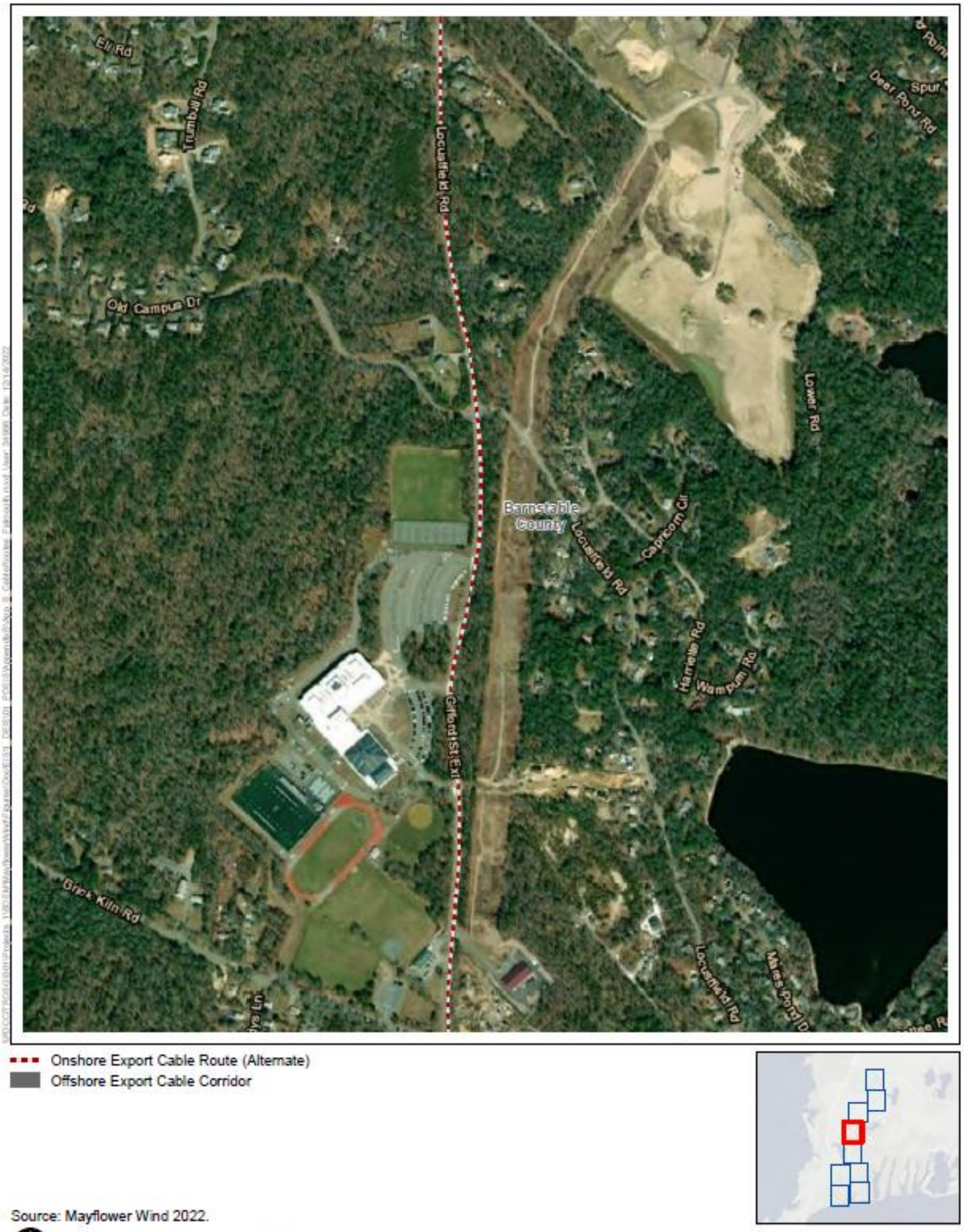
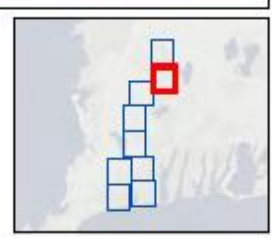
Falmouth Cable Routes
Map 5 of 9



Falmouth Cable Routes
Map 6 of 9

Falmouth Cable Routes
Map 7 of 9

Falmouth Alternative Onshore Substation
Onshore Export Cable Route (Alternate)
Underground Transmission Route (Alternate)
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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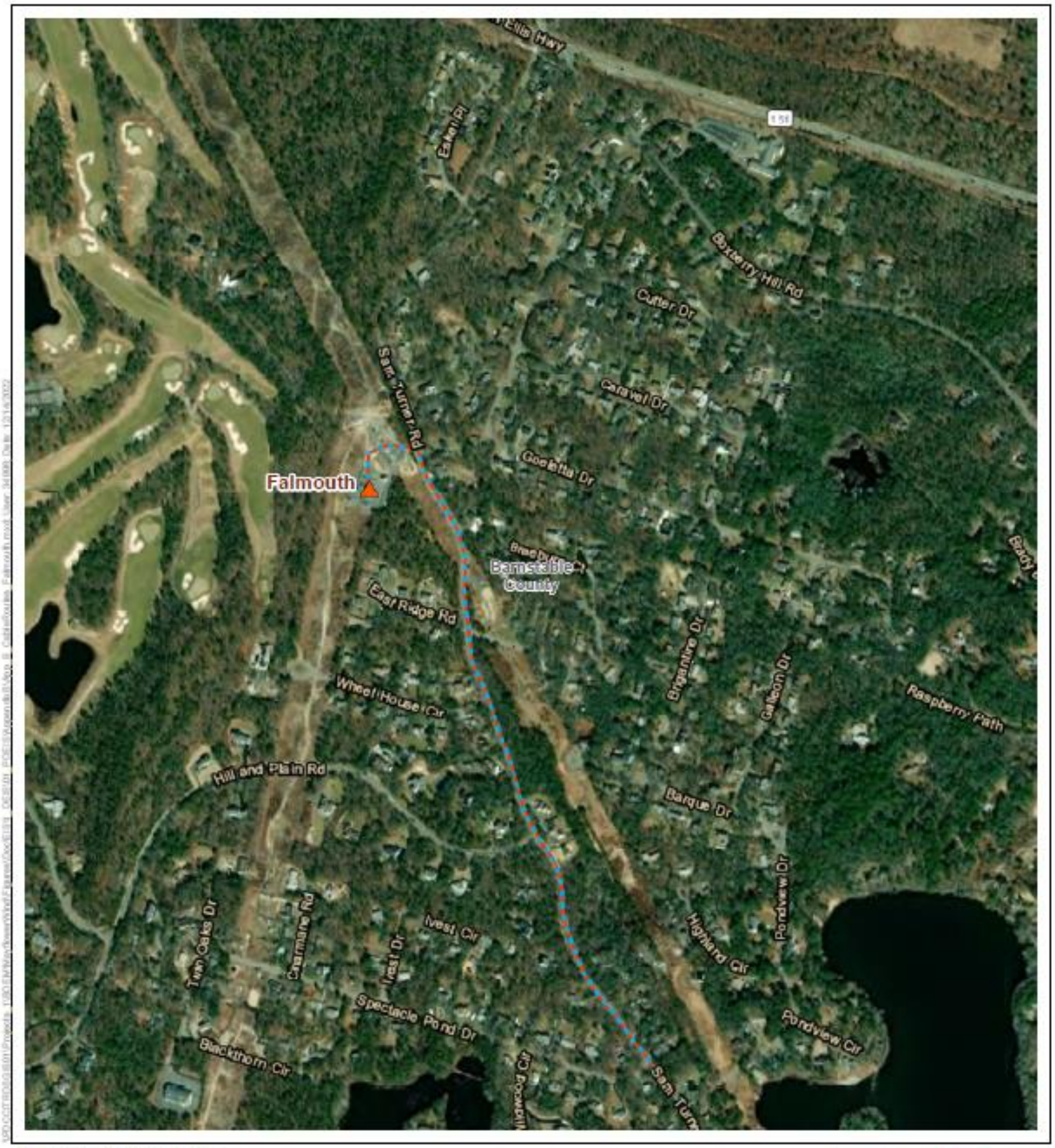
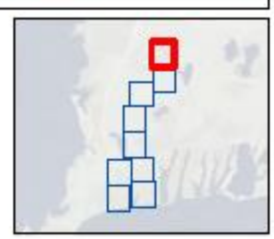
Falmouth Cable Routes
Map 8 of 9



▲ Point of Interconnection
Underground Transmission Route (Alternate)
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

N

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1:8,000

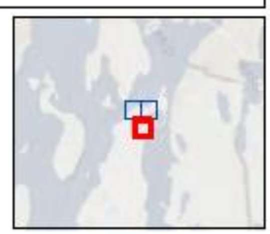
Falmouth Cable Routes
Map 9 of 9

B.7.2 Proposed Action - Brayton Point Onshore Cable Routes

Brayton Point Cable Route

B.7.3 Proposed Action - Aquidneck Island Cable Routes

Onshore Export Cable Route
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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0 500 1,000 Feet

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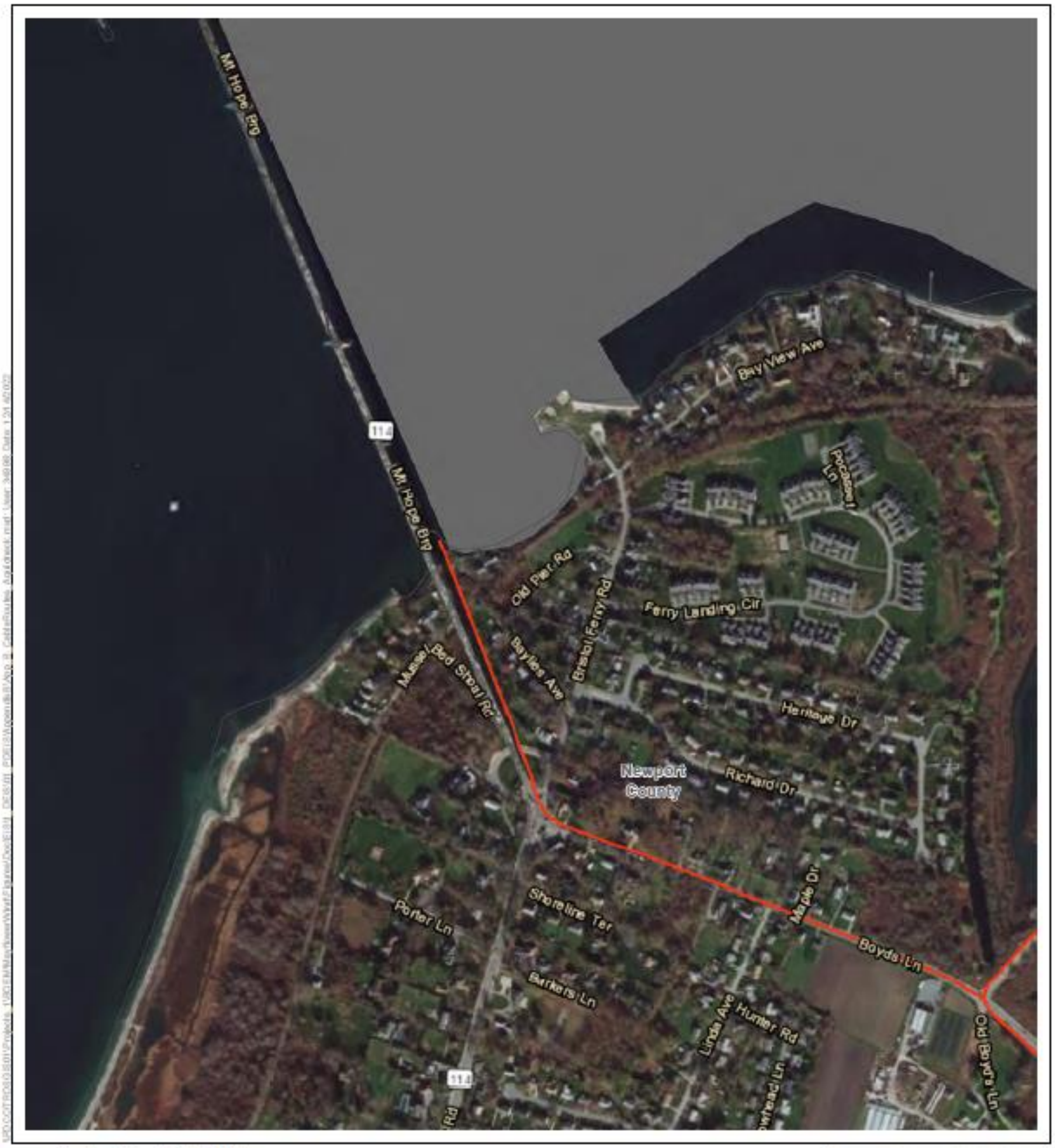
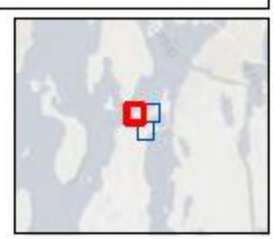
Aquidneck Island Cable Routes
Map 1 of 3



Onshore Export Cable Route
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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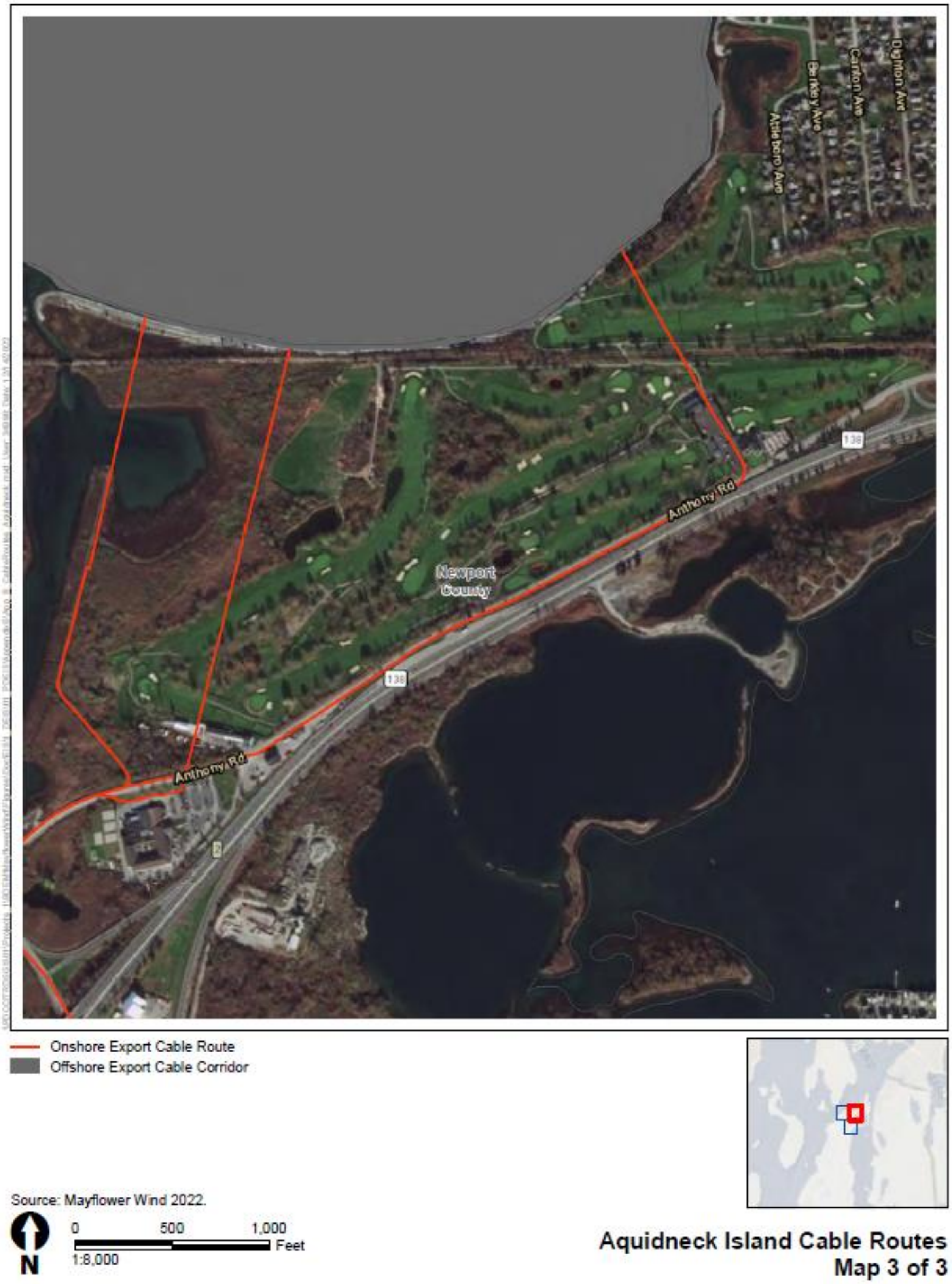
Aquidneck Island Cable Routes
Map 2 of 3

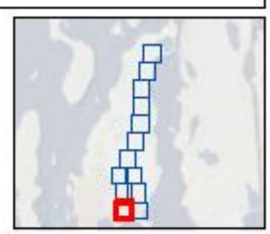


Aquidneck Island Cable Routes
Map 3 of 3

B.7.4 Alternative C-1 Onshore Cable Routes (Aquidneck Island)

Alternative C-1 - Onshore Export Cable Route

Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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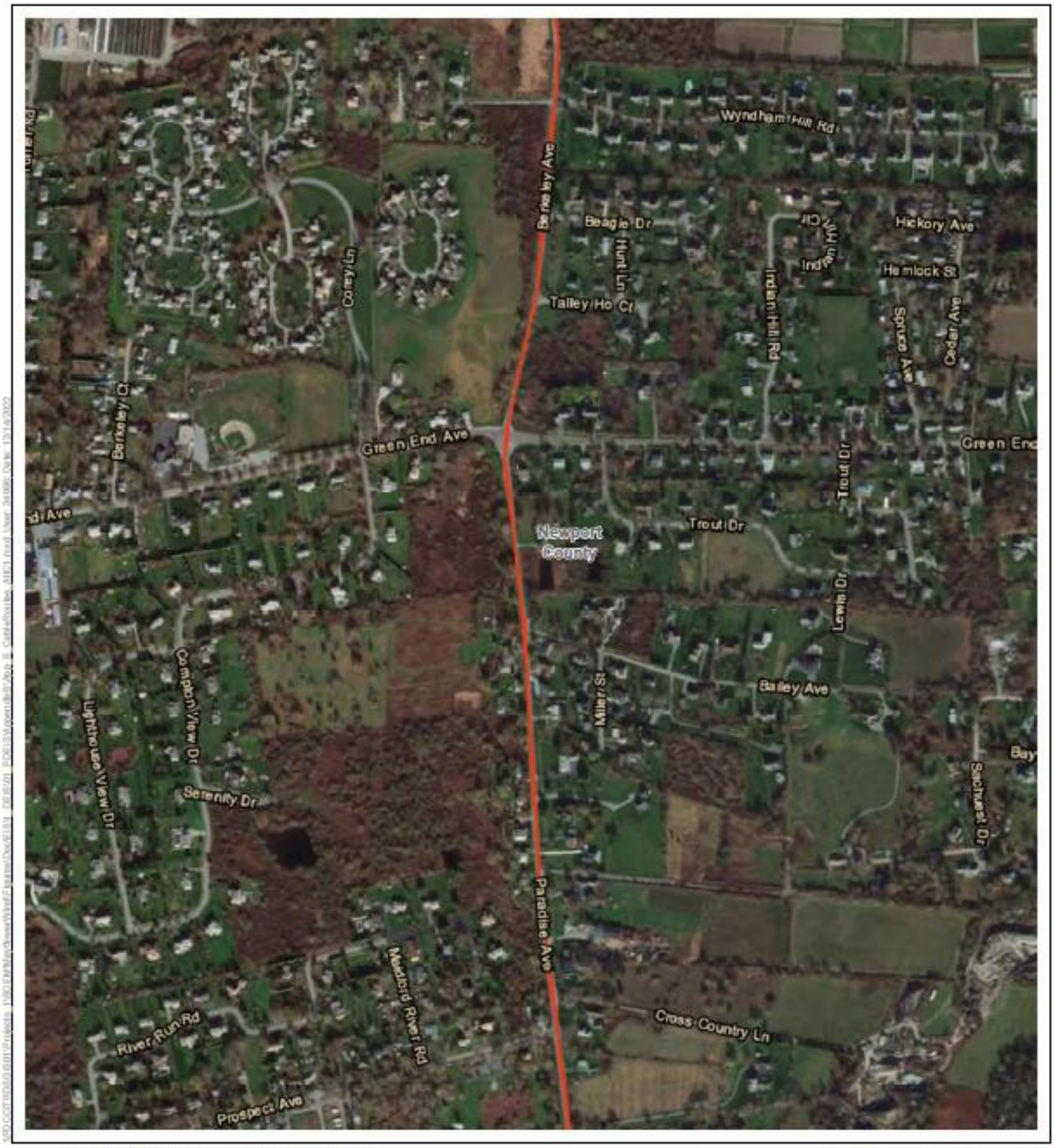
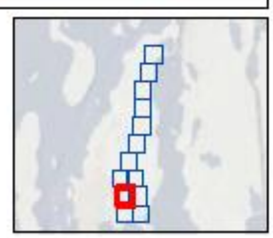
Alternative C-1 Onshore Export Cable Route
Map 1 of 13



Alternative C-1 - Onshore Export Cable Route
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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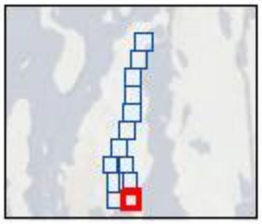
1:8,000

Alternative C-1 Onshore Export Cable Route
Map 2 of 13

Alternative C-1 Onshore Export Cable Route
Map 3 of 13

Alternative C-1 - Onshore Export Cable Route
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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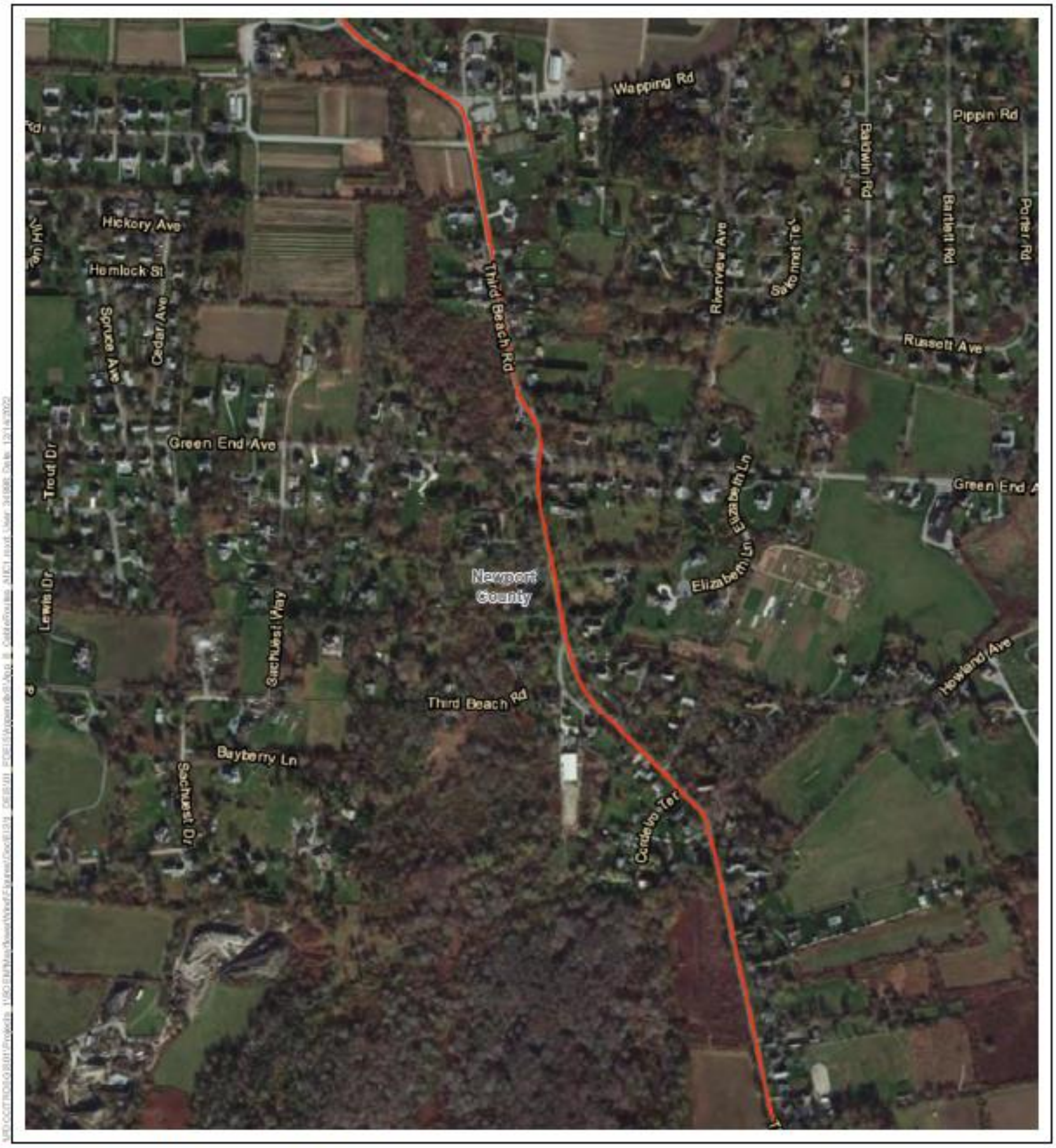
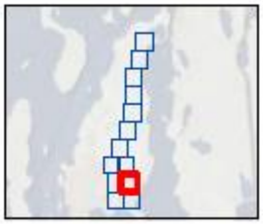
Alternative C-1 Onshore Export Cable Route
Map 4 of 13





Alternative C-1 - Onshore Export Cable Route
Offshore Export Cable Corridor

Source: Mayflower Wind 2022.

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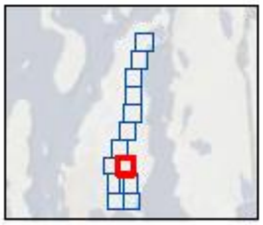
Alternative C-1 Onshore Export Cable Route
Map 5 of 13

Alternative C-1 - Onshore Export Cable Route
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

N
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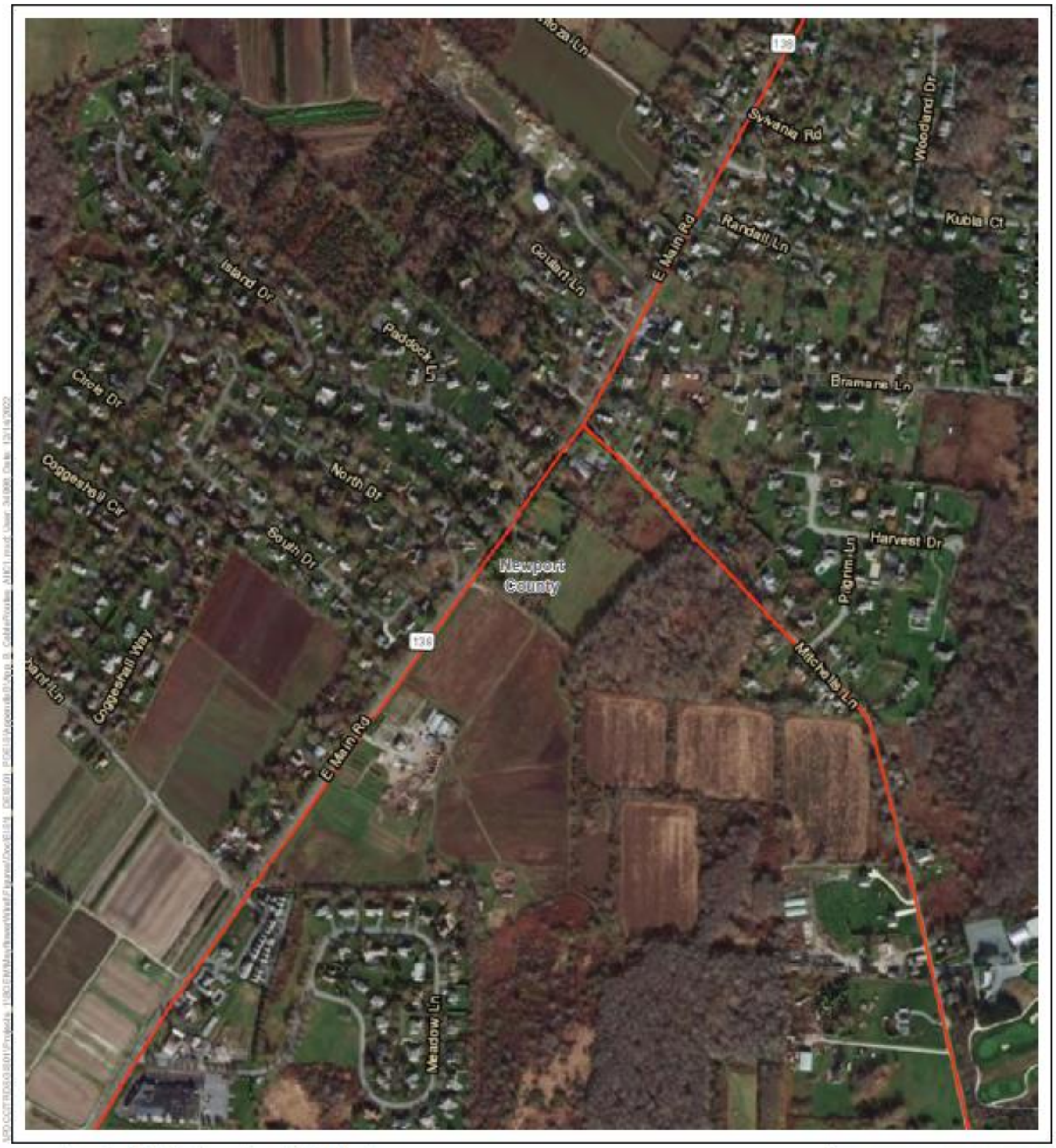
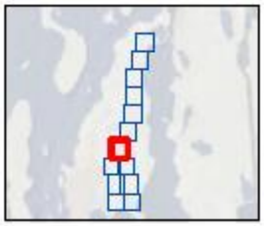
Alternative C-1 Onshore Export Cable Route
Map 6 of 13





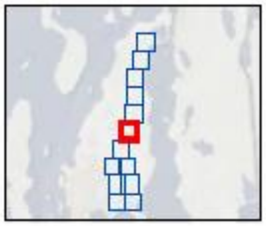
Alternative C-1 - Onshore Export Cable Route

Offshore Export Cable Corridor

Source: Mayflower Wind 2022.

Alternative C-1 Onshore Export Cable Route
Map 7 of 13

Alternative C-1 - Onshore Export Cable Route
Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

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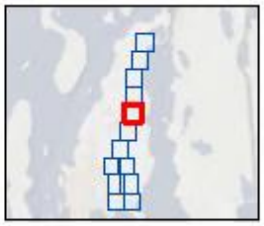
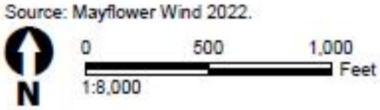
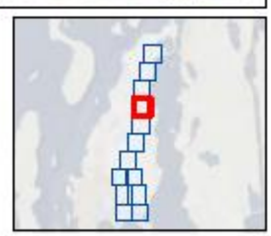
Alternative C-1 Onshore Export Cable Route
Map 8 of 13



Source: Mayflower Wind 2022.



Alternative C-1 Onshore Export Cable Route
Map 9 of 13



Alternative C-1 - Onshore Export Cable Route

Offshore Export Cable Corridor

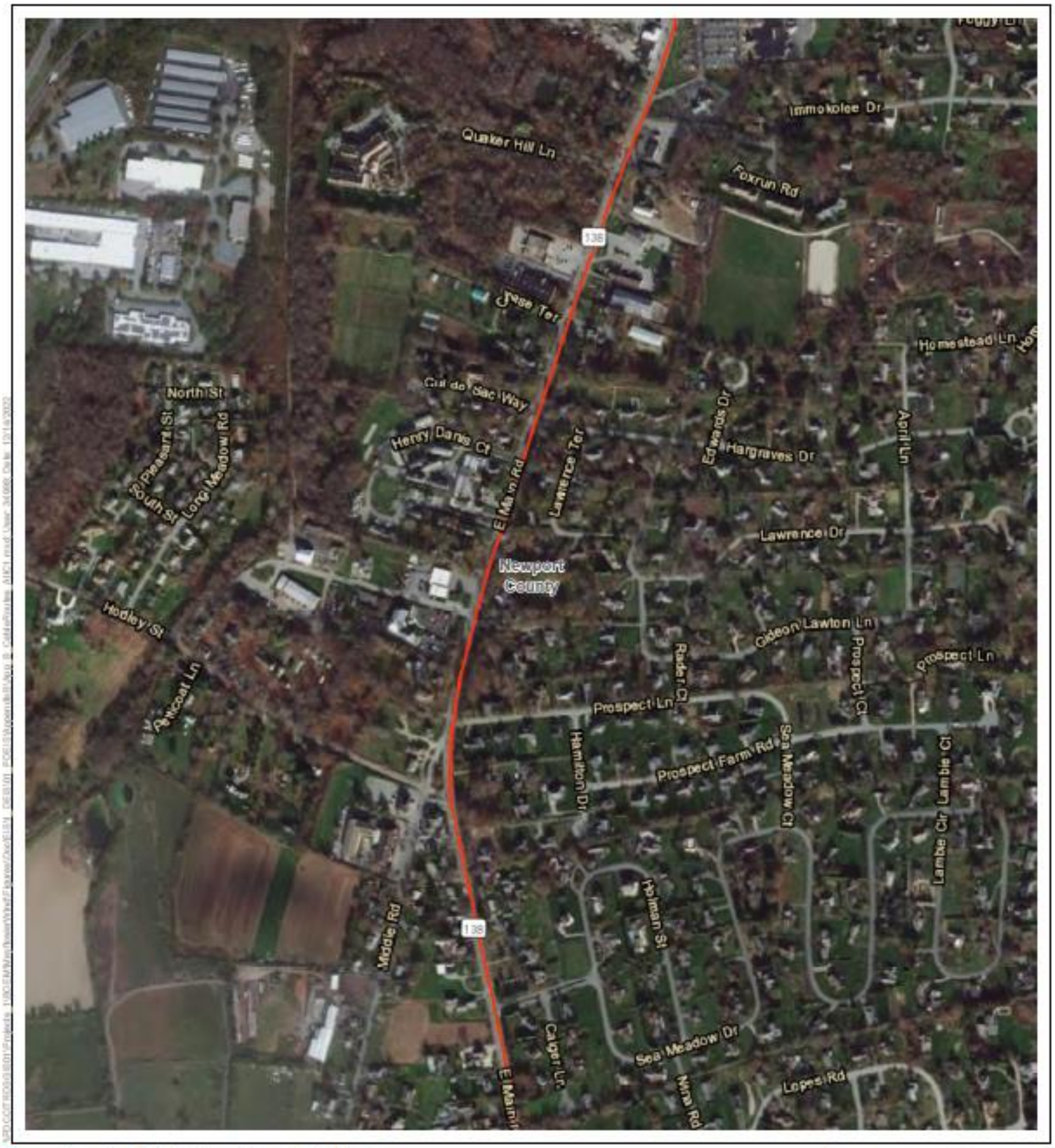
Source: Mayflower Wind 2022.

N

0 500 1,000 Feet

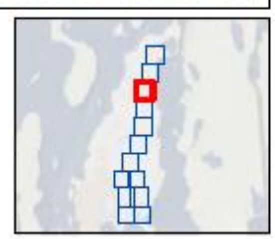
1:8,000

Alternative C-1 Onshore Export Cable Route
Map 10 of 13



Alternative C-1 - Onshore Export Cable Route

Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

N

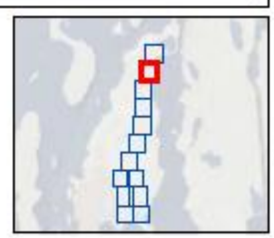
0 500 1,000 Feet

1:8,000

Alternative C-1 Onshore Export Cable Route
Map 11 of 13

Alternative C-1 - Onshore Export Cable Route

Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

N

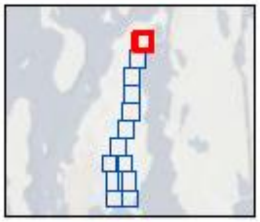
0 500 1,000 Feet

1:8,000

Alternative C-1 Onshore Export Cable Route
Map 12 of 13

Alternative C-1 - Onshore Export Cable Route

Offshore Export Cable Corridor



Source: Mayflower Wind 2022.

N

0 500 1,000 Feet

1:8,000

Alternative C-1 Onshore Export Cable Route
Map 13 of 13

B.7.5 Alternative C-2 Onshore Cable Routes (Little Compton and Tiverton, Rhode Island)

Alternative C-2 - Onshore Export Cable Route

Source: Mayflower Wind 2022.

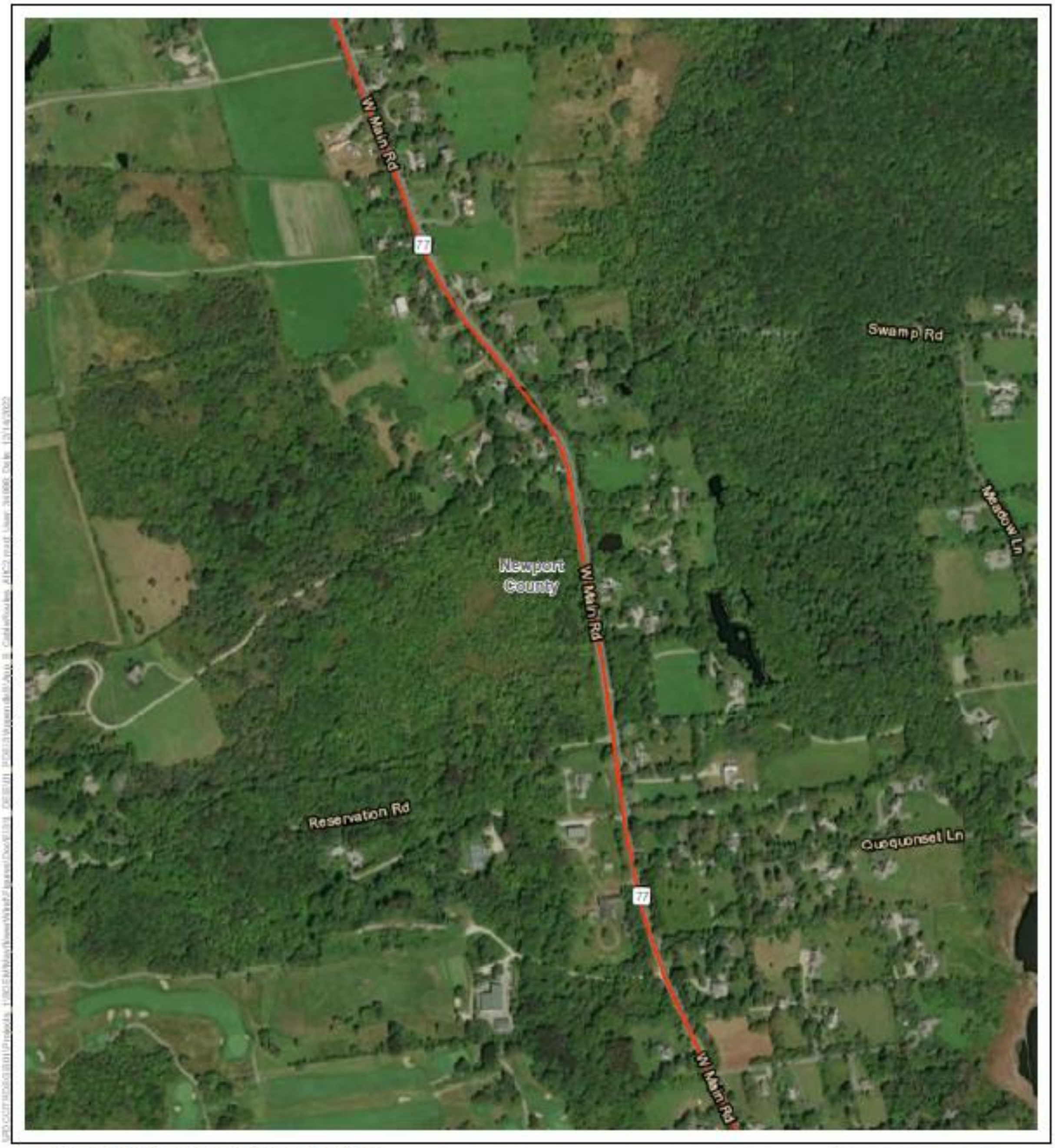
N

0 500 1,000 Feet

1:8,000

Alternative C-2 Cable Route
Map 1 of 15

Alternative C-2 Cable Route
Map 2 of 15



Alternative C-2 - Onshore Export Cable Route

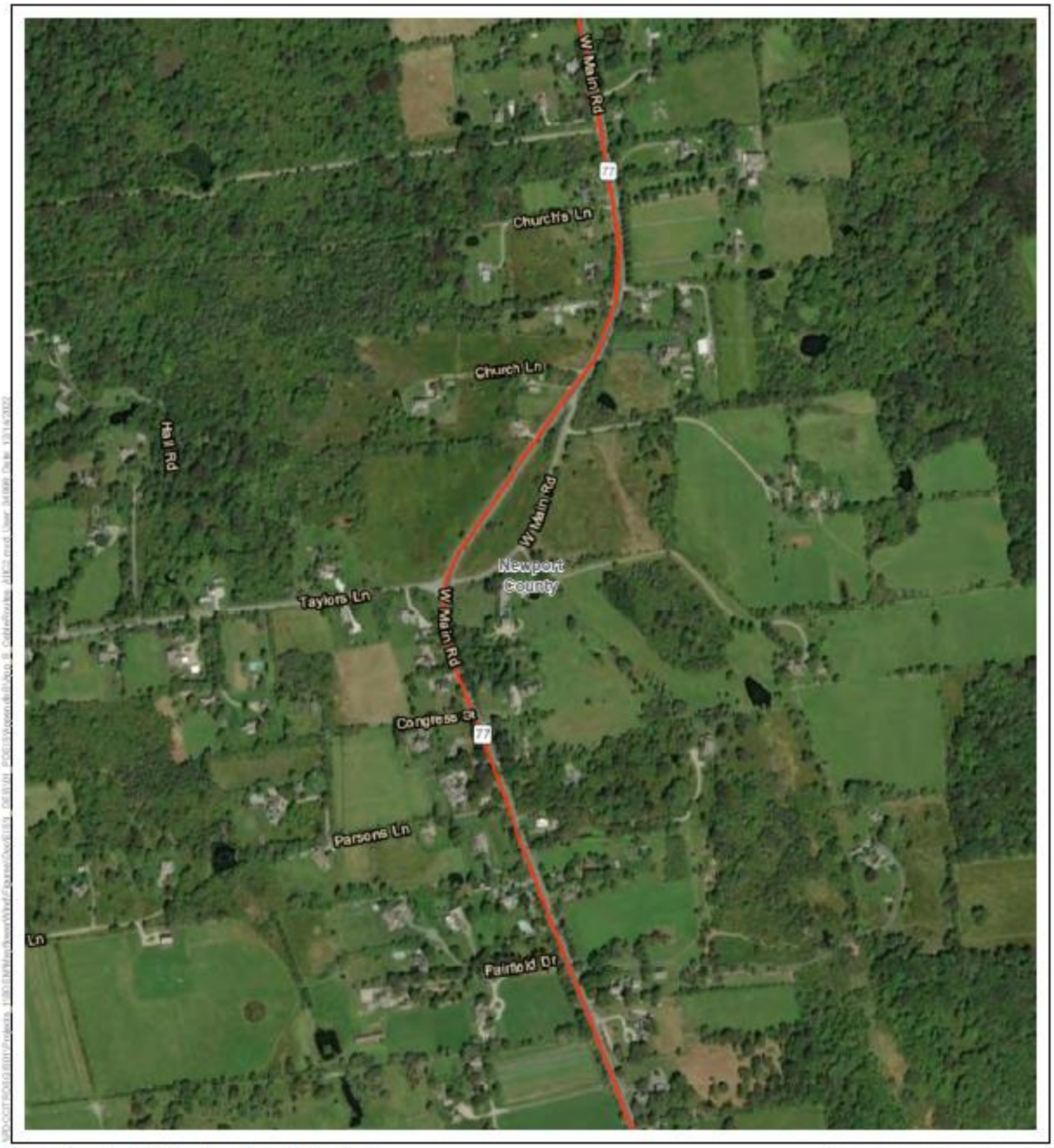
Source: Mayflower Wind 2022.

N

0 500 1,000 Feet

1:8,000

Alternative C-2 Cable Route
Map 3 of 15



Alternative C-2 - Onshore Export Cable Route

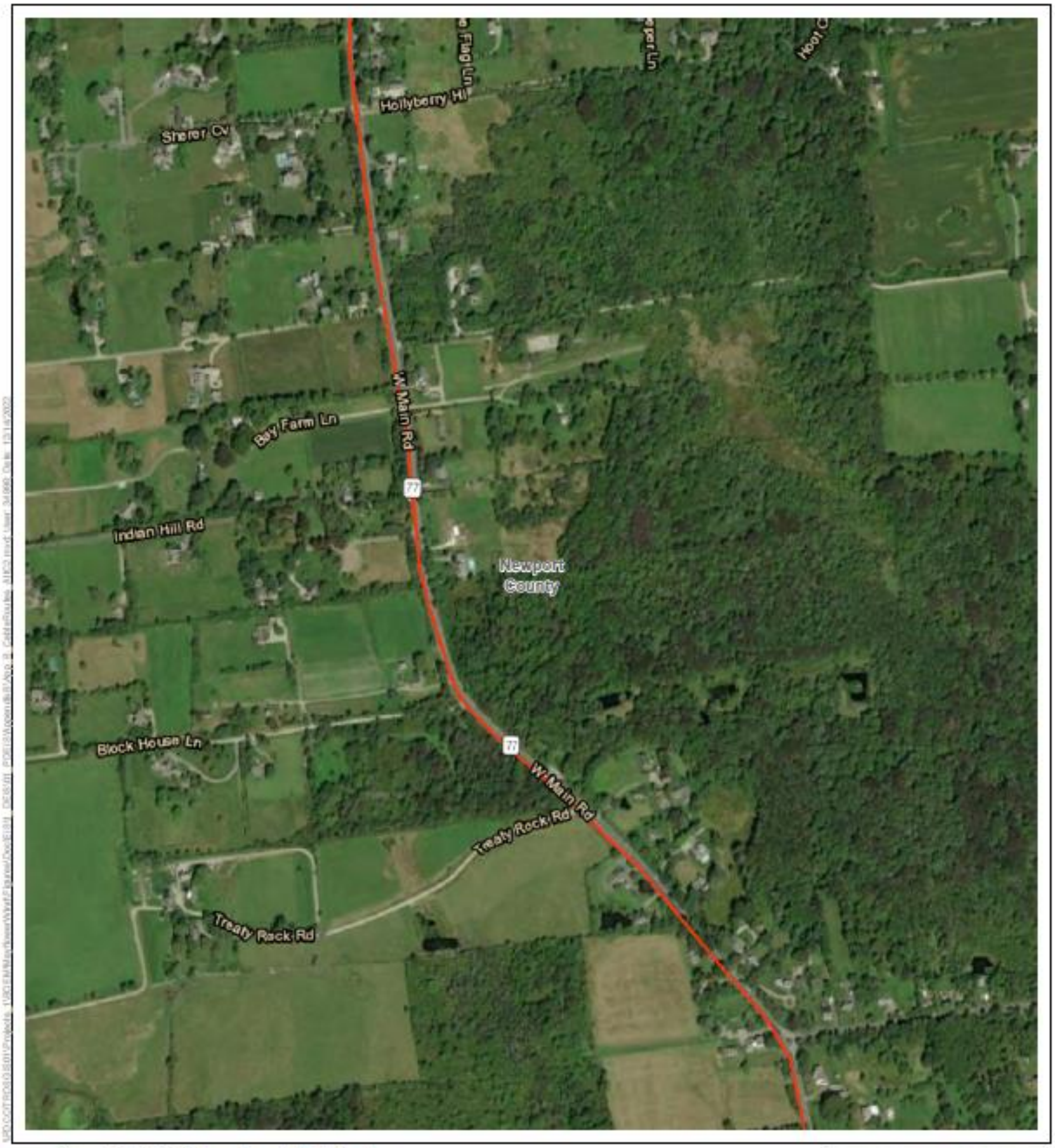
Source: Mayflower Wind 2022.

N

0 500 1,000 Feet

1:8,000

Alternative C-2 Cable Route
Map 4 of 15

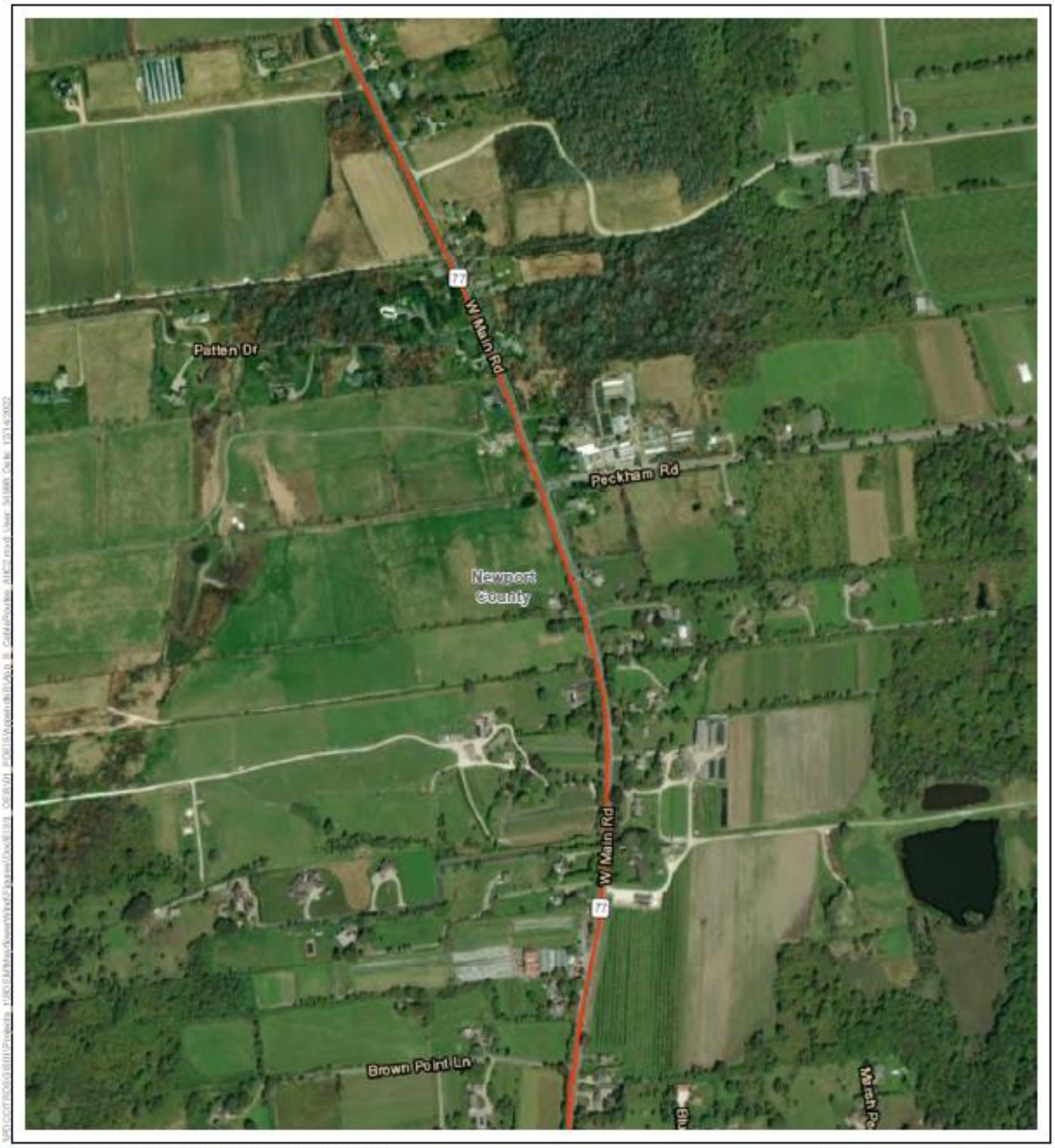


Alternative C-2 - Onshore Export Cable Route

Source: Mayflower Wind 2022.

N 0 500 1,000 Feet 1:8,000

Alternative C-2 Cable Route
Map 5 of 15



Alternative C-2 - Onshore Export Cable Route

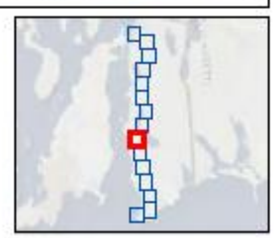
Source: Mayflower Wind 2022.

N

0 500 1,000 Feet
1:8,000

Alternative C-2 Cable Route
Map 6 of 15

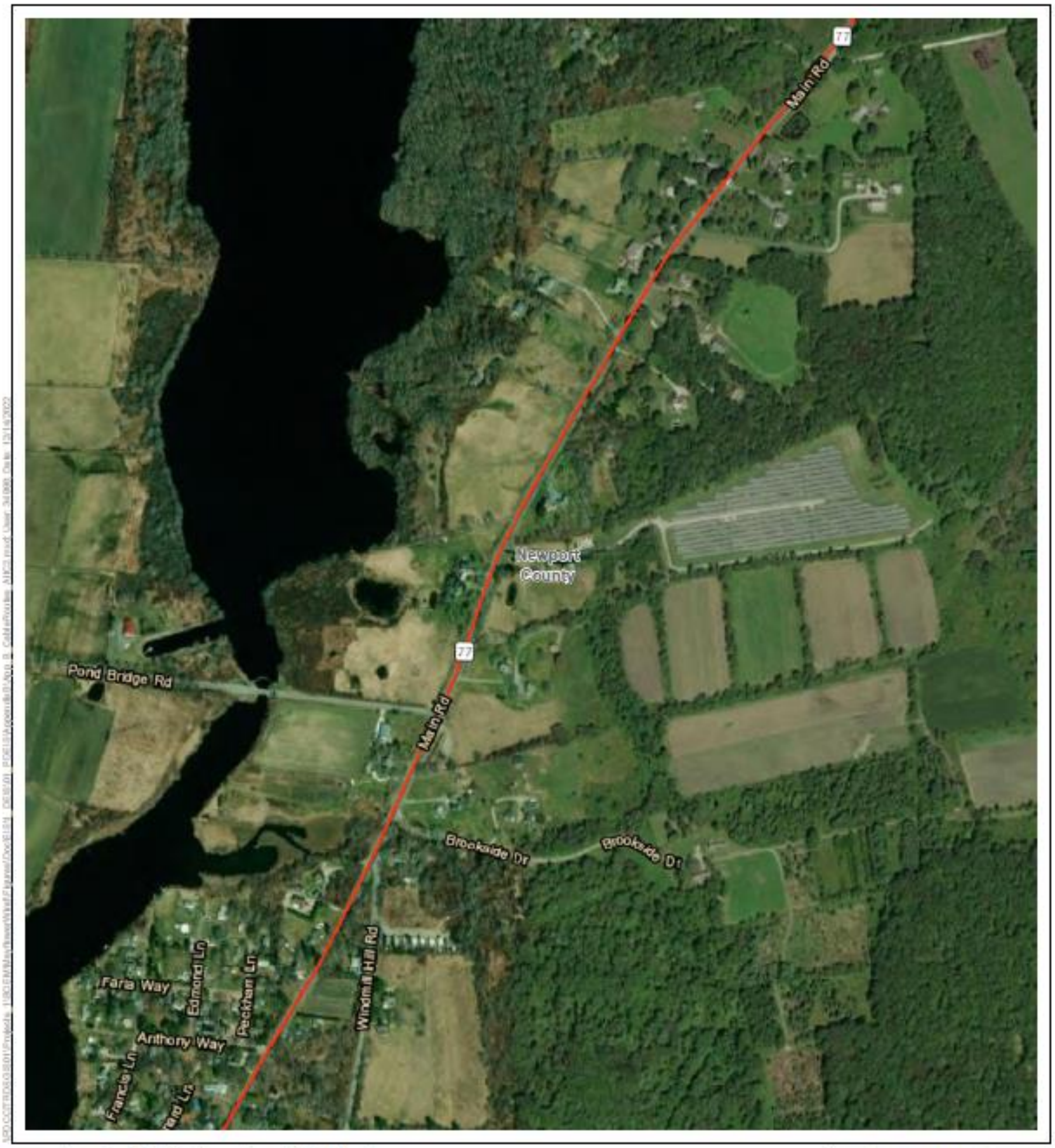
Alternative C-2 - Onshore Export Cable Route



Source: Mayflower Wind 2022.

N 0 500 1,000 Feet 1:8,000

Alternative C-2 Cable Route
Map 7 of 15



Alternative C-2 - Onshore Export Cable Route

Source: Mayflower Wind 2022.

N

0 500 1,000 Feet

1:8,000

Alternative C-2 Cable Route
Map 8 of 15

Alternative C-2 - Onshore Export Cable Route

Source: Mayflower Wind 2022.

N

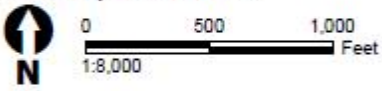
0 500 1,000 Feet

1:8,000

Alternative C-2 Cable Route
Map 9 of 15

Alternative C-2 - Onshore Export Cable Route

Source: Mayflower Wind 2022.



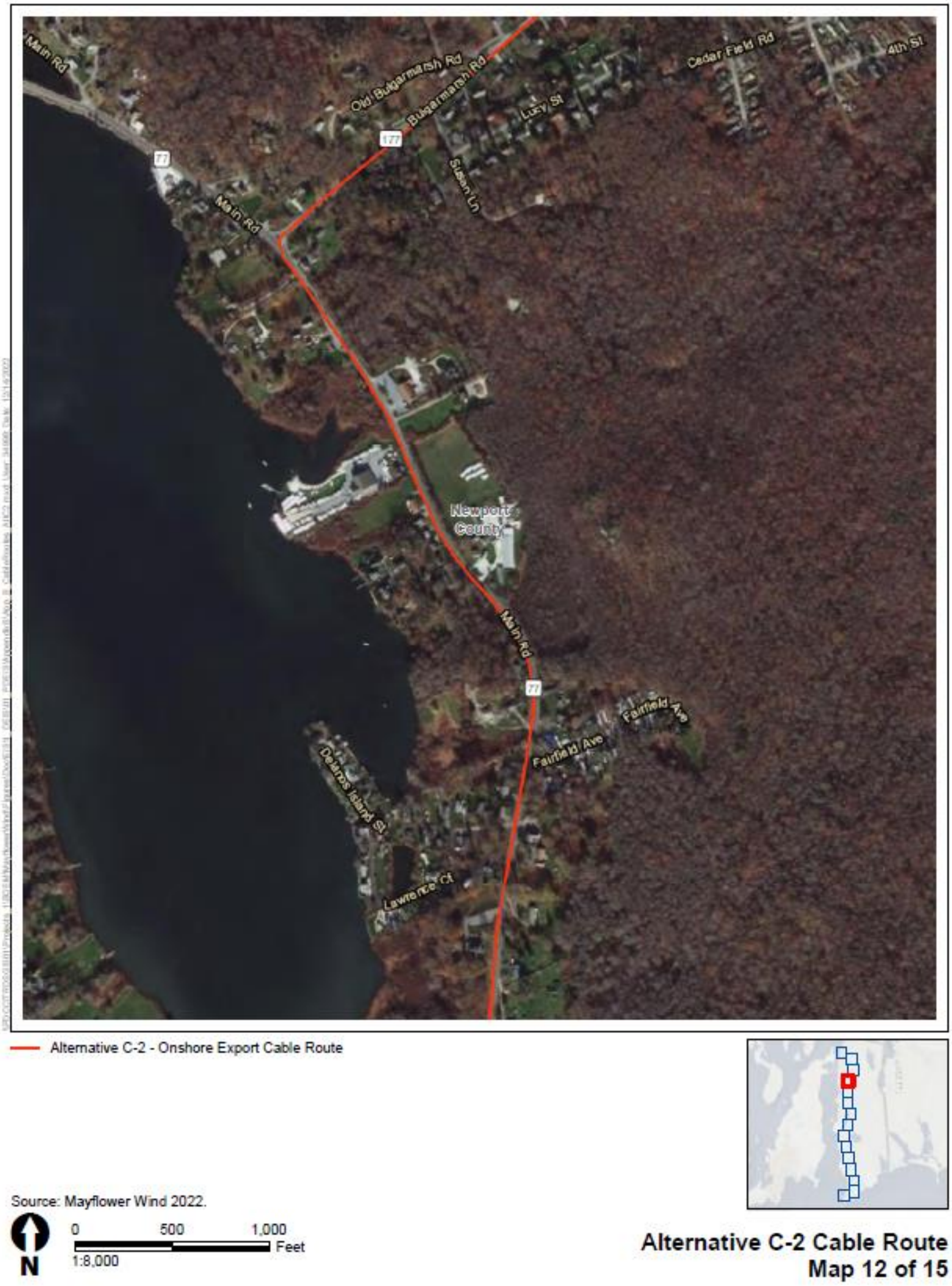
Alternative C-2 Cable Route
Map 10 of 15

Alternative C-2 - Onshore Export Cable Route

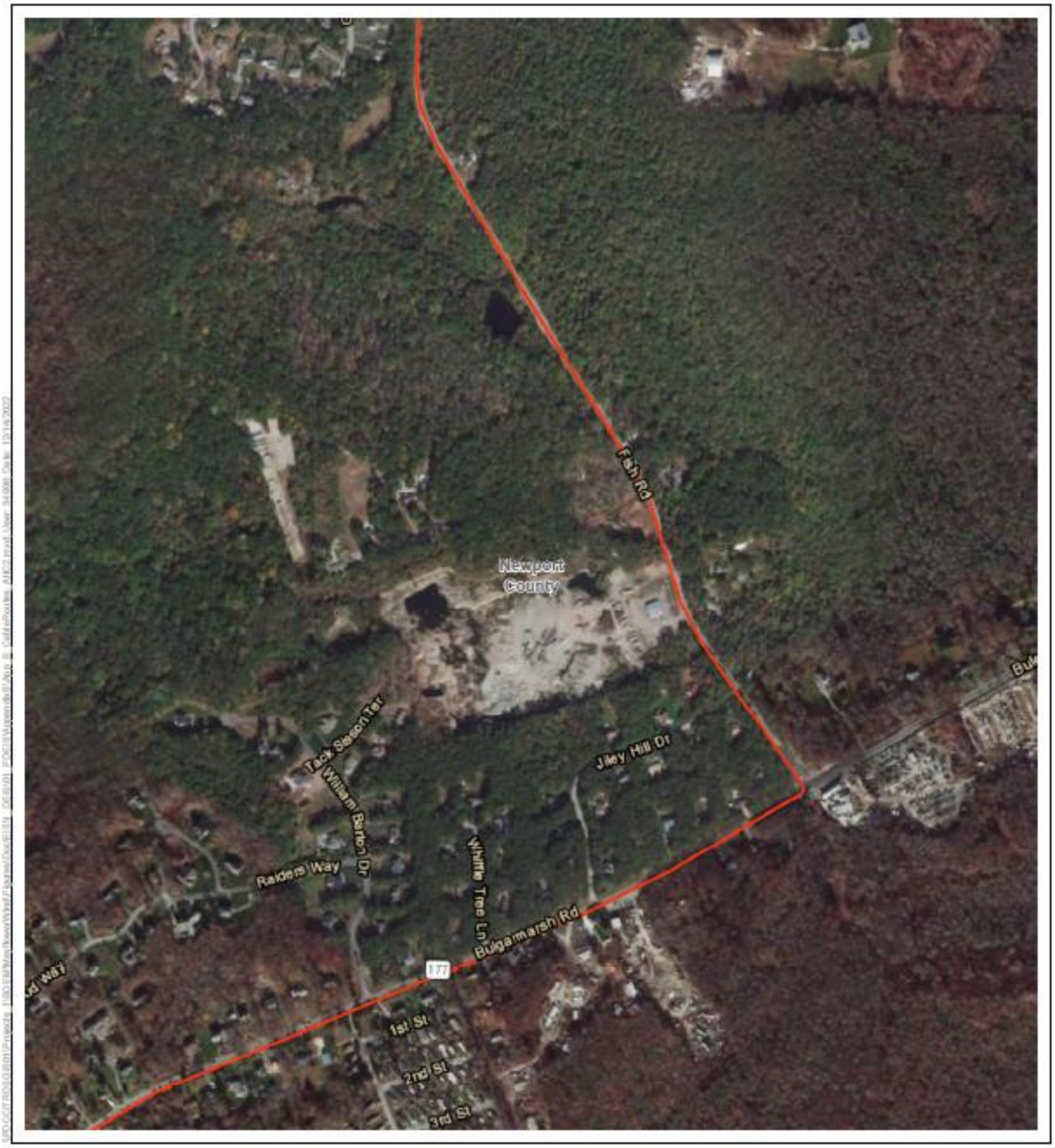
Source: Mayflower Wind 2022.

N 0 500 1,000 Feet
1:8,000

Alternative C-2 Cable Route
Map 11 of 15

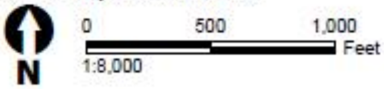


Alternative C-2 Cable Route
Map 12 of 15



Alternative C-2 - Onshore Export Cable Route

Source: Mayflower Wind 2022.



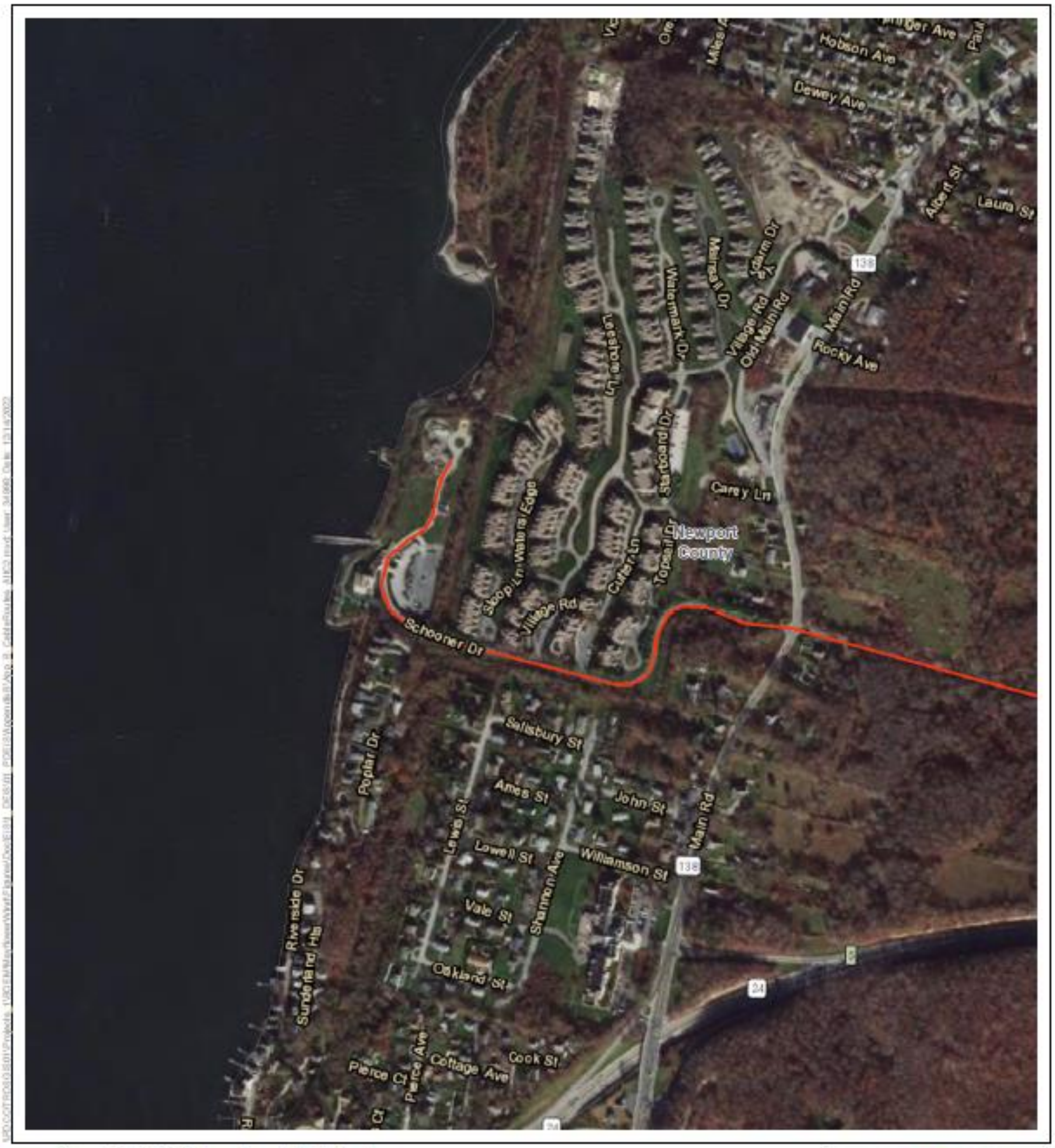
Alternative C-2 Cable Route
Map 13 of 15

— Alternative C-2 - Onshore Export Cable Route

Source: Mayflower Wind 2022.

N 0 500 1,000 Feet 1:8,000

Alternative C-2 Cable Route
Map 14 of 15



Alternative C-2 - Onshore Export Cable Route

Source: Mayflower Wind 2022.

N

0 500 1,000 Feet

1:8,000

Alternative C-2 Cable Route
Map 15 of 15

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B.8.6 Water Quality

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Appendix C: Project Design Envelope and Maximum-Case Scenario

SouthCoast Wind Energy LLC (SouthCoast Wind) would implement a Project Design Envelope (PDE) concept. This concept allows SouthCoast Wind to define and bracket proposed project characteristics for environmental review and permitting while maintaining a reasonable degree of flexibility for selection and purchase of project components such as wind turbine generators (WTGs), foundations, submarine cables, and offshore substation platforms (OSPs).

The Bureau of Ocean Energy Management (BOEM) invited SouthCoast Wind and other lessees to submit construction and operations plans (COPs) using the PDE concept—providing 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 based on the PDE provided by SouthCoast Wind and analyzed in this 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 may enable BOEM to expedite review by beginning National Environmental Policy Act (NEPA) evaluations of COPs before a lessee has finalized all its design decisions.

This EIS assesses the impacts of the reasonable range of project designs that are described in the SouthCoast Wind COP by using the “maximum-case scenario” process. The maximum-case scenario analyzes the aspects of each design parameter that would result in the greatest impact for each physical, biological, and socioeconomic resource. This Final EIS considers the interrelationship between aspects of the PDE rather than simply viewing each design parameter independently. This EIS also analyzes the planned action impacts of the maximum-case scenario alongside other reasonably foreseeable past, present, and future actions.

Certain resources evaluated in this EIS may have multiple maximum-case scenarios, and the most impactful design parameters may not be the same for all resources. A summary of SouthCoast Wind’s PDE parameters is provided in Table C-1. Table C-2 details the full range of maximum-case design parameters for the proposed Project and which parameters are relevant to the analysis for each EIS Section in Chapter 3, *Affected Environment and Environmental Consequences*.

Table C-1. Summary of PDE parameters

Project Parameter Details
General (Layout and Project Size)
• Up to 147 WTGs • Up to 5 OSPs • Up to a total of 149 WTG/OSP positions • 1 nautical mile (nm) x 1 nm (1.9 kilometers x 1.9 kilometers) grid layout with east–west and north–south orientation • Project to be developed in two parts or projects: Project 1 refers to the development in the northern portion of the Lease Area and associated interconnection, and Project 2 refers to the development in the southern portion of the Lease Area and associated interconnection.
Foundations
• Monopile, piled jacket, and/or suction-bucket jacket (maximum 85 suction-bucket jacket foundations for Project 2) • Scour protection for up to all foundations • Seabed penetration up to 262.4 feet (80 meters) depth • Foundation piles would be installed using a pile-driving hammer and/or drilling techniques such as using a hydraulic impact hammer, vibratory hammer, or water jetting
Wind Turbine Generators
• Rotor diameter up to 918.6 feet (280 meters) • Blade length up to 452.8 feet (138 meters) • Hub height up to 605.1 feet (184.4 meters) above mean lower low water (MLLW) • Upper blade tip height up to 1,066.3 feet (325 meters) above MLLW • Lowest blade tip height (air gap) 75.5 feet (23 meters) above highest astronomical tide
Offshore Substation Platforms
• Up to five OSPs • OSPs installed atop a monopile, piled jacket, and/or suction-bucket jacket • OSPs may use high voltage direct current (HVDC) or high voltage alternating current (HVAC) technology • Total OSP structure height up to 344.5 feet (105 meters) above MLLW • Scour protection for all foundations • Maximum length and width of topside structure 360.9 feet by 328.1 feet (110 meters by 100 meters; with ancillary facilities) • Foundation piles to be installed using a pile-driving hammer and/or drilling techniques such as using a hydraulic impact hammer, vibratory hammer, or water jetting. • Each HVDC converter OSP will use less than 10 million gallons per day of once-through non-contact cooling water and a maximum end-of-pipe discharge temperature of 86°F (30°C)
Interarray Cables
• Anticipated burial depth of 3.2 to 8.2 feet (1 to 2.5 meters) • Nominal interarray cable voltage: 60 kilovolt (kV) to 72.5 kV • Maximum interarray cable diameter of 1.24 inches (800 millimeter) • Maximum total interarray cable length is 497.1 miles (800 kilometers) • Preliminary layout available; however, final layout pending • Cable lay, installation, and burial: Activities may involve use of a jetting remotely operated vessel (ROV), mechanical cutting ROV system, plowing (pre-cut and mechanical)

Project Parameter Details
Falmouth Offshore Export Cables [a]
• Up to 5 offshore export cables (4 power cables and 1 communications cable) • Nominal export cable voltage: 200 kV to 345 kV HVAC or ±525 kV HVDC • Maximum total export cable corridor length is 87 miles (140 kilometers) • Maximum export cable length is 434.9 miles (700 kilometers • Anticipated burial depth of 3.2 to 13.1 feet (1 to 4 meters); target burial depth of 6 feet (1.8 meters) • Up to 9 cable / pipeline crossings • Cable lay, installation, and burial: Activities may involve use of a jetting tool (jetting ROV or jetting sled), vertical injection, mechanical cutting ROV system, plowing (pre-cut and mechanical)
Brayton Point Offshore Export Cables
• Up to 6 offshore export cables (2 cable bundles consisting of 2 power cables and 1 communications cable per bundle) • Nominal export cable voltage: ±320 kV HVDC • Maximum total export cable corridor length is 124 miles (200 kilometers) • Maximum export cable length is 744 miles (1,200 kilometers) • Anticipated burial depth of 3.2 to 13.1 feet (1 to 4 meters); target burial depth of 6 feet (1.8 meters) • Up to 16 cable/pipeline crossings • Cable lay, installation, and burial: Activities may involve use of a jetting tool (jetting ROV or jetting sled), vertical injection, mechanical cutting ROV system, plowing (pre-cut and mechanical)
Falmouth Landfall Site [a]
• Three landfall locations under consideration: Worcester Avenue (preferred), Central Park, and Shore Street
Brayton Point Landfall Site
• Two landfall locations under consideration: the western (preferred) and eastern (alternate) shorelines of Brayton Point • Aquidneck Island, Portsmouth, Rhode Island; several locations under consideration for intermediate landfall across the island
Falmouth Onshore Export Cable Corridor[a]
• Up to 12 onshore export cables and up to five communications cables • Nominal underground onshore export cable voltage: 200 kV to 345 kV HVAC • Maximum onshore export cable length is 6.4 statute miles (10.3 kilometers)
Brayton Point Onshore Export Cable Corridor
• Up to 6 onshore export cables and up to two communications cables • Nominal underground onshore export cable voltage: ±320 kV HVDC • Maximum onshore export cable length is 0.7 mile (1.1 kilometer)
Brayton Point Onshore Export Cable Corridor on Aquidneck Island (intermediate landfall)
• Up to 4 onshore export cables and up to two communications cables • Nominal underground onshore export cable voltage: ±320 kV HVDC • Onshore export cable corridor length is 3 miles (4.8 kilometers) across Aquidneck Island

Project Parameter Details
Falmouth Onshore Substation/Interconnection [a]
• Two Falmouth locations under consideration - Lawrence Lynch (preferred) and Cape Cod Aggregates (alternate) • Up to 26 acres (10.5 hectares) permanent area • New 345-kV overhead (preferred) or underground (alternate) transmission line in existing right-of-way up to 2.1 miles (3.4 kilometers) in length • Transmission line to Falmouth point of interconnection would be designed, permitted, and constructed by interconnection transmission owner
Brayton Point Converter Station/Interconnection
• One Brayton Point location under consideration – existing National Grid substation • Up to two new HVDC converter stations • Up to 7.5 acres (3 hectares) permanent area for each converter station • New 345-kV underground transmission route to existing Brayton Point point of interconnection, up to 0.2 mile (0.3 kilometer) on Brayton Point property

[a] To be developed only if Falmouth is the selected point of interconnection for Project 2.

Table C-2. Project design envelope maximum-case scenario per resource

Design Parameter	Maximum Design Parameters	3.4.1 Air Quality	3.4.2 Water Quality	3.5.1 Bats	3.5.2 Benthic Resources	3.5.3 Birds	3.5.4 Coastal Habitat and Fauna	3.5.5 Finfish, Invertebrates, and Essential Fish Habitat	3.5.6 Marine Mammals	3.5.7 Sea Turtles	3.5.8 Wetlands and Other Waters of the United States	3.6.1 Commercial Fisheries and For-Hire Recreational Fishing	3.6.2 Cultural Resources	3.6.3 Demographics, Employment, and Economics	3.6.4 Environmental Justice	3.6.5 Land Use and Coastal Infrastructure	3.6.6 Navigation and Vessel Traffic	3.6.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)	3.6.8 Recreation and Tourism	3.6.9 Visual Resources
WIND FARM																				
Wind Facility Capacity	Up to 2,400 megawatts (MW)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WTG Foundation Arrangement Envelope	1 nm x 1 nm (1.9 kilometers x 1.9 kilometers)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WIND TURBINES																				
Parameters per Turbine																				
Number of WTG/OSP positions	149 total WTGs and OSPs	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X
Number of WTGs installed	147 WTGs	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X
Tip height above mean lower low water (MLLW)	1,066.3 feet (325 meters)			X		X						X	X	X	X	X	X	X	X	X
Hub height above MLLW	605.1 feet (184.4 meters)			X		X						X	X	X	X	X	X	X	X	X
Rotor diameter	918.6 feet (280 meters)			X		X						X	X	X	X	X	X	X	X	X
Blade length	452.8 feet (138 meters)			X		X						X	X	X	X	X	X	X	X	X
Tip clearance above highest astronomical tide	75.5 feet (23 meters)			X		X						X	X	X	X	X	X	X	X	X
PARAMETERS PER WTG FOUNDATION STRUCTURE (COP Volume 1 Table 3-2)																				
WTG Pin-Piled Jacket (COP Volume 1 Table 3-2)																				
Diameter at seabed (seabed centerline diameter)	164.0 feet (50.0 meters)				X			X	X	X		X	X				X		X	
Foundation diameter	14.7 feet (4.5 meters)				X			X	X	X		X	X				X		X	
Footprint diameter across [a]	380.5 feet (116.0 meters)				X			X	X	X		X	X				X		X	
Number of legs/discrete contact points with seabed per substructure	4				X			X	X	X		X	X				X			
Depth of penetration below seabed with scour protection	229.6 feet (70.0 meters)				X			X	X	X		X	X						X	
WTG Monopile (COP Volume 1 Table 3-2)																				
Foundation diameter	52.5 feet (16.0 meters)				X			X	X	X		X	X				X		X	
Footprint diameter across [a]	374 feet (114.0 meters)				X			X	X	X		X	X				X		X	
Number of legs/discrete contact points with seabed per substructure	1				X			X	X	X		X	X				X		X	
Depth of penetration below seabed with scour protection	164.0 feet (50.0 meters)				X			X	X	X		X	X				X		X	
WTG Suction Bucket Jacket (COP Volume 1 Table 3-2)																				
Diameter of suction bucket at seabed (seabed centerline diameter)	180.4 feet (55.0 meters)				X			X	X	X		X	X				X		X	
Foundation diameter	65.6 feet (20.0 meters)				X			X	X	X		X	X				X		X	
Footprint diameter across [a]	521.6 feet (159.0 meters)				X			X	X	X		X	X				X		X	
Number of legs/discrete contact points with seabed per substructure	4				X			X	X	X		X	X				X		X	
Depth of penetration below seabed with scour protection	65.6 feet (20.0 meters)				X			X	X	X		X	X				X		X	

Design Parameter	Maximum Design Parameters	3.4.1 Air Quality	3.4.2 Water Quality	3.5.1 Bats	3.5.2 Benthic Resources	3.5.3 Birds	3.5.4 Coastal Habitat and Fauna	3.5.5 Finfish, Invertebrates, and Essential Fish Habitat	3.5.6 Marine Mammals	3.5.7 Sea Turtles	3.5.8 Wetlands and Other Waters of the United States	3.6.1 Commercial Fisheries and For-Hire Recreational Fishing	3.6.2 Cultural Resources	3.6.3 Demographics, Employment, and Economics	3.6.4 Environmental Justice	3.6.5 Land Use and Coastal Infrastructure	3.6.6 Navigation and Vessel Traffic	3.6.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)	3.6.8 Recreation and Tourism	3.6.9 Visual Resources
OFFSHORE SUBSTATIONS																				
PARAMETERS PER OSP FOUNDATION STRUCTURE																				
Topside Offshore Substations																				
Number of OSPs	Up to 5	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X
Height of OSP topside above MLLW	344.5 feet (105 meters)			X	X							X	X				X	X		X
PARAMETERS PER OSP FOUNDATION STRUCTURE (COP Volume 1 Table 3-3) – Option A Modular																				
OSP Monopile (COP Volume 1 Table 3-3)																				
Number of OSPs	Up to 5	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X
Diameter at seabed (seabed centerline diameter)	52.5 feet (16.0 meters)				X			X	X	X		X	X				X		X	
Footprint diameter at mudline	52.5 feet (16.0 meters)				X			X	X	X		X	X				X		X	
Number of legs/discrete contact points with seabed per substructure	1				X			X	X	X		X	X				X		X	
Depth of penetration below seabed with scour protection	164.0 feet (50.0 meters)				X			X	X	X		X	X				X		X	
Total foundation footprint contacting seabed per foundation [a]	2.52 acres (1.02 hectares)				X			X	X	X		X	X				X		X	
OSP Pin-Pile Jacket (COP Volume 1 Table 3-3)																				
Number of OSPs	Up to 5	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X
Diameter at seabed (seabed centerline diameter)	164.0 feet (50.0 meters)				X			X	X	X		X	X				X		X	
Foundation diameter (pile or bucket diameter at mudline)	14.7 feet (4.5 meters)				X			X	X	X		X	X				X		X	
Number of legs/discrete contact points with seabed per substructure	Up to 4 foundations and up to 2 piles per foundation				X			X	X	X		X	X				X		X	
Depth of penetration below seabed with scour protection	229.6 feet (70.0 meters)				X			X	X	X		X	X				X		X	
Distance between adjacent legs at seabed	116 feet (36 meters)				X			X	X	X		X	X				X		X	
Total foundation footprint contacting seabed per foundation [a]	2.61 acres (1.05 hectares)				X			X	X	X		X	X				X		X	
OSP Suction-Bucket Jacket (COP Volume 1 Table 3-3)																				
Number of OSPs	Up to 5	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X
Diameter of suction bucket at seabed (seabed centerline diameter)	180.4 feet (55.0 meters)				X			X	X	X		X	X				X		X	
Foundation diameter (pile or bucket diameter at mudline)	65.6 feet (20.0 meters)				X			X	X	X		X	X				X		X	
Number of legs/discrete contact points with seabed per substructure	Up to 4 foundations and 1 bucket per foundation				X			X	X	X		X	X				X		X	
Depth of penetration below seabed with scour protection	65.6 feet (20.0 meters)				X			X	X	X		X	X				X		X	
Distance between adjacent legs at seabed	65.6 feet (20.0 meters)				X			X	X	X		X	X				X		X	
Total foundation footprint contacting seabed per foundation [a]	4.90 acres (1.98 hectares)				X			X	X	X		X	X				X		X	

Design Parameter	Maximum Design Parameters	3.4.1 Air Quality	3.4.2 Water Quality	3.5.1 Bats	3.5.2 Benthic Resources	3.5.3 Birds	3.5.4 Coastal Habitat and Fauna	3.5.5 Finfish, Invertebrates, and Essential Fish Habitat	3.5.6 Marine Mammals	3.5.7 Sea Turtles	3.5.8 Wetlands and Other Waters of the United States	3.6.1 Commercial Fisheries and For-Hire Recreational Fishing	3.6.2 Cultural Resources	3.6.3 Demographics, Employment, and Economics	3.6.4 Environmental Justice	3.6.5 Land Use and Coastal Infrastructure	3.6.6 Navigation and Vessel Traffic	3.6.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)	3.6.8 Recreation and Tourism	3.6.9 Visual Resources
PARAMETERS PER OSP FOUNDATION STRUCTURE (COP Volume 1 Table 3-3) – Option B Integrated																				
OSP Pin-Pile Jacket (COP Volume 1 Table 3-3)																				
Number of OSPs	Up to 5	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X
Diameter at seabed (seabed centerline diameter)	213 feet x 105 feet (65 meters x 32 meters)				X			X	X	X		X	X				X		X	
Foundation diameter (pile or bucket diameter at mudline)	11.7 feet (3.57 meters)				X			X	X	X		X	X				X		X	
Number of legs/discrete contact points with seabed per substructure	Up to 6 foundations and up to 3 piles per foundation				X			X	X	X		X	X				X		X	
Depth of penetration below seabed with scour protection	277.2 feet (84.5 meters)				X			X	X	X		X	X				X		X	
Foundation diameter/leg spacing at mean sea level (MSL)	114.8–168.0 feet (35–50 meters				X			X	X	X		X	X				X		X	
Total foundation footprint contacting seabed per foundation [a]	7.54 acres (3.05 hectares)				X			X	X	X		X	X				X		X	
PARAMETERS PER OSP FOUNDATION STRUCTURE (COP Volume 1 Table 3-3) – Option C DC Converter																				
OSP Pin-Pile Jacket (COP Volume 1 Table 3-3)																				
Number of OSPs	Up to 5	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X
Diameter at seabed (seabed centerline diameter)	279 feet x 197 feet (85 meters x 60 meters)				X			X	X	X		X	X				X		X	
Foundation diameter (pile or bucket diameter at mudline)	12.8 feet (3.9 meters)				X			X	X	X		X	X				X		X	
Number of legs/discrete contact points with seabed	4 foundations and 1 to 4 piles / foundation = 4 to 16 piles				X			X	X	X		X	X				X		X	
Depth of penetration below seabed with scour protection	262.4 feet (80 meters)				X			X	X	X		X	X				X		X	
Total foundation footprint contacting seabed per foundation [a]	9.79 acres (3.96 hectares)				X			X	X	X		X	X				X		X	
PERMANENT SEABED DISTURBANCE (COP Volume 1 Table 3-36; Table 3-37)																				
Monopile WTG Substructures (COP Volume 1 Table 3-37)																				
Total permanent footprint per foundation [a]	2.52 acres (1.02 hectares)		X		X			X	X	X		X	X				X		X	
Total permanent footprint for 147 WTG foundations [a]	370.44 acres (149.94 hectares)		X		X			X	X	X		X	X				X		X	
Pin-Pile Jacket WTG Substructures (COP Volume 1 Table 3-37)																				
Total permanent footprint per foundation [a]	2.61 acres (1.05 hectares)		X		X			X	X	X		X	X				X		X	
Total permanent footprint for 147 WTG foundations [a]	383.67 acres (154.35 hectares)		X		X			X	X	X		X	X				X		X	
Pin-Pile Jacket OSP Substructures (COP Volume 1 Table 3-36)																				
Total permanent footprint per OSP foundation [a]	9.8 acres (3.7 hectares)		X		X			X	X	X		X	X				X		X	
Total permanent footprint for 2 OSP foundations [a]	19.6 acres (7.4 hectares)		X		X			X	X	X		X	X				X		X	

Design Parameter	Maximum Design Parameters	3.4.1 Air Quality	3.4.2 Water Quality	3.5.1 Bats	3.5.2 Benthic Resources	3.5.3 Birds	3.5.4 Coastal Habitat and Fauna	3.5.5 Finfish, Invertebrates, and Essential Fish Habitat	3.5.6 Marine Mammals	3.5.7 Sea Turtles	3.5.8 Wetlands and Other Waters of the United States	3.6.1 Commercial Fisheries and For-Hire Recreational Fishing	3.6.2 Cultural Resources	3.6.3 Demographics, Employment, and Economics	3.6.4 Environmental Justice	3.6.5 Land Use and Coastal Infrastructure	3.6.6 Navigation and Vessel Traffic	3.6.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)	3.6.8 Recreation and Tourism	3.6.9 Visual Resources
Suction Bucket Jacket WTG Substructures (COP Volume 1 Table 3-37)																				
Total permanent footprint per foundation [a]	4.90 acres (1.98 hectares)		X		X			X	X	X		X	X				X		X	
Total permanent footprint for 147 WTG foundations (assumes 85 suction-bucket jacket substructures [maximum considered under the Proposed Action] and pin-pile jackets for the remaining 62 WTG positions) [a]	578.32 acres (233.4 hectares)		X		X			X	X	X		X	X				X		X	
TEMPORARY SEABED DISTURBANCE DURING CONSTRUCTION																				
Monopile WTG Substructures (COP Volume 1 Table 3-37; Table 3-38)																				
Disturbance due to jack-up or anchored vessels per foundation	2.96 acres (1.2 hectares)		X		X			X	X	X		X	X				X		X	
Total temporary seabed disturbance beyond permanent footprint per foundation	0.5 acre (0.2 hectare)		X		X			X	X	X		X	X				X		X	
Total temporary seabed disturbance beyond permanent footprint for 147 WTG foundations	73.5 acres (29.4 hectares)		X		X			X	X	X		X	X				X		X	
Pin-Pile Jacket WTG Substructures (Table 3-37; Table 3-38)																				
Disturbance due to jack-up or anchored vessels per foundation	2.96 acres (1.2 hectares)		X		X			X	X	X		X	X				X		X	
Total temporary seabed disturbance beyond permanent footprint per foundation	0.5 acre (0.2 hectare)		X		X			X	X	X		X	X				X		X	
Total temporary seabed disturbance beyond permanent footprint for 147 WTG foundations	73.5 acres (29.4 hectares)		X		X			X	X	X		X	X				X		X	
Pin-Pile Jacket OSP Substructures (COP Volume 1 Table 3-36; Table 3-38)																				
Disturbance due to jack-up or anchored vessels per foundation	2.96 acres (1.2 hectares)		X		X			X	X	X		X	X				X		X	
Total temporary seabed disturbance beyond permanent footprint per foundation	0.5 acre (0.2 hectare)		X		X			X	X	X		X	X				X		X	
Total temporary seabed disturbance beyond permanent footprint for 2 OSP foundations	1.0 acres (0.4 hectare)		X		X			X	X	X		X	X				X		X	
Suction Bucket Jacket WTG Substructures (COP Volume 1 Table 3-37; Table 3-38)																				
Disturbance due to jack-up or anchored vessels per foundation	2.96 acres (1.2 hectares)		X		X			X	X	X		X	X				X		X	
Total temporary seabed disturbance beyond permanent footprint per foundation	0.6 acre (0.3 hectare)		X		X			X	X	X		X	X				X		X	
Total temporary seabed disturbance beyond permanent footprint for 147 WTG foundations (assumes 85 suction-bucket jacket substructures [maximum considered under the Proposed Action] and pin-pile jackets for the remaining 62 WTG positions)	82 acres (37.9 hectares)		X		X			X	X	X		X	X				X		X	
Installation Timeframe																				
Monopile																				
Approximate duration per foundation	4 hours	X	X	X	X	X		X	X	X		X					X		X	
Number of piles driven per day	2	X	X	X	X	X		X	X	X		X					X		X	

Design Parameter	Maximum Design Parameters	3.4.1 Air Quality	3.4.2 Water Quality	3.5.1 Bats	3.5.2 Benthic Resources	3.5.3 Birds	3.5.4 Coastal Habitat and Fauna	3.5.5 Finfish, Invertebrates, and Essential Fish Habitat	3.5.6 Marine Mammals	3.5.7 Sea Turtles	3.5.8 Wetlands and Other Waters of the United States	3.6.1 Commercial Fisheries and For-Hire Recreational Fishing	3.6.2 Cultural Resources	3.6.3 Demographics, Employment, and Economics	3.6.4 Environmental Justice	3.6.5 Land Use and Coastal Infrastructure	3.6.6 Navigation and Vessel Traffic	3.6.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)	3.6.8 Recreation and Tourism	3.6.9 Visual Resources
Piled Jacket																				
Approximate duration per foundation	2 hours	X	X	X	X	X		X	X	X		X					X		X	
Number of piles driven per day	8	X	X	X	X	X		X	X	X		X					X		X	
Temporary Seabed Disturbance During WTG Construction (COP Volume 1 Table 3-37; Table 3-38)																				
Area of seabed preparation per foundation monopile	0.5 acre (0.2 hectare)		X		X			X	X	X		X	X				X		X	
Area of seabed preparation per foundation pin-pile jacket	0.5 acre (0.2 hectare)		X		X			X	X	X		X	X				X		X	
Area of seabed preparation per foundation suction-bucket jacket	0.6 acre (0.3 hectare)		X		X			X	X	X		X	X				X		X	
Area of disturbance per jack-up vessel (vessel spuds including all legs)	0.37 acre (0.15 hectare)		X		X			X	X	X		X	X				X		X	
Number of vessel visits per WTG location	6 to 8	X	X		X			X	X	X		X	X	X	X		X		X	
Temporary Seabed Disturbance During OSP Construction (COP Volume 1 Table 3-36; Table 3-38)																				
Area of seabed preparation per foundation pin-pile jacket	0.5 acre (0.2 hectare)		X		X			X	X	X		X	X				X		X	
Number of vessel visits per OSP location	4	X	X		X			X	X	X		X	X	X	X		X		X	
Temporary Seabed Disturbance During WTG/OSP Construction (COP Volume 1 Table 3-38)																				
Total jack-up vessel spud seabed footprint area (149 WTG/OSP locations)	441.8 acres (178.8 hectares)		X		X			X	X	X		X	X				X		X	
INTERARRAY and EXPORT CABLES																				
Interarray Cable (COP Volume 1 Table 3-12; Table 3-30)																				
Cable diameter	1.24 inches (800 millimeter)		X		X	X		X	X	X		X	X				X	X		
Nominal cable voltage (AC)	72.5 kV				X			X	X	X										
Number of WTGs per interarray cable string	1 to up to 9				X								X	X			X	X		
Seabed preparation (assumes local boulder removal and grapnel run over entire length; sand wave and boulder field clearance is not expected in the Lease Area in preparation for interarray cable installation)	99 acres (40 hectares)		X		X	X		X	X	X		X	X	X		X	X			
Cable installation (assumed 19.7 feet [6 meters] of surface impact around each cable)	1,186 acres (480 hectares)		X		X	X		X	X	X		X	X	X		X	X			
Cable protection (assumes mattresses or rock placement at cable crossings and as needed; assumes 10 percent of the interarray cable will require additional protection; a 19.7-foot (6-meter)-wide rock berm would be constructed along these cable sections)	122 acres (50 hectares)		X		X	X						X	X	X			X	X	X	
Total area disturbed	1,408 acres (570 hectares)		X		X	X		X	X	X		X	X	X		X	X		X	
Interarray cable length	497.1 miles (800 kilometers)	X			X	X		X	X	X		X	X	X			X	X	X	
Target burial depth	8.2 feet (2.5 meters)				X	X		X	X	X		X	X				X	X	X	
Number of cable/pipeline crossings	Up to 10				X													X		

Design Parameter	Maximum Design Parameters	3.4.1 Air Quality	3.4.2 Water Quality	3.5.1 Bats	3.5.2 Benthic Resources	3.5.3 Birds	3.5.4 Coastal Habitat and Fauna	3.5.5 Finfish, Invertebrates, and Essential Fish Habitat	3.5.6 Marine Mammals	3.5.7 Sea Turtles	3.5.8 Wetlands and Other Waters of the United States	3.6.1 Commercial Fisheries and For-Hire Recreational Fishing	3.6.2 Cultural Resources	3.6.3 Demographics, Employment, and Economics	3.6.4 Environmental Justice	3.6.5 Land Use and Coastal Infrastructure	3.6.6 Navigation and Vessel Traffic	3.6.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)	3.6.8 Recreation and Tourism	3.6.9 Visual Resources
Offshore Export Cable (COP Volume 1 Table 3-29; Table 3-14) – Falmouth [b]																				
Number of export cables	Up to 5	X	X		X	X		X	X	X		X	X	X		X	X	X	X	
Nominal cable voltage	345 kV (HVAC) ±525 kV (HVDC)				X			X	X	X										
Burial depth	13.1 feet (4 meters)				X	X		X	X	X		X	X				X	X	X	
Export cable diameter (excluding cable protection)	13.8 inches (350.0 millimeters)		X		X	X		X	X	X		X	X				X	X		
Maximum Length of export cable	434.9 miles (700 kilometers)	X	X		X	X		X	X	X		X	X				X	X		
Length of Offshore cable corridor	87.0 miles (140 kilometers)		X		X	X		X	X	X		X	X				X	X		
Export cable corridor width	3,280.8 feet (1,000 meters)		X		X	X		X	X	X		X	X				X	X		
Number of cable/pipeline crossings (COP Volume 1 Table 3-15)	Up to 9				X													X		
Typical separation distance of export cable	328 feet (100 meters)		X		X	X						X	X				X	X		
Seabed preparation (per cable) (assumes suction hopper dredger over 5 percent of route; boulder field clearance 10 percent of route; grapnel run over the entire route)	138 acres (56 hectares)		X		X	X		X	X	X		X	X	X		X	X			
Cable installation (per cable) (assumes surface impact of 19.7 feet [6 meters] around each cable)	186 acres (75 hectares)		X		X	X		X	X	X		X	X	X		X	X			
Cable protection (per cable) (an estimated 10 percent of the route will require additional cable protection. It is assumed that a 19.7 foot- (6 meter)-wide rock berm will be constructed)	27 acres (11 hectares)		X		X	X		X	X	X		X	X	X		X	X			
Total seabed disturbance area (per cable)	351 acres (142 hectares)		X		X	X		X	X	X		X	X	X		X	X		X	
Total seabed disturbance area (5 cables)	1,753 acres (709 hectares)		X		X	X		X	X	X		X	X	X		X	X		X	
Offshore Export Cable (COP Volume 1 Table 3-29; Table 3-14) – Brayton Point																				
Number of export cable bundles (each bundle consisting of two power cables and one communication cable)	Up to 2	X	X		X	X		X	X	X		X	X	X		X	X	X	X	
Nominal cable voltage (HVDC)	±320 kV				X			X	X	X										
Export cable diameter (excluding cable protection)	6.9 inches (175.0 millimeters)		X		X	X		X	X	X		X	X				X	X		
Burial depth	13.1 feet (4 meters)				X	X		X	X	X		X	X				X	X	X	
Maximum length of export cable	744 miles (1,200 kilometers)	X	X		X	X		X	X	X		X	X				X	X		
Length of Offshore cable corridor	124 miles (200 kilometers)		X		X	X		X	X	X		X	X				X	X		
Export cable corridor width	2,300 feet (700 meters)		X		X	X		X	X	X		X	X				X	X		
Number of cable/pipeline crossings (COP Volume 1 Table 3-15)	Up to 16				X													X		
Typical separation distance of export cable	164 feet (50 meters)		X		X	X						X	X				X	X		
Seabed preparation (per cable bundle) (boulder field clearance 10 percent of route; grapnel run over the entire route)	65 acres (26 hectares)		X		X	X		X	X	X		X	X	X		X	X			
Cable installation (per cable bundle) (assumes surface impact of 19.7 feet [6 meters] around each cable)	242 acres (98 hectares)		X		X	X		X	X	X		X	X	X		X	X			

Design Parameter	Maximum Design Parameters	3.4.1 Air Quality	3.4.2 Water Quality	3.5.1 Bats	3.5.2 Benthic Resources	3.5.3 Birds	3.5.4 Coastal Habitat and Fauna	3.5.5 Finfish, Invertebrates, and Essential Fish Habitat	3.5.6 Marine Mammals	3.5.7 Sea Turtles	3.5.8 Wetlands and Other Waters of the United States	3.6.1 Commercial Fisheries and For-Hire Recreational Fishing	3.6.2 Cultural Resources	3.6.3 Demographics, Employment, and Economics	3.6.4 Environmental Justice	3.6.5 Land Use and Coastal Infrastructure	3.6.6 Navigation and Vessel Traffic	3.6.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)	3.6.8 Recreation and Tourism	3.6.9 Visual Resources
Cable protection (per cable bundle) (an estimated 15 percent of the route will require additional cable protection. It is assumed that a 19.7-foot (6-meter)-wide rock berm will be constructed	56 acres (23 hectares)		X		X	X		X	X	X		X	X	X		X	X			
Seabed disturbance area (per cable bundle)	363 acres (147 hectares)		X		X	X		X	X	X		X	X	X		X	X		X	
Total seabed disturbance area (2 cables bundles)	727 acres (294 hectares)		X		X	X		X	X	X		X	X	X		X	X		X	
Onshore Components Falmouth (COP Volume 1 Table 3-18; Table 3-19; Table 3-34; Table 3-39) [b]																				
Landfall locations	Worcester Avenue; Shore Street; or Central Park		X	X		X	X				X		X	X	X	X			X	X
Landfall transition method	horizontal directional drilling (HDD)		X	X	X	X	X				X		X			X				
Number of sea to shore HDDs	Up to 4		X	X	X	X	X				X		X			X				
Area of disturbance per HDD	0.1 acre (0.04 hectare)		X	X		X	X				X		X			X				
Total area of HDD disturbance	0.4 acre (0.16 hectare)		X	X		X	X				X		X			X				
Onshore substation locations	Lawrence Lynch or Cape Cod Aggregates		X	X		X	X				X		X	X	X	X			X	X
Maximum distance from landfall to substation (Shore Street to Cape Cod Aggregates)	6.4 miles (10.25 kilometers)		X	X		X	X				X		X			X				
Number of Onshore export power cables	3 to 12		X	X		X	X				X		X			X				
Number of Onshore communications cables	1 to 5		X	X		X	X				X		X			X				
Number of Onshore continuity cables	1 to 4		X	X		X	X				X		X			X				
Approximate cable diameter	5.59 inches (142 millimeters)		X	X		X	X				X		X			X				
Nominal cable voltage (HVAC)	345 kV		X	X		X	X				X		X			X				
Transition joint bay (4 transition joint bays)	0.066 acre (0.027 hectare)		X	X		X	X				X		X			X				
Maximum case duct bank (direct buried duct bank arrangement 12 ducts)	10 acres (4 hectares)		X	X		X	X				X		X			X				
Buried splice vault (installed)	0.4 acre (0.2 hectare)		X	X		X	X				X		X			X				
Maximum case landfall construction	0.91 acre (0.37 hectare)		X	X		X	X				X		X			X				
Trench excavation area along duct bank route	12.4 acres (5 hectares)		X	X		X	X				X		X			X				
Splice vault work area (20 locations; 0.5 acre per location)	10 acres (4 hectares)		X	X		X	X				X		X			X				
Onshore substation (HVAC)	26 acres (10.5 hectares)		X	X		X	X				X		X			X				
Alternate Falmouth underground transmission line	18.86 acres (7.6 hectares)		X	X		X	X				X		X			X				
Onshore Components Brayton Point (COP Volume 1 Table 3-18; Table 3-20; Table 3-35; Table 3-39)																				
Landfall locations	East Brayton Point / West Brayton Point		X	X		X	X				X		X	X	X	X			X	X
Landfall transition method	HDD		X	X	X	X	X				X		X			X				
Number of sea to shore HDDs	Up to 12		X	X	X	X	X				X		X			X				

Design Parameter	Maximum Design Parameters	3.4.1 Air Quality	3.4.2 Water Quality	3.5.1 Bats	3.5.2 Benthic Resources	3.5.3 Birds	3.5.4 Coastal Habitat and Fauna	3.5.5 Finfish, Invertebrates, and Essential Fish Habitat	3.5.6 Marine Mammals	3.5.7 Sea Turtles	3.5.8 Wetlands and Other Waters of the United States	3.6.1 Commercial Fisheries and For-Hire Recreational Fishing	3.6.2 Cultural Resources	3.6.3 Demographics, Employment, and Economics	3.6.4 Environmental Justice	3.6.5 Land Use and Coastal Infrastructure	3.6.6 Navigation and Vessel Traffic	3.6.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)	3.6.8 Recreation and Tourism	3.6.9 Visual Resources
Area of disturbance per HDD	0.3 acre (0.12 hectare)		X	X		X	X				X		X			X				
Total area of HDD disturbance	1.20 acres (0.48 hectare)		X	X		X	X				X		X			X				
Onshore substation location	Existing National Grid Substation		X	X		X	X				X		X	X	X	X			X	X
Maximum length of onshore cable to Brayton Point	3,940 feet (1,200 meters)		X	X		X	X				X		X			X				
Maximum length of onshore cable at intermediate landfall on Aquidneck Island	3 miles (4.8 kilometers)		X	X		X	X				X		X			X				
Maximum distance from landfall to converter stations (Western Landfall Site)	0.6 mile (1.0 kilometers)		X	X		X	X				X		X			X				
Maximum distance from landfall to converter stations (Eastern Landfall Site)	0.7 mile (1.1 kilometers)		X	X		X	X				X		X			X				
Number of Onshore export power cables	1 to 4		X	X		X	X				X		X			X				
Number of Onshore communications cables	1 to 2		X	X		X	X				X		X			X				
Approximate cable diameter	5.9 inches (150 millimeters)		X	X		X	X				X		X			X				
Nominal cable voltage (HVDC)	±320 kV		X	X		X	X				X		X			X				
Maximum case duct bank (split duct bank, 4 power conduits)	1.8 acres (0.7 hectare)		X	X		X	X				X		X			X				
Buried transition joint bays and splice vaults (installed)	0.14 acre (0.06 hectare)		X	X		X	X				X		X			X				
Landfall construction area	3 acres (1.2 hectares)		X	X		X	X				X		X			X				
Trench excavation area along duct bank route (split duct bank installation)	2.7 acres (1.1 hectares)		X	X		X	X				X		X			X				
Buried transition and splice vault work area	0.11 acre (0.05 hectare)		X	X		X	X				X		X			X				
Number of converter stations (HVDC)	Up to 2		X	X		X	X				X		X			X				
Converter station (HVDC) (temporary and permanent impacts)	10 acres each (4.0 hectares)		X	X		X	X				X		X			X				
Alternate Brayton Point underground transmission line	0.2 acre (0.10 hectare)		X	X		X	X				X		X			X				

[a] Footprint includes combined area of foundation, scour protection, and mud mats
[b] To be developed only if Falmouth is the selected point of interconnection for Project 2.

Appendix D: Planned Activities Scenario

Contents

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D.1 Ongoing and Planned Activities Scenario

This appendix describes the other ongoing and planned activities that could occur in the geographic analysis area for each resource and contribute to baseline conditions and trends for resources considered in this Environmental Impact Statement (EIS). The SouthCoast Wind Project (Project) is the construction, operations and maintenance (O&M), and conceptual decommissioning of a wind energy facility proposed by SouthCoast Wind Energy LLC (SouthCoast Wind) in its Construction and Operations Plan (COP) within the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0521, approximately 26 nautical miles (nm) (48 kilometers [km]) south of Martha's Vineyard and 20 nm (37 km) south of Nantucket, Massachusetts.

The geographic analysis area varies for each resource as described in the individual resource sections of Chapter 3, *Affected Environment and Environmental Consequences*. BOEM anticipates that impacts could occur from the start of Project construction in 2024 through Project decommissioning. Construction of the Project is anticipated to be completed in approximately 3 years, and the decommissioning phase of the Project is anticipated to be around 35 years after construction is completed.[1] The geographic analysis area is defined by the anticipated geographic extent of impacts for each resource. For the mobile resources—bats, birds, finfish, and invertebrates; marine mammals; and sea turtles—the species potentially affected are those that occur in the area of impact of the Proposed Action. The geographic analysis area for these mobile resources is the general range of the species. The purpose is to capture the cumulative impacts on each of those resources that would be affected by the Proposed Action, as well as the impacts that would still occur under the No Action Alternative.

In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nm (miles used specifically for marine navigation). This appendix uses statute miles more commonly and refers to them simply as *miles*, whereas nm are referred to by name.

D.2 Ongoing and Planned Activities

This section includes a list and description of ongoing and planned activities that could contribute to baseline conditions and trends in the geographic analysis area for each resource topic analyzed in this EIS. Projects or actions that are considered speculative per the definition provided in 43 Code of Federal

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[1] SouthCoast Wind's lease with BOEM (Lease OCS-A 0521) has an operations term of 33 years that commences on the date of COP approval (https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/Lease-OCS-A-0521.pdf; see also 30 CFR 585.235(a)(3)). SouthCoast Wind would need to request and be granted an extension of its operations term from BOEM to operate the proposed Project for 35 years. While SouthCoast Wind has not made such a request, this EIS uses the longer period to avoid possibly underestimating any potential effects.

Regulations (CFR) 46.30[2] are noted in subsequent tables but excluded from the cumulative impact analysis in Chapter 3.

Ongoing and planned activities described in this section consist of 11 types of actions: (1) offshore wind energy development activities; (2) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); (3) tidal energy projects; (4) dredging and port improvement projects; (5) marine minerals use and ocean-dredged material disposal; (6) military use; (7) marine transportation; (8) fisheries use, management, and monitoring surveys; (9) global climate change; (10) oil and gas activities; and (11) onshore development activities.

BOEM analyzed the possible extent of future other offshore wind energy development activities on the Atlantic Outer Continental Shelf (OCS) to determine reasonably foreseeable cumulative effects measured by installed power capacity. Attachment 2, Table D2-1, represents the status of projects as of October 1, 2022. The methodology for developing the scenario is the same as for the Vineyard Wind 1 project and details of the scenario development are described in the Vineyard Wind 1 Final EIS (BOEM 2021a).

D.2.1 Offshore Wind Energy Development Activities

D.2.1.1 Site Characterization Studies

A lessee is required to provide the results of site characterization activities with its site assessment plan (SAP) and COP. For the purposes of the cumulative impact analysis, BOEM makes the following assumptions, which represent 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 a 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 of a meteorological tower, two buoys, and commercial facilities (wind turbines). The surveys may be completed in phases, with the meteorological tower and buoy areas likely to be surveyed first.
- Lessees 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).

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[2] 43 CFR 46.30 – Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but sufficiently likely to occur, that a responsible official of ordinary prudence would take such activities into account in reaching a decision. The federal and non-federal activities that BOEM must take into account in the analysis of cumulative impacts include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified by BOEM. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite.

Table D-1 describes the typical site characterization surveys, the types of equipment and method used, and which resources the survey information would inform.

Table D-1. Site characterization survey assumptions

Survey Type	Survey Equipment and Method	Resource Surveyed or Information Used to Inform
HRG surveys	Side-scan sonar, sub-bottom profiler, magnetometer, multi- beam echosounder	Shallow hazards, archaeological, bathymetric charting, benthic habitat
Geotechnical/sub-bottom sampling	Vibracores, deep borings, cone penetration tests	Geological, marine archaeology
Biological	Grab sampling, benthic sled, underwater imagery/sediment profile imaging	Benthic habitat
	Aerial digital imaging; visual observation from boat or airplane	Birds, 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.
HRG = high-resolution geophysical

D.2.1.2 Site Assessment Activities

After SAP approval, a lessee can evaluate the meteorological conditions, such as wind resources, with the approved installation of meteorological towers and buoys. Meteorological buoys have become the preferred meteorological and oceanographic (metocean) data collection platform for developers, and BOEM expects that most future site assessments would use buoys instead of towers (BOEM 2021b). For newly issued plans, BOEM is no longer considering the installation of met towers. The installation and operation of meteorological buoys involves substantially less activity and a much smaller footprint than the construction and operation of a meteorological tower. Site assessment activities have been approved or are in the process of being approved for multiple lease areas consisting of one to three meteorological buoys per SAP (Attachment 2, Table D2-1). Site assessment activities would likely take place starting within 1 to 2 years of lease execution, because preparation of an SAP (and subsequent BOEM review) takes time. The No Action Alternative and cumulative analyses consider these site assessment activities.

D.2.1.3 Construction and Operation of Offshore Wind Facilities

Attachment 2, Table D2-1 lists all offshore wind development activities that BOEM considers reasonably foreseeable by lease areas and projects.

D.2.2 Commercial Fisheries Cumulative Fishery Effects Analysis

Table D-2 depicts future construction of offshore wind projects from Maine to North Carolina including development of Lease Areas OCS-A 0520 and OCS-A 0522 that are proposed offshore Massachusetts adjacent to SouthCoast Wind. Also included are all of the projects currently in various stages of planning within BOEM's offshore leases from Massachusetts to North Carolina. Projected construction dates for each offshore wind project are listed in Attachment 2, Table D2-1, and each project will require a National Environmental Policy Act (NEPA) process with an EIS or environmental assessment prior to approval.

Table D-2 summarizes (1) the incremental number of construction locations that are projected to be active in each region during each year between 2021 and 2030; (2) the number of operational foundations in each region at the beginning of each year between 2021 and 2030; and (3) the total number of active construction locations and operational foundations across the Atlantic OCS by year.

Note that the Kitty Hawk project is included despite its location in the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) South Atlantic Region. Fishing vessels operating in fisheries managed by the NMFS Greater Atlantic Regional Office regularly harvest in this area. It is also likely that vessels participating in fisheries managed by the NMFS Southeast Regional Office would be affected by the Kitty Hawk project.

BOEM assumes proposed offshore wind projects would include the same or similar components as the proposed Project: wind turbines, offshore and onshore cable systems, offshore substation platform (OSP), onshore O&M facilities, and onshore interconnection facilities. BOEM further assumes that other potential offshore wind projects would employ the same or similar construction, O&M, and conceptual decommissioning activities as the proposed Project. However, 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 in a particular lease area may occur in phases over long periods of time. Research currently being conducted 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 the analysis of ongoing and planned activities the proposed projects included in Attachment 2, Table D2-1 are analyzed in Chapter 3 of this EIS. For a list of mitigation measures that were considered in the impact analysis in Chapter 3 of this EIS, please see Appendix G, *Mitigation and Monitoring*.

Table D-2. Future offshore wind project construction schedule (dates shown as of August 12, 2024)

Project/Region	Number of Foundations										
	Before 2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030 and Beyond
NE Aqua Ventus (Maine state waters)	-	-	-	-		-2	-	-	-	-	-
Total Other State Waters Projects	0	0	0	0	0	2	0	0	0	0	0
Estimated Other State Waters Construction Total	0	0	0	0	0	2	0	0	0	0	0
Estimated O&M Total	0	0	0	0	0	0	2	2	2	2	2
EXISTING AND ONGOING PROJECTS											
Block Island (Rhode Island state waters)	5	-	-	-	-	-	-	-	-	-	-
Vineyard Wind 1, part of OCS-A 0501	-	-	-	63-	63-	-	-	-	-	-	-
South Fork Wind, OCS-A 0517	-	-	-	13	-	-	-	-	-	-	-
CVOW-Pilot, OCS-A 0497	2	-	-	-	-	-	-	-	-	-	-
Revolution Wind, part of OCS-A 0486	-	-	-	102-	67	-	-	-	-	-	-
Ocean Wind 1, OCS-A 0498	-	-	-	-	101-	-	-101	-	-	-	-
Sunrise Wind, OCS-A 0487	-	-	-	-	95	-	-	-	-	-	-
New England Wind, OCS-A 0534 and portion of OCS-A 0501 remainder (Phase 1 [i.e., Park City Wind])[b]	-	-	-	-	-	64	-	-	-	-	-
New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	-	-	-	-	-	66	-	-	-	-	-
Empire Wind 1, part of OCS-A 0512	-	-	-	-	55	-	-	-	-	-	-
Empire Wind 2, part of OCS-A 0512	-	-	-	-	-	-	85	-	-	-	-
CVOW-Commercial, OCS-A 0483	-	-	-	-	179	-	-	-	-	-	-
Estimated Existing and Ongoing Project Construction Total											
Estimated O&M Total											
Massachusetts/Rhode Island Region											
SouthCoast Wind, OCS-A 0521[c]	-	-	-	-	-	149					
Beacon Wind 1, part of OCS-A 0520[c]	-	-	-	-		-	78	-	-	-	-

Project/Region	Number of Foundations										
	Before 2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030 and Beyond
Beacon Wind 2, part of OCS-A 0520	-	-	-	-	-	-	-	79	-	-	-
Bay State Wind, part of OCS-A 0500	-	-	-	-	-	-	96	-	-	-	-
OCS-A 0500 remainder							119				
OCS-A 0487 remainder											
Vineyard Wind NE, OCS-A 0522	-	-	-	-	-	-	-	160	-	-	-
Estimated annual Massachusetts/Rhode Island construction	0	0	0	0	70	149	293	293	0	0	0
Estimated O&M total	0	0	0	0	0	70	414	442	681	681	681
New York/New Jersey Region											
Atlantic Shores South, OCS-A 0499	-	-	-	-	-		197		-	-	-
Atlantic Shores North, OCS-A 0549										158	
Ocean Wind 2, OCS-A 0532	-	-	-	-	-	-	111				
Bluepoint Wind, OCS-A 0537	-	-	-	-	-	-	-	82	-	-	-
Attentive Energy OCS-A 0538								102			
Ocean Wind 2, part of OCS- A 0532							111				
Community Offshore Wind OCS A- 0539								148			
Atlantic Shores Offshore Wind Bight, OCS-A 0541								95			
Invenergy Wind Offshore, OCS-A 0542								99			
Vineyard Mid-Atlantic, LLC, OCS-A 0544								104			
Estimated annual New York/New Jersey construction	0	0	0				111	630	0	158	0
Estimated O&M total	0	0	0	0	0	0	0	111	741	741	899
Delaware/Maryland Region											
Skipjack, OCS-A 0519	-	-	-	-	-	-	17	-	-	-	-
US Wind/Maryland Offshore Wind, part of OCS-A 0490						125					
GSOE I, OCS-A 0482							96				
OCS-A 0519 remainder											
Estimated annual Delaware/Maryland construction	0	0	0	0	0	125	113	0	0	0	0
Estimated O&M total	0	0	0	0	0	0	125	238	238	238	238

Project/Region	Number of Foundations										
	Before 2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030 and Beyond
Virginia/North Carolina Region											
Kitty Hawk North, OCS-A 0508							70				
Kitty Hawk South, OCS-A 0508 remainder							123				
TotalEnergies Renewables Wind, OCS-A 0545							65				
Duke Energy Renewables Wind, OCS-A 0546							65				
Estimated annual Virginia/North Carolina construction	0	0	0	0	0	0	323	0	0	0	0
Estimated O&M total	0	0	0	0	0	0	0	323	323	323	323
Gulf of Mexico Region											
RWE Offshore US Gulf, OCS-G 37334	-	-	-	-	-	-	-	-	-	-	103
Estimated Gulf of Mexico Construction Total	0	0	0	0	0	0	0	0	0	0	103
Estimated O&M Total	0	0	0	0	0	0	0	0	0	0	0
Total											
Estimated total construction	7	0	0	13	459	406	1,223	869	0	158	103
Estimated O&M total	0	7	7	7	20	479	885	2,108	2,977	2,977	3,135

[a] BOEM recognizes that the estimates presented within this cumulative analysis are likely high, conservative estimates; however, BOEM believes that this analysis appropriately captures the potential cumulative impacts and errs on the side of maximum impacts.
[b] New England Wind Phase I and Phase 2 would collectively have no more than 130 foundations, and the maximum number of foundations for Phase I would be 64.
[c] Beacon Wind 1 and Beacon Wind 2 would collectively have no more than 157 foundations. BOEM made the assumption to split the foundation numbers evenly across both projects.
CVOW = Coastal Virginia Offshore Wind; GSOE = Garden State Offshore Energy

D.2.3 Incorporation by Reference of Cumulative Impacts Study and the Analyses Therein

BOEM has completed a study of impact-producing factors (IPFs) on the North Atlantic OCS to consider in an offshore wind development cumulative impacts scenario (BOEM 2019). The study is incorporated in this document by reference. The study identifies cause-and-effect relationships between renewable energy projects and resources potentially affected by such projects. It further 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 impact scenario. The study identifies actions and activities that may affect the same physical, biological, economic, or cultural resources as renewable energy projects, and observes 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 ongoing and planned activities in the North Atlantic OCS to consider in a NEPA cumulative impacts scenario. These IPFs and their relationships were used in the EIS analysis of cumulative impacts.

As discussed in the BOEM (2019) study, reasonably foreseeable activities other than offshore wind projects may also affect the same resources as the proposed Project or other offshore wind projects, possibly via the same IPFs or via IPFs through which offshore wind projects do not contribute. This appendix lists reasonably foreseeable non-offshore wind activities that may contribute to the cumulative impacts of the proposed Project.

D.2.4 Undersea Transmission Lines, Gas Pipelines, and Other Submarine Cables

Several in-service and abandoned submarine telecommunications cables are present in the offshore export cable corridor and in the vicinity of the Lease Area (COP Volume 2, Figure 14-6, Table 14-2; SouthCoast Wind 2024). The Brayton Point export cable corridor could have up to 13 crossings of planned cables and up to 3 crossings of existing pipelines. The Falmouth export cable corridor could have up to 2 crossings of existing cables and more than 7 crossings of planned cables associated with the Vineyard Wind and New England Wind 1 projects and New England Wind offshore wind projects.

The offshore wind projects listed in Attachment 2, Table D2-1 that have a COP under review are presumed to include at least one identified cable route. Cable routes have not yet been announced for the remainder of the projects.

D.2.5 Tidal Energy Projects

The Bourne Tidal Test Site located in the Cape Cod Canal near Bourne, Massachusetts, is a testing platform for tidal turbines that was installed in late 2017 by the Marine Renewable Energy Collaborative. The Bourne Tidal Test Site offers a test platform for tidal turbines (MRECo 2017, 2018). On behalf of the Marine Renewable Energy Collaborative of New England, Barrett Energy Resources Group, LLC (BERG) filed a Draft Pilot License Application dated November 3, 2021. The Draft Pilot License Application is an application to interconnect and operate a marine hydrokinetic test facility (the Bourne Tidal Test Site) (Barrett 2021).

The Roosevelt Island Tidal Energy Project is in the East Channel of the East River, a tidal strait connecting Long Island Sound with the Atlantic Ocean in New York Harbor. In 2005, Verdant Power petitioned the Federal Energy Regulatory Commission (FERC) for permission for the first U.S. commercial license for tidal power. In 2012, FERC issued a 10-year license to install up to 1 megawatt (MW) of power (30 turbines/10 TriFrames) at the Roosevelt Island Tidal Energy Project (FERC 2012a; Verdant Power 2022).

The Cobscook Bay Tidal Project, located in Maine, is a FERC-licensed tidal project that began operations in 2012 (FERC 2012b). The project owner, Ocean Renewable Power Company, informed FERC in a March 14, 2017, submittal that it did not intend to file a notice of intent (NOI) to relicense the project or a Pre-Application Document at the time. The Ocean Renewable Power Company anticipates that the project infrastructure, environmental monitoring and data analysis efforts, resource information documentation, and collaborative relationships with existing marine users will continue through the duration of the existing pilot license term through 2022 and potentially beyond (PNNL 2020). The Western Passage Tidal Energy Project, a proposed tidal energy site in the Western Passage, received a preliminary permit from FERC in 2016. The preliminary permit allows developers to study a project but does not authorize construction (PNNL 2021).

D.2.6 Dredging and Port Improvement Projects

The following dredging and port improvement projects have been proposed or studied at ports that may be used by the Project in Massachusetts, Rhode Island, Connecticut, South Carolina, Texas, and Maryland, and are either funded/under construction projects or are considered reasonably foreseeable.

- **Point Judith, Port of Galilee, Rhode Island.** The Rhode Island Department of Environmental Management (RIDEM), which operates the Port of Galilee, a Narragansett-based commercial fishing port, began four projects in 2022 in the north bulkhead area of the port totaling nearly $15 million in investments. At the end of 2023, RIDEM was in the third phase of a multi-year investment with work aimed at the replacement of bulkheads and docks, water supply, electrical, and security upgrades, and improvements to bolster the port against the effects of climate change (Office of the Governor of Rhode Island 2022; State of Rhode Island Department of Environmental Management 2023).
- **Port of Davisville, Rhode Island.** The Rhode Island Fiscal Year 2023 budget included $60 million and $35 million, respectively, for infrastructure upgrades to the Port of Davisville and the South Quay Marine Terminal in East Providence to support offshore wind activities on the U.S. East Coast. The funding for the Port of Davisville would support construction of the port’s Terminal 5 Pier and completion of required dredging, preparation of about 34 acres to accommodate additional cargo laydown, and reconstruction and hardening of the existing surface of Pier 1 (Buljan 2022).
- **Massachusetts Port Authority.** The Port of Massachusetts is implementing an $850 million port upgrade project to accommodate larger freight vessels. Project work includes dredging of Boston Harbor, construction of a new berth, and installation of new ship-to-shore cranes (Glenn 2021).

- **Port of New Bedford, Massachusetts.** The New Bedford Port Authority recently completed a $17 million project to expand the North Terminal at the Port of New Bedford; adding 150,000 square feet of terminal space. The bulkhead was constructed using up to 97,000 yards of contaminated dredge material (Port of New Bedford 2022; Standard Times 2022). Additionally, the New Bedford Port Authority has been awarded $24 million to reconstruct and extend Leonard's Wharf to support commercial fishing and the offshore wind industry (Standard Times 2023).
- **New London Heavy Lift Port, Connecticut.** The Connecticut Port Authority is conducting a project to redevelop the Port of New London State Pier as a heavy-lift capable port facility, in partnership with terminal operator Gateway Terminal, and joint venture partners Ørsted and Eversource. Heavy-lift capability would support various cargoes including wind turbine construction staging and pre-assembly, including construction support for the South Fork, Revolution Wind, and Sunrise offshore wind projects. Environmental permits for in-water work and onshore construction were issued in December 2021(Connecticut Port Authority 2021a; 2021b; CT Examiner 2022). Operations began at the port in 2023 though a portion of the site remains under construction (CT Insider 2023).
- **Sparrows Point Port, Maryland.** The Sparrows Point Container Terminal project will construct a new container terminal and intermodal yard located on 330 acres within the Tradepoint Atlantic industrial development site on Sparrows Point. In addition to onshore development, the project would include the widening and deepening of an existing channel and connection into the Brewerton Federal Navigation channel. USACE is currently preparing an EIS for the project (88 FR 87414).
- **Port of Charleston, South Carolina.** Construction is currently underway at the Port of Charleston on a near-dock rail-served cargo yard and inner-harbor barge operation. The $400 million Navy Base Intermodal Facility and $150 million inner-harbor barge operation includes the construction of almost 80,000 feet of rail track and will establish a designated marine highway to move shipping containers. Construction on the project is anticipated to be complete by July 2025 (South Carolina Ports Authority 2022).
- **Port of Corpus Christi, Texas.** The $681.6 million Channel Improvement Project to widen the channel to 530 feet and deepen to 54 feet is in the final construction phase and is estimated to be complete in early 2025 (Port of Corpus Christi 2023).

D.2.7 Marine Minerals Use and Ocean Dredged Material Disposal

To help meet the sand resource needs of coastal communities, BOEM-funded reconnaissance or design-level OCS studies along the East Coast from Rhode Island to Florida have identified potential future sand resources in many areas. Sand resources identified nearest the Project include OCS locations offshore Massachusetts and Rhode Island; many of these potential sand resources are within 5 miles of the Project Lease Area and associated planned infrastructure (e.g., export cables) (Mabee and Woodruff 2016; King et al. 2016). Topographic profiles and grain size analyses were performed on sediment samples collected at 18 Massachusetts beaches experiencing erosion were taken during the summer and winter seasons from 2014 through 2016 to evaluate seasonal and spatial variability. This information will be used primarily to match native-beach material with compatible offshore sand resources for beach nourishment projects (BOEM 2016).

U.S. Environmental Protection Agency (USEPA) Region 1 is responsible for designating and managing ocean disposal sites for all materials except dredged material in the region of the Project. Under Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) (33 USC 1401 et seq.), USACE regulates the transportation of dredged material for purposes of dumping it into ocean water. There is one USEPA-designated open-ocean disposal site along the southern Massachusetts/Rhode Island Coast, the Rhode Island Sound Disposal Site located approximately 10 miles northeast of Block Island. The Rhode Island Sound Disposal Site was first used in 2003 and was last used in 2019 (USACE 2022). The Eastern Long Island Sound Disposal Site offshore New London, Connecticut is designated for offshore disposal and is in use (USACE 2022).

D.2.8 Military Use

The Lease Area is within the Narragansett Bay Operations Area. The Narragansett Bay Operations Area extends from the shoreline seaward to approximately 180 nm from land at its farthest point; the subsurface portion of the Narragansett Bay Operations Area has the same boundaries as the surface water portion. The offshore Narragansett Bay Range Complex provides infrastructure for U.S. Atlantic Fleet training and testing exercises (U.S. Navy 2018). The offshore Narragansett Bay Range Complex also supports training and testing by other services (Ecology & Environment 2016).

Military activities with the Narragansett Bay Range Complex can include various vessel training exercises, submarine and antisubmarine training, and U.S. Air Force exercises. The U.S. Navy, the U.S. Coast Guard (USCG), and other military entities have numerous facilities in the region. Major onshore regional facilities include Joint Base Cape Cod, Naval Station Newport, Newport Naval Undersea Warfare Center, Naval Submarine Base New London, and USCG Academy (BOEM 2013; Rhode Island Coastal Resources Management Council 2010). The U.S. Atlantic Fleet also conducts training and testing exercises in the Narraganset Bay Operations Area, and the Newport Naval Undersea Warfare Center routinely performs testing in the area (BOEM 2013).

D.2.9 Marine Transportation

Marine transportation in the region is diverse and sourced from many ports and private harbors. Commercial vessel traffic in the region includes research, tug/barge, tankers (such as those used for liquid petroleum), cargo, cruise ships, smaller passenger vessels, and commercial fishing vessels. Recreational vessel traffic includes private motorboats and sailboats. A number of federal agencies, state agencies, educational institutions, and environmental non-governmental organizations participate in ongoing research offshore including oceanographic, biological, geophysical, and archaeological surveys. The Northeast Regional Planning Body anticipates that major vessel traffic routes will be relatively stable in the region for the foreseeable future, but that coastal developments and market demands that are unknown at this time could affect them (Northeast Regional Planning Body 2016). Most vessel traffic, excluding recreational vessels, tends to travel within established vessel traffic routes and the number of trips, as well as the number of unique vessels, has remained consistent (USCG 2021). In response to future offshore wind projects in the New York Bight, multiple additional fairways and a new anchorage may be established to route existing vessel traffic around wind energy projects (USCG

2021). Two Maritime Highway Routes are designated in the Atlantic Coast by the U.S. Department of Transportation Maritime Administration; Marine Highway M-95 (Atlantic Ocean Coastal Waters) that extends from Florida to Maine and Marine Highway M-295 that includes the East River (New York Harbor), Long Island Sound (New York and Connecticut) to Block Island Sound (Rhode Island) (USDOT 2022).

D.2.10 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 protected under the federal Endangered Species Act (ESA). 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. Current fisheries management and ecosystem monitoring surveys conducted by or in coordination with the Northeast Fisheries Science Center (NEFSC) could overlap with offshore wind lease areas in the New England region and south into the Mid-Atlantic region. Surveys include (1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; (2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool, using a bottom dredge and camera tow; (3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; and (4) the NEFSC Ecosystem Monitoring Program, a more than 40-year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units. These surveys are anticipated to continue within the region, regardless of offshore wind development.

The regulatory process administered by NMFS, which includes stock assessments for all marine mammals and 5-year reviews for all ESA-listed species, assists in informing decisions on take authorizations and the assessment of project-specific and cumulative impacts that consider ongoing and planned activities in biological opinions. Stock assessments completed regularly under the 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.

D.2.10.1 Directed Take Permits for Scientific Research and Enhancement

NMFS issues permits for scientific research on protected species. These 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. 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 NARWs; and research on population dynamics of harbor and gray seals. Reasonably foreseeable future impacts from scientific research and enhancement permits include physical and behavioral stressors (e.g., restraint and capture, marking, implantable and suction tagging, biological sampling).

D.2.10.2 Fisheries Use and Management

NMFS implements regulations to manage commercial and recreational fisheries in federal waters, including those within which the Project would be located; the State of Massachusetts regulates commercial fisheries in state waters (within 3 nm of the coastline). There are no aquaculture leases in the vicinity of the Falmouth landfall locations (SouthCoast Wind 2024). There are nine approved aquaculture leases located near the Brayton Point offshore export cable in and near the Sakonnet River that are mostly for oysters but also for clams, scallops, and quahogs (RIDEM 2022). The Project (including landfall and potential marshalling and O&M port locations) overlaps four of NMFS's eight regional councils to manage federal fisheries: Mid-Atlantic Fishery Management Council (MAFMC), which includes New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina; South Atlantic Fishery Management Council, which includes North Carolina, South Carolina, Georgia, and part of Florida; the Gulf of Mexico Fishery Management Council, which includes part of Florida, Louisiana, Alabama, Mississippi, and Texas; and New England Fishery Management Council (NEFMC), which includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut (NEFMC 2022). The councils manage species with many Fishery Management Plans (FMPs) that are frequently updated, revised, and amended and coordinate with each other to jointly manage species across jurisdictional boundaries (MAFMC 2022). Many of the fisheries managed by the councils are fished for in state waters or outside of the Mid-Atlantic region, so the council works with the Atlantic States Marine Fisheries Commission (ASMFC). The 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 states and NMFS, under the framework of ASMFC's *Amendment 3 to the Interstate Fishery Management Plan for American Lobster*, cooperatively manage the American lobster resource and fishery (NOAA 1997).

The FMPs 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 Mid-Atlantic regions.

NMFS also manages highly migratory species, such as tuna and sharks, that can travel long distances and cross domestic boundaries. Table D-3 summarizes other FMPs and actions in the region.

Table D-3. Other fishery management plans

Area	Plan and Projects
ASMFC	ASMFC Five-Year Strategic Plan 2019–2023 (ASMFC 2019) ASMFC 2022 Action Plan (ASMFC 2021) Management, Policy and Science Strategies for Adapting Fisheries Management to Changes in Species Abundance and Distribution Resulting from Climate Change (ASMFC 2018).
Massachusetts	Massachusetts Shellfish Initiative 2021–2025 Strategic Plan (MSI 2021).
Rhode Island	Rhode Island 2018 Shellfish Sector Management Plan (RIDEM 2018) Rhode Island Department of Environmental Management Division of Marine Fisheries Strategic Plan (2021–2025) (RIDEM 2021).
Connecticut	Town of Groton, Connecticut Shellfish Management Plan (Town of Groton 2020).
Maryland	The Maryland Department of Natural Resources implements fishery management plans for the following species: American eel, Atlantic croaker, black drum, black sea bass, blue crab within the Chesapeake Bay, blue crab within coastal bays, bluefish, brook trout, catfish, eastern oyster, hard clam within coastal bays, horseshoe crab, largemouth bass, Spanish and king mackerel, red drum, alewife and blueback river herring, American and hickory shad, spot, spotted seatrout, striped bass, summer flounder, tautog, weakfish, and yellow perch (Maryland DNR 2024).
South Carolina	S.C. Sea Grant Consortium Strategic Plan, 2024–2027 (S.C. Sea Grant Consortium 2024).
Texas	The Texas Parks and Wildlife Department implements fisheries management programs including operation of hatcheries and development of artificial reefs and habitat projects (TPWD 2024).

D.2.11 Global Climate Change

Climate change results primarily from the increasing concentration of greenhouse gas (GHG) emissions in the atmosphere, which causes planet-wide physical, chemical, and biological changes, substantially affecting the world's oceans and lands. Changes include increases in global atmospheric and oceanic temperature, shifting weather patterns, rising sea levels, and changes in atmospheric and oceanic chemistry (Blunden and Arndt 2020). Section 7.6.1.4 of the *Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Activities on the Outer Continental Shelf* (MMS 2007) describes global climate change with respect to assessing renewable energy development. Key drivers of climate change are increasing atmospheric concentrations of carbon dioxide (CO_2) and other GHGs, such as methane (CH_4) and nitrous oxide (N_2O). These GHGs reduce the ability of solar radiation to reradiate out of Earth's atmosphere and into space. Although all three of these GHGs have natural sources, the majority of these GHGs are released from anthropogenic activity. Since the industrial revolution, the rate at which solar radiation is reradiated back into space has slowed due to increasing GHG concentrations in the atmosphere, resulting in a net increase of energy in the Earth's system (Solomon et al. 2007). This energy increase presents as heat, raising the planet's temperature and causing climate change.

Fluorinated gases are a type of GHG released in trace amounts but are highly efficient at preventing solar radiation from being re-radiated back into space. They have a much longer lifespan than CO_2, CH_4, and N_2O. Fluorinated gases have no natural sources, are either a product or byproduct of manufacturing, and can have 23,000 times the warming potential of an equal amount of CO_2. These gases include hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride. These gases are currently being phased out; however, sulfur hexafluoride is still used in wind turbine generator (WTG) switchgears and OSP high-voltage and medium-voltage gas-insulated switchgears.

The Intergovernmental Panel on Climate Change released a special report in October 2018 that compared risks associated with an increase of global warming of 1.5 degrees Celsius (°C) and an increase of 2°C. The report found that climate-related risks depend on the rate, peak, and duration of global warming, and that an increase of 2°C was associated with greater risks associated with climatic changes such as extreme weather and drought; global sea level rise; impacts 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). Higher global temperatures increase the chances of sea level rise by the end of the century, with a projected relative seal level rise of 0.6 to 2.2 meters along the contiguous U.S. coastline by 2100 (NOAA 2022). Expected relative sea level rise would cause tide and storm surge heights to increase, leading to a shift in the U.S. coastal flood regimes by 2050 with major and moderate high tide flood events occurring as frequently as moderate and minor high tide flood events occur today (NOAA 2022).

Global emissions of GHGs have impacts whose local effects are increasingly elucidated through research. For example, a recent study concerning North Atlantic right whale provides evidence that the whale's feeding area moved north following relocation of its food source related to climate change, and whale mortality may have increased because of fewer controls on fishing activities in the new, more northerly area (Meyer-Gutbrod et al. 2021). Climate change is predicted to affect Northeast fishery species in different ways (Hare et al. 2016), and the NMFS biological opinion discusses in detail the potential impacts of global climate change on protected species that occur within the Proposed Action area (NMFS 2013).

Local emissions, such as those from maintenance of and accidental chemical leaks from wind energy projects, would contribute incrementally to global GHG emissions. However, the largest climate impact from wind energy projects is expected to be beneficial: the energy generated by wind energy projects is expected to displace energy generated by combustion of fossil fuels, which would lead to reductions in regional emissions of air pollutants and GHGs from fossil-fueled power plants.

Table D-4 summarizes regional plans and policies that are in place to address climate change, and

Table D-5 summarizes resiliency plans.

Table D-4. Climate change plans and policies

Plans and Policies	Summary/Goal
Massachusetts	
Global Warming Solutions Act of 2008	Framework to reduce GHG emissions by requiring 25% reduction in emissions from all sectors below 1990 baseline emissions level in 2020, at least 80% reduction in 2050. Full implementation of these policies is projected to result in total net reduction of 25.0 million metric tons of carbon dioxide equivalent, or 26.4% below 1990 baseline level (Commonwealth of Massachusetts 2018a).
Massachusetts Clean Energy and Climate Plan for 2025 and 2030	Interim policy that updates the 2015 and 2020 climate plans. Policies that aim to reduce GHG emissions in the commonwealth across all sectors; full implementation of policies would result in reducing emissions by at least 50% below 1900 level in 2030 (Commonwealth of Massachusetts 2020a).
An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy (2021)	Requires the Secretary of the Executive Office of Energy and Environmental Affairs to set interim emissions limit and sector-specific sublimit every 5 years. Calls for the 2030 emissions limit to be at least 50% below the 1990 baseline, the 2040 emissions limit to be at least 75% below the 1990 baseline, and a 2050 emissions limit that achieves at least net zero statewide GHG emissions, provided that in no event shall the emissions in 2050 be higher than a level 85% below the 1990 baseline (Commonwealth of Massachusetts 2021).
Massachusetts 2050 Decarbonization Roadmap (2020)	Framework for long-term and short-term strategies to reach net zero statewide greenhouse gas emissions by 2050 (Commonwealth of Massachusetts 2020b).
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.
Massachusetts State Hazard Mitigation and Climate Adaptation Plan 2018	Updated 2013 plan to comprehensively integrate climate change impacts and adaptation strategies with hazard mitigation planning while complying with federal requirements for state hazard mitigation plans and maintaining eligibility for federal disaster recovery and hazard mitigation funding under the Stafford Act. The plan received FEMA-approval and is effective through September 2023 (Commonwealth of Massachusetts 2018b).
Rhode Island	
Resilient Rhode Island Act (2014)	The 2014 Resilient Rhode Island Act established the Executive Climate Change Coordinating Council. It also set specific GHG emissions reduction targets; established an advisory board and a science and technical advisory board to assist the council; and incorporated consideration of climate change impacts into the powers and duties of all state agencies. The Executive Climate Change Coordinating Council is charged with developing and tracking the implementation of a plan to achieve GHG emissions reductions below 1990 levels of 10% by 2020, 45% by 2035, and 80% by 2050 (State of Rhode Island 2014).

Plans and Policies	Summary/Goal
Rhode Island 2021 Act on Climate (Section 42, Chapter 6.2)	The 2021 Act on Climate sets mandatory, enforceable climate emissions reduction goals leading the state to achieve net-zero emissions economy-wide by 2050. This legislation updates the previous 2014 Resilient Rhode Island Act.
Connecticut	
Executive Order 3 (2019)	Executive Order 3 established a framework for monitoring and reporting on the state's implementation of GHG emissions reduction strategies set forth in the previous Governor's Council on Climate Change, and a framework to develop a statewide Adaptation and Resilience Plan for Connecticut (State of Connecticut 2019).
Executive Order 21-3 (2021)	Executive Order 21-2 establishes policies for energy efficiency and resiliency, including conducting a State Vulnerability Assessment of state government assets and operations and climate resilience project pipeline (State of Connecticut 2021a).
Maryland	
Climate Solutions Now Act of 2022 (Article II, Section 17(b), Chapter 38).	The Climate Solutions Now Act of 2022 calls for Maryland to reduce GHG by 60% as compared to a 2006 baseline by 2031 and for the Maryland economy to reach net-zero emissions by 2045.
Maryland's Climate Pollution Reduction Plan (2023)	Establishes plans to achieve net-zero emissions by 2045 through incentives for home electrification, electric vehicles, and commercial building efficiency and investments in infrastructure and natural and working lands (Maryland Department of the Environment 2023).
South Carolina	
Charleston, South Carolina Climate Action Plan (2021)	Establishes a five-year framework for the city of Charleston to reduce emissions by 56% by 2030 and to net-zero by 2050 (City of Charleston 2021).
Texas	
Texas Coastal Resiliency Master Plan (2023)	Texas General Land Office 2023 *Texas Coastal Resiliency Master Plan* is the third installment of a statewide plan to protect and promote a vibrant and resilient Texas coast (Texas General Land Office 2023). The Resiliency Master Plan identifies ten actions to coordinate Texas's coastal resiliency needs: • Managing coastal habitats • Managing gulf shorelines • Managing bay shorelines • Improving community resilience • Adapting to changing conditions • Managing watersheds • Growing key knowledge and experience • Enhancing emergency preparation and response • Addressing under-represented needs • Maintaining coastal economic growth

Table D-5. Resiliency plans and policies in the Lease Area

Plans and Policies	Summary
Massachusetts	
Municipal Vulnerability Preparedness grant program (2017)	Created as part of Executive Order 568, the Municipal Vulnerability Preparedness grant program provides support for cities and towns in Massachusetts to identify climate hazards, assess vulnerabilities, and develop action plans to improve resilience to climate change (Climate Change Clearinghouse for the Commonwealth 2022).
Coastal Grant and Resilience Program	Provide financial and technical support for local and regional efforts to increase community understanding of coastal storm and climate impacts, evaluate vulnerabilities, conduct adaptation planning, redesign and retrofit vulnerable public facilities and infrastructure, and restore shorelines to enhance natural resources and provide storm damage protection. The Town of Falmouth was awarded a grant in 2022 for a project to address erosion along the Eel River Inlet shoreline (Commonwealth of Massachusetts 2022).
Rhode Island	
Rhode Island Executive Order 17-10: Action Plan to Stand Up to Climate Change (2017)	Executive Order 17-10 established the office of the Rhode Island Resiliency Officer. The Rhode Island Executive Climate Change Coordinating Council works with the Resiliency Officer to develop climate preparedness strategies.
Rhode Island Shoreline Change Special Area Management Plan (Rhode Island Coastal Resources Management Council 2018)	The Shoreline Change Special Area Management Plan (SAMP) provides information, guidance, and a suite of tools to empower state and local decision makers as they plan for, recover from, and successfully adapt to the impacts of coastal storms, erosion, and sea level rise (Rhode Island Coastal Resources Management Council 2018).
Connecticut	
Public Act No. 21-115 An Act Concerning Climate Change Adaptation (2021)	This act authorizes Connecticut municipalities to establish a municipal stormwater authority, broadens the authority of municipal flood and erosion control boards to include flood prevention and climate resilience and allows municipalities to form joint boards, and establishes an Environmental Infrastructure Fund (State of Connecticut 2021b).
Taking Action on Climate Change and Building a More Resilient Connecticut for All – Phase I Report (Office of the Governor of Connecticut 2021)	The Phase I report implements provisions of Executive Order 3, including a report on the progress on mitigation strategies and recommendations. Continued reporting on implementation of the mitigation strategies was also called for annually in the Executive Order. The framework for inventory of vulnerable assets and operations and the report from state agencies on adaptation strategies in their planning processes required under Executive Order Objective 2 is to be included in the Phase 2 report.
Maryland	
Maryland Senate Bill 457: Resilience Authorities (2020)	This bill authorizes local governments to establish and fund a resilience authority to fund large-scale infrastructure projects aimed as addressing the effects of climate change.

South Carolina	
Disaster Relief and Resilience Act (2020)	Establishes the South Carolina Office of Resilience to coordinate disaster recovery and resilience efforts within South Carolina, creates the Disaster Relief and Resilience Reserve Fund to finance disaster recovery efforts and hazard mitigation projects, and creates the Resilience Revolving Fund to provide low-interest loans to local governments to perform floodplain buyouts and restoration.
Strategic Statewide Resilience and Risk Reduction Plan (2023)	Serves as the framework to guide state investment in flood mitigation projects and the adoption of programs and policies to protect the people and property of South Carolina from the damage and destruction of extreme weather events (South Carolina Office of Resilience 2023).
Texas	
Texas Coastal Resiliency Master Plan (2017)	The Texas Coastal Resiliency Master Plan was developed to direct future management of Texas coastline in support of sustaining resilient communities and coastal ecosystems (Texas General Land Office 2017).
Texas Infrastructure Resiliency Fund (2019)	The Texas Infrastructure Resiliency Fund was established to finance flood mitigation and protection projects and related planning efforts. It includes funds for federal matching to implement projects already eligible for partial federal funding; floodplain management for flood planning, protection, mitigation, or adaption projects; flood plan implementation for projects included in the state flood plan; and the Hurricane Harvey fund to implement projects related to Hurricane Harvey recovery.

D.2.12 Oil and Gas Activities

The proposed Project area is in the North Atlantic Planning Area of the OCS Oil and Gas Leasing Program (National OCS Program). On September 8, 2020, the White House issued a presidential memorandum for the Secretary of the Interior on the withdrawal of certain areas of the United States OCS from leasing disposition for 10 years, including the areas currently designated by BOEM as the South Atlantic and Straits of Florida Planning Areas (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 (White House 2020b). This withdrawal prevents consideration of these areas for any leasing for purposes of oil and gas exploration, development, or production during the 10-year period beginning July 1, 2022 and ending June 30, 2032. However, currently, there has been no decision by the Secretary of the Interior regarding future oil and gas leasing in the North Atlantic or remainder of the Mid-Atlantic Planning Areas. Existing leases in the withdrawn areas are not affected.

BOEM issues geological and geophysical permits to obtain data for hydrocarbon exploration and production; locate and monitor marine mineral resources; aid in locating sites for alternative energy structures and pipelines; identify possible manmade, seafloor, or geological hazards; and locate potential archaeological and benthic resources. Geological and geophysical surveys are typically classified into categories by equipment type and survey technique. There are currently no such permits under review for areas offshore Massachusetts or Rhode Island (BOEM 2022).

Several liquefied natural gas ports are on the East Coast of the United States. Table D-6 lists existing and proposed liquified natural gas ports on the East Coast that provide (or may provide in the future) services such as natural gas export, natural gas supply to the interstate pipeline system or local distribution companies, storage of liquified natural gas for periods of peak demand, or production of liquified natural gas for fuel and industrial use (FERC 2022).

Table D-6. Liquid natural gas terminals in the eastern United States

Terminal Name	Type	Company	Jurisdiction	Distance from Project (approximate)	Status
Everett, MA	Import terminal	GDF SUEZ— DOMAC	FERC	90 miles north	Existing
Offshore Boston, MA	Import terminal	Neptune LNG	MARAD/USCG	100 miles north	Existing
Offshore Boston, MA	Import terminal, authorized to re-export delivered LNG	Excelerate Energy—Northeast Gateway	MARAD/USCG	95 miles north (Buoy B)	Existing
Cove Point, MD (Chesapeake Bay)	Import terminal/ Export Terminal	Dominion—Cove Point LNG	FERC	340 miles southwest	Existing
Elba Island, GA (Savannah River)	Import terminal	El Paso—Southern LNG	FERC	835 miles southwest	Existing
Elba Island, GA (Savannah River)	Import Terminal/ Export terminal	Southern LNG Company	FERC	835 miles southwest	Existing
Jacksonville, FL	Export terminal	Eagle LNG Partners	FERC	960 miles southwest	Proposed

Source: FERC 2022.
DOMAC = Distrigas of Massachusetts Corporation; GDF = Gaz de France; FL = Florida; GA = Georgia; LNG = liquified natural gas; MA = Massachusetts; MARAD = U.S. Department of Transportation Maritime Administration; MD = Maryland.

D.2.13 Onshore Development Activities

Onshore development activities that may contribute to cumulative impacts 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, counties, and towns may also contribute to cumulative impacts. These may include residential, commercial, and industrial developments spurred by population growth in the region (Table D-7).

Table D-7. Existing, approved, and proposed onshore development activities

Type	Description
Local planning documents	*Massachusetts* Town of Falmouth Local Comprehensive Plan (Town of Falmouth 2016). City of New Bedford City Master Plan (City of New Bedford 2010). Town of Somerset Master Plan (Town of Somerset 2020).
	Rhode Island Town of Bristol 2016 Comprehensive Community Plan (Town of Bristol 2016). Town of Portsmouth Comprehensive Community Plan (Town of Portsmouth 2021). Town of North Kingstown Comprehensive Plan (Town of North Kingstown 2019). Town of Tiverton 2018 Comprehensive Plan (Town of Tiverton 2018). Providence Tomorrow, City of Providence Comprehensive Plan (City of Providence 2014). Aquidneck Island Planning Commission (AIPC 2022).
	Connecticut City of New London Strategic Plan (City of New London 2017).
	Maryland Baltimore County Master Plan 2030 (Baltimore County Department of Planning 2023).
	South Carolina Charleston 2021 City Plan (Charleston Planning Commission 2021).
	Texas Corpus Christi, Plan CC Comprehensive Plan (City of Corpus Christi 2016).
Onshore wind projects	According to the USGS, there are no onshore wind projects within the 42.8-mile (68.9-kilometer) viewshed of the Project (USGS 2022).
Communications towers	There are numerous communications towers in communities within the viewshed of the Project. For example, there are 17 communications towers and 102 antennas within a 3-mile radius of Falmouth, Massachusetts; 55 communications towers and 360 antennas within a 3-mile radius of Brayton Point, Massachusetts; and 96 communications towers and 396 antennas within a 3-mile radius of the Port of New Bedford, Massachusetts (AntennaSearch.com 2022).

Type	Description
Development projects	*Massachusetts* City of New Bedford • The South Coast Rail project aims to restore commuter rail service between Boston and southeastern Massachusetts, including the City of New Bedford. Phase 1 construction is underway and will be complete by the end of 2023 (Massachusetts Bay Transportation Authority 2022). • An Offshore Wind Control Center is proposed by the offshore wind project developer, Vineyard Wind in the City of New Bedford. The development is contingent on Commonwealth Wind being selected by the state (Buljan 2021). Town of Falmouth • The Town of Falmouth intends to improve street safety and accessibility for motorists, pedestrians, and bicyclists through the development of a Complete Streets Prioritization Plan. If approved, the project would be eligible for up to $400,000 in construction funding from MassDOT (Cape Cod Commission 2022). Town of Somerset • The Town of Somerset received $32,100 as part of the Shared Streets and Spaces Grant Program through Mass DOT to extend bike lanes to improve connections to the South Coast Bikeway (Town of Somerset 2022). • Brayton Point LLC Redevelopment Project proposed by Brayton Point LLC (2021). Martha's Vineyard • None identified.
	Rhode Island Town of Bristol • The Walley Beach/Halsey C. Herreshoff Park Seawall Repair project aims to restore the existing seawall along the seaside park. Proposed activities include replacing lost material and providing protective measures for the lawn. The project began in Spring 2021 and construction is ongoing (East Bay Rhode Island 2022). Town of Portsmouth • On May 20, 2021, a planned 3.16 MW, 18.3-acre solar project located on West Main Road in the Town of Portsmouth was approved by the town's Zoning Board of Review (West Main Solar 1, LLC 2021). Town of Tiverton • Two solar projects in the Town of Tiverton are currently in the planning stage: Brayton Road Solar and Cook Farm Solar Project. The Brayton Road Solar project received preliminary plan approval in 2021 and is expected to be approved by the Planning Board in 2022. The Cook Farm Solar project has received final plan approval from the Planning Board but has not begun construction (Newport Daily News 2021).
Port studies/ upgrades	*Massachusetts* • *Massachusetts Port Authority.* The Port of Massachusetts is implementing an $850 million port upgrade project to accommodate larger freight vessels. Project work includes dredging of Boston Harbor, constructing a new berth, and installing new ship-to-share cranes (Glenn 2021). • *Port of New Bedford.* The New Bedford Port Authority is conducting a $17 million project to expand the North Terminal at the Port of New Bedford, adding 150,000 square feet of terminal space. The bulkhead will be constructed using up to 97,000 yards of

Type	Description
	contaminated dredge material. Construction is anticipated to commence in May 2022 (Port of New Bedford 2022; Standard Times 2022).
	Rhode Island • *Point Judith, Port of Galilee, Rhode Island.* The Rhode Island Department of Environmental Management, which operates the Port of Galilee, a Narragansett-based commercial fishing port, is conducting four projects in 2022 in the north bulkhead area of the port totaling nearly $15 million in investments. The proposed Rhode Island Fiscal Year 2023 budget includes approximately $50 million in State Fiscal Recovery Funding to continue the work of upgrading essential infrastructure at the Port of Galilee. The proposed investment would fund the replacement of bulkheads and docks, water supply, electrical, and security upgrades, and improvements to bolster the port against the effects of climate change (Office of the Governor of Rhode Island 2022). • *Port of Davisville, Rhode Island.* The Rhode Island Fiscal Year 2023 budget includes $60 million and $35 million, respectively, for infrastructure upgrades to the Port of Davisville and the South Quay Marine Terminal in East Providence to support offshore wind activities on the U.S. East Coast. The funding for the Port of Davisville would support construction of the port's Terminal 5 Pier and completion of required dredging, preparation of about 34 acres to accommodate additional cargo laydown, and reconstruction and hardening of the existing surface of Pier 1 (Buljan 2022).
	Connecticut • *New London Heavy Lift Port.* The Connecticut Port Authority is conducting a project to redevelop the Port of New London State Pier as a heavy-lift capable port facility, in partnership with terminal operator Gateway Terminal, and joint venture partners Ørsted and Eversource. Heavy-lift capability would support various cargoes including wind turbine construction staging and pre-assembly, including construction support for the South Fork, Revolution Wind, and Sunrise offshore wind projects. Environmental permits for in-water work and onshore construction were issued in December 2021. Construction is anticipated to be completed by 1Q 2023 (Connecticut Port Authority 2021a; 2021b; CT Examiner 2022).
	Maryland • *Sparrows Point Port*. The Sparrows Point Container Terminal project will construct a new container terminal and intermodal yard located on 330 acres within the Tradepoint Atlantic industrial development site on Sparrows Point. In addition to onshore development, the project would include the widening and deepening of an existing channel and connection into the Brewerton Federal Navigation channel. USACE is currently preparing an EIS for the project (88 FR 87414).
	South Carolina • *Port of Charleston*. Construction is currently underway at the Port of Charleston on a near-dock rail-served cargo yard and inner-harbor barge operation. The $400 million Navy Base Intermodal Facility and $150 million inner-harbor barge operation includes the construction of almost 80,000 feet of rail track and will establish a designated marine highway to move shipping containers. Construction on the project is anticipated to be complete by July 2025 (South Carolina Ports Authority 2022).
	Texas

Type	Description
	• *Port of Corpus Christi*. The $681.6 million Channel Improvement Project to widen the channel to 530 feet and deepen to 54 feet is in the final construction phase and is estimated to be complete in early 2025 (Port of Corpus Christi 2023).

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Attachment 1: Ongoing and Future Non-Offshore Wind Activity Analysis

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BOEM developed the following tables based on its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), which evaluates potential impacts associated with ongoing and future non-offshore wind activities.

Table D1-1. Summary of activities and the associated impact-producing factors for air quality

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	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. According to the U.S. Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited, which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and offshore it was up to less than 70,000 barrels.	Accidental releases of air toxics or HAPs will be due to potential chemical spills. Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. These may lead to short-term periods of toxic pollutant emissions through evaporation. Air quality impacts will be short-term and limited to the local area at and around the accidental release location.
Air emissions: Construction and decommissioning Air emissions: O&M Air emissions: Power generation emissions reductions	Air emissions originate from combustion engines and electric power generated by burning fuel. These activities are regulated under the CAA to meet set standards. Air quality has generally improved over the last 40 years; however, some areas in the Northeast have experienced a decline in air quality over the last 2 years. Some areas of the Atlantic coast remain in nonattainment for ozone, with the source of this pollution from power generation. Many of these states have made commitments toward cleaner energy goals to improve this, and offshore wind is part of these goals. Primary processes and activities that can affect the air quality impacts are expansions and modifications to existing fossil fuel power plants, onshore and offshore activities involving renewable energy facilities, and various construction activities.	Many Atlantic states have committed to clean energy goals, with offshore wind being a large part of that. Other reductions include transitioning to onshore wind and solar. The No Action Alternative without implementation of other future offshore wind projects would likely result in increased air quality impacts regionally due to the need to construct and operate new energy generation facilities to meet future power demands. These facilities may consist of new natural-gas-fired power plants, coal-fired, oil-fired, or clean-coal-fired plants. These types of facilities would likely have larger and continuous emissions and result in greater regional scale impacts on air quality.

CAA = Clean Air Act; hazmat = hazardous materials; HAPs = hazardous air pollutants

Table D1-2. Summary of activities and the associated impact-producing factors for bats

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded and would result in high-intensity, low-exposure level, long-term, but localized intermittent risk to bats in nearshore waters. Direct impacts are not expected to occur as recent research has shown that bats may be less sensitive to TTS than other terrestrial mammals (Simmons et al. 2016). Indirect impacts (i.e., displacement from potentially suitable habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized.	Similar to ongoing activities, noise associated with pile driving activities would be limited to nearshore waters, and these high-intensity, but low-exposure risks would not be expected to result in direct impacts. Some indirect impacts (i.e., displacement from potentially suitable foraging habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized, and no population-level effects would be expected.
Noise: Construction	Onshore construction occurs regularly for generic infrastructure projects in the bats geographic analysis area. There is a potential for displacement caused by equipment if construction occurs at night (Schaub et al. 2008). Any displacement would only be temporary. No individual or population level impacts would be expected. Some bats roosting in the vicinity of construction activities may be disturbed during construction but would be expected to move to a different roost farther from construction noise. This would not be expected to result in any impacts as frequent roost switching is a common component of a bat's life history (Hann et al. 2017; Whitaker 1998).	Onshore construction is expected to continue at current trends. Some behavioral responses and avoidance of construction areas may occur (Schaub et al. 2008). However, no injury or mortality would be expected.
Presence of structures: Migration disturbances	There may be few structures scattered throughout the offshore bats geographic analysis area, such as navigation and weather buoys and light towers. Migrating bats can easily fly around or over these sparsely distributed structures, and no migration disturbance would be expected. Bat use of offshore areas is very limited and generally restricted to spring and fall migration. Very few bats would be expected to encounter structures on the OCS and no population-level effects would be expected.	The infrequent installation of future new structures in the marine environment of the next 40 years is expected to continue. As described under Ongoing Activities, these structures would not be expected to cause disturbance to migrating tree bats in the marine environment.
Presence of structures: Turbine strikes	There may be few structures in the offshore bats geographic analysis area, such as navigation and weather buoys, turbines, and light towers. Migrating tree bats can easily fly around or over these sparsely distributed structures, and no strikes would be expected.	The infrequent installation of future new structures in the marine environment of the next 40 years is expected to continue. As described under Ongoing Activities, these structures would not be expected to result in increased collision risk to migrating tree bats in the marine environment.
Land disturbance: onshore construction	Onshore construction activities are expected to continue at current trends. Potential direct effects 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 by bats at the time of removal. While there is some potential for indirect impacts associated with habitat loss, no individual or population-level effects would be expected.	Future non-offshore wind development would continue to occur at the current rate. This development has the potential to result in habitat loss and could result in injury or mortality of individuals.

Table D1-3. Summary of activities and the associated impact-producing factors for benthic resources

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a discussion of ongoing accidental releases. Accidental releases of hazmat occur periodically, mostly consisting of fuels, lubricating oils, and other petroleum compounds. Because most of these materials tend to float in seawater, they rarely contact benthic resources. The chemicals with potential to sink or dissolve rapidly often dilute to non-toxic levels before they affect benthic resources. The corresponding impacts on benthic resources are rarely noticeable.	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. See previous cell and the Water Quality table for details.
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on benthic resources (e.g., competitive disadvantage, smothering) depend on many factors, but can be noticeable, widespread, and permanent.	No future activities were identified within the geographic analysis area other than ongoing activities.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occurs from onshore sources, fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying. However, there does not appear to be evidence that ongoing releases have detectable impacts on benthic resources.	No future activities were identified within the geographic analysis area other than ongoing activities.
Anchoring	Regular vessel anchoring related to ongoing military, survey, commercial, and recreational activities 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 the potential for direct 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.
EMFs	EMFs continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the geographic analysis area. Some benthic species can detect EMFs, although EMFs do not appear to present a barrier to movement. The extent of impacts (behavioral changes) is likely less than 50 feet (15.2 meters) 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.
Cable emplacement and maintenance	Cable maintenance activities infrequently disturb benthic resources and cause temporary increases in suspended sediment; these disturbances would be local and limited to the emplacement corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities injure and kill benthic resources, and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) where the activities occur. (See also the IPFs of Seabed profile alterations and Sediment deposition and burial.)	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Onshore/offshore construction	See finfish, invertebrates, and EFH table. Detectable impacts of construction noise on benthic resources rarely, if ever, overlap from multiple sources.	See finfish, invertebrates, and EFH table. Detectable impacts of construction noise on benthic resources would rarely, if ever, overlap from multiple sources.
Noise: G&G	See finfish, invertebrates, and EFH table. Detectable impacts of G&G noise on benthic resources rarely, if ever, overlap from multiple sources.	See finfish, invertebrates, and EFH table. Detectable impacts of G&G noise on benthic resources would rarely, if ever, overlap from multiple sources.
Noise: O&M	See finfish, invertebrates, and EFH table.	See finfish, invertebrates, and EFH table.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to benthic resources in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	Infrequent trenching activities for pipeline and cable laying, as well as other cable burial methods, emit noise. These disturbances are local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area. These disturbances would be infrequent over the next 40 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: Expansion	See finfish, invertebrates, and EFH table.	See finfish, invertebrates, and EFH table.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear are periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb, injure, or kill benthic resources, creating small, short-term, localized impacts.	Future new cables would present additional risk of gear loss, resulting in small, short-term, localized impacts (disturbance, injury).
Presence of structures: Hydrodynamic disturbance	See finfish, invertebrates, and EFH table.	See finfish, invertebrates, and EFH table.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables continuously create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes can adversely affect populations and communities of benthic resources. These impacts are local and permanent.	New cables installed in the geographic analysis area over the next 40 years would likely require hard protection atop portions of the route (see the "cable emplacement and maintenance" row in this table). Any new towers, buoy, or piers would also create uncommon relief in a mostly flat, sandy seascape. Structure-oriented fishes could be attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes could adversely affect populations and communities of benthic resources. These impacts are expected to be local and to be permanent as long as the structures remain.
Presence of structures: Habitat conversion	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables continuously provide uncommon hard-bottom habitat. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Benthic species dependent on hard-bottom habitat 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.	Any new towers, buoy, piers, or cable protection structures would create uncommon relief in a mostly sandy seascape. Benthic species dependent on hard-bottom habitat could benefit, although the new habitat could also be colonized by invasive species (e.g., certain tunicate species). 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).
Presence of structures: Cable infrastructure	The presence of cable infrastructure, especially hard protection atop cables, causes impacts through entanglement/gear loss/damage, fish aggregation, and habitat conversion.	See other sub-IPFs within Presence of structures.
Discharges/intakes	The gradually increasing amount of vessel traffic is increasing the cumulative permitted discharges from vessels. Many discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated. However, there does not appear to be evidence that the volumes and extents have any impact on benthic resources.	There is the potential for new ocean dumping/dredge disposal sites in the Northeast. Impacts (disturbance, reduction in fitness) of infrequent ocean disposal to benthic resources are short-term because spoils are typically recolonized naturally. In addition, USEPA has 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.
Cable emplacement and maintenance: Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized short-term impacts (habitat alteration, injury, and mortality) on benthic resources through this IPF. Dredging typically occurs only in sandy or silty habitats, which are abundant in the geographic analysis area and are quick to recover from disturbance. Therefore, such impacts, while locally intense, have little impact on benthic resources in the geographic analysis area.	No future activities were identified within the geographic analysis area other than ongoing activities.
Cable emplacement and maintenance: Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. Sediment deposition could have adverse impacts on some benthic resources, especially eggs and larvae, including smothering and loss of fitness. Impacts may vary based on season/time of year. Where dredged materials are disposed, benthic resources are smothered. However, such areas are typically recolonized naturally in the short term. Most sediment dredging projects have time-of-year restrictions to minimize impacts on benthic resources. Most benthic resources in the geographic analysis area are adapted to the turbidity and periodic sediment deposition that occur naturally in the geographic analysis area.	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.

EFH = Essential Fish Habitat; EMFs = electromagnetic fields; hazmat = hazardous materials

Table D1-4. Summary of activities and the associated impact-producing factors for birds

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Ingestion of hydrocarbons can lead to morbidity and mortality due to decreased hematological function, dehydration, drowning, hypothermia, starvation, and weight loss (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016). Additionally, even small exposures that result in feather oiling can lead to sublethal effects that include changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities including chick provisioning, commuting, courtship, foraging, long-distance migration, predator evasion, and territory defense (Maggini et al. 2017). These impacts rarely result in population-level impacts.	Gradually increasing vessel traffic over the next 40 years would increase the potential risk of accidental releases and associated impacts, including mortality, decreased fitness, and health effects on individuals. Impacts are unlikely to affect populations.
Accidental releases: Trash and debris	Trash and debris are accidentally discharged through onshore sources; fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation, navigation, and traffic; survey activities; and 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).	As population and vessel traffic increase gradually over the next 40 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.
Light: Vessels	Ocean vessels have an array of lights including navigational lights, deck lights, and interior lights. Such lights can attract some birds. The impact is localized and temporary. This attraction would not be expected to result in an increased risk of collision with vessels. Population-level impacts would not be expected.	Gradually increasing vessel traffic over the next 40 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. No population-level impacts would be expected.
Light: Structures	Buoys, towers, and onshore structures with lights can attract birds. Onshore structures like houses and ports emit a great deal more light than offshore buoys and towers. This attraction has the potential to result in an increased risk of collision with lighted structures (Hüppop et al. 2006). Light from structures is widespread and permanent near the coast, but minimal offshore.	Light from onshore structures is expected to gradually increase in proportion with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
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. Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances will be temporary and limited to the emplacement corridor. Suspended sediment could impair the vision of diving birds that are foraging in the water column (Cook and Burton 2010). However, given the localized nature of the potential impacts, individuals would be expected to successfully forage in nearby areas not affected by increased sedimentation and no biologically significant impacts on individuals or populations would be expected.	Future new cables, would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in localized, short-term impacts. Impacts would be temporary and localized, with no biologically significant impacts on individuals or populations.
Noise: Aircraft	Aircraft routinely travel in the geographic analysis area for birds. With the possible exception of rescue operations and survey aircraft, no ongoing aircraft flights would occur at altitudes that would elicit a response from birds. If flights are at a sufficiently low altitude, birds 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.	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.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities could result in diving birds leaving the local area. Non-diving birds would be unaffected. Any displacement would only be temporary during non-migratory periods, but impacts could be greater if displacement were to occur in preferred feeding areas during seasonal migration periods.	Same as ongoing activities, with the addition of possible future oil and gas surveys.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water could result in intermittent, temporary, localized impacts on diving birds due to displacement from foraging areas if birds are present in the vicinity of pile-driving activity. The extent of these impacts depends on pile size, hammer energy, and local acoustic conditions. No biologically significant impacts on individuals or populations would be expected.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Noise: Onshore construction	Onshore construction is routinely used in generic infrastructure projects. Equipment could potentially cause displacement. Any displacement would only be temporary and no individual fitness or population-level impacts would be expected.	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: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Sub-surface noise from vessels could disturb diving birds foraging for prey below the surface. The consequence to birds would be similar to noise from G&G but likely less because noise levels are lower.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Presence of structures: Entanglement, gear loss, gear damage	Each year, 2,551 seabirds die annually from interactions with U.S. commercial fisheries on the Atlantic (Sigourney et al. 2019). Even more die due to abandoned commercial fishing gear (nets). In addition, recreational fishing gear (hooks and lines) is periodically lost on existing buoys, pilings, hard protection, and other structures and has the potential to entangle birds.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various hard protections atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these objects. These impacts are local and can be short-term to permanent. These fish aggregations can provide localized, short-term to permanent, beneficial impacts on some bird species because it could increase prey species availability.	New cables, installed incrementally in the geographic analysis area for birds over the next 20 to 40 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.
Presence of structures: Migration disturbances	A few structures may be scattered about the offshore geographic analysis area for birds, such as navigation and weather buoys and light towers. Migrating birds can easily fly around or over these sparsely distributed structures.	The infrequent installation of future new structures in the marine or onshore environment over the next 40 years would not be expected to result in migration disturbances.
Presence of structures: Turbine strikes, displacement, and attraction	A few structures may be in the offshore geographic analysis area for birds, such as navigation and weather buoys, turbines, and light towers. Given the limited number of structures currently in the geographic analysis area, individual- and population-level impacts due to displacement from current foraging habitat would not be expected. Stationary structures in the offshore environment would not be expected to pose a collision risk to birds. Some birds like cormorants and gulls may be attracted to these structures and opportunistically roost on these structures.	The installation of future new structures in the marine or onshore environment over the next 40 years would not be expected to result in an increase in collision risk or to result in displacement. Some potential for attraction and opportunistic roosting exists but would be expected to be limited given the anticipated number of structures.
Traffic: Aircraft	General aviation accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). In addition to general aviation, 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 will 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.
Land disturbance: Onshore construction	Onshore construction activity will continue at current trends. There is some potential for indirect impacts associated with habitat loss and fragmentation.	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.

hazmat = hazardous materials

Table D1-5. Summary of activities and the associated impact-producing factors for coastal habitats and fauna

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a discussion of ongoing accidental releases. Accidental releases of fuel/fluids/ hazmat have the potential to cause habitat contamination and harm to the species that build biogenic coastal habitats (e.g., eelgrass, oysters, mussels, slipper limpets, salt marsh cordgrass) from releases and/or cleanup activities. Only a portion of the ongoing releases contact coastal habitats in the geographic analysis area. Impacts are small, localized, and temporary.	See the Water Quality table for a discussion of accidental releases.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occur from onshore sources, fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and 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.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
Anchoring	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 direct contact to cause physical damage to coastal habitats. 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 for coastal habitats other than ongoing activities.
EMF	EMFs continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the analysis area. The extent of impacts is likely less than 50 feet from the cable, and the intensity of impacts on coastal habitats is likely undetectable.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
Light: Vessels	Navigation lights and deck lights on vessels would be a source of ongoing light. The extent of impacts is limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats is likely undetectable.	Light is expected to continue to increase gradually with increasing vessel traffic over the next 40 years. The extent of impacts would likely be limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats would likely be undetectable.
Light: Structures	Ongoing lights from navigational aids and other structures onshore and nearshore. The extent of impacts is likely limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats is likely undetectable.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
Cable emplacement and maintenance	Ongoing cable maintenance activities infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor (see the Sediment deposition and burial IPF).	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Onshore/offshore construction	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 40 years in line with human population growth along the coast of the geographic analysis area. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary.	No future activities were identified within the analysis area other than ongoing activities.
Noise: G&G	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.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 40 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.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can reach coastal habitats. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the analysis area other than ongoing activities.
Noise: Cable laying/trenching	Rare but 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 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 40 years. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on coastal habitats are discountable compared to the impacts of the physical disturbance and sediment suspension.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Habitat conversion	Various structures, including pilings, piers, towers, riprap, buoys, and various means of hard protection, are periodically added to the seascape, creating uncommon 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 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.	Any new cable or pipeline installed in the geographic analysis area would likely require hard protection atop portions of the route (see cells to the left). Such protection is anticipated to increase incrementally over the next 40 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.
Presence of structures: Transmission cable infrastructure	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 has no impact on coastal habitats.	See above.
Land disturbance: Erosion and sedimentation	Ongoing development of onshore properties, especially shoreline parcels, periodically causes short-term erosion and sedimentation of coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.
Land disturbance: Onshore construction	Ongoing development of onshore properties, especially shoreline parcels, periodically causes short-term to permanent degradation of onshore coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.
Land disturbance: Onshore, land use changes	Ongoing development of onshore properties, especially shoreline parcels, periodically causes the conversion of onshore coastal habitats to developed space.	No future activities were identified within the geographic analysis area other than ongoing activities.
Cable emplacement and maintenance: Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized, short-term impacts on coastal habitats through this IPF. Dredging typically occurs only in sandy or silty habitats, which are abundant in the analysis area and are quick to recover from disturbance. Therefore, such impacts, while locally intense, have little effect on the general character of coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.
Cable emplacement and maintenance: Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition within coastal habitats. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. No dredged material disposal sites were identified within the geographic analysis area.	No future activities were identified within the geographic analysis area other than ongoing activities.

hazmat = hazardous materials

Table D1-6. Summary of activities and the associated impact-producing factors for commercial fisheries and for-hire recreational fishing

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Impacts from anchoring occur due to ongoing military, survey, commercial, and recreational activities. The short-term, 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 40 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Anchoring could pose a temporary (hours to days), localized (within a few hundred meters of anchored vessel) navigational hazard to fishing vessels.
Cable emplacement and maintenance	New cable emplacement and infrequent cable maintenance activities disturb the seafloor, increase suspended sediment, and cause temporary displacement of fishing vessels. These disturbances would be local and limited to the emplacement corridor.	Future new cables and cable maintenance would occasionally disturb the seafloor and cause temporary displacement in fishing vessels and increases in suspended sediment resulting in local, short-term impacts. If the cable routes enter the geographic analysis area for this resource, short-term disruption of fishing activities would be expected.
Noise: Construction, trenching, operations and maintenance	Noise from construction occurs frequently in coastal habitats in populated areas in New England and the Mid-Atlantic, but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Infrequent offshore trenching could occur in connection with cable installation. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Low levels of elevated noise from operational WTGs likely have low to no impacts on fish and no impacts at a fishery level. Noise is also created by O&M of marine minerals extraction, which has small, local impacts on fish, but likely no impacts at a fishery level.	Noise from construction near shore 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 their O&M over the next 40 years. Impacts from construction, operations, and maintenance would likely be small and local on fish, and not seen at a fishery level. Periodic trenching would be needed for repair or new installation of underground infrastructure. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on commercial fish species are typically less prominent than the impacts of the physical disturbance and sediment suspension. Therefore, fishery-level impacts are unlikely.
Noise: G&G	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb fish and invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 40 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seabed, potentially resulting in injury or mortality to finfish and invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when ports or marinas, piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to finfish and invertebrates in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area, leading to temporary local impacts on commercial fisheries and for-hire recreational fishing. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified in the analysis area other than ongoing activities.
Noise: Vessels	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 this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	Planned new barge route and dredging disposal sites would generate vessel noise when implemented.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 40 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 to be able to host larger deep-draft vessels as they continue to increase in size. Port utilization is expected to increase over the next 40 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.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Navigation hazard and allisions	Structures in and near the cumulative lease areas that pose potential navigation hazards include offshore wind turbines, buoys, and shoreline developments such as docks and ports. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. Two types of allisions occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements or is distracted.	No known reasonably foreseeable structures are proposed to be located in the geographic analysis area that could affect commercial fisheries. Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts on fish, but likely no impacts at a fishery level.	No future activities were identified in the analysis area other than ongoing activities.
Presence of structures: Habitat conversion and fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom 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.	New cables, installed incrementally in the analysis area over the next 20 to 40 years, would likely require hard protection atop portions of the route (see cable emplacement and maintenance IPF above). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented species could be attracted to these locations. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016). This may lead to more and larger structure-oriented fish communities and larger predators opportunistically feeding on the communities, as well as increased private and for-hire recreational fishing opportunities. Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010). These impacts are expected to be local and may be long term.
Presence of structures: Migration disturbances	Human structures in the marine environment, e.g., shipwrecks, artificial reefs, buoys, and oil platforms, can attract finfish and invertebrates that approach the structures during their migrations. This could slow species migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure (Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.	The infrequent installation of future new structures in the marine environment over the next 40 years may attract finfish and invertebrates that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded. Therefore, fishery-level impacts are not anticipated.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Presence of structures: Cable infrastructure	The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between mainland and islands. Shoreline developments are ongoing and include docks, ports, and other commercial, industrial, and residential structures.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Traffic: Vessels and vessel collisions	No substantial changes are anticipated to the vessel traffic volumes. The geographic analysis area would continue to have numerous ports and the extensive marine traffic related to shipping, fishing, and recreation would continue to be important to the region’s economy. The region’s substantial marine traffic may result in occasional collisions. Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is more complex, as the vessels need to avoid both the structure and each other. The risk for collisions is ongoing but infrequent.	New vessel traffic in the geographic analysis area would consistently be generated by proposed barge routes and dredging demolition sites. Marine commerce and related industries would continue to be important to the regional economy.

Table D1-7. Summary of activities and the associated impact-producing factors for cultural resources

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for water quality for a quantitative analysis of these risks. Accidental releases of fuel/fluids/hazmat occur during vessel use for recreational, fisheries, marine transportation, or military purposes, and other ongoing activities. Both released fluids and cleanup activities that require the removal of contaminated soils and/or seafloor sediments can cause impacts on cultural resources because resources are affected during by the released chemicals as well as the ensuing cleanup activities.	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases within the geographic analysis area for cultural resources, increasing the frequency of small releases. Although the majority of anticipated accidental releases would be small, resulting in small-scale impacts on cultural resources, a single, large-scale accidental release such as an oil spill, could have significant impacts on marine and coastal cultural resources. A large-scale release would require extensive cleanup activities to remove contaminated materials resulting in damage to or the complete removal of terrestrial and marine cultural resources. In addition, the accidentally released materials in deep water settings could settle on seafloor cultural resources such as wreck sites, accelerating their decomposition and/or covering them and making them inaccessible/unrecognizable to researchers, resulting in a significant loss of historic information. As a result, although considered unlikely, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive, and large-scale impacts on cultural resources.
Accidental releases: Trash and debris	Accidental releases of trash and debris occur during vessel use for recreational, fisheries, marine transportation, or military purposes and other ongoing activities. While the released trash and debris can directly affect cultural resources, the majority of impacts associated with accidental releases occur during cleanup activities, especially if soil or sediment removed during cleanup affect known and undiscovered archaeological resources. In addition, the presence of large amounts of trash on shorelines or the ocean surface can impact the cultural value of Traditional Cultural Properties (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 effects of small-scale accidental releases of trash.	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	The use of vessel anchoring and gear (i.e., wire ropes, cables, chain, sweep on the seafloor) that disturbs the seafloor, such as bottom trawls and anchors, by military, recreational, industrial, and commercial vessels can impact cultural resources by physically damaging maritime archaeological resources such as shipwrecks and debris fields.	Future activities with the potential to result in anchoring/gear utilization include construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); military use; marine transportation; fisheries use and management; and oil and gas activities. These activities are likely to continue to occur at current rates along the entire coast of the eastern United States.
Gear utilization: Dredging	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 operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities.	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.
Light: Vessels	Light associated with military, commercial, or construction vessel traffic can temporarily affect coastal historic structures and TCP resources when the addition of intrusive, modern lighting changes the physical environment ("setting") of cultural resources. The impacts of construction and operational lighting would be limited to cultural resources on the shoreline for which a nighttime sky is a contributing element to historic integrity. This excludes resources that are closed at night, such as historic buildings, lighthouses, and battlefields, and resources that generate their own nighttime light, such as historic districts. Offshore construction activities that require increased vessel traffic, construction vessels stationed offshore, and construction area lighting for prolonged periods can cause more sustained and significant visual impacts on coastal historic structure and TCP resources.	Future activities with the potential to result in vessel lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the northeast coast, with a slight increase due to population increase and development over time.
Light: Structures	The construction of new structures that introduce new light sources into the setting of historic architectural properties or TCPs can result in impacts, particularly if the historic and/or cultural significance of the resource is associated with uninterrupted nighttime skies or periods of darkness. Any tall structure (commercial building, radio antenna, large satellite dishes, etc.) requiring nighttime hazard lighting to prevent aircraft collision can cause these types of impacts.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Port utilization: Expansion	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. Expansion of port facilities can introduce large, modern port infrastructure into the viewsheds of nearby historic properties, affecting their setting and historic significance.	Future activities with the potential to result in port expansion impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Port expansion would continue at current levels, which reflect efforts to capture business associated with the offshore wind industry (irrespective of specific projects).
Presence of structures	The only existing offshore structures within the viewshed of the geographic analysis area are minor features such as buoys.	Non-offshore wind structures that could be viewed would be limited to meteorological towers. Marine activity would also occur within the marine viewshed of the geographic analysis area.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and could cause impacts on submerged archaeological resources. These disturbances would be local and limited to emplacement corridors.	Future activities with the potential to result in seafloor disturbances similar to offshore 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; and oil and gas activities. Such activities could cause impacts on submerged archaeological resources including shipwrecks and formerly subaerially exposed pre-contact Native American archaeological sites.
Land disturbance: Onshore construction	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 along the East Coast, particularly those proximate to export cables and interconnection facilities. Onshore construction would continue at current rates.

hazmat = hazardous materials; TCPs = Traditional Cultural Resources

Table D1-8. Summary of activities and the associated impact-producing factors for demographics, employment, and economics

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Light: Structures	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
Light: Vessels	Ocean vessels have an array of lights including navigational lights and deck lights.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting.
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.	Future new cables would disturb the seafloor and cause temporary increases in suspended sediment resulting in infrequent, localized, short-term impacts over the next 40 years.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the geographic analysis area for demographics, employment, and economics other than ongoing activities.
Noise: Cable laying/trenching	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.	Periodic trenching would be needed over the next 40 years for repair or new installation of underground infrastructure.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF 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 route and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Port of Paulsboro (New Jersey) and Port of New London (Connecticut) are being upgraded specifically to support the construction of offshore wind energy facilities.	Ports would need to perform maintenance and upgrade facilities over the next 40 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Port utilization: Maintenance/dredging	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. As ports expand, maintenance dredging of shipping channels is expected to increase.	Ports would need to perform maintenance and upgrades over the next 40 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners and are expected to continue at or near current levels.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations, which may be known as fish aggregation devices (FADs). Recreational and commercial fishing can occur near the FADs, although recreational fishing is more popular, because commercial mobile fishing gear is more likely to snag on FADs.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 40 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	No existing offshore structures are within the viewshed of the offshore wind lease area except buoys.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Transmission cable infrastructure	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.	No known proposed structures not associated with offshore wind development are reasonably foreseeable.
Traffic: Vessels	Ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 40 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy.
Traffic: Vessel collisions	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.	No substantial changes anticipated.
Land disturbance: Onshore construction	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.

FADs = fish aggregating devices

Table D1-9. Summary of activities and the associated impact-producing factors for environmental justice

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Air emissions: Construction/decommissioning	Ongoing population growth and new development within the 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.
Air emissions: Operations and maintenance	Ongoing population growth and new development within the 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.
Light: Structures	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
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.	Future new cables would disturb the seafloor and cause temporary increases in suspended sediment, resulting in infrequent, localized, short-term impacts over the next 40 years.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the analysis area other than ongoing activities.
Noise: Trenching	Infrequent trenching for pipeline and cable laying activities emits noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	Periodic trenching would be needed over the next 40 years for repair or new installation of underground infrastructure.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF 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: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Port of Paulsboro and Port of New London are being upgraded specifically to support the construction of offshore wind energy 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 to be able to host larger deep-draft vessels as they continue to increase in size.
Presence of structures: Entanglement, gear loss/damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners and are expected to continue at or near current levels.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure, and each other.	Vessel traffic is generally not expected to meaningfully increase over the next 40 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	There are no existing offshore structures within the viewshed of the offshore wind lease area except buoys.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Cable infrastructure	Existing submarine cables cross cumulative lease areas.	Existing cable O&M activities would continue within the analysis area.
Traffic: Vessels	Ports and marine traffic related to shipping, fishing and recreation are important to the region’s economy. No substantial changes are anticipated to existing vessel traffic volumes.	Vessel traffic is not expected to meaningfully increase over the next 40 years. Marine commerce and related industries would continue to be important to area employment.
Land disturbance: Erosion and sedimentation	Potential erosion and sedimentation from development and construction is controlled by local and state development regulations.	New development activities would be subject to erosion and sedimentation regulations.
Land disturbance: Onshore construction	Onshore development supports local population growth, employment, and economics.	Onshore development would continue in accordance with local government land use plans and regulations.
Land disturbance: Onshore, land use changes	Onshore development would result in changes in land use in accordance with local government land use plans and regulations.	Development of onshore solar and wind energy would provide diversified, small-scale energy generation.

Table D1-10. Summary of activities and the associated impact-producing factors for finfish, invertebrates, and essential fish habitat

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Impacts, including mortality, decreased fitness, and contamination of habitat, are localized and temporary, and rarely affect populations.	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. Impacts are unlikely to affect populations.
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on finfish, invertebrates, and EFH depend on many factors, but can be widespread and permanent.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Anchoring	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 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 40 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. These impacts would include increased turbidity levels and potential for direct contact causing mortality of benthic species and, possibly, degradation of sensitive habitats. All impacts would be localized; turbidity would be temporary; impacts from direct contact would be recovered in the short term. Degradation of sensitive habitats such as certain types of hard bottom (e.g., boulder piles), if it occurs, could be long term.
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 negatively affects commercially and recreationally important fish species (CSA Ocean Sciences, Inc. and Exponent 2019).	During operation, future new cables would produce EMF. Submarine power cables in the geographic analysis area are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. 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.
Light: Vessels	Marine vessels have an array of lights including navigational lights and deck lights. There is little downward-focused lighting, and therefore only a small fraction of the emitted light enters the water. Light can attract finfish 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.	Vessels would continue to be a light source within the analysis area.
Light: Structures	Offshore buoys and towers emit light, and onshore structures, including buildings and ports, emit a great deal more on an ongoing basis. Light can attract finfish 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.
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. New cables are infrequently added near shore. Cable emplacement/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. (See also the IPF of Sediment deposition and burial.)	Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in local short-term impacts. 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.
Noise: Aircraft	Noise from aircraft reaches the sea surface on a regular basis. However, there is not likely to be any impact of aircraft noise on finfish, invertebrates, and EFH, as very little of the aircraft noise propagates through the water.	Aircraft noise is likely to continue to increase as commercial air traffic increases. However, there is not likely to be any impact of aircraft noise on finfish, invertebrates, and EFH.
Noise: Onshore/offshore construction	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. See also sub-IPF for Noise: Pile driving.	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.
Noise: G&G	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb finfish and invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 40 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seabed, potentially resulting in injury or mortality to finfish and invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: O&M	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 barley exceeds ambient levels at 164 feet (50 meters) from the WTG base. Based on the results of Thomsen et al. (Thomsen et al. 2015), SPLs would be expected to be at or below ambient levels at relatively short distances (approximately 164 feet [50 meters]) from WTG foundations. These low levels of elevated noise likely have little to no impact. Noise is also created by O&M of marine minerals extraction and commercial fisheries, each of which has small local impacts.	New or expanded marine minerals extraction and commercial fisheries may intermittently increase noise during their O&M over the next 40 years. Impacts would likely be small and local.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to finfish and invertebrates in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. 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.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Noise: Cable laying/trenching	Infrequent trenching activities for pipeline and cable laying, as well as other cable burial methods, emit noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area for this resource. These disturbances would be infrequent over the next 40 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.
Noise: Vessels	While ongoing vessel noise may have some effect on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	See cell to the left.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 40 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 South Carolina 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, adverse 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: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Presence of structures: Hydrodynamic disturbance	Manmade 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. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood. New structures are periodically added.	Tall vertical structures can increase seabed scour and sediment suspension. Impacts would likely be highly localized and difficult to detect. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. These impacts are local and often permanent. Fish aggregation may be considered adverse, beneficial, or neutral.	New cables, installed incrementally in the geographic analysis area for this resource over the next 20 to 40 years, would likely require hard protection atop portions of the route (see the cable emplacement and maintenance IPF). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes may increase. These impacts are local and may be permanent.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Habitat conversion	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Structure-oriented species thus benefit on a constant basis; however, the diversity may decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019 [Chapter 7]). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat.	New cable, installed incrementally in the analysis area over the next 20 to 40 years, would likely require hard protection atop portions of the route (see cable emplacement and maintenance). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016); however, the diversity may decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019 [Chapter 7]). Soft bottom is the dominant habitat type from Cape Hatteras to the Gulf of Maine (over 60 million acres), and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010).
Presence of structures: Migration disturbances	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. This could slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure is (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.	The infrequent installation of future new structures in the marine environment over the next 40 years may attract finfish and invertebrates that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Moser and Shepherd 2009; Fabrizio et al. 2014; Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded.
Presence of structures: Cable infrastructure	See other sub-IPFs within the Presence of structures IPF. See table for Coastal Habitats and Fauna.	See other sub-IPFs within the Presence of structures IPF. See table for Coastal Habitats and Fauna.
Cable emplacement and maintenance: Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized short-term impacts (habitat alteration, change in complexity) on finfish, invertebrates, and EFH through this IPF. Dredging is most likely in sand wave areas where typical jet plowing is insufficient to meet target cable burial depth. Sand waves that are dredged would likely be redeposited in like-sediment areas. Any particular sand wave may not recover to the same height and width as pre-disturbance; however, the habitat function would largely recover post-disturbance. Therefore, seabed profile alterations, while locally intense, have little impact on finfish, invertebrates, and EFH on a regional (Cape Hatteras to Gulf of Maine) scale.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Cable emplacement and maintenance: Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. Sediment deposition could have negative impacts on eggs and larvae, particularly demersal eggs such as longfin squid, which are known to have high rates of egg mortality if egg masses are exposed to abrasion or burial. Impacts may vary based on season/time of year.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.

AC = alternating current; DC = direct current; EFH = Essential Fish Habitat; EMF = electromagnetic field; hazmat = hazardous materials; SPLs = sound pressure levels

Table D1-11. Summary of activities and the associated impact-producing factors for land use and coastal infrastructure

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	Various ongoing onshore and coastal construction projects include the use of vehicles and equipment that contain fuel, fluids, and hazardous materials that could be released.	Ongoing onshore construction projects involve vehicles and equipment that use fuel, fluids, or hazardous materials could result in an accidental release. Intensity and extent would vary, depending on the size, location, and materials involved in the release.
Light: Structures	Various ongoing onshore and coastal construction projects have nighttime activities, as well as existing structures, facilities, and vehicles that would use nighttime lighting.	Ongoing onshore construction projects involving nighttime activity could generate nighttime lighting. Intensity and extent would vary, depending on the location, type, direction, and duration of nighttime lighting.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Port of Paulsboro and Port of New London being upgraded specifically to support the construction of offshore wind energy 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 to be able to host larger deep draft vessels as they continue to increase in size.
Presence of structures: Viewshed	The only existing offshore structures within the offshore viewshed are minor features such as buoys.	Non-offshore wind structures that could be viewed in conjunction with the offshore components would be limited to met towers. Marine activity would also occur within the marine viewshed.
Presence of structures: Cable infrastructure	Onshore buried cables would only occur where permitted by local land use authorities, which would avoid long-term land use conflicts.	No known proposed structures are reasonably foreseeable and proposed to be located in the geographic analysis area for land use and coastal infrastructure.
Land disturbance: Onshore construction	Onshore construction supports local population growth, employment, and economics.	Onshore development would continue in accordance with local government land use plans and regulations.
Land disturbance: Onshore, land use changes	New development or redevelopment would result in changes in land use in accordance with local government land use plans and regulations.	Ongoing and future development and redevelopment is anticipated to reinforce existing land use patterns, based on local government planning documents.

hazmat = hazardous materials; met = meteorological

Table D1-12. Summary of activities and the associated impact-producing factors for marine mammals

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a quantitative analysis of these risks. Ongoing releases are frequent/ chronic. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on the individual fitness, including adrenal effects, hematological effects, liver effects lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Kellar et al. 2017; Mazet et al. 2001; Mohr et al. 2008; Smith et al. 2017; Sullivan et al. 2019; Takeshita et al. 2017). Additionally, accidental releases may result in impacts on marine mammals due to effects on prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on the individual fitness, including adrenal effects, hematological effects, liver effects lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Kellar et al. 2017; Mazet et al. 2001; Mohr et al. 2008; Smith et al. 2017; Sullivan et al. 2019; Takeshita et al. 2017). Additionally, accidental releases may result in impacts on marine mammals due to effects on prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).
Accidental releases: Trash and debris	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, and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Worldwide 62 of 123 (50.4%) marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Stranding data indicate potential debris induced mortality rates of 0 to 22%. Mortality has been documented in cases of debris interactions, as well as blockage of the digestive track, disease, injury, and malnutrition (Baulch and Perry 2014). However, it is difficult to link physiological effects to individuals to population level impacts (Browne et al. 2015).	As population and vessel traffic increase gradually over the next 40 years, accidental release of trash and debris may increase. Trash and debris may continue to be accidentally released through fisheries use and other offshore and onshore activities. There may also be a long-term risk from exposure to plastics and other debris in the ocean. Worldwide 62 of 123 (50.4%) of marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Mortality has been documented in cases of debris interacts, as well as blockage of the digestive track, disease, injury, and malnutrition (Baulch and Perry 2014).
EMFs	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Marine mammals appear to have a detection threshold for magnetic intensity gradients (i.e., changes in magnetic field levels with distance) of 0.1% of the earth's magnetic field or about 0.05 μT (Kirschvink 1990) and are thus likely to be very sensitive to minor changes in magnetic fields (Walker et al. 2003). There is a potential for animals to react to local variations of the geomagnetic field caused by power cable EMFs. Depending on the magnitude and persistence of the confounding magnetic field, such an effect could cause a trivial temporary change in swim direction or a longer detour during the animal's migration (Gill et al. 2005). Such an effect on marine mammals is more likely to occur with direct current 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 operation, future new cables would produce EMF. Submarine power cables in the marine mammal geographic analysis area are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Marine mammals have the potential to react to submarine cable EMF; however, no effects from the numerous submarine cables have been observed. Furthermore, this IPF would be limited to extremely small portions of the areas used by migrating marine mammals. As such, exposure to this IPF would be low, and as a result impacts on marine mammals would not be expected.
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. (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. (McConnell et al. 1999) documented movements and foraging of grey seals in the North Sea. One tracked individual was blind in both eyes, but otherwise healthy. Despite being blind, observed movements were typical of the other study individuals, indicating that visual cues are not essential for grey seal foraging and movement (McConnell et al. 1999). If elevated turbidity caused any behavioral responses such as avoiding the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be temporary and short term. Turbidity associated with increased sedimentation may result in temporary, short-term impacts on marine mammal prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).	The impact on water quality from accidental sediment suspension during cable emplacement is temporary and short term. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any negative impacts would be temporary and short term. Turbidity associated with increased sedimentation may result in temporary, short-term impacts on some marine mammal prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).
Noise: Aircraft	Aircraft routinely travel in the marine mammal geographic analysis area. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from marine mammals. If flights are at a sufficiently low altitude, marine mammals 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 (610 meters) of a haul out area (Efroymson et al. 2000).	Future low altitude aircraft activities such as survey activities and navy training operations could result short-term responses of marine mammals to aircraft noise. If flights are at a sufficiently low altitude, marine mammals may respond with a 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.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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.	
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in high intensity, high consequence impacts, including auditory injuries, stress, disturbance, and behavioral responses, if present within the ensonified area (NOAA 2018). Survey protocols and underwater noise mitigation procedures are typically implemented to decrease the potential for any marine mammal to be within the area where sound levels are above relevant harassment thresholds associated with an operating sound source to reduce the potential for behavioral responses and injury (PTS/TTS) close to the sound source. The magnitude of effects, if any, is intrinsically related to many factors, including acoustic signal characteristics, behavioral state (e.g., migrating), biological condition, distance from the source, duration and level of the sound exposure, as well as environmental and physical conditions that affect acoustic propagation (NOAA 2018).	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.
Noise: Turbines	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 (50 meters) from the WTG base. Based on the results of Thomsen et al. (Thomsen et al. 2015) and Kraus et al. (Kraus et al. 2016), SPLs would be expected to be at or below ambient levels at relatively short distances from the WTG foundations.	This sub-IPF does not apply to future non-offshore wind development.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the 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 negatively affect marine mammals during foraging, orientation, migration, predator detection, social interactions, or other activities (Southall et al. 2007). Noise exposure associated with pile-driving activities can interfere with these functions and have the potential to cause a range of responses, including insignificant behavioral changes, avoidance of the ensonified area, PTS, harassment, and ear injury, depending on the intensity and duration of the exposure. BOEM assumes that all ongoing and potential future activities will be conducted in accordance with a project-specific IHA to minimize impacts on marine mammals.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	Noise from cable laying could periodically occur in the analysis area.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, 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 in most oceanic regions. While vessel noise may have some effect on marine mammal behavior, it would be expected to be limited to brief startle and temporary stress response. Results from studies on acoustic impacts from vessel noise on odontocetes indicate that small vessels at a speed of 5 knots in shallow coastal water can reduce the communication range for bottlenose dolphins within 164 feet (50 meters) of the vessel by 26% (Jensen et al. 2009). Pilot whales in a quieter, deep-water habitat could experience a 50% reduction in communication range from a similar size boat and speed (Jensen et al. 2009). Since lower frequencies propagate farther away from the sound source compared to higher frequencies, LFCs are at a greater risk of experiencing Level B Harassment produced by vessel traffic.	Any offshore projects that require the use of ocean vessels could 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, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of marine mammals and no stock or population level effects would be expected.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats, and are expected to result in temporary, short-term impacts, if any, on marine mammals. Vessel noise may affect marine mammals, but response would be expected to be temporary and short-term (see Vessels: Noise sub-IPF above). The impacts on water quality from sediment	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 South Carolina 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

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	suspension during port expansion activities is temporary, short-term, and would be similar to those described under the cable emplacement and maintenance IPF above.	increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g. ferry use and cruise industry) and may continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strike could also occur (see the Traffic: Vessel collisions sub-IPF below).
Presence of structures: Entanglement or ingestion of lost fishing gear	There are more than 130 artificial reefs in the Mid-Atlantic region. This sub-IPF may result in long-term, 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 nearshore where these structures are located. There are very few, if any, areas within the OCS geographic analysis area for marine mammals that would serve to concentrate recreational fishing and increase the likelihood that marine mammals would encounter lost fishing gear.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Presence of structures: Habitat conversion and prey aggregation	There are more than 130 artificial reefs in the Mid-Atlantic region. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and 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.	The presence of structures associated with non-offshore wind development in near shore coastal waters have the potential to provide habitat for seals and small odontocetes as well as preferred prey species. This “reef effect” has the potential to result in long term, low-intensity benefits. Bridge foundations 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 OSP 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.
Presence of structures: Avoidance/displacement	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF. There may be some impacts resulting from the existing Block Island Wind Facility, but given that there are only 5 WTGs, no measurable impacts are occurring.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Behavioral disruption - breeding and migration	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Displacement into higher risk areas (Vessels and Fishing)	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Traffic: Vessel collisions	Current activities that are contributing to this sub-IPF include port traffic levels, fairways, TSS, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Vessel strike is relatively common with cetaceans (Kraus et al. 2005) and one of the primary causes of death to NARWs with as many as 75% of known anthropogenic mortalities of NARWs likely resulting from collisions with large ships along the U.S. and Canadian eastern seaboard (Kite-Powell et al. 2007). Marine mammals are more vulnerable to vessel strike when they are within the draft of the vessel and when they are beneath the surface and not detectable by visual observers. Some conditions that make marine mammals less detectable include weather conditions with poor visibility (e.g., fog, rain, and wave height) or nighttime operations. Vessels operating at speeds exceeding 10 knots have been associated with the highest risk for vessel strikes of NARWs (Vanderlaan and Taggart 2007). Reported vessel collisions with whales show that serious injury rarely occurs at speeds below 10 knots (Laist et al. 2001). Data show that the probability of a vessel strike increases with the velocity of a vessel (Pace and Silber 2005; Vanderlaan and Taggart 2007).	Vessel traffic associated with non-offshore wind development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of marine mammals makes stock or population-level effects unlikely (Navy 2018).

µT = microtesla; AC = alternating current; EMF = electromagnetic field; hazmat = hazardous materials; IHA = Incidental Harassment Authorization; NARW = North Atlantic right whale; PTS = permanent threshold shift; SPLs = sound pressure levels; TSS = total suspended solids; TTS = temporary threshold shift

Table D1-13. Summary of activities and the associated impact-producing factors for navigation and vessel traffic

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Larger commercial vessels (specifically tankers) sometimes anchor outside of major ports to transfer their cargo to smaller vessels for transport into port, an operation known as lightering. These anchors have deeper ground penetration and are under higher stresses. Smaller vessels (commercial fishing or recreational vessels) would anchor for fishing and other recreational activities. These activities cause temporary to short-term impacts on navigation in the immediate anchorage area. All vessels may anchor in an emergency scenario (such as power loss) if they lose power to prevent them from drifting and creating navigational hazards for other vessels or drifting into structures.	Lightering and anchoring operations are expected to continue at or near current levels, with the expectation of moderate increase commensurate with any increase in tankers visiting ports. Deep draft visits to major port visits are expected to increase as well, increasing the potential for an emergency need to anchor, creating navigational hazards for other vessels. Recreational activity and commercial fishing activity would likely stay largely the same related to this IPF.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. 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 to be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. There are two types of allisions that occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements or is distracted.	Although there are some exceptions (ferry traffic and cruise ships), BOEM expects vessel traffic to remain relatively steady into the reasonably foreseeable future (BOEM 2019:57). Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Fish aggregation	Items in the water, such as ghost fishing gear, buoys, and energy platform foundations can create an artificial reef effect, aggregating fish. Recreational and commercial fishing can occur near the artificial reefs. Recreational fishing is more popular than commercial near artificial reefs as commercial mobile fishing gear can risk snagging on the artificial reef structure.	Fishing near artificial reefs is not expected to change meaningfully over the next 40 years.
Presence of structures: Habitat conversion	Equipment in the ocean can create a substrate for mollusks to attach to, and fish eggs to settle near. This can create a reef-like habitat and benefit structure-oriented species on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Migration disturbances	Noise-producing activities, such as pile driving and vessel traffic, may interfere and adversely affect marine mammals during foraging, orientation, migration, response to predators, social interactions, or other activities. Marine mammals may also be sensitive to changes in magnetic field levels. The presence of structures and operational noise could cause mammals to avoid areas.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is made more complex, as the vessels need to avoid both the structure and each other.	Although there are some exceptions (ferry traffic and cruise ships), BOEM expects vessel traffic to remain relatively steady into the reasonably foreseeable future (BOEM 2019:57). Even with increased port visits by deep-draft vessels, this is still a relatively small effect when considering the whole of Atlantic Coast vessel traffic. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Currently, the offshore area is occupied by marine trade, stationary and mobile fishing, and survey activities.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Cable infrastructure	See IPF for Anchoring.	See IPF for 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.	Future new cables would cause temporary increases in vessel traffic during installation or maintenance, resulting in infrequent, localized, short-term impacts over the next 40 years. Care would need to be taken by vessels that are crossing the cable routes during these activities.
Traffic: Aircraft	USCG SAR helicopters are the main aircraft that may be flying at low enough heights to risk interaction with WTGs. USCG SAR aircraft need to fly low enough that they can spot objects in the water.	SAR operations could be expected to increase with any increase in vessel traffic. However, as vessel traffic volume is not expected to increase appreciably, neither should SAR operations. EIS Section 3.6.6 provides a discussion of navigation impacts on fishing vessel traffic.
Traffic: Vessels	See the sub-IPF for Presence of structures: Navigation hazard.	See the sub-IPF for Presence of structures: Navigation hazard.
Traffic: Vessels, collisions	See the sub-IPF for Presence of structures: Navigation hazard.	See the sub-IPF for Presence of structures: Navigation hazard.

SAR = Search and Rescue

Table D1-14. Summary of activities and the associated impact-producing factors for other uses: military and national security uses

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Allisions	Existing stationary facilities that present allision risks include buoys that are used to mark inlet approaches, channels, and shoals, dock facilities, meteorological buoys associated with offshore wind lease areas, and other offshore or shoreline-based structures.	No additional non-offshore wind stationary structures were identified within the geographic analysis area. Stationary structures such as private or commercial docks may be added close to the shoreline.
Presence of structures: Fish aggregation	No existing stationary structures that would act as FADs were identified within the geographic analysis area.	No future non-offshore wind additional stationary structures that would act as FADs were identified within the geographic analysis area.
Presence of structures: Navigation hazard	Existing stationary facilities within the geographic analysis area that present navigational hazards include buoys that are used to mark inlet approaches, channels, and shoals, dock facilities, meteorological buoys associated with offshore wind lease areas, and other offshore or shoreline-based structures.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers and onshore commercial, industrial, and residential developments.
Presence of structures: Space use conflicts	Existing stationary facilities within the geographic analysis area that could present a space use conflict include onshore wind turbines, communication towers, and other onshore commercial, industrial, and residential structures.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers and onshore commercial, industrial, and residential developments.
Presence of structures: Cable infrastructure	Existing submarine cables cross cumulative lease areas.	Submarine cables would remain in current locations with infrequent maintenance continuing along those cable routes for the foreseeable future.
Traffic: Vessels	Current vessel traffic in the region is described in EIS Section 3.6.6. Vessel activities associated with offshore wind in the cumulative lease areas is currently limited to site assessment surveys.	Continued vessel traffic in the region.
Traffic: Vessels, collisions	Current vessel traffic in the region is described in EIS Section 3.6.6. Vessel activities associated with offshore wind in the cumulative lease areas is currently limited to site assessment surveys.	Continued vessel traffic in the region.

FAD = fish aggregating device; SAR =

Table D1-15. Summary of activities and the associated impact-producing factors for other uses: aviation and air traffic

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Towers	Existing aboveground stationary facilities within the geographic analysis area that present aviation hazards include onshore wind turbines, communication towers, dock facilities, and other onshore structures exceeding 200 feet in height.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore development activities are anticipated to continue with additional proposed communications towers.
Presence of structures: Space use conflicts	Existing aboveground stationary facilities within the geographic analysis area that could cause space use conflicts for aircraft include onshore wind turbines, communication towers, and other onshore structures exceeding 200 feet in height.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers.

Table D1-16. Summary of activities and the associated impact-producing factors for other uses: cables and pipelines

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Allisions and navigation hazards	Structures within and near the geographic analysis area that pose potential allision hazards include buoys that are used to mark inlet approaches, channels, and shoals, meteorological buoys associated with offshore wind lease areas, and shoreline developments such as docks, ports, and other commercial, industrial, and residential structures.	Reasonably foreseeable non-offshore wind structures that could affect submarine cables have not been identified in the geographic analysis area.
Presence of structures: Space use conflicts	Existing submarine cables cross cumulative lease areas and create potential space use conflicts with marine mineral and sand borrow areas.	Reasonably foreseeable non-offshore wind structures that could create space use conflicts with submarine cables have not been identified in the geographic analysis area.
Presence of structures: Cable infrastructure	Existing submarine cables cross cumulative lease areas.	Reasonably foreseeable non-offshore wind structures have not been identified in the geographic analysis area.

Table D1-17. Summary of activities and the associated impact-producing factors for other uses: radar systems

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

Presence of structures: Towers	Wind developments in the direct line-of-sight with, or extremely close to, radar systems can cause clutter and interference.	Reasonably foreseeable non-offshore wind structures proposed for construction in the lease areas that could affect radar systems have not been identified.

Table D1-18. Summary of activities and the associated impact-producing factors for other uses: scientific research and surveys

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Navigation hazards	Stationary structures are limited in the open ocean environment of the geographic analysis area, and include met buoys associated with site assessment activities, the five Block Island Wind Farm WTGs, and the two Coastal Virginia Offshore Wind WTGs.	Reasonably foreseeable non-offshore wind activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft.

met = meteorological

Table D1-19. Summary of activities and the associated impact-producing factors for recreation and tourism

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	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, localized impacts of navigational hazards, increased turbidity levels, and potential for direct contact causing mortality of benthic resources.
Light: Vessels	Ocean vessels have an array of lights including navigational lights and deck lights.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting.
Light: Structures	Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
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.	Cable maintenance or replacement of existing cables in the geographic analysis area would occur infrequently and would generate short-term disturbances.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	Offshore trenching occurs periodically in connection with cable installation or sand and gravel mining.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF 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: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance.	Ports would need to perform maintenance and upgrade facilities over the next 40 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Port utilization: Maintenance/dredging	Periodic maintenance is necessary for harbors within the analysis area.	Ongoing maintenance and dredging of harbors within the geographic analysis area will continue as needed. No specific projects are known.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations. Recreational and commercial fishing can occur near these aggregation	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	locations, although recreational fishing is more popular, because commercial mobile fishing gear is more likely to snag on structures.	
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 40 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	The only existing offshore structures within the viewshed of the Project are minor features such as buoys.	Non-offshore wind structures that could be viewed in conjunction with the offshore components of the Project would be limited to meteorological towers. Marine activity would also occur within the marine viewshed.
Traffic: Vessels	Geographic analysis area ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 40 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy.
Traffic: Vessel collisions	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.	An increased risk of collisions is not anticipated from future activities.

Table D1-20. Summary of activities and the associated impact-producing factors for sea turtles

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a quantitative analysis of these risks. Ongoing releases are frequent and chronic. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Camacho et al. 2013; Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases may result in impacts on sea turtles due to effects on prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka et al. 2010; Wallace et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Camacho et al. 2013; Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases may result in impacts on sea turtles due to effects on prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).
Accidental releases: Trash and debris	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, as well as 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; Schuyler et al. 2014). In addition to plastic debris, ingestion of tar, paper, Styrofoam™, wood, reed, feathers, hooks, lines, and net fragments have also been documented (Thomás et al. 2002). Ingestion can also occur when individuals mistake debris for potential prey items (Gregory 2009; Hoarau et al. 2014; Thomás et al. 2002). Potential ingestion of marine debris varies among species and life history stages due to differing feeding strategies (Nelms et al. 2016). Ingestion of plastics and other marine debris can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Long-term sublethal effects may include dietary dilution, chemical contamination, depressed immune system function, poor body condition, as well as reduced growth rates, fecundity, and reproductive success. However, these effects are cryptic and clear causal links are difficult to identify (Nelms et al. 2016).	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, and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct and indirect ingestion of plastic fragments and other marine debris is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Gregory 2009; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014; Thomás et al. 2002). Ingestion can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). However, these effects are cryptic and clear causal links are difficult to identify (Nelms et al. 2016).
EMFs	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Sea turtles appear to have a detection threshold of magnetosensitivity and behavioral responses to field intensities ranging	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

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	from 0.0047 to 4000 µT for loggerhead turtles, and 29.3 to 200 µT for green turtles, with other species likely similar due to anatomical, behavioral, and life history similarities (Normandeau et al. 2011). Juvenile or adult sea turtles foraging on benthic organisms may be able to detect magnetic fields while they are foraging on the bottom near the cables and up to potentially 82 feet (25 meters) 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 impacts on sea turtles from EMFs generated by underwater cables, although anthropogenic magnetic fields can influence migratory deviations (Luschi et al. 2007; Snoek et al. 2016). However, any potential impacts from AC cables on turtle navigation or orientation would likely be undetectable under natural conditions, and thus would be insignificant (Normandeau et al. 2011).	EMF to low levels. (Section 5.2.7 of BOEM's 2007 Final Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf.) 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. Furthermore, this IPF would be limited to extremely small portions of the areas used by resident or migrating sea turtles. As such, exposure to this IPF would be low, and as a result, impacts on sea turtles would not be expected.
Light: Vessels	Ocean vessels such as ongoing commercial vessel traffic, recreational and fishing activity, 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.	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.
Light: Structures	Artificial lighting on nesting beaches or in nearshore habitats has the potential to result in disorientation to nesting females and hatchling turtles. Artificial lighting on the OCS does not appear to have the same potential for effects. Decades of oil and gas platform operation in the Gulf of Mexico, that can have considerably more lighting than offshore WTGs, has not resulted in any known impacts on sea turtles (BOEM 2019).	Non-offshore wind activities would not be expected to appreciably contribute to this sub-IPF. As such, no impact on sea turtles would be expected.
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 effects 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 (NOAA 2020). Sea turtles would be expected to swim away from the sediment plume. Elevated turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors, but no impacts would be expected due to swimming through the plume (NOAA 2020). Turbidity associated with increased sedimentation may result in short-term, temporary impacts on sea turtle prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).	The impact on water quality from accidental sediment suspension during cable emplacement is short-term and temporary. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be short-term and temporary. Turbidity associated with increased sedimentation may result in short-term, temporary impacts on some sea turtle prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).
Noise: Aircraft	Aircraft routinely travel in the geographic analysis area for sea turtles. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from sea turtles. If flights are at a sufficiently low altitude, sea turtles 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.	Future low-altitude aircraft activities such as survey activities and navy training operations could result in short-term responses of sea turtles to aircraft noise. If flights are at a sufficiently low altitude, sea turtles 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.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in some impacts including potential auditory injuries, short-term disturbance, behavioral responses, and short-term displacement of feeding or migrating sea turtles, if present within the ensonified area (NSF and USGS 2011). The potential for PTS and TTS is considered possible in proximity to G&G surveys utilizing air guns, but impacts are unlikely as turtles would be expected to avoid such exposure and survey vessels would pass quickly (NSF and USGS 2011). No significant impacts would be expected at the population level.	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.
Noise: Turbines	Available evidence suggests that typical underwater noise levels from operating WTGs would be below current cumulative injury and behavioral effect thresholds for sea turtles. Operating turbines were determined to produce underwater noise on the order of 110 to 125 dB_{RMS}, occasionally reaching as high as 128 dB_{RMS}, in the 10-Hz to 8-kilohertz range (Tougaard et al. 2020). As measured at the Block Island Wind Facility, low frequency operational noise barely exceeds ambient levels at 164 feet (50 meters) from the WTG base (Miller and Potty 2017). Operational noise impacts would be expected to be negligible.	This sub-IPF does not apply to future non-offshore wind development.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the 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	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	impacts on sea turtles from sound exposure during pile driving are very limited, and no regulatory threshold criteria have been established for sea turtles. Based on current literature, the following thresholds are used to assess impacts on turtles: Potential mortal injury: 210 dB cumulative SPL or greater than 207 dB peak SPL (Popper et al. 2014) Potential mortal injury: 204 dB_{SEL}, 232 dB_{PEAK} (PTS), 189 dB_{SEL}, 226 dB_{PEAK} (TTS) (Navy 2017) Behavioral harassment: 175 dB referenced to 1 µPa RMS (Navy 2017)	
Noise: Vessels	The frequency range for vessel noise (10 to 1000 Hz; MMS 2007) overlaps with sea turtles' known hearing range (less than 1,000 Hz with maximum sensitivity between 200 to 700 Hz; Bartol 1994) and would therefore be audible. However, Hazel et al. (Hazel et al. 2007) suggests 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. (Samuel et al. 2005) indicated that vessel noise could have an effect on sea turtle behavior, especially their submergence patterns.	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, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of sea turtles and no stock or population level effects would be expected.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats, and are expected to result in short-term, temporary impacts, if any, on sea turtles. Vessel noise may affect sea turtles, but response would be expected to be short-term and temporary (see the Vessels: Noise sub-IPF above). The impact on water quality from sediment suspension during port expansion activities is short-term, temporary, and would be similar to those described under the cable emplacement and maintenance IPF above.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from South Carolina 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. 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 (see the Traffic: Vessel collisions sub-IPF below).
Presence of structures: Entanglement or ingestion of lost fishing gear	The Mid-Atlantic region has more than 130 artificial reefs. Currently bridge foundations and the 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 where these structures are located. At the scale of the OCS geographic analysis area for sea turtles, there are very few areas that would serve to concentrate recreational fishing and increase the likelihood that sea turtles would encounter lost fishing gear.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Presence of structures: Habitat conversion and prey aggregation	The Mid-Atlantic region has more than 130 artificial reefs. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations, Block Island Wind Facility WTGs, and two WTGs with the Coastal Virginia Offshore Wind pilot project) 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 sea turtles compared to the surrounding soft-bottoms.	The presence of structures associated with non-offshore wind development in near-shore coastal waters has the potential to provide habitat for sea turtles as well as preferred prey species. This reef effect has the potential to result in long-term, low-intensity beneficial impacts. Bridge foundations will continue to provide foraging opportunities for sea turtles with measurable benefits to some individuals.
Presence of structures: Avoidance/displacement	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF. There may be some impacts resulting from the existing Block Island Wind Facility (5 WTGs) and the Coastal Virginia Offshore Wind pilot project (2 WTGs) but given the limited number of WTGs, no measurable impacts are occurring.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Behavioral disruption - breeding and migration	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Displacement into higher risk areas (Vessels and Fishing)	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Traffic: Vessel collisions	Current activities contributing to this sub-IPF include port traffic levels, fairways, TSS, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Propeller and collision injuries from boats and ships are common in sea turtles. Vessel strike is an increasing concern for sea turtles, especially in the southeastern United States, where development along the coasts is likely to result in increased recreational boat traffic. 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 evidence suggests that they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007).	Vessel traffic associated with non-offshore wind development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of sea turtles makes stock or population-level effects unlikely (Navy 2018).

µPa = micropascal; µT = microtesla; AC = alternating current; dB = decibels; hazmat = hazardous materials; HZ = hertz; PTS = permanent threshold shift; RMS = root mean square; SPL = sound pressure level; TTS = temporary threshold shift

Table D1-21. Summary of activities and the associated impact-producing factors for water quality

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	Accidental releases of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable lines, and pipeline laying activities. According to the DOE, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited, which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and into the offshore was < 70,000 barrels. Impacts on water quality would be expected to brief and localized from accidental releases.	Future accidental releases from offshore vessel usage, spills, and consumption will likely continue on a similar trend. Impacts are unlikely to affect water quality.
Accidental releases: Trash and debris	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 relatively limited spatial impact.	As population and vessel traffic increase gradually over the next 40 years, accidental release of trash and debris may increase. However, there does not appear to be evidence that the volumes and extents anticipated would have any effect on water quality.
Anchoring	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 40 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	Elevated suspended sediment concentrations can occur under natural tidal conditions and increase during storms, trawling, and vessel propulsion. Survey activities, and new cable and pipeline laying activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be short-term and either be limited to the emplacement corridor or localized.	Suspension of sediments may continue to occur infrequently over the next 40 years due to survey activities, and submarine cable, lines, and pipeline-laying activities. Future new cables would occasionally disturb the seafloor and cause short-term increases in turbidity and minor alterations in localized currents resulting in local short-term impacts. 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.
Port utilization: Expansion	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from South Carolina 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 have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future.	The general trend along the coastal region from South Carolina to Maine is that port activity will increase modestly over the next 40 years. Port modifications and channel deepening activities are being undertaken to accommodate the increase in vessel traffic and deeper draft vessels that transit the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future.
Presence of structures	The installation of onshore and offshore structures leads to alteration of local water currents. These disturbances would be local but, depending on the hydrologic conditions, have the potential to impact water quality through the formation of sediment plumes.	Impacts associated with the presence of structures includes temporary sediment disturbance during maintenance. This sediment suspension would lead to interim and localized impacts.
Discharges/intakes	Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species.	Increased coastal development is causing increased nutrient pollution in communities. In addition, ocean disposal activity in the North and Mid-Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because USEPA has established dredge spoil criteria and regulate the disposal permits issued by USACE.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
		The impact on water quality from sediment suspension during these future activities would be short-term and localized.
Land disturbance: erosion and sedimentation	Ground disturbance activities may lead to un-vegetated or otherwise unstable soils. Precipitation events could potentially mobilize the soils into nearby surface waters, leading to potential erosion and sedimentation effects and subsequent increased turbidity.	Ground disturbance associated with construction and installation of onshore components could lead to un-vegetated or unstable soils. Precipitation events could mobilize these soils leading to erosion and sedimentation effects and turbidity. The impacts for future offshore wind through this IPF 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.
Land disturbance: Onshore construction	Onshore construction activities may lead to un-vegetated 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.	The general trend along coastal regions is that port activity will 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.

DOE = U.S. Department of Energy; hazmat = hazardous materials

Table D1-22. Summary of activities and the associated impact-producing factors for scenic and visual resources

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat, suspended sediments, trash and debris	Ongoing offshore and onshore construction projects involve the use of vehicles, vessels, and equipment that contain fuel, fluids, and hazmat that have the potential for accidental release. Offshore and onshore construction can also result in sedimentation from land and seabed disturbance and accidental releases of trash and debris with associated visual impacts.	Future offshore and onshore construction projects have the potential to result in accidental releases from vehicles, vessels, and equipment that contain fuel, fluids, and hazmat. Future offshore and onshore construction could also result in sedimentation from land and seabed disturbance and accidental releases of trash and debris with associated visual impacts.
Land disturbance: Erosion and sedimentation, onshore construction, onshore land use changes	Onshore human-caused and naturally occurring erosion and sedimentation results from construction, maintenance, and weather events.	Ongoing onshore construction projects could generate noticeable disturbance in the landscape. Intensity and extent would vary depending on the location, type, and duration of activities.
Light: Offshore structures and vessels, onshore vehicles, roads, laydown, parking, facilities, equipment, and structures	Offshore vessels have an array of lights including navigational lights, deck lights, and interior lights. Various ongoing onshore and coastal construction projects have nighttime activities, as well as existing structures, facilities, and vehicles that would require 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.
Structures: Viewshed	Buoys are the only existing stationary structures within the offshore viewshed of the Project. Typically, buoys are visible only in the immediate foreground (less than 1 mile). Stationary and moving barges, boats, and ships also are visible in the daytime and nighttime viewsheds.	Onshore wind-related structures that could be viewed in conjunction with the offshore project components would be limited to meteorological towers, substations, and electrical transmission towers and conductors.
Traffic: Helicopters, vessels, vehicles	Ongoing activities contribute air, marine, and onshore traffic and visible congestion.	Planned onshore and offshore construction projects involving vessel, vehicle, and helicopter traffic could generate noticeable changes in the characteristic seascape and landscape and viewer experience. Intensity and extent of the changes would vary depending on the location, type, direction, and duration of the traffic.

Table D1-23. Summary of activities and the associated impact-producing factors for wetlands

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Land disturbance: Erosion and sedimentation	Ground disturbance activities may lead to unvegetated or otherwise unstable soils. Precipitation events could potentially mobilize the soils into nearby wetlands, leading to potential erosion and sedimentation effects and subsequent increased turbidity.	Ground disturbance associated with construction and installation of onshore components could lead to unvegetated or unstable soils. Precipitation events could mobilize these soils, leading to erosion and sedimentation effects and turbidity.
Land disturbance: Onshore construction	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 wetlands, leading to increased turbidity and alteration of water quality.	The general trend along coastal regions is that port activity and land development will 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.

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Attachment 2: Maximum-Case Scenario Estimates for Offshore Wind Projects

The following tables provide maximum-case scenario estimates of potential offshore wind project impacts assuming maximum buildout within the SouthCoast Wind EIS geographic analysis areas. BOEM developed these estimates based on offshore wind demand, as discussed in its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019). Estimates disclosed in this EIS's Chapter 3, *Affected Environment and Environmental Consequences*, no action analyses were developed by summing acreage or number calculations across all lease areas noted as occurring within, or overlapping, a given geographic analysis area. This likely overestimates some impacts in cases where lease areas only partially overlap analysis areas. However, this approach was used to provide the most conservative estimate of future offshore wind development.

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Table D2-1. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 1, Turbine and Cable Design Parameters)

Region	Lease, Project, Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area) [c]						Estimated Construction Schedule [d]	Turbine Number [e]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles) [f]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles) [g]	Hub Height (feet) [h]	Rotor Diameter (feet) [h]	Height of Turbine (feet) [h]
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism									
ME	New England Aqua Ventus I (Maine state waters)	State Project					X		2023	2	11					450	520
	Total State Waters									**2**	**11**						
EXISTING AND ONGOING PROJECTS																	
NE	Block Island (state waters)	Built					X		Built	5	30	28	5	2	328	541	659
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021)	X	X	X		X	X	2024–2025	62	800	98	6.5	171	451	721	812
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021)	X		X		X	X	Built	12	132	139	6.5	24	358	543	614
MA/RI	Sunrise, OCS-A 0487	COP Approved (ROD issued 2024)	X		X		X	X	2024–2025	94	924	104.6	13	180	459	656	787
MA/RI	Revolution, part of OCS-A 0486	COP Approved (ROD issued 2023)	X		X		X	X	2024–2025	65	704	84	6.5	155	512	722	853
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP Approved (ROD issued 2024)	X	X	X		X	X	2025	63	804	125	10	139	702	935	1,171
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP Approved (ROD issued 2024)	X	X	X		X	X	2025 or later	65	1,725	226	10	201	702	935	1,171
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)					X		2024–2026	54	816	46	5	134	525	853	951
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)					X		By 2030, spread over 2026–2030	84	1,260	30	5	166	525	853	951
NY/NJ	Ocean Wind 1, OCS-A 0498	COP Approved (ROD issued 2023)					X		By 2030, spread over 2026–2030	98	1,100	194[14]	7	190	512	788	906
NY/NJ	Atlantic Shores South, OCS-A 0499	COP Approved (ROD issued 2024)					X		2025-2028	195	2,837[13]	441	3.3	547	576	919	1,049
VA/NC	CVOW, OCS-A 0497	Built					X		Built	2	12	27	3.3	9	364	506	620
VA/NC	CVOW-C, OCS-A 0483	COP Approved (ROD issued 2023), SAP					X		2023–2024	176	2,587	338	16.4	300	489	761	869
	Total Existing and Ongoing Projects									**975**	**13,731**	**1,880.6**		**2,218**			
PLANNED PROJECTS																	

Region	Lease, Project, Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area) [c]						Estimated Construction Schedule [d]	Turbine Number [e]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles) [f]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles) [g]	Hub Height (feet) [h]	Rotor Diameter (feet) [h]	Height of Turbine (feet) [h]
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism									
Massachusetts/Rhode Island Region																	
MA/RI	SouthCoast Wind, OCS-A 0521	COP	X	X	X	X	X	X	2025–2031	147	2,400	1,179	6.5	497	605	919	1,066
MA/RI	Beacon Wind 1, part of OCS-A 0520	COP	X	X	X		X	X	2026–2029	78	1,230	233	6.5	186	591	984	1,083
MA/RI	Beacon Wind 2, part of OCS-A 0520	COP	X	X	X		X	X	2027–2030	77	1,100	202	6.5	187	591	984	1,083
MA/RI	Bay State Wind, part of OCS-A 0500	Planning	X		X		X	X	By 2030, spread over 2026–2030	94	1,128	139	6.5	172	492	722	853
MA/RI	OCS-A 0500 remainder	Planning	X		X		X	X	By 2030, spread over 2026–2030	116	1,392	200	7	240	492	722	853
MA/RI	OCS-A 0487 remainder	Planning	X		X		X	X				200	7		492	722	853
MA/RI	Vineyard Wind Northeast, OCS-A 0522	COP	X	X	X		X	X	2027–2030	160	2,400	532	33	221	787	1,050	1,312
	Total MA/RI Leases [b]									**671**	**9,650**	**2,654**		**1,480**			
New York/ New Jersey Region																	
NY/NJ	Ocean Wind 2, OCS-A 0532	Planning					X		By 2030, spread over 2026–2030	109	1,148	200	7	173	512	788	906
NY/NJ	Atlantic Shores North, OCS-A 0549	COP					X		2029-2032	157	2,400	751	3.3	466	576	968	1,049
NY/NJ	Bluepoint Wind, OCS-A 0537	Planning					X		2027–beyond 2030	80	7,404	200	7	120	492	722	853
NY/NJ	Attentive Energy, OCS-A 0538						X		By 2030, spread over 2026–2030	100		200	7	120	492	722	853
NY/NJ	Community Offshore Wind, OCS-A 0539	Planning					X		By 2030, spread over 2026–2030	145		200	7	120	492	722	853
NY/NJ	Atlantic Shores Offshore Wind Bight, OCS-A 0541	SAP					X		2027– beyond 2030	93		200	7	120	492	722	853
NY/NJ	Invenergy Wind Offshore, OCS-A 0542						X		2027– beyond 2030	97		200	7	120	492	722	853
NY/NJ	Vineyard Mid-Atlantic LLC, OCS-A 0544	COP					X		2027– beyond 2030	102		200	7	120	492	722	853
	Total NY/NJ Leases									**883**	**10,952**	**2,151**		**1,359**			
Delaware/Maryland Region																	
DE/MD	Skipjack, part of OCS-A 0519	COP					X		By 2030, spread over 2026–2030	16	191	40	6.5	23.7	492	722	822
DE/MD	US Wind/Maryland Offshore Wind, part of OCS-A 0490	COP					X		2025	121	2,000	145	6.5	152	528	820	938

Region	Lease, Project, Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area) [c]						Estimated Construction Schedule [d]	Turbine Number [e]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles) [f]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles) [g]	Hub Height (feet) [h]	Rotor Diameter (feet) [h]	Height of Turbine (feet) [h]
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism									
DE/MD	GSOE I, OCS-A 0482	Planning					X		By 2030, spread over 2025–2030	94	1,128	200	6.5	139.1	492	722	853
DE/MD	OCS-A 0519 remainder						X										
	Total DE/MD Leases									**231**	**4,448**	**585**		**453.9**			
Virginia/North Carolina/South Carolina Region																	
VA/NC	Kitty Hawk North, OCS-A 0508	COP					X		By 2030, spread over 2026–2030	69	1,242	112	30	149	574	935	1,042
VA/NC	Kitty Hawk South, OCS-A 0508	COP					X		By 2030, spread over 2026–2030	121	2,178	353	30	200	574	935	1,042
SC	TotalEnergies Renewables Wind, OCS-A 0545	Planning					X		By 2030, spread over 2026–2030	64	785	200	6.5	94.7	492	722	853
SC	Duke Energy Renewables Wind, OCS-A 0546	Planning					X		By 2030, spread over 2026–2030	64	788	200	6.5	94.7	492	722	853
	Total VA/NC/SC Leases									**318**	**4,993**	**865**		**538.4**			
Gulf of Mexico Region[3]																	
LA	RWE Offshore US Gulf, OCS-G 37334	Planning					X[4]		2030 or later	101	1,240	200	6.5	149	492	722	853
	Total Gulf of Mexico Leases									**101**	**1,240**	**200**		**149**			
	OCS Total (Planned)									**2,205**	**31,283**	**6,232**		**3,980**			
	OCS Total [i,j]									**3,182**	**45,025**	**8,113**		**6,198**			

[a] The spacing/layout for projects are as follows: NE State water projects include a single strand of WTGs and no OSP. For projects in the RI, MA, NY, NJ, DE, MD lease areas, a 1×1–nm grid spacing is assumed. For the CVOW Project, the spacing is 0.7 nm; and the Dominion commercial lease area off the coast of Virginia would utilize 0.5 nm average spacing, which is less than the 1×1–nm spacing due to the need to attain the state's goals.
[b] Because development could occur anywhere within the RI and MA lease areas and assumes a continuous 1x1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the scenario described in this appendix, the total area in the RI and MA lease areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.
[c] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[d] The estimated construction schedule is based on information known at the time of this analysis and could be different when an applicant submits a COP.
[e] The number of turbines for those lease areas without an announced number of turbines has been calculated based on lease size, a 1×1-nm grid spacing, and/or the generating capacity.
[f] BOEM assumes that each offshore wind development would have its own cable (both onshore and offshore) and that future projects would not utilize a regional transmission line. The length of offshore export cable for those lease areas without a known project size is assumed to include two offshore cables totaling 120 miles (193 kilometers). The offshore export cable would be buried a minimum of 4 feet (1.8 meters) but not more than 10 feet (3.1 meters).

[3] The Final Sale Notice for Commercial Leasing for Wind Power Development on the OCS in the Gulf of Mexico was published on July 21, 2023. An auction was held on August 29, 2023; where Lake Charles, OCS-G 37334, received a winning bid from RWE Offshore US Gulf, LLC. On July 29, 2024, BOEM published a RFCI for two wind energy areas in the Gulf Mexico. The RFCI was published in the *Federal Register,* 89 FR 60913, for a 45-day public comment period, which ended on September 12, 2024.
[4] Within the geographic analysis area for marine mammals and sea turtles only.

[g] If information for a future project could not be obtained from a COP, the length of interarray cabling is assumed to be the average amount per foundation based on the COPs submitted to date, which is 1.48 miles (2.4 kilometers). In addition, for those lease areas that require more than one OSP, it is assumed that an additional 6.2 miles (9.9 kilometers) of inter-link cable would be required to link the two OSPs. Interarray cable is assumed to be buried between 4 and 6 feet.
[h] The hub height, rotor diameter, and turbine height for lease areas is based on worst-case scenario for the resource area. Presentation of heights vary by COP and may be presented relative to MLLW, mean sea level, or height above highest astronomical tide.
[i] BOEM recognizes that the estimates presented within this analysis are likely high, conservative estimates; however, BOEM believes that this analysis is appropriately capturing the potential cumulative impacts and errs on the side of maximum impacts. Totals by lease area and by OCS may not fully sum due to rounding errors.
[j] New York's demand is not double-counted, this total comes from looking at New York's state demand, not adding up the potential of the areas because that would double-count New York.
CT = Connecticut; CVOW = Coastal Virginia Offshore Wind; DE = Delaware; FDR = Facility Design Report; FIR = Fabrication and Installation Report; MA = Massachusetts; MD = Maryland; NC = North Carolina; NE = New England; NJ = New Jersey; NY = New York; PPA = Power Purchase Agreement; RAP = research activities plan; RI = Rhode Island; SAP = Site Assessment Plan

Table D2-2. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 2, Seabed/Anchoring Disturbance and Scour Protection)

Region	Lease/Project/Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area) [c]						Estimated Foundation Number [c]	Foundation Footprint [d] (acres)	WTG Seabed Disturbance (Foundation + Scour Protection) (acres) [e]	Offshore Export Cable Seabed Disturbance (acres) [f]	Offshore Export Cable Operating Seabed Footprint (acres) [g]	Offshore Export Cable Hard Protection (acres) [h]	Anchoring Disturbance (acres) [i]	Interarray Construction Footprint/Seabed Disturbance (acres) [j]	Interarray Operating Footprint/ Seabed Disturbance (acres) [k]	Interarray Cable Hard Protection (acres) [l]
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism										
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021), PPA, SAP	X	X	X		X	X	63	1	33	69	77	35	4	129	90	22
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021), PPA, SAP	X		X		X	X	13	1	11	555	7	7	663	340	19	20
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X		X		X	X	95	3	108	1,259	102	25	11	462	145	129
MA/RI	Revolution, part of OCS-A 0486	COP, PPA	X		X		X	X	102	10	72	125	40	36	10	245	146	0
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP, PPA	X	X	X		X	X	64	2	86	263	22	22	34	222	92	129
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP	X	X	X		X	X	82	3	98	243	32	32	50	321	117	14
MA/RI	SouthCoast Wind, OCS-A 0521	COP, PPA	X	X	X	X	X	X	149	4.9	578	2,480	472	247	442	1,408	213	122
MA/RI	Beacon Wind 1, part of OCS-A 0520	PPA, SAP	X	X	X		X	X	79	5	265	143	95	43	442	247	152	152
MA/RI	Beacon Wind 2, part of OCS-A 0520	SAP	X	X	X		X	X	78	5	265	143	95	43	442	247	152	152
MA/RI	Bay State Wind, part of OCS-A 0500	SAP	X		X		X	X	112	11	112	143	95	43	442	264	160	0
MA/RI	Vineyard Wind Northeast, OCS-A 0522		X	X	X		X	X										
MA/RI	OCS-A 0500 remainder		X		X		X	X	232	9	197	2,182	144	129	36	2,231	332	0
MA/RI	OCS-A 0487 remainder		X		X		X	X										
	Remaining MA/RI Lease Area Total [b]								344	20	309	2,325	239	171	478	2,495	492	0
	Total MA/RI Leases								**1,069**	**193**	**1,825**	**7,605**	**1,179**	**661**	**2,576**	**6,116**	**1,617**	**740**
	NY, NJ, DE, MD, NC, VA Leases								**2,025**	**69**	**1,706**	**143,333**	**1,381**	**914**	**496**	**28,657**	**3,029**	**442**
	OCS Total								**3,094**	**262**	**3,531**	**150,937**	**2,561**	**1,575**	**3,072**	**34,773**	**4,647**	**1,182**

[a] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[b] Because development could occur anywhere within the RI and MA lease areas and assumes a continuous 1x1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the scenario described in this appendix, the total area in the RI and MA lease areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.
[c] The estimated number of foundations is the total number of turbines plus OSP. If information for a future project could not be obtained from a publicly available COP, it is assumed that for every 50 turbines there would be one OSP installed.
[d] If information for a future project could not be obtained from a publicly available COP, the foundation footprint is assumed to be 0.04 acre, which is based on the largest monopile reported (12 MW) for all lease areas.
[e] The seabed disturbance with the addition of scour protection was calculated based on scour protection expected in submitted COPs. If information for a future project could not be obtained from a publicly available COP, it is assumed that for all lease areas that a 12-MW foundation with addition of scour protection would be 0.85 acre per foundation.
[f] Offshore export cable seabed bottom disturbance is assumed to be due to installation of the export cable, the use of jack-up vessels, and the need to perform dredging. If information for a future project could not be obtained from a publicly available COP, export cable seabed disturbance assumed to be 6.06 acres per mile.
[g] If information for a future project could not be obtained from a publicly available COP, the offshore export cable operating seabed footprint assumed to be 0.4 acre per mile.
[h] If information for a future project could not be obtained from a publicly available COP, the offshore export cable hard protection is assumed to be similar to Vineyard Wind 1 Project, which is 0.357 acre per mile of offshore export cable.
[i] If information for a future project could not be obtained from a publicly available COP, anchoring disturbance for other lease areas is assumed to be a rate equal to 0.10 acre per mile of offshore export cable.
[j] If information for a future project could not be obtained from a publicly available COP, interarray construction seabed disturbance is assumed to be 6.06 acres per mile.
[k] If information for a future project could not be obtained from a publicly available COP, the interarray operating footprint is assumed to be a rate equal to the average amount per foundation of 1.43 acres per foundation.
[l] If information for a future project could not be obtained from a publicly available COP, the interarray cable hard protection is assumed to be zero.
DE = Delaware; MA = Massachusetts; MD = Maryland; NC = North Carolina; PPA = Power Purchase Agreement; NJ = New Jersey; NY = New York; RI = Rhode Island; VA = Virginia

Table D2-3. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 3, Gallons of Coolant, Oils, Lubricants, and Diesel Fuel)

Region	Lease/Project/Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area) [a]						Total Coolant Fluids in WTGs (gallons)	Total Coolant Fluids in OSP or ESP (gallons)	Total Oils and Lubricants in WTGs (gallons)	Total Oils and Lubricants in OSP or ESP (gallons)	Total Diesel Fuel in WTGs (gallons)	Total Diesel Fuel in OSP or ESP (gallons)
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism						
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021), PPA, SAP	X	X	X		X	X	42,300	46	383,000	123,559	79,300	5,696
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021), PPA, SAP	X		X		X	X	41,208	23	69,732	80,045	9,516	52,834
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X		X		X	X	350,268	23	307,326	199,956	80,886	24,304
MA/RI	Revolution, part of OCS-A 0486	COP, PPA	X		X		X	X	343,400	0	330,300	0	79,300	0
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP, PPA	X	X	X		X	X	314,470	4,226	165,106	371,956	98,271	10,935
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP	X	X	X		X	X	475,826	9,510	249,798	557,934	146,087	24,604
MA/RI	SouthCoast Wind, OCS-A 0521	COP, PPA	X	X	X	X	X	X	73,500	1,500	433,650	755,000	132,300	200,000
MA/RI	Beacon Wind 1, part of OCS-A 0520 [b]	PPA, SAP	X	X	X		X	X	38,970	795	229,922	400,302	70,146	106,040
MA/RI	Beacon Wind 2, part of OCS-A 0520 [b]	SAP	X	X	X		X	X	38,477	785	227,011	395,235	69,258	104,698
MA/RI	Bay State Wind, part of OCS-A 0500 [b]	SAP	X		X		X	X	55,248	1,128	325,965	567,517	99,447	150,336
MA/RI	Vineyard Wind Northeast, OCS-A 0522 [b]		X	X	X		X	X	114,443	2,336	675,213	1,175,570	205,997	311,409
MA/RI	OCS-A 0500 remainder [b]		X		X		X	X						
MA/RI	OCS-A 0487 remainder [b]		X		X		X	X						
	Remaining MA/RI Lease Area Total [c]								169,691	3,463	1,001,179	1,743,087	305,444	461,745
	Total MA/RI Leases								**1,888,110**	**20,372**	**3,397,024**	**4,627,074**	**1,070,508**	**990,856**
	NY, NJ, DE, MD, NC, VA Leases								**2,200,905**	**19,231**	**5,452,042**	**4,000,436**	**1,141,917**	**1,505,955**
	OCS Total								**4,089,015**	**39,603**	**8,849,066**	**8,627,510**	**2,212,425**	**2,496,811**

[a] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[b] Quantities of coolant, oil and lubricants, and diesel fuel are scaled to SouthCoast Wind based on number turbines and OSP foundations.
[c] Because development could occur anywhere within the RI and MA lease areas and assumes a continuous 1x1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the scenario described in this appendix, the total area in the RI and MA lease areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.
ESP = electrical service platform; DE = Delaware; MA = Massachusetts; MD = Maryland; NC = North Carolina; PPA = Power Purchase Agreement; NJ = New Jersey; NY = New York; RI = Rhode Island; VA = Virginia

Table D2-4. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 4, OCS Construction and Operation Emissions)

Region	Lease/Project/Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area) [a]						Nitrogen oxides	Volatile organic compounds	Carbon monoxide	Particulate matter, 10 microns or less	Particulate matter, 2.5 microns or less	Sulfur dioxide	Carbon dioxide
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism							
									Construction Emissions (Total) – Tons						
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021), PPA, SAP	X	X	X		X	X	5,064	123	1,139	176	169	38	325,127
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021), PPA, SAP	X		X		X	X	1,451	59	284	49	47	33	97,026
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X		X		X	X	5,876	138	2,441	108	108	6	637,986
MA/RI	Revolution, part of OCS-A 0486	COP, PPA	X		X		X	X	22,488	439	5,702	756	730	67	1,712,429
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP, PPA	X	X	X		X	X	6,074	128	1,402	223	216	36	404,287
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP	X	X	X		X	X	6,906	147	1,608	277	268	41	471,961
MA/RI	SouthCoast Wind, OCS-A 0521	COP, PPA	X	X	X	X	X	X	39,964	1,589	8,284	2,897	1,566	1,556	2,607,026
MA/RI	Beacon Wind 1 and 2, part of OCS-A 0520	PPA, SAP	X	X	X		X	X	26,330	1,055	2,929	577	461	653	1,603,031
MA/RI	Bay State Wind, part of OCS-A 0500 [b]	SAP	X		X		X	X	29,905	1,189	6,199	2,168	1,172	1,164	1,950,836
MA/RI	Vineyard Wind Northeast, OCS-A 0522 [b]		X	X	X		X	X							
MA/RI	OCS-A 0500 remainder [b]		X		X		X	X	61,713	2,454	12,792	4,474	2,418	2,403	4,025,816
MA/RI	OCS-A 0487 remainder [b]		X		X		X	X							
	Remaining MA/RI Lease Area Total [c]								91,618	3,643	18,991	6,641	3,590	3,567	5,976,651
Total Air Quality Analysis Area – Total Construction Emissions									205,771	7,321	42,780	11,705	7,155	5,997	13,835,524
									Operations Emissions (Annual) – Tons per year						
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021), PPA, SAP	X	X	X		X	X	71	2	18	2	2	0	5,487
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021), PPA, SAP	X		X		X	X	281	6	58	10	10	2	18,894
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X		X		X	X	590	14	246	11	11	1	64,145
MA/RI	Revolution, part of OCS-A 0486	COP, PPA	X		X		X	X	1,066	16	263	35	34	1	73,349
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP, PPA	X	X	X		X	X	412	7	101	14	13	1	35,179

Region	Lease/Project/Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area) [a]						Nitrogen oxides	Volatile organic compounds	Carbon monoxide	Particulate matter, 10 microns or less	Particulate matter, 2.5 microns or less	Sulfur dioxide	Carbon dioxide
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism							
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP	X	X	X		X	X	419	7	102	14	13	1	42,376
MA/RI	SouthCoast Wind, OCS-A 0521	COP, PPA	X	X	X	X	X	X	729	13	180	24	19	28	46,925
MA/RI	Beacon Wind 1 and 2, part of OCS-A 0520	PPA	X	X	X		X	X	563	18	97	11	11	5	65,257
MA/RI	Bay State Wind, part of OCS-A 0500 [b]	SAP	X		X		X	X	546	10	135	18	14	21	35,114
MA/RI	Vineyard Wind Northeast, OCS-A 0522 [b]		X	X	X		X	X	1,126	20	278	37	29	43	72,462
MA/RI	OCS-A 0500 remainder [b]		X		X		X	X							
MA/RI	OCS-A 0487 remainder [b]		X		X		X	X							
	Remaining MA/RI Lease Area Total [c]								1,671	30	413	55	44	64	107,576
Total Air Quality Analysis Area – Annual Operations Emissions									**5,802**	**113**	**1,477**	**176**	**156**	**103**	**459,188**

[a] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[b] Emissions are scaled to SouthCoast Wind based on number turbines.
[c] Because development could occur anywhere within the RI and MA lease areas and assumes a continuous 1x1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the scenario described in this appendix, the total area in the RI and MA lease areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.
MA = Massachusetts; RI = Rhode Island; PPA = Power Purchase Agreement

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Bureau of Ocean Energy Management (BOEM). 2019. National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf. Available: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf. Accessed: December 2020.

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Appendix E: Analysis of Incomplete and Unavailable Information

In accordance with Section 1502.21 of the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA), when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an Environmental Impact Statement (EIS) and when information is incomplete or unavailable, the agency shall make clear that such information is lacking. When incomplete or unavailable information was identified, the Bureau of Ocean Energy Management (BOEM) considered whether the information was relevant to the assessment of impacts and essential to its analysis of alternatives based upon the resource analyzed. If essential to a reasoned choice among the alternatives, BOEM considered whether it was possible to obtain the information and if the cost of obtaining it was exorbitant. If it could not be obtained or if the cost of obtaining it was exorbitant, BOEM applied acceptable scientific methodologies to inform the analysis in light of this incomplete or unavailable information. For example, conclusive information on many impacts of the offshore wind industry may not be available for years, and certainly not within the contemplated timeframe of this NEPA process. However, if this information is essential for a reasoned decision, subject matter experts have used the scientifically credible information available and generally accepted scientific methodologies to evaluate impacts on the resources while this information is unavailable. The following sections present an analysis by resource topic of incomplete or unavailable information in the EIS for the SouthCoast Wind Project (Project) proposed by SouthCoast Wind Energy LLC (SouthCoast Wind) in its Construction and Operations Plan (COP) (SouthCoast Wind 2024) within Lease Area OCS-A 0521 (Lease Area).

E.1 Incomplete or Unavailable Information Analysis for Resource Areas

E.1.1 Physical Resources

E.1.1.1 Air Quality

Although a quantitative emissions inventory analysis of the region, or regional modeling of pollutant concentrations, over the next 35 years would more accurately assess the overall impacts of the changes in emissions from the Project, any action alternative would lead to reduced emissions regionally and can only lead to a net improvement in regional air quality. The differences among action alternatives with respect to direct emissions due to construction, operations and maintenance (O&M), and decommissioning of the Project are expected to be small. As such, the analysis provided in this EIS is sufficient to support sound scientific judgments and informed decision-making related to the use of the offshore portions of the Wind Farm Area and offshore export cable route corridors. Therefore, BOEM does not believe that there is incomplete or unavailable information on air quality that is essential to a reasoned choice among alternatives.

E.1.1.2 Water Quality

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

E.1.2 Biological Resources

E.1.2.1 Bats

There will always be some level of incomplete information on the distribution and habitat use of bats in the offshore portions of the Lease Area, as habitat use and distribution varies among seasons and species. Additionally, surveying bat activity offshore provides challenges as limited methods have been developed and tested for surveying within this environment. No BOEM issued guidance for bat surveys currently exist for renewable energy development on the outer continental shelf (OCS). Although SouthCoast Wind did not complete Project-specific surveys within the Project area, the evaluation of several studies was examined to provide a baseline understanding of the presence, abundance, and seasonality of bats which may occur within the Project area (including the OCS, State Waters, and coastal lands of Massachusetts and Rhode Island) and the northeast, and an examination of the terrestrial natural communities within the Onshore Project area. Additionally, because U.S. offshore wind development is in its infancy, with only two offshore wind projects having been constructed at the time of this analysis, there is some level of uncertainty regarding the potential collision risk to individual bats that may be present within the offshore portions of the Wind Farm Area. However, sufficient information on collision risk to bats observed at land-based U.S. wind projects exists and was used to analyze and corroborate the potential for this impact as a result of the proposed Project. In addition, the likelihood of a bat encountering an operating wind turbine generator (WTG) during migration is very low and, therefore, the differences among action alternatives with respect to bats for the Project are expected to be small. As such, the analysis provided in this EIS is sufficient to support sound scientific judgments and informed decision-making related to bat use of the Wind Farm Area and the potential for collision risk of bats. Therefore, BOEM does not believe that there is incomplete or unavailable information on bat resources that is essential to a reasoned choice among alternatives.

E.1.2.2 Benthic Resources

Although there is uncertainty regarding the spatial and temporal distribution of benthic (faunal) resources and periods during which they might be especially vulnerable to disturbance, SouthCoast Wind's surveys of benthic resources and other broad-scale studies (SouthCoast Wind 2024; Guida et al. 2017) provided this suitable basis for generally predicting the species, abundances, and distributions of benthic resources within the geographic analysis area. Surveys have not been completed for any of the alternative offshore export cable routes (Alternatives C-1 and C-2) where they diverge from the Proposed Action cable corridors. BOEM is relying on general information and the surveys of the Proposed Action cable corridors, which are in close proximity to the alternative cable routes to characterize benthic habitat impacts. Uncertainty also exists regarding the impact of some impact-producing factors (IPFs) on benthic resources. For example, specific stimulus-response related to acoustics and electromagnetic fields (EMF) is not well studied, although there is some emerging information from benthic monitoring at European wind facilities and the Block Island Wind Farm in the United States that allows for a broad understanding of the impacts. Similarly, specific secondary impacts, such as changes in diets throughout 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 general knowledge of the overall impacts of these IPFs combined, if not individually. Therefore, the analysis provided in this EIS is sufficient to support sound scientific judgments and informed decision-making related to the overall impacts. For these reasons, BOEM does not believe that there is incomplete or unavailable information on benthic resources that is essential to a reasoned choice among alternatives.

E.1.2.3 Birds

Habitat use and distribution of marine birds varies between seasons, species, and years and, as a result, there will always be some level of incomplete information on the distribution and habitat use of marine birds in the offshore portions of the geographic analysis area. However, in accordance with BOEM guidance (BOEM 2020 a-b), an Avian Exposure Risk Assessment was completed for SouthCoast Wind (COP Appendix I1; SouthCoast Wind 2024) to use the best-available marine avian species information with potential to occur in the OCS Lease Area with consideration of several quantitative, qualitative, and spatially explicit resources available for select species occurrences at multiple scales. The Avian Exposure Risk Assessment incorporated baseline regional information, and site-specific data collected during SouthCoast Wind-sponsored high-definition aerial surveys and opportunistic ship-based surveys in order to evaluate the marine bird occurrences in the Lease Area with a specific focus on federally or state listed species and potentially sensitive species that are believed to be susceptible to displacement or collision. These findings were used to inform the predictive models and analyze the potential adverse impacts on bird resources in the EIS.

Because U.S. offshore wind development is in its infancy, there will always be some level of uncertainty regarding the potential for collision risk and avoidance behaviors for some of the bird species that may be present within the offshore portions of the geographic analysis area. In place of this information, subject matter experts used the data and assumptions described below and in the EIS to create models to evaluate impacts, where it was determined that the information was essential for reasoned decision-making. Bird mortality data are available for onshore wind facilities and, based on a number of assumptions regarding their applicability to offshore environments, were used to inform the analysis of bird mortality associated with the offshore WTGs analyzed in the EIS. However, uncertainties exist regarding the use of the onshore bird mortality rate to estimate the offshore bird mortality rate due to differences in species groups present and life history and behavior of species as well as differences in the offshore marine environment compared to onshore habitats. Modeling is commonly used to predict the potential mortality rates for marine bird species in Europe and the United States (BOEM 2015, 2021). Due to inherent data limitations, these models often represent only a subset of species potentially present. However, the datasets used by both SouthCoast Wind and BOEM to assess the potential for exposure of marine birds to the Wind Farm Area represent the best available data and provide context at both local and regional scales. Furthermore, 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., Skov et al. 2018). As such, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision-making related to distribution and use of the offshore portions of the geographic analysis area as well as to the potential for collision risk and avoidance behaviors in bird resources. Furthermore, the similarity between the layouts analyzed for the different action alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information on avian resources that is essential to a reasoned choice among alternatives.

E.1.2.4 Coastal Habitat and Fauna

Although the preferred habitats of terrestrial and coastal fauna are generally known, specific data on abundances and distributions within the geographic analysis area of various fauna within these habitats are likely to remain unknown without site-specific surveys. However, the species inventories and other general information about the area provide an adequate basis for evaluating the fauna likely to inhabit the onshore geographic analysis area. Additionally, the onshore activities proposed involve only common, industry-standard activities for which impacts are generally understood. Therefore, BOEM believes that the analysis provided in this EIS is sufficient to make a reasoned choice among the alternatives.

E.1.2.5 Finfish, Invertebrates, and Essential Fish Habitat

Although there is some uncertainty regarding the spatial and temporal distribution of finfish and invertebrate resources and periods during which they might be especially vulnerable to disturbance, SouthCoast Wind's site assessment surveys and other broad-scale studies (e.g., Guida et al. 2017) provided a suitable basis for general predictions of finfish and invertebrate resources with respect to species, densities, and distributions within the geographic analysis area. Additional information related to species listed under the Endangered Species Act (ESA) and essential fish habitat (EFH) are addressed in the biological assessment (BA) and EFH Assessment. While impacts on these specific finfish and invertebrate species are not anticipated to vary from the general impacts provided in the EIS, specific impact discussion for ESA-listed species and EFH will be provided in the BA and EFH Assessment. Site assessment surveys have not been completed for any of the alternative offshore export cable routes (Alternatives C-1 and C-2) where they diverge from the Proposed Action cable corridors. BOEM is relying on general information and the assessment surveys of the Proposed Action cable corridors, which are in close proximity to the alternative cable routes to characterize habitat impacts for finfish, invertebrates, and EFH.

Uncertainty also exists regarding the impact of some IPFs on invertebrate resources, such as the effects of EMFs 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. Lastly, the nature, extent, and significance of potential spillover effects on broader ecosystem functions, such as larval dispersal, are not fully understood (van Berkel et al. 2020). 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 information provided in this 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.

E.1.2.6 Marine Mammals

The National Marine Fisheries Service (NMFS) has summarized the most current information about marine mammal population status, occurrence, and use of the region in its 2020 stock status report for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2020, 2021). These studies provided a suitable basis for predicting the species, abundances, and distributions of marine mammals in the geographic analysis area. However, population trend data from NMFS are unavailable for 24 species, and annual human-caused mortality is unknown for 16 species (Appendix B, *Supplemental Information and Additional Figures and Tables*). The majority of species lacking population trend data are offshore species, such as blue whale, fin whale, and non-porpoise odontocetes (e.g., beaked whales and dolphins). As a result, there is uncertainty regarding how Project activities and cumulative effects may affect these populations. In addition to species distribution information, effects of some IPFs on marine mammals are also uncertain or ambiguous, as described below.

Potential effects of EMF have not been scaled to consider impacts on marine mammal populations or their prey in the geographic analysis area (Taormina et al. 2018). The widespread ranges of marine mammals and difficulty obtaining permits make experimental studies challenging. As a result, no scientific studies have been conducted that examine the effects of altered EMF on marine mammals. However, although scientific studies summarized by Normandeau et al. (2011) demonstrate that marine mammals are sensitive to, and can detect, small changes in magnetic fields (Section 3.5.6, *Marine Mammals*), potential impacts would likely only occur within a few feet of cable segments. The current literature does not support a conclusion that EMF could lead to changes in behavior that would cause significant adverse effects on marine mammal populations.

The behavioral effects of anthropogenic noises on marine mammals are increasingly being studied; however, behavioral responses vary depending on a variety of factors such as life stage, previous experience, and current behavior (e.g., feeding, nursing) and are, therefore, difficult to predict. In addition, the current NMFS disturbance criteria apply a single threshold for all marine mammals for impulsive noise sources and do not consider the overall duration, exposure, or frequency distribution of the sound to account for species-dependent hearing acuity. While elevated underwater sound could startle or displace animals, behavioral responses are not necessarily predictable from source levels alone (Southall et al. 2007).

In addition, research regarding the potential behavioral effects of pile-driving noise has generally focused on harbor porpoises and seals; studies that examine the behavioral responses of baleen whales to pile driving are absent from the literature. Of the available research, most studies conclude that, although pile-driving activities could cause avoidance behaviors or disruption of feeding activities, individuals would likely return to normal behaviors once the activity had stopped. However, uncertainty remains regarding the long-term cumulative acoustic impacts associated with multiple pile-driving projects that may occur over a number of years. This also applies to other project activities such as vessel movements, high-resolution geophysical (HRG) surveys, geotechnical drilling, and dredging activities that may elicit behavioral reactions in marine mammals. As a result, it is not possible to predict with certainty the potential long-term behavioral effects on marine mammals from Project-related pile driving or other activities, as well as ongoing concurrent and cumulative pile driving and other activities.

Offshore WTGs produce continuous, non-impulsive underwater noise during operation, mostly in lower-frequency bands below 1,500 Hz. SPLs measured from WTGs within the size range likely to be utilized by this Project do not currently exist in the literature, and modeling scenarios are limited to two studies with a high degree of uncertainty. It is likely that source levels and frequencies emitted from the larger WTGs to be used for the Project would fall somewhere between those recorded for smaller-gear driven WTGs (e.g., 109 to 128 dB re 1 µPa SPL_{RMS} [at varying distances]) (Lindeboom et al. 2011; Pangerc et al. 2016; Tougaard et al. 2009) and those modeled in Stöber and Thomsen (2021) (e.g., 170 to 177 dB re 1 µPa SPL_{RMS}). Using the least-squares fits from Tougaard et al. (2020), SPLs from 11.5-MW turbines (in 20-meter-per-second, gale-force wind) would be expected to fall below the 120 dB re 1 µPa behavioral threshold within about 800 feet (245 meters). In lighter, 10-meter-per-second winds (approximately 20 knots), the predicted range to threshold would be only about 460 feet (140 meters). Effects related to the large WTGs to be used for the Project would include behavioral and masking effects. Masking of the low-frequency calls emitted from LFC and phocid pinnipeds in water would be more likely to occur. However, without further information regarding these larger WTGs, the extent of these effects is unknown.

To address this uncertainty, the assessment used the best available information when considering behavioral effects related to underwater noise. To better characterize these impacts, all potential types of behavioral responses, as well as the context within which these responses may occur, were considered following guidance from applicable studies (Southall et al. 2021) and used in conjunction with the NMFS disturbance threshold, as described in Chapter 3, Section 3.5.6, *Marine Mammals*. For the assessment of large baleen whales, studies on other impulsive noises (e.g., seismic sources) were used to inform the potential behavioral reactions to pile-driving noise. Monitoring studies would provide insight into species-specific behavioral reactions to Project-generated underwater noise. Long-term monitoring of concurrent and multiple projects could inform the understanding of long-term effects and subsequent consequences from cumulative underwater noise activities on marine mammal populations.

There is a lack of research regarding the responses of large whale species to extensive networks of new structures due to the novelty of this type of development on the Atlantic OCS. Although new structures are anticipated from multiple offshore wind projects under the planned activities scenario, it is expected that spacing will allow large whales to access areas within and between wind facilities. No physical obstruction of marine mammal migration routes or habitat areas are anticipated, but whether avoidance of offshore wind lease areas will occur due to new structures is unknown. 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. The potential consequences of these impacts on marine mammals are unknown. Monitoring studies would provide insight into species-specific avoidance behaviors and other potential behavioral reactions to Project structures.

At present, this EIS has no basis to conclude that these IPFs would result in significant adverse impacts on marine mammal populations.

BOEM determined that the overall costs of obtaining the missing information for or addressing these uncertainties are exorbitant, or the means to obtain it are not known. Therefore, to address these gaps as described above, BOEM extrapolated or drew assumptions from known information for similar species and studies using acceptable scientific methodologies to inform the analysis in light of this incomplete or unavailable information, as presented in Chapter 3, Section 3.5.6, *Marine Mammals*, and in the BA submitted to NMFS (BOEM 2022). The information and methods used to predict potential impacts on marine mammals represent the best available information, and the information provided in this EIS is sufficient to support sound scientific judgments and informed decision-making. Therefore, BOEM does not believe that there is incomplete or unavailable information on marine mammal resources that is essential to a reasoned choice among alternatives.

E.1.2.7 Sea Turtles

The NMFS BA (BOEM 2022) provides a thorough overview of the available information about potential species occurrence and exposure to Project-related IPFs. The studies summarized therein provide a suitable basis for predicting potential species occurrence, relative abundance, and probable distribution of sea turtles in the geographic analysis area. There are Protected Species Observer sightings and modeled densities of sea turtle species expected to occur within the Project Area outlined in the most recent COP submission (SouthCoast Wind 2024). However, without specific sea turtle surveys or monitoring guidelines, data to investigate impacts on sea turtles is lacking.

Some uncertainty exists about the effects of certain IPFs on sea turtles and their habitats. The effects of EMF on sea turtles are not completely understood. However, the available relevant information is summarized in the BOEM-sponsored report by Normandeau et al. (2011). Although the thresholds for EMF disturbing various sea turtle behaviors are not known, the evidence suggests that impacts may only occur on hatchlings over short distances, and no adverse effects on sea turtles have been documented to occur from the numerous submarine power cables around the world.

There is also uncertainty about sea turtle responses to proposed Project construction activities, and data are not available to evaluate potential changes to movements of juvenile and adult sea turtles due to elevated suspended sediments. However, although some exposure may occur, total suspended solid impacts would be limited in magnitude and duration and would occur within the range of exposures periodically experienced by these species. On this basis, any resulting impact on sea turtle behavior due to sediment plumes would likely be too small to be biologically meaningful, and no adverse impacts would be expected (NOAA 2020). Some potential exists for sea turtle displacement, but it is unclear if this would result in adverse impacts (e.g., because of lost foraging opportunities or increased exposure to potentially fatal vessel interactions). Additionally, it is currently unclear whether concurrent construction of multiple projects, increasing the extent and intensity of impacts over a shorter duration, or spreading out project construction with lower-intensity impacts over multiple years would result in the least potential harm to sea turtles.

Information on sea turtle hearing is limited, and there are some discrepancies between hearing range determinations. Cumulative acoustic impacts associated with pile-driving activities are unknown, including whether sea turtles affected by construction activities would resume normal feeding, migrating, or breeding behaviors once daily pile-driving activities cease, or if secondary impacts would continue. Under the planned activities scenario, individual sea turtles may be exposed to acoustic impacts from multiple projects in a single day or from one or more projects over the course of multiple days. Although the consequences of these exposure scenarios have been analyzed with the best available information, some level of uncertainty remains due to the lack of observational data on species' responses to pile driving.

Since U.S. offshore wind development is in its infancy, there is some level of uncertainty regarding the potential collision risk to sea turtles that may be present within the offshore portions of the Wind Farm Area. The potential for sea turtle responses to Federal Aviation Administration hazard lights and navigation lighting is unknown. SouthCoast Wind would limit lighting on WTGs and offshore substation platforms to minimum levels required by regulation for worker safety, navigation, and aviation. Although sea turtles' sensitivity to these minimal light levels is unknown, sea turtles do not appear to be adversely affected by oil and gas platform operations, which produce far more artificial light than offshore wind structures. The placement of new structures would be far from nesting beaches, so no impacts on nesting female or hatchling sea turtles are anticipated.

Considerable uncertainty exists about how sea turtles would interact with the long-term changes in biological productivity and community structure resulting from the reef effect of offshore wind farms across the geographic analysis area. Artificial reef and hydrodynamic impacts could influence predator-prey interactions and foraging opportunities in ways that influence sea turtle behavior and distribution. Also, the extent of sea turtle entanglement on artificial reefs and shipwrecks is not captured in sea turtle stranding records and the significance and potential scale of sea turtle entanglement in lost fishing gear are not quantified. These impacts are expected to interact with the ongoing influence of climate change on sea turtle distribution and behavior over broad spatial scales, but the nature and significance of these interactions are not predictable. BOEM anticipates that ongoing monitoring of offshore energy structures will provide some useful insights into these synergistic effects.

BOEM considered the level of effort required to address the uncertainties described above for sea turtles and determined that the methods necessary to do so are lacking or the associated costs would be exorbitant. Therefore, where appropriate, BOEM inferred conclusions about the likelihood of potential biologically significant impacts from available information for similar species and situations to inform the analysis in light of this incomplete or unavailable information. These methods are described in greater detail in Section 3.5.7, *Sea Turtles*, and in the BA submitted to NMFS (BOEM 2022). Therefore, the analysis provided is sufficient to support sound scientific judgments and informed decision-making about the proposed Project with respect to its impacts on sea turtles. For these reasons, BOEM does not believe that there is incomplete or unavailable information on turtles that is essential to a reasoned choice among alternatives.

E.1.2.8 Wetlands

The analysis of impacts on wetlands presented in Section 3.5.8, *Wetlands*, is based on publicly available data sets, including National Wetland Inventory, Massachusetts Bureau of Geographic Information wetlands dataset, and the University of Rhode Island Environmental Data Center and Rhode Island Geographic Information System Wetlands dataset. SouthCoast Wind delineated wetlands during field surveys conducted within the onshore substation sites in Falmouth; however, the field delineation report for the onshore substation sites under consideration in Falmouth is private data and, therefore, has not been provided (COP Volume 2, Section 6.4.1.1; SouthCoast Wind 2024). Additional field delineations will be completed as part of the federal (Clean Water Act Section 404) and state permitting processes as necessary. While delineated wetland data provides more accurate and site-specific impact information, use of the national and state wetland data provides adequate detail to characterize impacts on wetlands and any differences among the alternatives. Based on the foregoing, BOEM does not believe that there is incomplete or unavailable information on wetlands that is essential to a reasoned choice among alternatives.

E.1.3 Socioeconomic Conditions and Cultural Resources

E.1.3.1 Commercial Fisheries and For-Hire Recreational Fishing

Fisheries are managed in the context of an incomplete understanding of fish stock dynamics and effects of environmental factors on fish populations. The commercial fisheries information used in this assessment has limitations. For example, vessel trip report data are only an approximation because this information is self-reported and may not account for all trips. The vessel trip report data also do not include all commercial fishing operations that may be affected by the Proposed Action and only represent vessel logbook data for species managed by the Greater Atlantic Regional Fisheries Office. Additionally, available historical data lack consistency, making comparisons challenging.

Vessel Monitoring System (VMS) data are also limited, with a number of factors contributing to their limitations.

- VMS coverage is not universal for all fisheries, with some fisheries (summer flounder, scup, black sea bass, bluefish, American lobster, spiny dogfish, skate, whiting, and tilefish) not covered at all by VMS.
- There is limited historical coverage for most fisheries (e.g., monkfish is optional and elective on a yearly basis, 2005 or earlier for herring, 2006 for groundfish and scallops, 2008 for surfclams/ocean quahogs, 2014 for mackerel, and 2016 for longfin squid/butterfish).
- Trip declaration does not necessarily correspond to actual operation.
- Hourly position pings limit area resolution based on speed.
- Fishing time/location can be mis-estimated by operational assumptions (speed and direction) that are affected by externalities (weather, sea state, mechanical issues).
- Catch data are limited because there is no information on catch rates, retained catch composition is limited to target species and some bycatch species, and the data are not universal.
- Catch information is for the full trip, not sub-trips.
- Not all information is collected from all fisheries (gear type).

However, these data represent the best available data, and sufficient information exists to support the findings presented in this EIS.

A second limitation is that recent annual exposure of revenue for for-hire recreational fishing specific to the Lease Area is not available. The economic analysis conducted by BOEM of recreational for-hire boats, as well as for-hire and private-boat angler trips that might be affected by the overall Massachusetts Wind Energy Area (WEA), including the Lease Area, was conducted for 2007–2012 (Kirkpatrick et al. 2017), and the Massachusetts WEA is treated as one entity with no site-specific data for the individual offshore wind lease areas that compose the Massachusetts WEA. Currently, there are an insufficient number of trips available for NMFS to generate a description of selected fishery landings and estimates of recreational party and charter vessel revenue from within the Project area (NMFS 2021). Due to the low effort in the area, BOEM does not believe that there is incomplete or unavailable information on commercial fisheries and for-hire recreational fishing resources that is essential to a reasoned choice among alternatives.

E.1.3.2 Cultural Resources

BOEM requires detailed information regarding the nature and location of historic properties that may be affected by an applicant’s proposed activity in order to conduct review of the COP under Section 106 of National Historic Preservation Act (54 United States Code 306108). The assessment of effects from the proposed Project on historic properties is reliant on the identification and analysis of cultural resources in the geographic area in which these activities are proposed to take place (referred to as the Area of Potential Effects [APE]). BOEM has determined that there is sufficient information on cultural resources in the APE for the proposed Project that allows for the assessment of impacts, analysis and comparison of alternatives, and Finding of Adverse Effect on historic properties.

For the Terrestrial Archaeological Resource Assessment (TARA), BOEM requires a complete inventory of terrestrial archaeological resources in the terrestrial APE to assess Project impacts and complete the analysis of alternatives based on specific historic properties. SouthCoast Wind will be using a process of phased identification and evaluation of historic properties as defined in 36 Code of Federal Regulations (CFR) 800.4(b)(2) to provide BOEM with the full completion of historic property identification in the terrestrial APE. This includes completion of Phase IB terrestrial archaeological survey in presently unsurveyed areas. Any thus-far known terrestrial archaeological resources identified as being located in the APE are provided in the TARA; however, additional terrestrial archaeological surveys completed for the proposed Project may lead to the identification of additional terrestrial archaeological resources. This process of phased identification and evaluation of historic properties will be stipulated in the MOA, as developed through BOEM's NHPA Section consultations with federally recognized Tribes and consulting parties (Appendix I, Attachment A) and will be completed following the execution of the MOA.

In conclusion, BOEM has determined there is sufficient information on cultural resources in the geographic analysis area and APE for the analysis in this Final EIS to support a reasoned choice among alternatives.

E.1.3.3 Demographics, Employment, and Economics

SouthCoast Wind's economic analysis estimated the employment and outputs for the Proposed Action. 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 specific incomplete or unavailable information on demographics, employment, and economics that is essential to a reasoned choice among alternatives.

E.1.3.4 Environmental Justice

Evaluations of impacts on environmental justice communities rely on the assessment of impacts on other resources. As a result, incomplete or unavailable information related to other resources, as described in this document, also affect the completeness of the analysis of impacts on environmental justice communities.

As discussed in other sections, BOEM has determined that incomplete and unavailable resource information for environmental justice or for other resources on which environmental justice communities rely was either not relevant to assess reasonably foreseeable significant adverse impacts, was not essential to a reasoned choice among alternatives, alternative data or methods could be used to predict potential impacts and provided the best available information, or the overall costs of obtaining the information were exorbitant or the means to do so were unknown. Therefore, the information provided in the EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the onshore and offshore portions of the geographic analysis area. Furthermore, the differences among action alternatives with respect to environmental justice are not expected to be significant.

E.1.3.5 Land Use and Coastal Infrastructure

There is no incomplete or unavailable information related to the analysis of impacts on land use and coastal infrastructure.

E.1.3.6 Navigation and Vessel Traffic

SouthCoast Wind's Navigation Safety Risk Assessment (COP Appendix X; SouthCoast Wind 2024), of which the navigation and vessel traffic impact analysis in the EIS is largely based, relies on 1 year's (January 1–December 31, 2021) Automatic Identification System (AIS) data from vessels required to carry AIS (i.e., those 65 feet [19.8 meters] or greater in length). To account for some gaps in the data due to limitations of the AIS carriage requirements, additional vessel transits were added to the Navigation Safety Risk Assessment risk modeling to account for both current and future traffic not represented in the data (COP Appendix X; SouthCoast Wind 2024). The AIS data and additional vessel trips added to the modeling described above represents the best available vessel traffic data and is sufficient to enable BOEM to make a reasoned choice among alternatives.

As stated in Section 3.6.6, *Navigation and Vessel Traffic*, WTGs could potentially interfere with marine radars. Marine radars 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 all would enable safe navigation with minimal loss of radar detection. Based on the foregoing, BOEM does not believe that there is incomplete or unavailable information on navigation and vessel traffic that is essential to a reasoned choice among alternatives.

E.1.3.7 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research, and Surveys)

There is no incomplete or unavailable information related to the analysis of impacts on other uses.

E.1.3.8 Recreation and Tourism

Evaluations of impacts on recreation and tourism rely on the assessment of impacts on other resources. As a result, incomplete or unavailable information related to other resources, as described in this document, also affect the completeness of the analysis of impacts on recreational tourism. BOEM has determined that incomplete and unavailable resource information for recreation and tourism or for other resources on which the analysis of recreation and tourism impacts rely was either not relevant to reasonably foreseeable significant adverse impacts, was not essential to a reasoned choice among alternatives, alternative data or methods could be used to predict potential impacts and provided the best available information, or the overall costs of obtaining the information were exorbitant or the means to do so were unknown. Therefore, the information provided in the EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the onshore and offshore portions of the geographic analysis area.

E.1.3.9 Visual Resources

No incomplete or unavailable information related to the analysis of impacts on scenic and visual resources was identified.

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Appendix F: Analysis of Alternatives to Inform the USACE's 404(b)(1) Alternatives Analysis

The purpose of this appendix is to help inform the U.S. Army Corps of Engineers' (USACE) 404(b)(1) Guidelines alternatives analysis and their selection of the Least Environmentally Damaging Practicable Alternative (LEDPA). This appendix describes alternatives that were considered and the reasons they were not carried forward.

The U.S. Environmental Protection Agency (EPA)'s Clean Water Act (CWA) Section 404(b)(1) guidelines (Guidelines) can be found at 40 Code of Federal Regulations (CFR) Part 230 and apply to the USACE's review of proposed discharges of dredged or fill material into waters of the United States regulated under CWA Section 404. In tidal waters, the shoreward limit of Section 404 jurisdiction is the high tide line, while the seaward limit is 3 nautical miles from the baseline of the territorial seas. In non-tidal waters, the Section 404 jurisdictional limit is the ordinary high water (OHW) mark of a waterbody. When adjacent wetlands are present, Section 404 jurisdiction extends beyond the OHW mark to the limit of the adjacent wetlands. The Guidelines also address impacts on "special aquatic sites," (defined at 40 CFR 230.3(m) and identified in 40 CFR 230 subpart E) which are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. Special aquatic sites include wetlands, sanctuaries and refuges, vegetated shallows (such as eelgrass), mud flats, coral reefs, and riffle and pool complexes.

Except as provided under CWA Section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Where the activity associated with a discharge which is proposed for a special aquatic site does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not ''water dependent''), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.

For the proposed SouthCoast Wind Project, USACE has determined that the basic project purpose is offshore wind energy generation, which is not "water dependent" per the Section 404(b)(1) Guidelines. The following information (including alternatives tables for Falmouth and Brayton Point) includes a description of alternatives considered that was provided by SouthCoast Wind and will be analyzed according to the appropriate criteria in the Guidelines.

The SouthCoast Wind proposed offshore export cable routes, SouthCoast Wind proposed landfall sites and onshore export cable routes, and BOEM alternative onshore routes for Alternative C-1 and Alternative C-2 routes are described below (Figure F-1, Figure F-2, Figure F-3, Figure F-4, Figure F-5, Figure F-6, and Figure F-7).

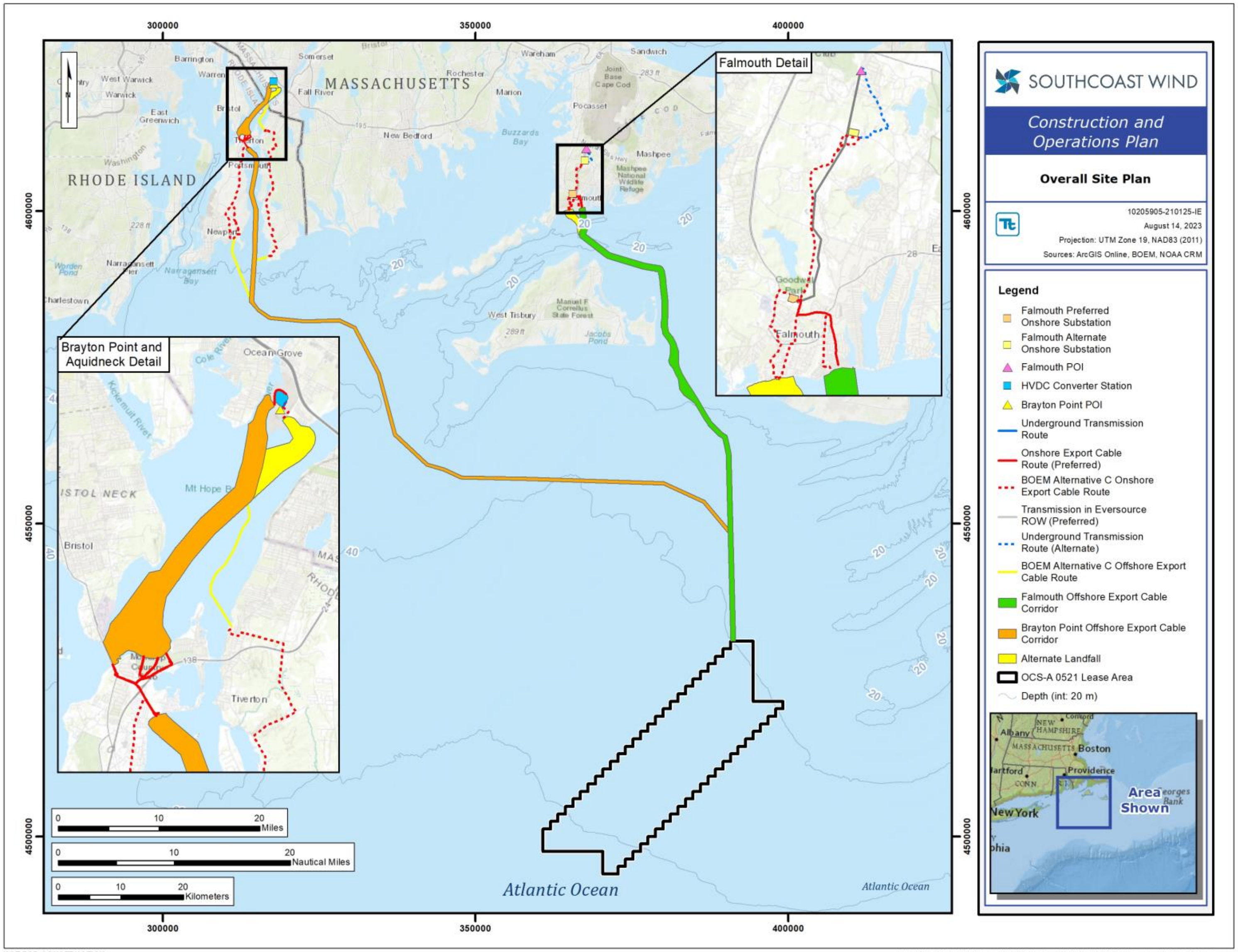


Figure F-1 Proposed Offshore Export Cable Routes

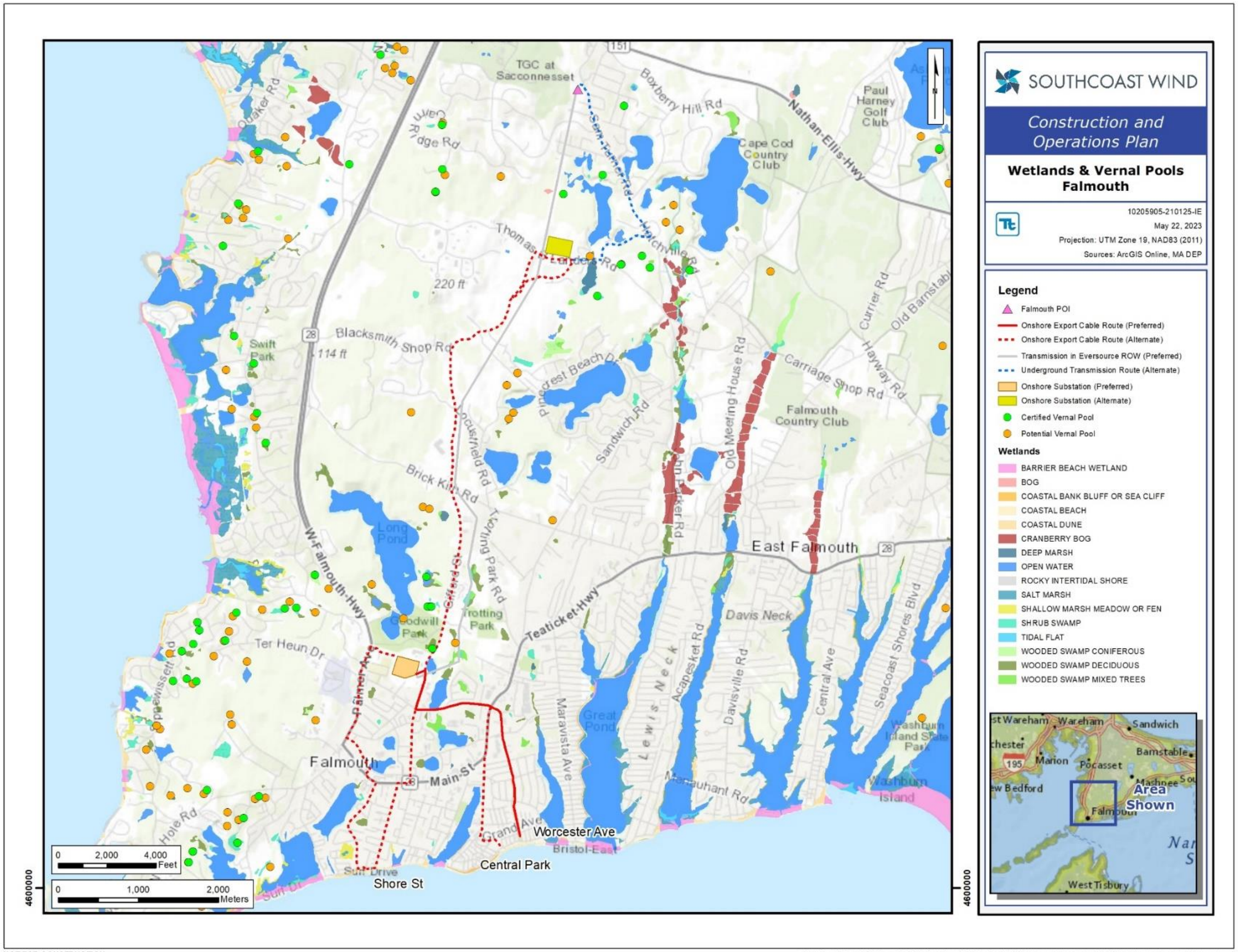


Figure F-2 Proposed Landfall Sites and Onshore Export Cables – Falmouth Variant

F.1 Falmouth Variant Alternatives (see Table F-1 for quantitative summary)

Proposed Action Offshore Export Cable Route

The Proposed Action Offshore Export Cable Route would run from the Lease Area in federal waters through Muskeget Channel and into Nantucket Sound in Massachusetts state waters, to make landfall in Falmouth, Massachusetts.

This route would be 137,442 linear feet of offshore cable in state waters, and there are no anticipated impacts on non-tidal waters, wetlands, or other protected resource areas anticipated (Table F-1).

Impacts to tidal waters are anticipated from horizontal directional drilling (HDD) exit pits, cable protection, and seabed preparation. Approximately 0.40 acres will be disturbed for HDD exit pits. A small portion of this route is estimated to require cable protection (Table F-1). Seabed preparation includes boulder field clearance where necessary, utilizing a boulder plow as well as local boulder removal via boulder grabs in other locations (Table F-1). Boulder field clearance is expected to be needed primarily in areas of this route traversing Muskeget Channel and Nantucket Sound.

The Proposed Action Offshore Export Cable Route follows the westernmost route option through Muskeget Channel. The western route has fewer areas of high risk related to extremely shallow water depths than the other options. The western route avoids ultra-shallow sections of the Muskeget Channel that would pose significant navigational hazards (even to a shallow-draft cable lay barge) during cable installation and (if needed) repair. It has a greater length proximate to or co-located with the Vineyard Wind 1 cables, which may reduce the cumulative impact area of both projects.

Proposed Alternative Offshore Export Cable Route 1

Falmouth Proposed Alternative Offshore Cable Route 1 would run from the Lease Area in federal waters through Muskeget Channel and into Nantucket Sound in Massachusetts state waters, to make landfall in Falmouth, Massachusetts. Proposed Alternative Offshore Cable Route 1 runs just east of the proposed offshore export cable route and is the easternmost option of the alternatives down-selected through Muskeget Channel.

This route would be 134,515 linear feet of offshore cable in state waters, and there are no impacts on non-tidal waters, wetlands, or other protected resource areas anticipated (Table F-1).

Impacts to tidal waters are anticipated from HDD exit pits, cable protection, and seabed preparation. Approximately 0.40 acres will be disturbed for HDD exit pits. A small portion of this route is estimated to require cable protection (Table F-1). Seabed preparation includes boulder field clearance where necessary, utilizing a boulder plow as well as local boulder removal via boulder grabs in other locations (Table F-1). Boulder field clearance is expected to be needed primarily in areas of this route traversing Muskeget Channel and Nantucket Sound.

SouthCoast Wind deselected Falmouth Proposed Alternative Offshore Cable Route 1 as it was deemed redundant due to its similarity to the Proposed Action Offshore Export Cable Route through Muskeget Channel and into Nantucket Sound.

Proposed Alternative Offshore Export Cable Route 2

Falmouth Proposed Alternative Offshore Cable Route 2 would run from the Lease Area in federal waters through Muskeget Channel and into Nantucket Sound in Massachusetts state waters, to make landfall in Falmouth, Massachusetts. Proposed Alternative Cable Route 2 follows the same route as Proposed Alternative Offshore Cable Route 1; however, it diverts to the east and reconnects to Alternative 3 (discussed below).

This route would be 147,259 linear feet of offshore cable in state waters and would utilize HDD for the sea-to-shore transition of export cables between the ocean and the land; therefore, there are no impacts to non-tidal waters, wetlands, or other protected resource areas anticipated (Table F-1).

Impacts to tidal waters are anticipated from HDD exit pits, cable protection, and seabed preparation. Approximately 0.40 acres will be disturbed for HDD exit pits. A small portion of this route is estimated to require cable protection (Table F-1). Seabed preparation includes boulder field clearance where necessary, utilizing a boulder plow as well as local boulder removal via boulder grabs in other locations (Table F-1). Boulder field clearance is expected to be needed primarily in areas of this route traversing Muskeget Channel and Nantucket Sound.

SouthCoast Wind deselected Falmouth Proposed Alternative Offshore Cable Route 2 to avoid overlap with other proposed offshore wind projects and because of challenging seabed conditions within Muskeget Channel, including expected high sediment mobility, very shallow bathymetry, and high seabed slopes, that were identified during reconnaissance and site characterization surveys completed in 2020. The resulting level of technical risk was too high to carry these corridors through for the Project Design Envelope (PDE).

Proposed Alternative Offshore Export Cable Route 3

Falmouth Proposed Alternative Offshore Cable Route 3 would run from the Lease Area in federal waters through Muskeget Channel and into Nantucket Sound in Massachusetts state waters, to make landfall in Falmouth, Massachusetts. Proposed Alternative Offshore Cable Route 3 is farther east compared to the proposed alternative and turns left parallel to the northernmost part of Martha's Vineyard.

This route would be 113,989 linear feet of offshore cable in state waters, and there are no impacts on non-tidal waters, wetlands, or other protected resource areas anticipated (Table F-1).

Impacts to tidal waters are anticipated from HDD exit pits, cable protection, and seabed preparation. Approximately 0.40 acres will be disturbed for HDD exit pits. A small portion of this route is estimated to require cable protection (Table F-1). Seabed preparation includes boulder field clearance where necessary, utilizing a boulder plow as well as local boulder removal via boulder grabs in other locations (Table F-1). Boulder field clearance is expected to be needed primarily in areas of this route traversing Muskeget Channel and Nantucket Sound.

SouthCoast Wind deselected Falmouth Proposed Alternative Offshore Cable Route 3 to avoid overlap with other proposed offshore wind projects and because of challenging seabed conditions, including expected high sediment mobility, very shallow bathymetry, and high seabed slopes within Muskeget Channel that were identified during reconnaissance and site characterization surveys completed in 2020. The resulting level of technical risk was too high to carry these corridors through for the PDE.

Proposed Alternative Offshore Export Cable Route 4

Falmouth Proposed Alternative Offshore Cable Route 4 would run from the Lease Area in federal waters through Muskeget Channel and into Nantucket Sound in Massachusetts state waters, to make landfall in Falmouth, Massachusetts. Alternative 4 is the easternmost cable route, closest to Nantucket, that heads to the east then curves west to rejoin the Alternative Offshore Cable Route 3 proposed corridor.

This route would be 119,779 linear feet of offshore cable in state waters, and there are no impacts on non-tidal waters, wetlands, or other protected resource areas anticipated (Table F-1).

Impacts to tidal waters are anticipated from HDD exit pits, cable protection, and seabed preparation. Approximately 0.40 acres will be disturbed for HDD exit pits. A small portion of this route is estimated to require cable protection (Table F-1). Seabed preparation includes boulder field clearance where necessary utilizing a boulder plow, as well as local boulder removal via boulder grabs in other locations (Table F-1). Boulder field clearance is expected to be needed primarily in areas of this route traversing Muskeget Channel and Nantucket Sound.

SouthCoast Wind deselected Falmouth Proposed Alternative Offshore Cable 4 because of challenging seabed conditions that were identified in a desktop assessment, amounting to a high level of technical risk, especially near Muskeget Island and Nantucket. For Falmouth Proposed Alternative Offshore Cable Routes 2 through 4, these challenging seabed conditions include expected high sediment mobility, very shallow bathymetry, and high seabed slopes.

Worcester Ave Landing to Proposed Onshore Substation Alternative

The proposed landfall is the easternmost potential landfall site located at Worcester Avenue. This location is protected by a short seawall, a broad beach, and Surf Drive. This landfall site would be located on a previously disturbed, off-road grassy median strip (also known as Worcester Park) that runs between the two lanes of Worcester Avenue. Residences and a hotel are adjacent to this landfall site but are buffered from the open green space by Worcester Avenue on either side. A paved parking lot located nearby could be used for construction staging operations. There are no known existing submarine cables that make landfall at Worcester Avenue and this landfall would avoid the need to cross any existing submarine cables between Martha's Vineyard and Falmouth, Massachusetts.

There are no anticipated impacts on non-tidal waters, wetlands, or other special aquatic sites. This location is within northern long-eared bat habitat range, but due to no tree clearing, impacts are not anticipated. See Table F-1 for an impact summary.

The Worcester Avenue landfall is the Proposed Action because it has the overall shortest length to the substation and minimal impacts on protected resources. The Worcester Avenue landfall is 2.0 miles (3.3 kilometers) from the proposed Onshore Substation located at Lawrence Lynch and 5.9 miles (9.4 kilometers) from the alternate Onshore Substation located at Cape Cod Aggregates.

Central Park Landing to the Proposed Onshore Substation Alternative

The Central Park landing is approximately 700 feet (213 meters) west of the Worcester Avenue landfall location, situated at Central Park on Falmouth Heights Beach north of Grand Avenue. This landfall site is proposed, yet not preferred, by SouthCoast Wind, and would occur at a public recreational park with a baseball diamond and basketball court. The park is flanked on the southern side by paved parking spaces, which could be used for construction staging operations. There are no known existing submarine cables that make landfall at Central Park and this landfall would avoid the need to cross any existing submarine cables between Martha's Vineyard and Falmouth, Massachusetts.

The Central Park landing and onshore cable route to the substation would have no impacts on non-tidal waters, wetlands, or other special aquatic sites (Table F-1). This location is within northern long-eared bat habitat range, but due to no tree clearing, impacts are not anticipated.

The Central Park landing and cable route to the substation is not preferred by SouthCoast Wind, due to its longer length and potential interference with activities at Central Park. The Central Park landfall is 2.2 miles (3.5 kilometers) from the proposed Onshore Substation located at Lawrence Lynch and 6.1 miles (9.8 kilometers) from the alternate Onshore Substation located at Cape Cod Aggregates.

Shore Street Landing to Proposed Onshore Substation Alternative

The Shore Street landfall site is west of the Central Park and Worcester Avenue landfall sites. This landfall site is proposed, yet not preferred, by SouthCoast Wind that is located on Surf Drive Beach at the intersection of Surf Drive and Shore Street. An existing seawall and nearby rock jetties protect this landfall site. The Shore Street location has a large, over 2 acres (0.8 hectare) public parking lot that could be used to site the cable transition joint bays and accommodate vehicles and equipment during installation operations. The Shore Street landfall location involves the potential crossing of two existing submarine cables that also make landfall at Shore Street. The existing arrangement may allow SouthCoast Wind to HDD underneath the existing cables in the approach to the landfall location.

SouthCoast Wind will utilize HDD for the sea-to-shore transition of export cables between the ocean and the land. Due to HDD drilling activities, there is 0.26 acre of anticipated temporary wetland impact. There is 0.01 acre of potential impacts on non-tidal waters due to a small stream crossing. This stream will be crossed by running over or under the existing culvert and would not result in permanent impacts. There are no anticipated impacts on other special aquatic sites. This location is within northern long-eared bat habitat range, but due to no tree clearing, impacts are not anticipated. See Table F-1 for an impact summary.

The Shore Street landing and cable route to the onshore alternate substation is not preferred due to its potential to cross existing submarine cables, and also due to its length. The Shore Street landfall is 2.3 miles (3.6 kilometers) from the proposed Onshore Substation located at Lawrence Lynch and 6.4 miles (10.25 kilometers) from the proposed alternative Onshore Substation located at Cape Cod Aggregates.

Table F-1. Clean Water Act Section 404(b)(1) alternatives analysis table – Falmouth

Factors	No Action Alternative	Preferred Offshore Cable Route	Alternative Offshore Cable Route 1 from COP	Alternative Offshore Cable Route 2 from COP	Alternative Offshore Cable Route 3 from COP	Alternative Offshore Cable Route 4 from COP	Preferred Worcester Ave Landing to Preferred Onshore Substation	Central Park Landing to Preferred Onshore Substation	Shore Street Landing to Alternate Onshore Substation
Linear Feet of Cable (entire route) [a,b]	0 LF	309,028 LF	301,027 LF	314,803 LF	308,338 LF	321,925 LF	N/A	N/A	N/A
Linear Feet of Cable (state waters)[a,b]	0 LF	137,442 LF	134,515 LF	147,259 LF	113,989 LF	119,779 LF	N/A	N/A	N/A
Amount of Dredge Material (entire route)	0 CY	0 CY	0 CY	0 CY	0 CY	0 CY	0 CY	0 CY	0 CY
Amount of Dredge Material (state waters)	0 CY	0 CY	0 CY	0 CY	0 CY	0 CY	0 CY	0 CY	0 CY
HDD Exit Pits Area of Disturbance	0 acres	0.40 acres	0.40 acres	0.40 acres	0.40 acres	0.40 acres	N/A	N/A	N/A
Cable Protection (entire route)	0 acres	135 acres	135 acres	135 acres	135 acres	135 acres	N/A	N/A	N/A
Cable Protection (state waters)	0 acres	39 acres	39 acres	39 acres	39 acres	39 acres	N/A	N/A	N/A
Amount of Fill Material (entire route) [c]	0 CY	2,088,954 CY	1,865,625 CY	2,118,576 CY	2,072,737 CY	1,952,548 CY	0 CY	0 CY	0 CY

Amount of Fill Material (state waters) [c]	0 CY	653,494 CY	482,634 CY	484,320 CY	474,466 CY	474,112 CY	0 CY	0 CY	0 CY
Non-Tidal Waters (e.g., streams, ponds)	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	.01 acres
Temporary Wetland Impacts	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	.26 acres
Impacts on Other Special Aquatic Sites	0	0	0	0	0	0	0	0	0
Other Resources of Concern	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	NLEB [d]	NLEB [d]	NLEB [d]

[a] Excludes onshore export cable segments (i.e., export cable segments landward of the landfall).
[b] Distances reported in linear feet are inclusive of all export cable circuits.
[c] These numbers were achieved assuming the PDE max of 3-meter cable burial depth and 1-meter wide corridor. This is representative of one cable. The Falmouth export cable corridor will contain up to five cables. Anticipated cable burial depth for the construction of the Project is 1.2 meters.
[d] Within northern long-eared bat habitat range; impacts on northern long-eared bat habitat are not anticipated.

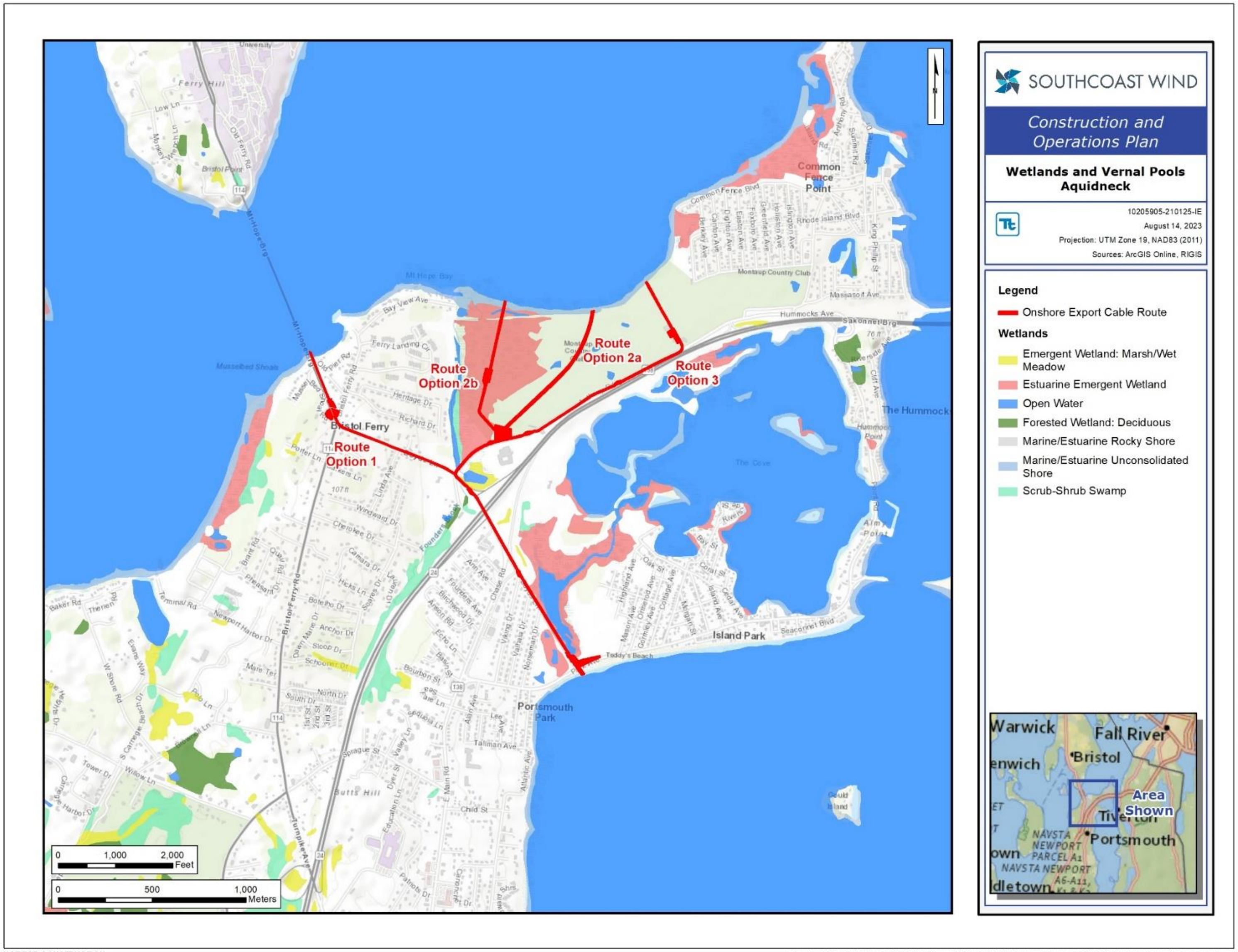
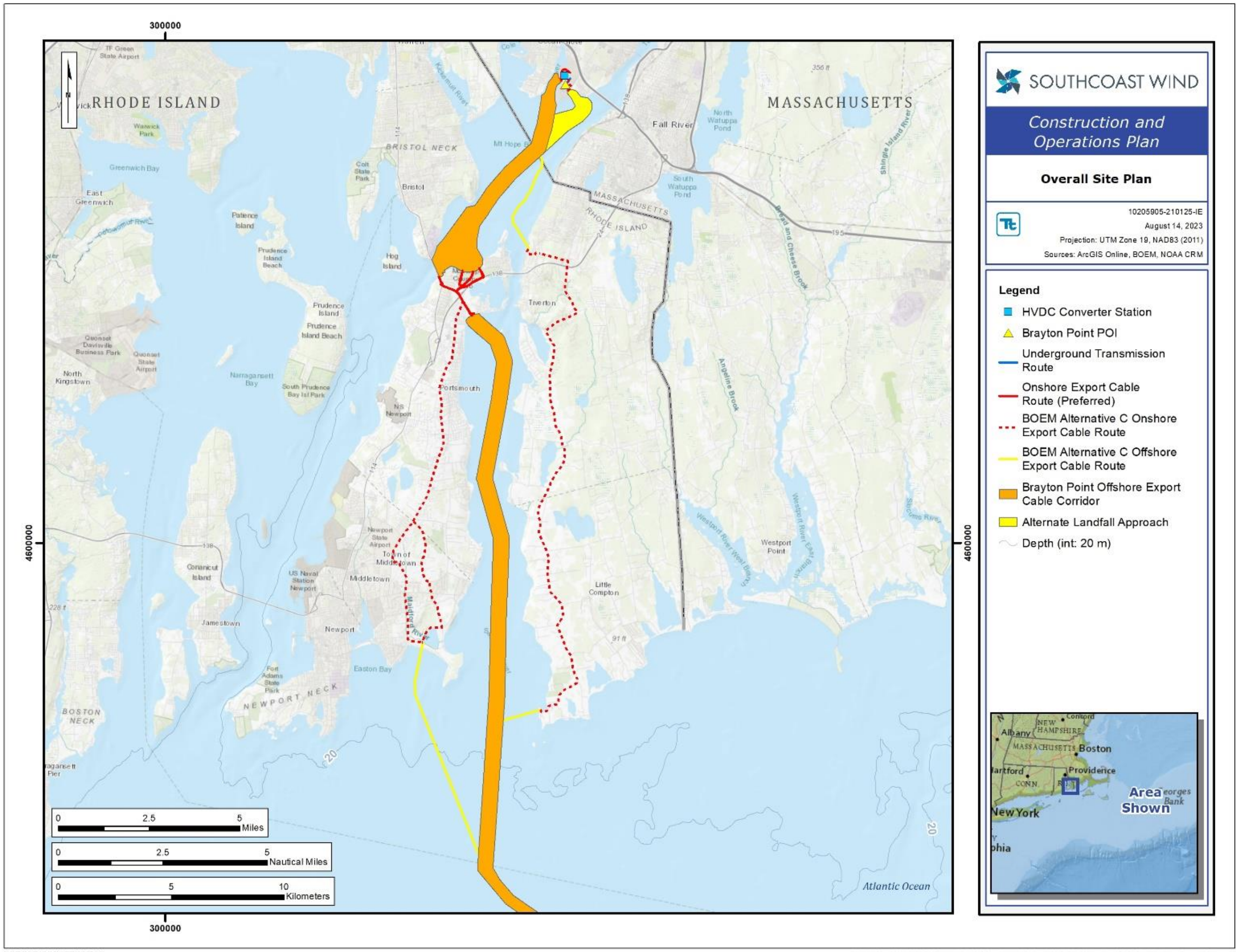


Figure F-3 Proposed Landfall Sites and Onshore Export Cables – Aquidneck Island



NOT FOR CONSTRUCTION

Figure F-4 BOEM Alternative Landfall Sites and Onshore Export Cables – Brayton Point (inclusive of BOEM Alternative C-1 and Alternative C-2 routes)

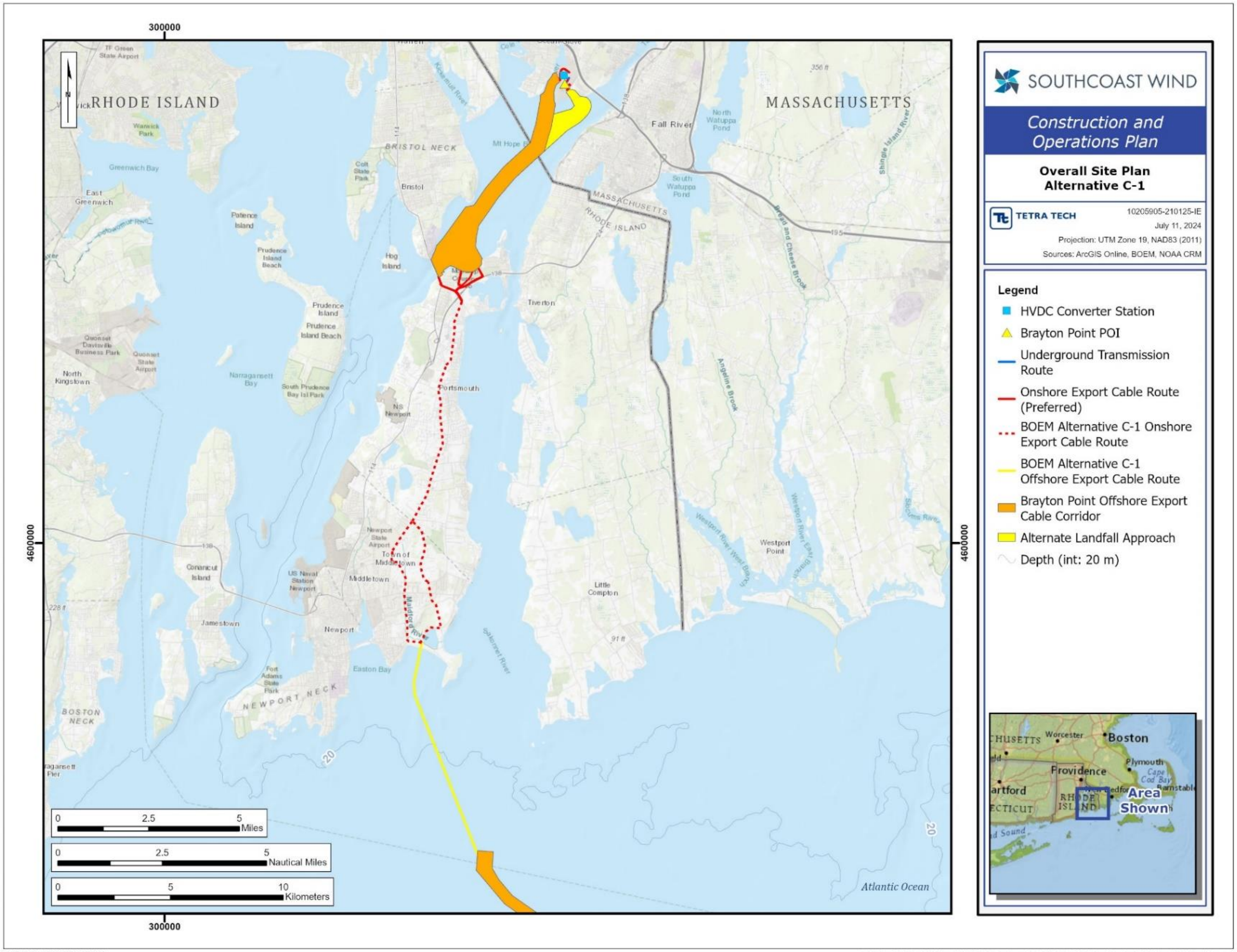


Figure F-5 BOEM Alternative C-1 Route (Eastern and Western)

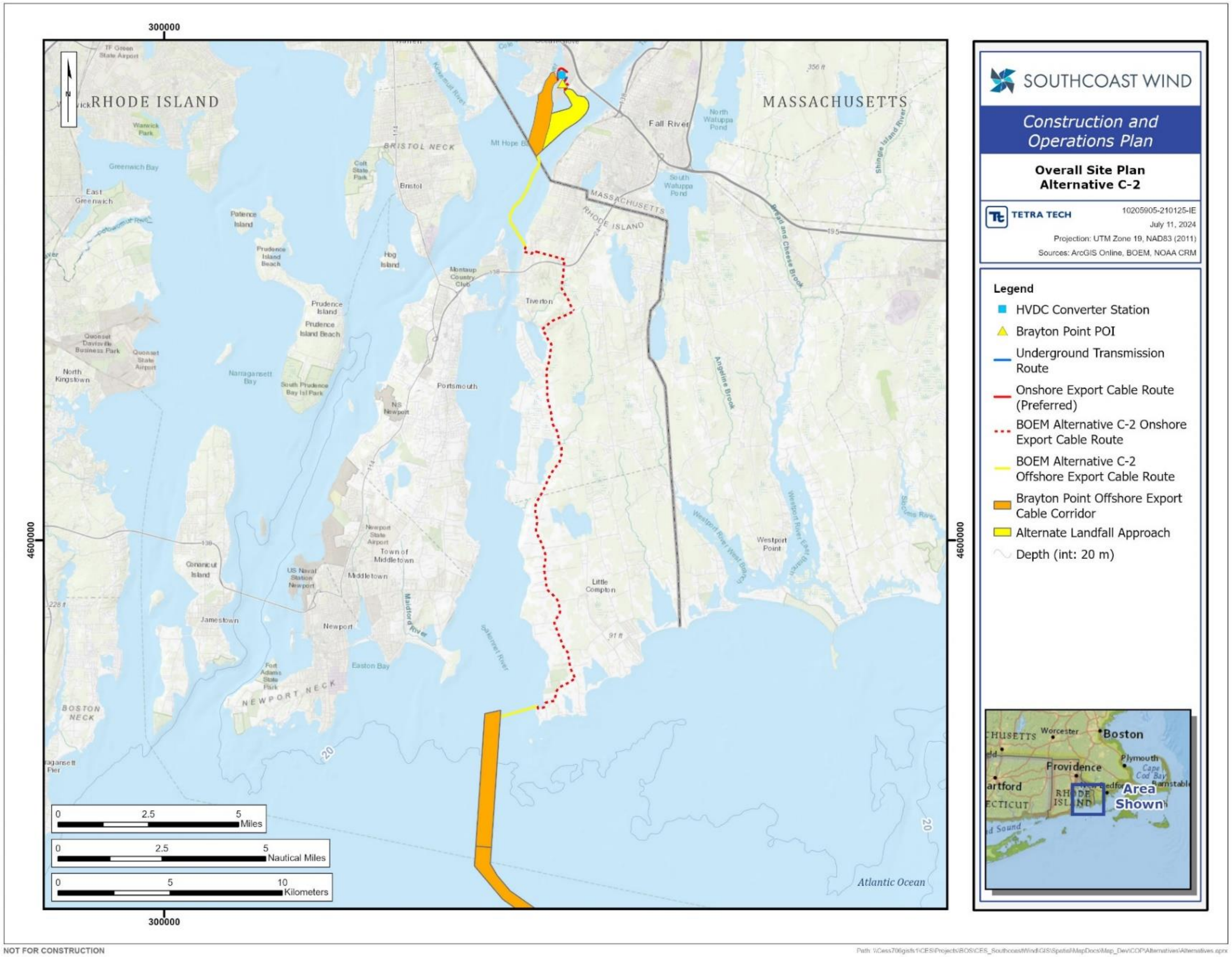


Figure F-6 BOEM Alternative C-2 Route

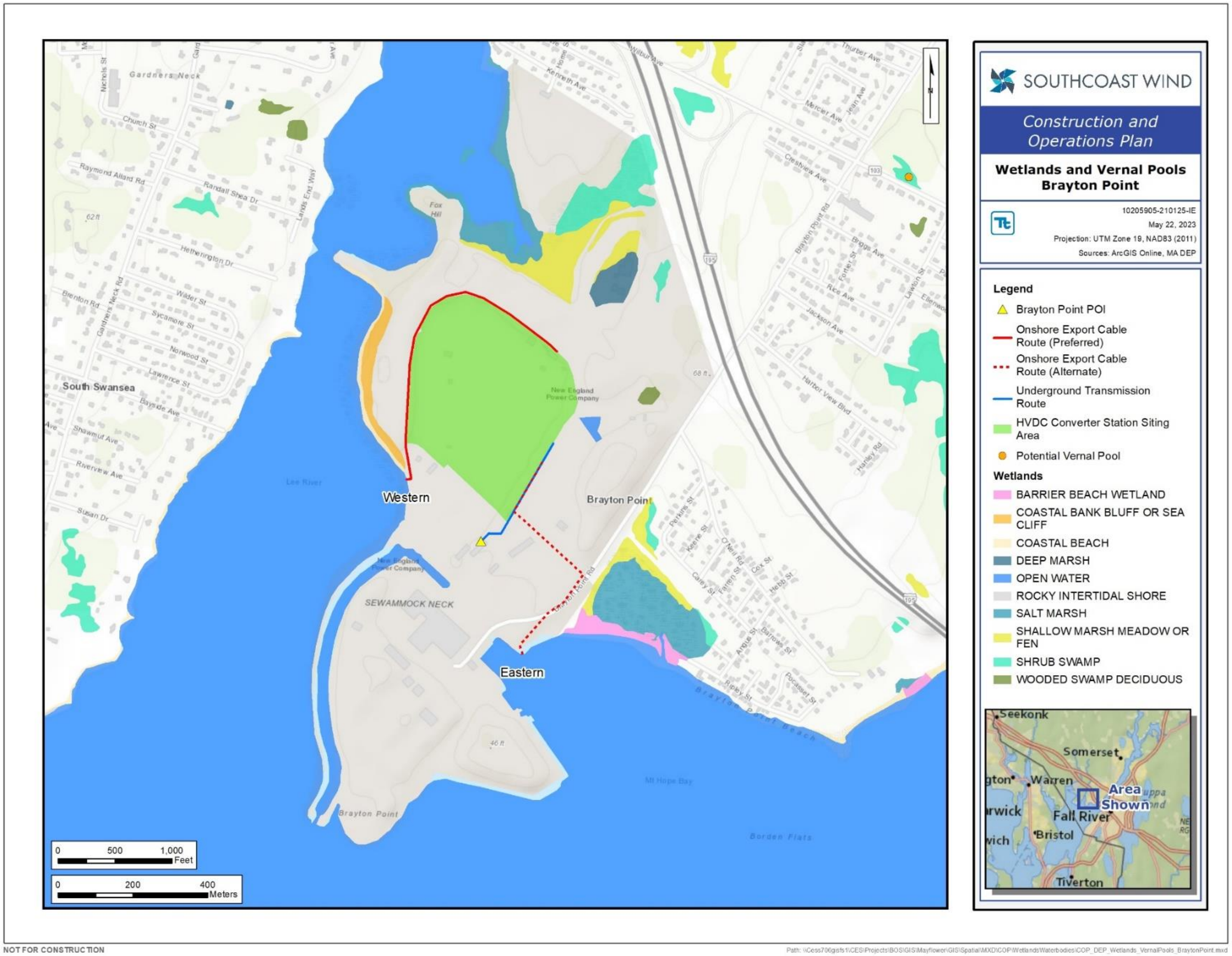


Figure F-7 Proposed Landfall Sites and Onshore Export Cables – Brayton Point

F.2 Brayton Point (see Table F-2 – Table A and B for quantitative summary)

Proposed Action over Aquidneck Island via the Lee River (Western Route) or via the Taunton River (Eastern Route) with Point of Interconnection at Brayton Point, with Portsmouth Route Options 1, 2A, 2B, and 3 (Figure F-1)

The Proposed route alternative over Aquidneck Island would traverse north from the Lease Area up the Sakonnet River. The offshore export cables would come ashore from the Sakonnet River to Portsmouth, Rhode Island at the northeast corner of Boyds Lane and Park Avenue. Landfall would be accomplished using HDD technology to drill below the beach, seawall, and Park Avenue. This selected alternative includes an intermediate, onshore underground crossing of Aquidneck Island, through Portsmouth (route options and impacts described in further detail below), continuing offshore through Mount Hope Bay. The cables would then travel northwest through Mount Hope Bay to Brayton Point via the Lee River and would connect to the point of interconnection (POI) at Brayton Point in Somerset, Massachusetts.

Approximately 2.0 miles (3.4 kilometers) of onshore, underground export cable would be routed north through Portsmouth from the intersection of Boyds Lane and Park Avenue on the east side of Boyds Lane. From here, four onshore route variants are being considered:

- Route Option 1 (121,065.7 total linear feet of offshore cable in state waters): Route Option 1 would continue north on Boyds Lane to the area around the Mount Hope Bridge access ramps, with HDD conducted on the east side of the Mount Hope Bridge into Mount Hope Bay. Because the route uses HDD for the sea-to-shore transitions, there are no impacts on tidal waters, or other protected resource areas anticipated (Table F-2). Due to a stream crossing with a culvert along the route, there are 0.04 acres of temporary impacts on non-tidal waters anticipated (Table F-2). Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.012 acres of temporary wetlands impacts anticipated due to construction activities.

- Route Option 2B (118,991.3 linear feet of offshore cable in state waters): Route Option 2B would continue east onto Anthony Road, turning north onto RIDEM/Aquidneck Land Trust, with HDD conducted in a northeasterly direction. Because the route uses HDD for sea-to-shore transitions, there are no impacts on tidal waters, or other protected resource areas anticipated. Due to multiple stream crossings with culverts along the route, there are 0.08 acres of temporary impacts on non-tidal waters anticipated (Table F-2). Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.012 acres of temporary wetlands impacts anticipated due to construction activities. There are no other anticipated impacts on protected resources. See Table F-2 for an impact summary.

- Route Option 2A (119,075.5 linear feet of offshore cable in state waters): Route Option 2A would continue east onto Anthony Road and onto Roger Williams University property, with HDD conducted in a northeasterly direction toward Mount Hope Bay. Because the route uses HDD for the sea-to-shore transitions, there are no impacts on tidal waters, or other protected resource areas anticipated. Due to multiple stream crossings with culverts along the route, there are 0.08 acres of temporary impacts on non-tidal waters anticipated (Table F-2). Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.012 acres of temporary wetlands impacts anticipated due to construction activities. There are no other anticipated impacts on protected resources. See Table F-2 for an impact summary.

- Route Option 3 (118,945.2 linear feet of offshore cable in state waters): Route Option 3 would continue east onto Anthony Road to the entrance of Montaup Country Club, with HDD headed northwest to Mount Hope Bay conducted from the Montaup Country Club parking area. Because the route uses HDD for the sea-to-shore transitions, there are no impacts on tidal waters, or other protected resource areas anticipated. Due to multiple stream crossings with culverts along the route, there are 0.08 acres of temporary impacts on non-tidal waters anticipated (Table F-2). Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.012 acres of temporary wetlands impacts anticipated due to construction activities. There are no other anticipated impacts on protected resources. See Table F-2 for an impact summary.

After the onshore route over Aquidneck Island, the Proposed Action would then make landfall at Brayton Point via the Lee River (Western Route) or the Taunton River (Eastern Route). The Western Route is the preferred route alternative.

SouthCoast Wind chose the Western Route as the preferred route alternative over Aquidneck Island via the Lee River because it has a shorter, more direct route length relative to the other routes and avoids or minimizes potential conflicts with other marine stakeholders including recreational vessel users, federally maintained shipping channel (USACE Fall River Harbor Federal Navigation Project), protected wildlife areas, and the U.S. Naval Station (NAVSTA) Newport facility which encompasses approximately 1,000 acres on the west shore of Aquidneck Island, facing the east passage of Narragansett Bay, located in the towns of Portsmouth, Middletown, and Newport, Rhode Island. The alternative route with the eastern landfall via the Taunton River is the alternate to the preferred route due to a slightly longer route length. This alternative route avoids or minimizes potential conflicts with other marine stakeholders including recreational vessel users, federally maintained shipping channels, protected wildlife areas, and the U.S. Navy.

Fisheries Habitat Impact Minimization Alternative C1 Western (Middletown/ Paradise Ave) with Point of Interconnection at Brayton Point with Portsmouth Route Options 1, 2A, 2B, and 3 (Figure F-5)

Fisheries Habitat Impact Minimization Alternative C1 Western would make landfall at the parking lot for Second Beach in Middletown via HDD under the municipal public beach from Sachuest Bay. From the landfall, the approximately 11-mile (17.7-kilometer) onshore route would proceed inland through Middletown via Paradise Avenue and Route 138, crossing into Portsmouth to join Route Options 1, 2A, 2B, and 3 discussed above and continuing offshore through Mount Hope Bay. The cables would then travel northwest through Mount Hope Bay to Brayton Point via the Lee River (Western Route) or the Taunton River (Eastern Route) and would connect to the POI at Brayton Point in Somerset, Massachusetts.

Route Options 1, 2A, 2B and 3 are discussed in further detail below:

- Route Option 1 (72,860 total linear feet of offshore cable in state waters): Route Option 1 would continue north on Boyds Lane to the area around the Mount Hope Bridge access ramps, with HDD conducted on the east side of the Mount Hope Bridge into Mount Hope Bay. Due to HDD construction, there are no anticipated impacts on tidal waters. There are 0.18 acres of temporary impacts anticipated to non-tidal waters due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.497 acres of temporary wetlands impacts anticipated due to construction activities. There would be no impacts on eelgrass or mudflats. See Table F-2 for an impact summary.
- Route Option 2B (72,399 linear feet of offshore cable in state waters): Route Option 2B would continue east onto Anthony Road, turning north onto RIDEM/Aquidneck Land Trust, with HDD conducted in a northeasterly direction. Due to HDD construction, there are no anticipated impacts on tidal waters. There are 0.22 acres of temporary impacts anticipated to non-tidal waters due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.497 acres of temporary wetlands impacts anticipated due to construction activities. There would be no impacts on eelgrass or mudflats. See Table F-2 for an impact summary.
- Route Option 2A (70,876.6 linear feet of offshore cable in state waters): Route Option 2A would continue east onto Anthony Road and onto Roger Williams University property, with HDD conducted in a northeasterly direction toward Mount Hope Bay. There are 0.22 acres of temporary impacts anticipated to non-tidal waters due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.497 acres of anticipated impact on wetlands due to construction activities. There would be no impacts on eelgrass or mudflats. See Table F-2 for an impact summary.
- Route Option 3 (70,746 linear feet of offshore cable in state waters): Route Option 3 would continue east onto Anthony Road to the entrance of Montaup Country Club, with HDD headed northwest to Mount Hope Bay conducted from the Montaup Country Club parking area. Due to HDD construction, there are no anticipated impacts on tidal waters. There are 0.22 acres of temporary impacts anticipated to non-tidal waters due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.497 acres of temporary wetlands impacts anticipated due to construction activities. There would be no impacts on eelgrass or mudflats. See Table F-2 for an impact summary.

The additional length and impacts on sensitive environmental resources and historic resources are greater, as compared to the Proposed Action. Second Beach, where this alternative would make landfall, is a dynamic beach system with mobile sediments, surrounded by wetlands, parks, and natural heritage. The Second Beach landfall site and routing also abuts the Norman Bird Sanctuary, a 325-acre bird sanctuary, nature preserve, environmental education center, and museum. To the west is Newport, a popular, year-round tourist destination and a designated Rhode Island historic district. In addition, this route passes through multiple residential areas, and also through High Value/High Vulnerability Habitat[1] and Natural Heritage Areas. Paradise School, a historic property, is located along the route. There are also ten National Register-eligible resources within 0.5 mile of the route along with ten archaeological sites along the route.

Fisheries Habitat Impact Minimization Alternative C1 Eastern (Middletown/ Mitchell's Lane) with Point of Interconnection at Brayton Point with Portsmouth Route Options 1, 2A, 2B, and 3 (Figure F-5)

Fisheries Habitat Impact Minimization Alternative C1 Eastern would make landfall at the parking lot for Second Beach in Middletown via HDD under the municipal public beach from Sachuest Bay, similar to Fisheries Habitat Impact Minimization Alternative C1 Western. From the landfall, the approximately 11-mile (17.7-kilometer) onshore route would head east along Hanging Rock Road, then travel via Mitchell's Lane to Route 138, crossing into Portsmouth to join Route Options 1, 2A, 2B, and 3 discussed above and continuing offshore through Mount Hope Bay. The cables would then travel northwest through Mount Hope Bay to Brayton Point via the Lee River (Western Route) or the Taunton River (Eastern Route) and would connect to the POI at Brayton Point in Somerset, Massachusetts. Alternative C1 Eastern would also pass through several protected resource areas, including Normans Bird Sanctuary and the Sachuest Point National Wildlife Refuge.

Route Options 1, 2A, 2B, and 3 are discussed in further detail below:

- Route Option 1 (74,026 total linear feet of offshore cable in state waters): Route Option 1 would continue north on Boyds Lane to the area around the Mount Hope Bridge access ramps, with HDD conducted on the east side of the Mount Hope Bridge into Mount Hope Bay. Due to HDD construction, there are no anticipated impacts on tidal waters. There are 0.13 acres of temporary impact anticipated to non-tidal waters due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.492 acres of temporary wetlands impacts anticipated due to construction activities. There are no anticipated impacts on eelgrass or mudflats. See Table F-2 for an impact summary.

- Route Option 2B (71,785 linear feet of offshore cable in state waters): Route Option 2B would continue east onto Anthony Road, turning north onto RIDEM/Aquidneck Land Trust, with HDD conducted in a northeasterly direction. Due to HDD construction, there are no anticipated impacts on tidal waters. There are 0.17 acres of temporary impacts anticipated to non-tidal waters due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.492 acres of temporary wetlands impacts anticipated due to

[1] Categorized by Rhode Island Department of Environmental Management by the following: Includes flood plain forest, hemlock/hardwood forest, northern hardwood forest, pitch pine/barrens, mud flat, inland sand barren, salt marsh, wet meadow, coastal streams, tidal marsh, rocky shore, sand flat, sea level fen, brackish sub-aquatic beds, brackish marsh, and Atlantic white cedar swamp.

construction activities. There are no anticipated impacts on eelgrass or mudflats. See Table F-2 for an impact summary.

- Route Option 2A (70,935 linear feet of offshore cable in state waters): Route Option 2A would continue east onto Anthony Road and onto Roger Williams University property, with HDD conducted in a northeasterly direction toward Mount Hope Bay. There are 0.17 acres of temporary impacts anticipated to non-tidal waters due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.492 acres of anticipated temporary impacts on wetlands due to construction activities. There would be no impacts on eelgrass or mudflats.

- Route Option 3 (70,808 linear feet of offshore cable in state waters): Route Option 3 would continue east onto Anthony Road to the entrance of Montaup Country Club, with HDD headed northwest to Mount Hope Bay conducted from the Montaup Country Club parking area. Due to HDD construction, there are no anticipated impacts on tidal waters. There are 0.17 acres of temporary impacts anticipated to non-tidal waters due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are 0.492 acres of temporary wetlands impacts anticipated due to construction activities. There would be no impacts on eelgrass or mudflats. See Table F-2 for an impact summary.

The additional length and potential impacts on sensitive environmental resources are greater, as compared to the Proposed Action. This onshore route passes through multiple residential areas, and also through High Value/High Vulnerability Habitat and Natural Heritage Areas 237, 216, and 209 according to RIDEM and RIGIS mapping. This route also passes Gardiner Pond, a City of Newport drinking water supply area, and Paradise Brook. Historic properties along the route include Gardiner Pond Shell Midden and Union Church and Southernmost Schoolhouse. Additional sensitive receptors abut this alternative including wetlands, parks, reserves, emergency and rescue services facilities, schools, and government facilities.

Fisheries Habitat Impact Minimization Alternative C2 with Point of Interconnection at Brayton Point (Figure F-6)

Fisheries Habitat Impact Minimization Route C2 would make intermediate landfall at Sakonnet Point in Little Compton in a 0.9-acre parking lot across from the Sakonnet Harbor. The 15.8-mile (25.4-kilometer) route would then head east and turns north, following Route 77 along the Sakonnet River coast through Little Compton and into Tiverton. Once in Tiverton, the route turns east onto Route 177. The route heads north on Fish Road and then turns northwest on Souza Road. Souza Road turns into Schooner Drive, which is a steep access road to the dense residential Village at Mount Hope Bay and Boat House Waterfront Dining Restaurant. The route then re-enters the water from private property near where Mount Hope Bay and the Sakonnet River meet, north of the State Route 24 Bridge. The export cables would then travel northwest through Mount Hope Bay to Brayton Point via the Lee River and would connect to the POI at Brayton Point in Somerset, Massachusetts. Once the export cables enter into

Mount Hope Bay from the HDD area in Tiverton, they traverse under the USACE Fall River Harbor Federal Navigation Project (FNP).

This route would be 59,621.29 linear feet of offshore cable in state waters, and because the route utilizes mostly HDD installation methodology, there are minimal expected impacts on tidal waters. There are 0.41 acres of temporary non-tidal impacts anticipated due to a stream crossing along the route. Streams will be crossed by installing the cable either over or under the existing culvert. There are also 0.12 acres of temporary wetlands impacts anticipated due to construction activities. There would be no impacts on eelgrass or mudflats. See Table F-2 for an impact summary. Alternative C2 would also pass through several protected resource areas including USACE Fall River Harbor Federal Navigation Project, the Nature Conservancy Pocasset Ridge Conservation Area, and the Audubon Emilie Ruecker Wildlife Sanctuary.

The extended duration of construction, use conflicts, potential for effects on the local economy, lack of sufficient space on small roads, and potential effects on sensitive environmental, historic, and cultural areas are greater, as compared to the Proposed Action. After landfall the route passes by a public boat ramp that construction activities would temporarily restrict access to at Sakonnet Point. It also abuts the Haffenreffer Wildlife refuge, which is a destination for birding.

Both Route 77 and Route 177 are busy two-lane roads with minimal paved shoulders that pass through a high prevalence of protected natural, historical, and agricultural areas. In Tiverton, Route 77 passes within 500 feet of Nonquit Pond and through the Tiverton Four Corners Historic District.

Before entering Mount Hope Bay, the route also travels along Schooner Drive which serves the dense residential Village at Mount Hope Bay and Boat House Waterfront Dining Restaurant. Schooner Drive is the only access route for the Boat House Waterfront Dining Restaurant and residential Village at Mount Hope Bay, meaning that construction activities would impact not only the commercial operations at the Boat House but also the residents of the Village at Mount Hope Bay, particularly if there is a road closure. Schooner Drive also includes a bridge over an abandoned railroad right-of-way, which would require a trenchless installation method.

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Table F-2. Clean Water Act Section 404(b)(1) alternatives analysis table – Brayton Point

Table A

	No Action	Proposed Action with Route Option 1 over Aquidneck Island and Western Landfall	Proposed Action with Route Option 2B over Aquidneck Island and Western Landfall	Proposed Action with Route Option 2A over Aquidneck Island and Western Landfall	Proposed Action with Route Option 3 over Aquidneck Island and Western Landfall	Proposed Action with Route Option 1 over Aquidneck Island and Eastern Landfall	Proposed Action with Route Option 2B over Aquidneck Island and Eastern Landfall	Proposed Action with Route Option 2A over Aquidneck Island and Eastern Landfall	Proposed Action with Route Option 3 over Aquidneck Island and Eastern Landfall	Fisheries Habitat Impact Minimization Alternative C1 western with Route Option 1 over Aquidneck Island and Western Landfall	Fisheries Habitat Impact Minimization Alternative C1 western with Route Option 2B over Aquidneck Island and Western Landfall	Fisheries Habitat Impact Minimization Alternative C1 western with Route Option 2A over Aquidneck Island and Western Landfall	Fisheries Habitat Impact Minimization Alternative C1 western with Route Option 3 over Aquidneck Island and Western Landfall	Fisheries Habitat Impact Minimization Alternative C1 western with Route Option 1 over Aquidneck Island and Eastern Landfall
Linear Feet of Cable (LF, entire route)	0	496,139	494,774	495,531	496,438	499,503	498,142	498,899	499,781	501,984	499,339	505,640	506,407	505,400
Linear Feet of Cable (LF, state waters)	0	121,065.7	118,991.3	119,075.5	118,945.2	124,429.9	122,358.6	122,442.9	122,288.4	72,860	72,399	70,876.6	70,746	70,207
Dredge Material (acres, entire route)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge Material (acres, state waters)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cable Protection (acres, entire route)	0	336	336	336	336	336	336	336	336	336	336	336	336	336
Cable Protection (acres, state waters)	0	280	280	280	280	280	280	280	280	112	112	112	112	112
Amount of Fill Material (CY, entire route)	0	29,321,984	29,213,758	29,197,962	29,193,216	29,328,740	29,207,275	29,218,016	29,213,140	7,136,657	7,135,554	6,831,912	7,078,168	7,072,096
Amount of Fill Material (CY, state waters)	0	1,410,552	1,398,682	1,397,556	1,396,324	1,788,431	1,872,997	1,997,111	1,996,763	-205,095	–178,600	177,469	191,997	201,776
Temporary Stream Crossings (acres)	0	0.04	0.08	0.08	0.08	0.04	0.08	0.08	0.08	0.18	0.22	0.22	0.22	0.18
Temporary Wetlands Impacts (acres)	0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.497	0.497	0.497	0.497	0.497
Impacts to Other SAS (Eelgrass, Mudflat) (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Resource Concerns	0	0	0	0	0	0	0	0	0	Middletown Cemetery, Middletown Historical Society Property Sachuest Point Nat'l Wildlife Refuge	Middletown Cemetery, Middletown Historical Society Property Sachuest Point Nat'l Wildlife Refuge	Middletown Cemetery, Middletown Historical Society Property Sachuest Point Nat'l Wildlife Refuge	Middletown Cemetery, Middletown Historical Society Property Sachuest Point Nat'l Wildlife Refuge	Middletown Cemetery, Middletown Historical Society Property Sachuest Point Nat'l Wildlife Refuge

Table B

	Fisheries Habitat Impact Minimization Alternative C1 western with Route Option 2B over Aquidneck Island and Eastern Landfall	Fisheries Habitat Impact Minimization Alternative C1 western with Route Option 2A over Aquidneck Island and Eastern Landfall	Fisheries Habitat Impact Minimization Alternative C1 western with Route Option 3 over Aquidneck Island and Eastern Landfall	Fisheries Habitat Impact Minimization Alternative C1 eastern with Route Option 1 over Aquidneck Island and Western Landfall	Fisheries Habitat Impact Minimization Alternative C1 eastern with Route Option 2B over Aquidneck Island and Western Landfall	Fisheries Habitat Impact Minimization Alternative C1 eastern with Route Option 2A over Aquidneck Island and Western Landfall	Fisheries Habitat Impact Minimization Alternative C1 eastern with Route Option 3 over Aquidneck Island and Western Landfall	Fisheries Habitat Impact Minimization Alternative C1 eastern with Route Option 1 over Aquidneck Island and Eastern Landfall	Fisheries Habitat Impact Minimization Alternative C1 eastern with Route Option 2B over Aquidneck Island and Eastern Landfall	Fisheries Habitat Impact Minimization Alternative C1 eastern with Route Option 2A over Aquidneck Island and Eastern Landfall	Habitat Minimization Alternative C1 eastern with Route Option 3 over Aquidneck Island and Eastern Landfall	Fisheries Habitat Impact Minimization Alternative C2 and Western Landfall	Fisheries Habitat Impact Minimization Alternative C2 and Eastern Landfall
Linear Feet of Cable (LF, entire route) [a,b]	502,684	501,985	509,802	503,089	500,357	501,037	501,992	506,550	501,926	504,459	505,400	509,440	510,807
Linear Feet of Cable (LF, state waters) [a,b]	73,178	87,910	77,906	74,026	71,785	70,935	70,808	77,409	73,435	75,136	68,458	59,621.29	60,909.21
Dredge Material (acres, entire route)	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge Material (acres, state waters)	0	0	0	0	0	0	0	0	0	0	0	0	0
Cable Protection(acres, entire route)	336	336	336	336	336	336	336	336	336	336	336	336	336
Cable Protection (acres, state waters)	112	112	112	112	112	112	112	112	112	112	112	112	112
Amount of Fill Material (CY, entire route) [c]	5,136,699	5,135,346	5,444,812	5,398,002	5,166,913	5,146,347	5,200,112	5,191,491	5,193,557	5,192,889	5,188,224	5,487,134	5,489,922
Amount of Fill Material (CY, state waters) [c]	179,533	178,222	165,546	163,908	160,916	159,231	159,150	164.447	162,009	165,095	159, 663	150,982	160,136
Temporary Stream Crossings (acres)	0.22	0.22	0.22	0.13	0.17	0.17	0.17	0.13	0.17	0.17	0.17	0.41	0.41
Temporary Wetlands Impacts (acres)	0.497	0.497	0.497	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.12	0.12
Impacts to Other SAS (Eelgrass, Mudflat) (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Resource Concerns	Middletown Cemetery, Middletown Historical Society Property	Middletown Cemetery, Middletown Historical Society Property	Middletown Cemetery, Middletown Historical Society Property	Norman Bird Sanctuary	Norman Bird Sanctuary	Norman Bird Sanctuary	Norman Bird Sanctuary	Norman Bird Sanctuary	Norman Bird Sanctuary	Norman Bird Sanctuary	Norman Bird Sanctuary	Federal Navigation Project	Federal Navigation Project
	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife Refuge	Sachuest Point Nat'l Wildlife	Nature Conversancy Pocasset Ridge Conservation Area	Nature Conversancy Pocasset Ridge Conservation Area
												Audubon Emilie Ruecker Wildlife Sanctuary	Audubon Emilie Ruecker Wildlife Sanctuary

Notes:

[a] Excludes onshore export cable segments (i.e., export cable segments landward of the landfall).

[b] Distances reported in linear feet are inclusive of all export cable circuits.

[c] A 2-meter wide by 2-meter deep corridor was used for offshore route calculations. Route calculations are representative of one cable bundle. The Brayton Point offshore export cable corridor contains up to two cable bundles.

F.3 Summary

Based on the analysis performed, SouthCoast Wind undertook a thorough route analysis and selection process for both offshore and onshore components of the Project. SouthCoast Wind identified various routes as potential alternatives to satisfy the regional need for the Project to provide renewable clean energy from offshore wind generation. SouthCoast Wind compared possible routes and route variants based upon reasonable criteria to evaluate the environmental impacts and social impacts to deliver energy from the Lease Area to the regional transmission system at Brayton Point and in Falmouth.

Brayton Point is an ideal site for the interconnection of offshore wind for several reasons, including, among others: (i) the robust 345-kilovolt regional transmission infrastructure available there, (ii) the brownfields legacy of the site, which both reduces impacts on the natural environment and provides an opportunity to revitalize it for clean energy uses and for the benefit of the community, including environmental justice populations within 1 mile of the Project location, (iii) its waterfront location, and (iv) its lack of residential abutters.

The proposed onshore substation site in Falmouth was evaluated and chosen based on land availability and proximity to potential landfall locations. Subsequently, SouthCoast Wind ruled out locations with greater environmental impacts. Sites were rejected for being too small to house all of the necessary equipment for the proposed onshore substation configuration or due to unnecessary environmental/social impacts which were apparent, such as required tree clearing, wetland and watershed resource disruption, or close proximity to residential neighborhoods.

The onshore and offshore route variants would enable SouthCoast Wind to achieve the best balance between reasonable cost and not causing unacceptable harm to the social and natural environment. Based on the foregoing analysis, SouthCoast Wind has determined the proposed routes for Brayton Point and Falmouth would result in the least impacts and would allow for safe, practical, and long-term cable installation, maintenance, and operation as compared to the alternatives considered. Construction of the Project, as proposed, will provide access to a major renewable clean energy resource, and will not cause unacceptable harm to the environment.

Appendix G: Mitigation and Monitoring

This Final Environmental Impact Statement (EIS) assesses the potential physical, biological, socioeconomic, and cultural impacts that could result from the construction, operations and maintenance (O&M), and conceptual decommissioning of the SouthCoast Wind Project (Project) proposed by SouthCoast Wind Energy LLC (SouthCoast Wind) in its Construction and Operations Plan (COP).

As part of the Project, SouthCoast Wind has committed to implement avoidance, minimization, and mitigation measures (AMMs) to avoid, reduce, mitigate, or monitor impacts on the resources discussed in Chapter 3, *Affected Environment and Environmental Consequences*, of this Final EIS. SouthCoast Wind's AMMs are part of the Proposed Action, and implementation of AMMs is considered in the impact analysis for the Proposed Action and each action alternative. These AMMs are described in Table G-1. The Bureau of Ocean Energy Management (BOEM) considers as part of the Proposed Action only those measures that SouthCoast Wind has committed to in the COP (SouthCoast Wind 2024). Attachment G-1 contains the AMMs proposed by SouthCoast Wind as part of its Request for Incidental Take Regulations application. Attachment G-2 contains the applicant-proposed Draft Post-Construction Avian and Bat Monitoring Framework. Attachment G-3 contains SouthCoast Wind's NARW Monitoring and Mitigation Plan for Pile Driving.

BOEM may select alternatives and require additional mitigation or monitoring measures to further protect and monitor these resources. Additional mitigation and monitoring measures, shown in Table G-2, may result from reviews under several environmental statutes (Clean Air Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, and National Historic Preservation Action) as discussed in Appendix A, *Required Environmental Permits and Consultations* of this Final EIS. Please note that not all of these mitigation measures are within BOEM's statutory and regulatory authority and some may be required by other governmental entities. Additional measures identified during development of this EIS are listed in Table G-3, and Table G-4 identifies measures that may be required by authorizations and permits issued to the lessee.

If BOEM decides to approve the COP, the Record of Decision (ROD) will state which of the mitigation and monitoring measures identified by BOEM in Table G-2 and Table G-3 have been adopted and, if not, why they were not. Where the impacts of an action alternative are determined through the inclusion of any mitigation and monitoring measures, all of those measures will be incorporated in the ROD if that alternative is selected. The ROD will describe the specific terms and conditions of these measures for which compliance is required (40 Code of Federal Regulations [CFR] 1505.3). SouthCoast Wind would be required to certify compliance with these terms and conditions under 30 CFR 285.633(a). Furthermore, pursuant to 30 CFR 585.634(b), BOEM will periodically review the activities conducted under the approved COP, with the frequency and extent of the review based on the significance of any changes in available information and on onshore or offshore conditions affecting, or affected by, the activities conducted under the COP.

Monitoring may be required to evaluate the effectiveness of mitigation measures or to identify if resources are responding as predicted to impacts from the Proposed Action. This monitoring would typically be developed in coordination among BOEM and agencies with jurisdiction over the resource to be monitored. The information generated by monitoring may be used to (1) modify how a mitigation measure identified in the COP or ROD is being implemented, (2) revise or develop new mitigation or monitoring measures for which compliance would be required under the COP in accordance with 30 CFR 285.633(a), (3) develop measures for future projects, or (4) contribute to regional efforts for better understanding of the impacts and benefits resulting from offshore wind energy projects in the Atlantic (e.g., a potential cumulative impact assessment tool). Unless specified, the proposed mitigation measures described below would not change the impact ratings on the affected resource, as described in Chapter 3 of the Final EIS, but would further reduce expected impacts or inform the development of additional mitigation measures if required.

G.1 Applicant-Proposed Measures

Table G-1 presents applicant-proposed measures as identified in SouthCoast Wind's COP (SouthCoast Wind 2024). In the last column of the table BOEM has identified the anticipated agency that would enforce each measure or whether the measure is a best practice and not an enforceable measure. Attachment G-1 contains the applicant-proposed mitigation measures proposed by SouthCoast Wind as part of its Request for Incidental Take Regulations application under the Marine Mammal Protection Act, dated September 2022 and a revised application dated March 2024. The National Marine Fisheries Service (NMFS) published a Notice of Receipt of the application in the Federal Register on October 17, 2022. These mitigation measures are subject to change pending NMFS's development of final regulations. Additional lessee authorization and permit conditions are included in Table G-4.

Table G-1. Applicant-proposed measures

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Applicant-Proposed Measures from COP Volume 2, Table 16-1 (SouthCoast Wind 2024)				
Construction	**Seabed or Ground Disturbance** Seabed preparation, offshore component installation, and vessel anchoring/spudding	• SouthCoast Wind will use BMPs to minimize sediment mobilization during offshore component installation • SouthCoast Wind, when feasible, will use technologies that minimize sediment mobilization and seabed sediment alteration for cable burial operations • SouthCoast Wind, where practical and safe, will utilize DP vessels • SouthCoast Wind will utilize HDD for sea-to-shore transition	Site Geology	Best practice - not an enforceable measure
O&M	**Seabed or Ground Disturbance** Routine offshore operation and maintenance	• SouthCoast Wind will utilize scour protection methods to avoid developing scour holes at the base of structures • SouthCoast Wind will bury submarine cables at depths to guard against exposure from seabed mobility	Site Geology	BSEE
Decommissioning	**Seabed or Ground Disturbance** Offshore component decommissioning	• SouthCoast Wind will use BMPs to minimize sediment mobilization during decommissioning	Site Geology	Best practice - not an enforceable measure
Construction, O&M, Decommissioning	**Seabed or Ground Disturbance** Scour development	• SouthCoast Wind will utilize scour protection methods to avoid developing scour holes at the base of structures • SouthCoast Wind will bury submarine cables at depths to guard against exposure from seabed mobility	Physical Oceanography and Meteorology	BSEE
Construction, O&M	**Planned Discharges: Air Emissions** Vehicles, onshore and offshore construction	• SouthCoast Wind will ensure that vessels used for construction will use the jurisdictionally required compliant fuel, e.g., ultra-low sulfur diesel or a fuel with less emissions	Air Quality	Best practice - not an enforceable measure

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
	equipment, drones, helicopters and generators	• SouthCoast Wind will ensure fuels used for construction equipment comply with EPA or equivalent emissions standards • SouthCoast Wind will use low-NOx engines when possible • SouthCoast Wind will engage with EPA on how to satisfy Best Available Control Technology		
Construction, O&M, Decommissioning	**Seabed or Ground Disturbance** Offshore component installation, routine offshore O&M, vessel anchoring, and decommissioning	• SouthCoast Wind will select and use BMPs including the use of a SWPPP to minimize sediment mobilization during offshore construction of WTGs and OSPs, scour protection placement, and HDD operations • SouthCoast Wind, when feasible, will use technologies that minimize sediment mobilization and seabed sediment alteration for cable burial operations	Water Quality	Best practice – not an enforceable measure
Construction, O&M, Decommissioning	**Seabed or Ground Disturbance** Onshore component installation and decommissioning	• SouthCoast Wind will follow BMPs, including the use of a SWPPP, during onshore construction activities to control sedimentation and erosion	Water Quality	BSEE, USCG, USACE, EPA, MassDEP and RIDEM
Construction, O&M, Decommissioning	**Planned Discharges** Stormwater runoff, routine releases, and duct bank installation	• SouthCoast Wind will follow USCG requirements at 33 CFR Part 151 and 46 CFR Part 162 regarding bilge and ballast water • SouthCoast Wind will require all Project vessels to comply with regulatory requirements related to the prevention and control of discharges and accidental spills including EPA requirements under the EPA 2013 Vessel General Permit and state and local government requirements	Water Quality	BOEM, BSEE and USCG
Construction, O&M, Decommissioning	**Accidental Events/Natural Hazards** Unplanned releases	• SouthCoast Wind will comply with the regulatory requirements related to the prevention and control of discharges and accidental spills as documented in the proposed Project's OSRP	Water Quality	BOEM, BSEE, USACE and USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind's SWPPP will include a Project-specific SPCC plan to prevent inadvertent releases of oils and other hazardous materials to the environment to the extent practicable • SouthCoast Wind will have an HDD Contingency Plan in place to mitigate, control, and avoid unplanned discharges related to HDD activities		
Construction, O&M, Decommissioning	**Seabed or Ground Disturbance** Habitat loss/fragmentation **Introduced Sound** Avoidance/ displacement **Presence of Structures** Collision with WTGs, avoidance/displacement and barrier effects, and habitat loss/modification	• SouthCoast Wind will site the proposed Project to avoid locating Project components in or near areas of known important or high bird use (e.g., nesting, foraging and overwintering areas, migratory staging or resting areas) • SouthCoast Wind will incorporate use of HDD at landfall locations to avoid disturbance to shorelines and coastal habitats to the extent practicable • SouthCoast Wind will coordinate with MassWildlife, RIDEM, and USFWS to identify appropriate mitigation measures	Birds	BOEM, USFWS, USACE, MassDEP and RIDEM
Construction, Decommissioning	**Changes in Ambient Lighting** Displacement/attraction and collision with WTGs **Vessel Operations** Collision with vessels and avoidance/ displacement	• SouthCoast Wind will minimize lighting, to the extent practicable, to reduce potential attraction of birds to vessels during construction activities	Birds	BOEM, BSEE
Construction, O&M, Decommissioning	**Planned Discharges** Disturbance or fatality **Accidental Events** Oiling or fatality from accidental spills, and ingestion of marine debris	• SouthCoast Wind will use approved OSRP mitigation measures, as necessary, to prevent birds from going to affected areas including chumming, hazing, and relocating to unaffected areas	Birds	BOEM, BSEE, and USFWS
O&M	**Changes in Ambient Lighting** Displacement/attraction and collision with WTGs	• SouthCoast Wind will develop and implement a Post-Construction Monitoring Plan	Birds	BOEM, BSEE, and USFWS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
O&M	**Changes in Ambient Lighting** Displacement/attraction and collision with WTGs	• SouthCoast Wind will ensure that lighting on WTGs will be executed in accordance with FAA regulations • Lighting on OSPs will be minimized to that required for navigation safety to reduce potential attraction of birds to the extent practicable		BOEM, BSEE
Construction, O&M, Decommissioning	**Ground Disturbance** Habitat loss/fragmentation **Introduced Sound** Behavioral disturbance **Changes in Ambient EMF** Displacement/attract-ion	• SouthCoast Wind will site Project components to avoid locating onshore facilities or landfall sites in or near significant fish and wildlife habitats, including known hibernacula, maternal roosting colonies or other concentration areas as practicable. The proposed onshore substation site and converter stations will be constructed in primarily open, developed areas • Onshore export cables will be buried underground beneath local roadways from landfall to the onshore substation site • SouthCoast Wind will coordinate with MassWildlife, RIDEM, and USFWS to identify appropriate mitigation measures	Bats	BSEE, USFWS, MassDEP and RIDEM
Construction, O&M, Decommissioning	**Changes in Ambient Lighting** Displacement/ attraction	• SouthCoast Wind will ensure that lighting will be minimized to reduce potential attraction of bats to vessels and vehicles during construction activities within the Onshore and Offshore Project Areas to the extent practicable	Bats	Best practice – not an enforceable measure
Construction, O&M, Decommissioning	**Tree Clearing** Roost disturbance from tree trimming or removal	• SouthCoast Wind will consult with BOEM and the USFWS to discuss BMPs available to avoid and minimize potential effects from construction/decommissioning to bats	Bats	BOEM and USFWS
O&M	**Presence of Structures** Collisions with WTGs	• SouthCoast Wind will develop and implement a Post-Construction Monitoring Plan	Bats	BOEM, BSEE, USFWS, MassDEP and RIDEM

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Construction, O&M	**Ground Disturbance** Habitat loss/fragmentation **Introduced Sound** Behavioral disturbance and displacement **Changes in EMF** Behavioral disturbance	• SouthCoast Wind will site Project components to avoid locating onshore facilities and landfall sites in or near significant fish and wildlife habitats to the greatest extent practicable. The proposed onshore substation site and the converter station site will be constructed in primarily open, developed areas. • SouthCoast Wind will train construction staff on biodiversity management and environmental compliance requirements • SouthCoast Wind will bury the onshore export cables underground beneath local roadways from landfall to the onshore substation site.	Terrestrial Vegetation and Wildlife	BOEM, USFWS, NMFS, MassDEP and RIDEM
Construction, Decommissioning	**Changes in Ambient Lighting** Displacement/attraction	• If tree clearing is required, SouthCoast Wind will conduct habitat assessments and presence/absence surveys and will coordinate with MassWildlife, RIDEM, and USFWS as appropriate • SouthCoast Wind will, to the extent practicable, conduct construction activities outside of periods when highly sensitive species are likely to be present • SouthCoast Wind will implement erosion and sediment control measures in areas adjacent to water resources, such as wetlands, ponds, and other waterbodies, or in areas with significant grades that would make them prone to erosion • SouthCoast Wind will implement a Vegetation Management Plan as approved by NHESP, RIDEM, and the Massachusetts Department of Agricultural Resources	Terrestrial Vegetation and Wildlife	USFWS, MassDEP and RIDEM
Construction	**Changes in Ambient Lighting** Displacement/attraction	• SouthCoast Wind will ensure lighting will be minimized to the extent practicable to reduce potential displacement or attraction of wildlife species to Project sites during construction activities in the Project Area	Terrestrial Vegetation and Wildlife	Best practice – not an enforceable measure

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Construction, O&M, Decommissioning	**Operation of Equipment and Heavy Machinery** Collision with equipment and heavy machinery Collision with utility lines or electrocution	• Vehicle speed limits will be enforced at all Project sites to minimize potential for vehicle collisions with wildlife • SouthCoast Wind will conduct presence/absence surveys; surveys for protected plant and wildlife species will be completed as needed to inform the detailed engineering and design of the Project facilities	Terrestrial Vegetation and Wildlife	Best practice – not an enforceable measure
Construction, Decommissioning	**Planned Discharges** Disruption of water flow or alteration of turbidity	• SouthCoast Wind will ensure that standard construction BMPs (including erosion and sediment control measures) will be implemented to avoid dewatering discharge scour and siltation to nearby receiving waters, including wetlands	Terrestrial Vegetation and Wildlife	Best practice – not an enforceable measure
Construction, Decommissioning	**Accidental Events** Release of hazardous materials into environment	• SouthCoast Wind will implement a construction-phase OSRP to provide procedures for containing, cleaning, and reporting any accidental spills of oil fuel, or other hazardous materials	Terrestrial Vegetation and Wildlife	BOEM, BSEE and USCG
O&M	**Ground Disturbance** Habitat loss/fragmentation **Introduced Sound** Behavioral disturbance and displacement **Changes in Ambient Lighting** Displacement/attract-ion	• SouthCoast Wind will implement a Vegetation Management Plan as approved by NHESP, RIDEM, and the Massachusetts Department of Agricultural Resources	Terrestrial Vegetation and Wildlife	Best practice - not an enforceable measure
O&M	**Accidental Events** Release of hazardous materials into environment	• SouthCoast Wind will implement an operations-phase OSRP to provide procedures for containing, cleaning, and reporting any accidental spills of oil fuel, or other hazardous materials	Terrestrial Vegetation and Wildlife	BOEM,BSEE and USCG
Decommissioning	**Ground Disturbance** Habitat loss/fragmentation **Introduced Sound**	• SouthCoast Wind will implement a Vegetation Management Plan approved by NHESP, RIDEM, and the Massachusetts Department of Agricultural Resources	Terrestrial Vegetation and Wildlife	Best practice - not an enforceable measure

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
	Behavioral disturbance and displacement **Changes in Ambient Lighting** Displacement/attract-ion	• SouthCoast Wind will implement erosion and sediment control measures in accordance with applicable regulations		
Construction, Decommissioning	**Ground Disturbance** Temporary habitat disturbance	• SouthCoast Wind will implement erosion and sediment control measures in accordance with Massachusetts and Rhode Island regulations and industry BMPs throughout the Onshore Project Area to abate technical and biological erosion	Wetlands and Waterbodies	Best practice - not an enforceable measure
Construction, Decommissioning	**Planned Discharges** Dewatering and stormwater runoff	• If groundwater is encountered, SouthCoast Wind will perform dewatering measures using standard construction BMPs for dewatering, including, but not limited to, use of temporary settling basins, dewatering filter bags, or temporary holding or frac tanks • SouthCoast Wind will direct dewatering wastewaters to well-vegetated uplands away from wetlands or other water resources to allow for infiltration to the soil of the discharged water • SouthCoast Wind will place construction mats to minimize soil disturbance in any wetland areas that cannot be avoided or are required to be temporarily crossed	Wetlands and Waterbodies	Best practice - not an enforceable measure
Construction	**Accidental Events** Release of hazardous materials into environment	• SouthCoast Wind will always require the construction contractor to have spill control and containment kits on site to allow for immediate response and cleanup in the event of an accidental release of fuel, oils, or other hazardous materials • Implementation of BMPs, the SMS, and a SWPPP for construction as well as an emergency response procedure to avoid, control, and address any accidental releases during construction activities	Wetlands and Waterbodies	BOEM, BSEE, USACE and USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind and their construction contractor will store petroleum products in upland areas more than 100 feet (30.5 meters) from wetlands and waterbodies • Equipment will not be parked overnight within 100 feet (30.5 meters) of a wetland or waterbody, with an exception being for equipment that cannot be practically moved. Temporary containment will be required for equipment that cannot be practically moved and must be parked overnight within 100 feet (30.5 meters) of a wetland or other water resources • SouthCoast Wind will use a secondary containment system for refueling that needs to occur within 100 feet (30.5 meters) of wetlands to contain any minor amounts of fuel inadvertently dripped or released during refueling • SouthCoast Wind will set up cement cleanout tubs in areas at least 100 feet (30.5 meters) from wetlands or other water resources to contain and hold any residual cement and washout from cement trucks prior to their departure from the site		
O&M	**Planned Discharges** Dewatering and stormwater runoff	• Discharges as a result of dewatering will be managed in accordance with the requirements for applicable EPA, MassDEP, RIDEM, and/or local regulations pertaining to dewatering	Wetlands and Waterbodies	BOEM, EPA, MassDEP AND RIDEM
O&M	**Accidental Events** Release of hazardous materials into environment	• SouthCoast Wind and their construction contractor will store petroleum products in upland areas more than 100 feet (30.5 meters) from wetlands and waterbodies	Wetlands and Waterbodies	BOEM, BSEE and USCG
Decommissioning	**Accidental Events** Release of hazardous materials into environment	• SouthCoast Wind will always require the decommissioning contractor to have spill control and containment kits on site to allow for immediate response and cleanup in the event of an accidental release of fuel, oils, or other hazardous materials	Wetlands and Waterbodies	BOEM, BSEE and USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind will implement BMPs, an SMS, and an SWPPP as well as an emergency response procedure to avoid, control and address any accidental releases during decommissioning activities as applicable • Equipment will not be parked overnight within 100 feet (30.5 meters) of a wetland or waterbody, with an exception being for equipment that cannot be practically moved • Temporary containment will be required for equipment that cannot be practically moved and must be parked overnight within 100 feet (30.5 meters) of a wetland or other water resources • The use of a secondary containment system for refueling that needs to occur within 100 feet (30.5 meters) of wetlands to contain any minor amounts of fuel inadvertently dripped or released during refueling		
Construction, O&M	**Seabed or Ground Disturbance** **Planned Discharges/ Accidental Events** Project installation and vessel O&M	• SouthCoast Wind will select sites for construction that avoid areas of sensitive seafloor and benthic habitat to the extent practicable • SouthCoast Wind will utilize HDD for nearshore export cable installation • SouthCoast Wind will minimize trench and sidecasting widths for export cable installation and anchor outside of eelgrass beds where possible • To the extent possible, SouthCoast Wind will avoid use of anchored vessels near known eelgrass beds	Coastal Habitats	BOEM, USACE and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Construction	**Change in Ambient Lighting**	• Any effects of changes to ambient lighting will be limited to proposed landfall locations where eelgrass beds or clusters of macroalgae were identified along the northern portions of the proposed export cable corridors	Coastal Habitats	BOEM and NMFS
Construction	**Actions that May Displace Biological Resources (Eelgrass and Macroalgae)** **Actions that May Cause Direct Injury or Death**	• Offshore export cable installation and the location of the HDD exit pit are planned for outside the mapped eelgrass extents at the cable landing locations	Coastal Habitats	BOEM, USACE, and NMFS
O&M	**Change in Ambient EMF**	• EMF modeling conducted for the proposed Project indicates that HDD installation in nearshore areas will reduce, but not entirely eliminate magnetic fields in the area where eelgrass beds or clusters of macroalgae were identified.	Coastal Habitats	Best practice - not an enforceable measure
Decommissioning	**Seabed or Ground Disturbance**	• The proposed Project's offshore export cables may be left in place to minimize environmental effects, thus resulting in minimal or no sea bottom disturbance	Coastal Habitats	Best practice - not an enforceable measure
Decommissioning	**Change in Ambient Lighting**	• The proposed Project's offshore export cables may be left in place to minimize environmental effects, thus resulting in no change to ambient lighting	Coastal Habitats	Best practice - not an enforceable measure
Decommissioning	**Displacement of Eelgrass and Macroalgae** **Actions that May Cause Direct Injury or Death of Biological Resources**	• The offshore export cables may be left in place to minimize environmental effects, thus resulting in no displacement	Coastal Habitats	Best practice - not an enforceable measure
Construction, Decommissioning	**Introduced Sound into the Environment (In-air or Underwater)** Behavioral disturbance	• SouthCoast Wind will incorporate lower-impact construction methods, where possible	Benthic and Shellfish Resources	Best practice - not an enforceable measure

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Construction, O&M, Decommissioning	**Seabed or Ground Disturbance/ Planned Discharges/ Accidental Events** Harassment/mortality	• SouthCoast Wind will design the scour protection system to reduce and minimize scour and sedimentation to the extent practicable	Benthic and Shellfish Resources	Best practice - not an enforceable measure
Construction, Decommissioning	**Actions that May Displace Biological or Cultural Resources, or Human Uses** Habitat Loss	• SouthCoast Wind will use HDD at landings to avoid disturbance to nearshore productive shellfish beds to the extent practicable • SouthCoast Wind will select lower-impact construction methods, where possible • SouthCoast Wind will select corridor and micro-route cables within selected corridor to avoid complex habitats, where possible • SouthCoast Wind's Project cable burial layout was designed to minimize length of cable needed • SouthCoast Wind will bury cables, where possible, to allow for benthic recolonization after construction is complete	Benthic and Shellfish Resources	BOEM and NMFS
O&M	**Actions that May Displace Biological or Cultural Resources, or Human Uses** Habitat Loss	• Presence of Project foundation areas, scour protection, and cable burial would allow for benthic recolonization	Benthic and Shellfish Resources	Best practice – not an enforceable measure
O&M	**Change in Ambient EMF** Displacement/harassment	• SouthCoast Wind will employ industry standard cable burial and cable shielding methods to reduce potential effects • SouthCoast Wind's Project cable burial layout was designed to minimize length of cable needed to reduce potential effects	Benthic and Shellfish Resources	BSEE
Construction, Decommissioning	**Introduced Sound into the Environment (in-air or underwater)** Behavioral disturbance	• SouthCoast Wind will incorporate soft start methods, to the extent practicable, during initial pile driving activities to allow mobile finfish and invertebrates to migrate away from the area	Finfish and Invertebrates	BOEM, BSEE, USACE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind will employ sound-attenuation measures (e.g., bubble curtains, insulated piles) • SouthCoast Wind will limit duration of pile driving activities to reduce sound propagation/sound exposure		
Construction, O&M, Decommissioning	**Seabed or Ground Disturbance** Harassment/ mortality	• SouthCoast Wind will design the scour protection system to reduce and minimize scour and sedimentation	Finfish and Invertebrates	Best practice – not an enforceable measure
Construction, O&M, Decommissioning	**Habitat Disturbance and Modification** Habitat Loss and artificial reef effect from	• SouthCoast Wind will design the sea-to-shore transition to reduce the dredging footprint and effects on benthic organisms (e.g., cofferdam and/or gravity cell) • SouthCoast Wind will incorporate use of HDD at landing(s) and avoid disturbance to finfish and invertebrate EFH to the extent practicable • SouthCoast Wind will incorporate use of HDD of subsea cables, as appropriate, to minimize spatial and temporal effects on benthic organisms	Finfish and Invertebrates	Best practice - not an enforceable measure
Construction, Decommissioning	**Change in Ambient Lighting/ Planned Discharges/ Accidental Events** Displacement, harassment, and mortality	• SouthCoast Wind will incorporate use of HDD at landings and avoid disturbance to finfish and invertebrate EFH to the extent practicable	Finfish and Invertebrates	Best practice - not an enforceable measure
Construction	**Change in Ambient Lighting/ Planned Discharges/ Accidental Events** Displacement, harassment and mortality	• SouthCoast Wind will install offshore export cables and inter-array cables to target burial depths and use cable shielding materials to minimize effects of EMFs	Finfish and Invertebrates	BSEE
Construction, O&M, Decommissioning	**Introduced Sound into the Environment (in-air or underwater)**	• When technically feasible, SouthCoast Wind will employ a “ramp-up” of the HRG survey equipment at	Marine Mammals	BOEM, BSEE, USACE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
	Behavioral disturbance	the start or re-start of HRG survey activities to minimize sound source effects. • SouthCoast Wind will ensure that active acoustic sound sources will not be activated until the PSO has reported the clearance zone clear of all marine mammals after the appropriate amount of pre-clearance watch time has passed based on the proposed Project's Incidental Take Authorization • SouthCoast Wind will employ sound-attenuation measures (e.g., bubble curtains, insulated piles, etc.) • SouthCoast Wind will limit duration of pile driving activities to reduce sound propagation/sound exposure • SouthCoast Wind will incorporate soft start methods during initial pile driving activities to allow marine mammals to migrate away from the area of effect • SouthCoast Wind will employ shut-down procedure when protected species are detected in their respective shutdown zones in the Project Area • SouthCoast Wind will ensure that Project activities adhere to NMFS-authorized Incidental Take Authorization for the proposed Project • SouthCoast will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan • To reduce impacts on NARW and other marine mammals, SouthCoast Wind does not intend to conduct pile-driving activities from January 1 through April 30 • SouthCoast Wind will not conduct pile driving activities within the Enhanced Mitigation Area from June 1 through October 31		
Construction, O&M, Decommissioning	**Vessel Operations** Serious injury or mortality	• SouthCoast Wind will ensure all vessels maintain a separation distance of 328 feet (100 meters) or greater from any sighted ESA-listed whales or humpback whales (except NARW). Ensure that the following	Marine Mammals	BOEM, BSEE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		avoidance measures are taken if a vessel comes within 328 feet (100 meters) of whale: • 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 328 feet (100 meters). • If stationary, the vessel must not engage engines until the whale has moved beyond 328 feet (100 meters). • SouthCoast Wind will ensure all vessels maintain a separation distance of 1,640 feet (500 meters) or greater from any sighted NARW or unidentified large marine mammal • If a vessel is stationary, the vessel must not engage engines until the NARW has moved beyond 328 feet (100 meters) • SouthCoast Wind will ensure that all vessels underway do not divert to approach any marine mammals • SouthCoast Wind will ensure that all vessels maintain a separation distance of 164 feet (50 meters) or greater from any sighted small cetacean or seal, except when a small cetacean or seal approaches the vessel • If a small cetacean or seal approaches any vessel underway, the Project vessel underway must avoid excessive speed or abrupt changes in direction to avoid injury to the animal • SouthCoast Wind will require all vessels operating within and transiting to/from the Project Area comply with the vessel strike avoidance measures specified in lease stipulations, including: • Ensure that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid striking these protected species		

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• Ensure that vessels 65 feet (19.8 meters) in length or greater that operate between November 1 through July 31, operate at speeds of 10 knots (11.5 mph) or less • Vessel operators should monitor NMFS NARW reporting systems all year and whenever a Dynamic Management Area is established within any area vessels operate • Ensure that all vessel operators comply with 10-knot (18.5 kilometers per hour [km/hr]) speed restrictions in any Dynamic Management Area • SouthCoast Wind will ensure that all vessel operators reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of marine mammals are observed near an underway vessel • SouthCoast Wind will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan		
Construction, O&M, Decommissioning	**Seabed or Ground Disturbance** Displacement/harassment **Habitat Disturbance and Modification** Habitat loss and artificial reef effect	• SouthCoast Wind will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan	Marine Mammals	BOEM, BSEE, and NMFS
Construction, O&M, Decommissioning	**Entanglement** Harassment/mortality **Accidental Events** Ingestion/entanglement	• SouthCoast Wind will adhere to all regulations under the EPA Clean Water Act • SouthCoast Wind will ensure that any structures or devices attached to the seafloor for continuous periods greater than 24 hours use the best available mooring systems (vertical and float lines, swivels, shackles, and anchor designs) for minimizing the risk of entanglement or entrainment of marine mammals while still ensuring the safety and integrity of the structure or device	Marine Mammals	BOEM, BSEE, EPA and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind will ensure that all mooring lines and ancillary attachment lines use one or more of the following measures to reduce entanglement risk: shortest practicable line length, rubber sleeves, weak-links chains, cables, or similar equipment types that prevent lines from looping or wrapping around animals, or entrapping protected species • If an entangled live or dead marine protected species is reported, SouthCoast Wind personnel must provide any assistance to authorized stranding response personnel as requested by BOEM or NMFS • SouthCoast Wind will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan		
Construction, O&M, Decommissioning	**Planned Discharges/ Accidental Events** Harassment/mortality	• SouthCoast Wind will use approved OSRP mitigation measures to prevent animals from going to affected area including translocation to unaffected areas as necessary • SouthCoast Wind will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan • To minimize potential impacts on zooplankton from impingement and entrainment, the northernmost HVDC converter OSP will be located outside of a 10kilometer buffer of the 30-meter isobath from Nantucket Shoals.	Marine Mammals	BOEM, BSEE, and NMFS
Construction, O&M, Decommissioning	**Introduced Sound into the Environment (in-air or underwater)** Behavioral disturbance	• SouthCoast Wind will incorporate soft start methods during initial pile driving activities to allow sea turtles to migrate away from the area of effect • SouthCoast Wind will ensure that active acoustic sound sources will not be activated until the PSO has reported the clearance zone clear of all sea turtles after the appropriate amount of pre-clearance watch time has	Sea Turtles	BOEM, BSEE, USACE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		passed based on the proposed Project's Incidental Take Authorization • SouthCoast Wind will employ sound-attenuation measures (e.g., bubble curtains, insulated piles, etc.) • SouthCoast Wind will limit duration of pile driving activities to reduce sound propagation/sound exposure • SouthCoast Wind will employ shut-down procedure when protected species are detected in their respective shutdown zones in the Project Area • SouthCoast Wind will ensure that Project activities adhere to NMFS-authorized Incidental Take Authorization for the proposed Project • SouthCoast Wind will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan		
Construction, O&M, Decommissioning	**Vessel Operations** Serious injury or mortality	• SouthCoast Wind will ensure that all vessels underway do not intentionally approach any sighted sea turtle • SouthCoast Wind will ensure that all vessels maintain a separation distance of 164 feet (50 meters) or greater from any sighted sea turtles • SouthCoast Wind will require all vessels operating within and transiting to/from the Lease Area comply with the vessel strike avoidance measures specified in lease stipulations or NMFS authorization, including: • Ensure that vessel operators and crews maintain a vigilant watch for sea turtles and slow down or stop their vessel to avoid striking these protected species • Employ reporting system to NMFS in the event of a vessel strike • SouthCoast Wind will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan	Sea Turtles	BOEM, BSEE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Construction, O&M, Decommissioning	**Habitat Disturbance and Modification** Reduced prey availability/ habitat loss	• SouthCoast Wind will design scour protection system to reduce and minimize scour and sedimentation • SouthCoast Wind will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan	Sea Turtles	BOEM, BSEE, and NMFS
Construction, O&M, Decommissioning	**Entanglement** Harassment/mortality or ingestion/entanglement from marine debris	• SouthCoast Wind will adhere to all regulations under the EPA Clean Water Act. SouthCoast Wind will ensure that any structures or devices attached to the seafloor for continuous periods greater than 24 hours use the best available mooring systems (vertical and float lines, swivels, shackles, and anchor designs) for minimizing the risk of entanglement or entrainment of sea turtles, while still ensuring the safety and integrity of the structure or device • SouthCoast Wind will ensure that all mooring lines and ancillary attachment lines will use one or more of the following measures to reduce entanglement risk: shortest practicable line length, rubber sleeves, weak-links chains, cables or similar equipment types that prevent lines from looping or wrapping around animals or entrapping protected species • If an entangled live or dead marine protected species is reported, SouthCoast Wind personnel must provide any assistance to authorized stranding response personnel as requested by BOEM or NMFS • SouthCoast Wind will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan	Sea Turtles	BOEM, BSEE, EPA and NMFS
Construction, O&M, Decommissioning	**Planned Discharges/ Accidental Events** Harassment/mortality	• SouthCoast Wind will use approved OSRP mitigation measures to prevent animals from going to affected area including translocation to unaffected areas	Sea Turtles	BOEM, BSEE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast will implement measures as identified in Appendix O, Marine Mammal and Sea Turtle Monitoring and Mitigation Plan		
O&M	**Changes in Ambient EMF** Displacement/harassment	• Employ industry standard cable burial and cable shielding methods to reduce potential effects	Sea Turtles	Best practice - not an enforceable measure
Construction, O&M, Decommissioning	**Seabed or Ground Disturbance/Sediment Suspension and Deposition** Unanticipated discovery of underwater cultural heritage	• SouthCoast Wind will maintain avoidance buffers around identified [marine archaeological resources], as appropriate • SouthCoast Wind will mark identified [ASLFs] for avoidance, as appropriate • SouthCoast Wind will continue to develop, in consultation with the [tribal nations] and applicable federal and state agencies, an Unanticipated Discovery Plan in the unlikely event unidentified and an unanticipated underwater cultural heritage [marine cultural resources and human remains] is encountered • Under the [UDP] (COP Volume II, Appendix Q.1; SouthCoast Wind 2024), in the event that a potential cultural resource is discovered during construction activities, all bottom-disturbing activities in the area of discovery will cease and every effort will be made to avoid or minimize damage to the potential [marine] cultural resource(s) • Training to identify archaeological resources will be provided by the QMA for resident engineers and contractor field supervisors prior to the implementation of Project and contractor personnel	Cultural – Marine Archaeological Resources	BOEM, BSEE, and USACE
Construction	**Ground Disturbance** Unanticipated discovery of terrestrial archaeological resources from ground disturbance	• SouthCoast Wind will site the onshore Project components in locations that minimize impacts on, or avoid, potential terrestrial archaeological resources, to the extent practicable	Cultural – Terrestrial Archaeological Resources	BOEM, BSEE, and USACE

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind will monitor archaeological subsurface testing during construction in areas determined to have a moderate to high potential for undiscovered archaeological resources • SouthCoast Wind will implement an Unanticipated Discovery Plan that will include stop-work and notification procedures to be followed if a cultural resource is encountered during installation • SouthCoast Wind will conduct additional site-specific site evaluation and site mitigation if determined to be warranted due to the identification of archaeological resources that exhibit a potential for listing in the NRHP • SouthCoast Wind will perform fieldwork in accordance with current standards and consultation with the MHC and RIHPHC • SouthCoast Wind will work with a cultural resource consultant (CRC) to determine the need for a site visit by the CRC within 24 hours upon discovery of a potential cultural resource • SouthCoast Wind will conduct necessary archaeological investigations under archaeological permits issued by the MHC and/or RIHPHC • SouthCoast Wind will handle any discoveries of human remains in accordance with the appropriate state requirements and if they appear to be Native American will be guided by the policy statement adopted by the ACHP		
Construction, O&M, Decommissioning	**Accidental Events** Damage to unanticipated archaeological resources from accidental events	• SouthCoast Wind will implement BMPs throughout the proposed Project phases to minimize potential effects, including accidental releases • SouthCoast Wind will develop and implement a SMS and OSRP to avoid, control and address any accidental releases during all proposed Project activities	Cultural – Terrestrial Archaeological Resources	BOEM, BSEE, and USACE

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• A SPCC plan will be developed for the Project, as appropriate		
Construction, O&M, Decommissioning	**Altered Visual Conditions/ Changes to Ambient Lighting** Change in resource setting	• SouthCoast Wind proposes to design the onshore substation to mitigate visual effects to the extent feasible, improving site aesthetics by adhering to landscape codes and edge treatments, and improving substation building architecture to fit local context • SouthCoast Wind will work with the Towns of Falmouth, if Falmouth is the selected POI for Project 2, with Somerset, and with Portsmouth to ensure the lighting scheme complies with Town requirements • SouthCoast Wind will ensure the design of outdoor light fixtures at the onshore substation complies with night sky lighting standards to the extent practicable • SouthCoast Wind will keep lighting at the onshore substation to a minimum; only a few lights will be illuminated for security reasons on dusk-to-dawn sensors and other lights will utilize motion-sensing switches. The majority of lights will be switched on for emergency situations only • SouthCoast Wind will implement ADLS to reduce nighttime visual impacts • SouthCoast Wind will continue to develop Historic Property Treatment Plans to resolve any adverse visual effects on historic properties • SouthCoast Wind will develop and implement a landscape vegetation and screening plan as part of the Historic Property Treatment Plan for the Oak Grove Cemetery in Falmouth, Massachusetts, if Falmouth is the selected POI for Project 2	Cultural – Visual Effects to Historic Properties	BOEM, BSEE, USACE, MassDEP and RIDEM
Construction, O&M, Decommissioning	**Altered Visual Conditions/ Changes to Ambient Lighting**	• SouthCoast Wind proposes to design the substation and converter stations to mitigate visual effects to the extent feasible, including height, location, and color	Visual Resources	BOEM and BSEE

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
	Change in seascape/ landscape	• SouthCoast Wind proposes to design the onshore substation and converter stations to mitigate visual effects to the extent feasible, including improving site aesthetics by adhering to landscape codes and edge treatments, and improving building architecture to fit local context. • SouthCoast Wind will work with the Towns of Falmouth, if Falmouth is the selected POI for Project 2, with Somerset, and with Portsmouth to ensure the lighting scheme complies with town requirements • SouthCoast Wind will design outdoor light fixtures at the onshore substation and converter stations to comply with night sky lighting standards, to the extent practicable • SouthCoast Wind will ensure lighting at the onshore substation and converter stations will be keep to a minimum. Only a few lights will be illuminated for security reasons on dusk-to-dawn sensors and other lights will utilize motion-sensing switches. The majority of lights will be switched on for emergency situations only • SouthCoast Wind will implement an ADLS		
Construction	**Activities that Introduce Sound into the Environment: In-Air Noise** HDD activities; Presence of onshore substation and converter stations	• SouthCoast Wind will minimize the amount of work conducted outside of typical construction hours • SouthCoast Wind will maintain construction equipment and use newer models to the extent practicable to provide the quietest performance • SouthCoast Wind will, when possible, use enclosures on continuously operating equipment such as compressors and generators • SouthCoast Wind will turn off construction equipment when not in use and minimize idling times; and	In-Air Acoustics	Best practice - not an enforceable measure

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind will mitigate the impact of noisy equipment on sensitive locations by using temporary barriers or buffering distances as practicable • SouthCoast Wind will install a temporary noise barrier, if necessary, at edges of the site, where practicable and safe • SouthCoast Wind will use equipment silencers, where required, for drilling rig exhaust, mud cleaner generator exhaust, and mud pump exhaust		
O&M	**Activities that Introduce Sound into the Environment: In-Air Noise** Onshore substation and converter stations	• SouthCoast Wind will install noise barriers at edges of the site, where necessary, to meet regulatory requirements	In-Air Acoustics	Best practice - not an enforceable measure
Construction, Decommissioning	**Introduced Sound into the Environment** Displacement; Harassment; Potential injury; Avoidance	• SouthCoast Wind will utilize noise abatement systems to decrease the sound levels produced by Project activities in the water • SouthCoast Wind will employ soft-start measures allowing for a gradual increase in sound levels before the full pile driving hammer energy is reached	Underwater Acoustics	Best practice - not an enforceable measure
Construction, O&M, Decommissioning	**Workforce Hiring/ Procurement of Materials, Equipment and Services Including Port Use and Vessel Charters/Presence of Infrastructure/Influx of Non-Local Employees that Could Affect Housing** Increase in employment and economic opportunities	• SouthCoast Wind will maintain a stakeholder engagement plan with outreach and communications mechanisms to share information and gather input from external stakeholders, including potential supply chain partners, educational institutions, and workforce training providers • SouthCoast Wind will execute financial commitments pursuant to the Project's Section 83C proposal, in collaboration with the Massachusetts Clean Energy Center, including: $35 million ports and infrastructure, $10 million local innovation and entrepreneurship, $5 million applied research, $5 million workforce development, $10 million marine science, $7.5 million	Demographics and Employment, and Economics	Best practice - not an enforceable measure

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		operations and maintenance port upgrades, and $5 million low income strategic electrification • SouthCoast Wind will encourage the hiring of skilled and unskilled labor from the Project region		
Construction, Decommissioning	**Workforce Hiring/ Procurement of Materials, Equipment and Services Including Port Use and Vessel Charters/Presence of Infrastructure/ Influx of Non-Local Employees that Could Affect Housing/Vehicle Traffic/Planned Discharges: Air Emissions** Increase in employment opportunities; Contribution to the economy	• SouthCoast Wind will maintain a stakeholder engagement plan with outreach and communications mechanisms to share information and gather input from external stakeholders, including EJ communities • SouthCoast Wind will execute financial commitments pursuant to the Project's Section 83C proposal, under the terms of an agreement with Massachusetts Clean Energy Center, for initiatives that benefit EJ communities, including: $5 million workforce development; and $5 million low income strategic electrification • SouthCoast Wind will encourage the hiring of the skilled and unskilled labor from the Project region	Environmental Justice Minority and Lower Income Groups and Subsistence Resources	Best practice - not an enforceable measure
Construction, Decommissioning	**Presence of Infrastructure/ Influx of Non-Local Employees that Could Affect Housing/Vehicle Traffic/ Planned Discharges: Air Emissions** Installation, construction, and decommissioning activities	• SouthCoast Wind will develop and implement a Traffic Management Plan to minimize disruptions to the community in the vicinity of construction and installation activities, especially along the underground transmission route. The Traffic Management Plan will be developed in consultation with the municipalities and will be submitted for review and approval by municipal authorities • SouthCoast Wind will develop and implement an onshore construction schedule to minimize effects on recreational uses and tourism-related activities to the extent practicable • SouthCoast Wind will mandate one or more independent construction and environmental monitors to ensure compliance with the Traffic Management Plan and other environmental plans. SouthCoast Wind	Environmental Justice Minority and Lower Income Groups and Subsistence Resources	BOEM, USACE, MassDEP and RIDEM

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		will coordinate with the municipalities to determine the need for such monitoring		
O&M	**Workforce Hiring/ Procurement of Materials, Equipment and Services Including Port Use and Vessel Charters** Increase in employment opportunities	• SouthCoast Wind will execute commitment to make at least 75 percent of O&M local	Environmental Justice Minority and Lower Income Groups and Subsistence Resources	Best practice - not an enforceable measure
Construction, O&M, Decommissioning	**Construction Areas and Traffic/Saturation of Tourism-related Services/ Influx of Non-Local Employees that Could Affect Housing/Vehicle Traffic/ Planned Discharges: Air Emissions** Accessibility disruption and reduced enjoyment of land-based resources due to vehicle traffic	• SouthCoast Wind will develop and implement a Traffic Management Plan to minimize disruptions to residences and commercial establishments in the vicinity of onshore construction activities; pedestrian and bicycle safety and movement would also be addressed to minimize effects of construction • SouthCoast Wind will develop an onshore construction schedule to minimize effects on recreational uses and tourism related activities to the extent feasible, such as scheduling nearshore construction activities to avoid the height of the summer tourist season and coordinating with stakeholders/visitors' bureaus to schedule outside of major events taking place onshore	Recreation and Tourism	Best practice - not an enforceable measure
Construction, O&M, Decommissioning	Accessibility disruption due to saturation of tourism-related services	• SouthCoast Wind will provide a 1 nm (1.9 km) space between offshore structures (WTGs and OSPs) providing room for anticipated vessels to transit through and safely maneuver within the proposed Offshore Project Area • SouthCoast Wind will implement a comprehensive communication plan and a Fisheries Communication Plan to keep relevant marine stakeholders informed of the Project activities especially during the construction and decommissioning phases. This will include the distribution of notices to inform mariners of Project-	Recreation and Tourism	BOEM, BSEE

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		related activities within the offshore export cable corridors and Lease Area • SouthCoast Wind will utilize PATONs in accordance with IALA Guidance for the marking of man-made offshore structures (IALA, 2013), and USCG approval		
Construction, O&M, Decommissioning	Reduced enjoyment of land-based resources due to noise and air emissions	• SouthCoast Wind will implement BMPs throughout the Project phases to minimize potential effects • SouthCoast Wind will develop an onshore construction schedule to minimize effects on recreational uses and tourism-related activities to the extent feasible	Recreation and Tourism	Best practice - not an enforceable measure
Construction, Decommissioning	**Vessel Activity/Presence of Infrastructure** Vessel traffic and construction	• SouthCoast Wind will adhere to a 1 nm x 1 nm (1.9 km x 1.9 km) grid layout agreed upon with USCG will be the mitigation measure regarding this impact • SouthCoast Wind will direct communications of vessel schedules and locations during construction activities to Fisheries Liaison Officer, Fisheries Representative, local ports, and other networks • SouthCoast Wind will continue to participate in the MA/RI WEA joint developer Marine Affairs Working Group • SouthCoast Wind will implement construction safety zones in consultation with USCG and communicate to local mariners regarding upcoming and ongoing construction activities • SouthCoast Wind will work with fishermen to determine appropriate courses of action for areas that will be temporarily closed during specific construction activities • Where possible, the SouthCoast Wind will avoid sensitive areas and common fishing grounds nearshore and offshore • SouthCoast Wind will work with Port Agencies and Port agents to schedule and communicate activities to	Commercial and Recreational Fishing	BOEM, BSEE, and USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		minimize impacts on fishing vessels coming in to not delay their ability to port and deliver their haul		
Construction, Decommissioning	**Actions that May Displace Biological Resources** Vessel activity and presence of infrastructure	• SouthCoast Wind will avoid locating onshore facilities or landfall sites in or near important fish habitats to the extent practicable • SouthCoast Wind will apply construction methods for cable laying activities that align with regulatory guidance • To mitigate impacts of vibration from pile-driving activities, SouthCoast Wind will utilize noise abatement systems around relevant construction activities • Certain construction activities have time-of-year restrictions to avoid, minimize, and mitigate impacts on marine organisms, such as sturgeon and winter flounder, which will also be protective of other demersal groundfish species • SouthCoast Wind will work with municipal shellfish constables to coordinate shellfish seeding with planned activities prior to construction activities • SouthCoast Wind's Boulder Relocation Plan will include a plan to document and communicate the locations of moved or newly uncovered boulders to vessels that fish in the area	Commercial and Recreational Fishing	BOEM, BSEE and NMFS
Construction, Decommissioning	**Gear Interactions** interactions	• SouthCoast Wind is currently working with commercial and recreational fishermen as well as FRs to determine construction timing and locations with fishing vessels to anticipate and avoid/minimize/mitigate gear interactions that may occur during construction • Temporary safety zone restrictions associated with construction activities will limit direct access to areas with construction activity for the safety of mariners and Project employees, but these areas will be limited spatially and temporally	Commercial and Recreational Fishing	BOEM, NMFS, and USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind will implement construction safety zones around active construction areas in consultation with USCG • SouthCoast Wind will notify mariners via LNMs of the presence and location of partially installed structures • The SouthCoast Wind FLO proactively contacts fishermen if their gear is entangled by geophysical and geotechnical survey operations and will continue to do so in later phases of the proposed Project, including during construction • SouthCoast Wind will consider the use of fixed mooring buoys at various strategic locations in the Project Area to avoid the need for anchoring		
O&M	**Vessel Activity/Presence of Infrastructure**	• SouthCoast Wind will continue to ensure that all Project-related vessels follow appropriate navigational routes and other USCG requirements, communicate via USCG LNMs, issue regular mariner updates and/or direct offshore radio communications to help mitigate risks to the commercial and recreational fishing industries, as well as other mariners • SouthCoast Wind will implement the 1 nm x 1 nm (1.9 km x 1.9 km) grid layout agreed upon with USCG and the MA/RI WEA developers • SouthCoast Wind will work with Port Agencies and Port agents to schedule and communicate activities to minimize impacts on fishing vessels • SouthCoast Wind will adopt best practice of an east-west orientation in the Lease Area with 1 nm (1.9 km) spacing between WTG/OSP rows. Layout orientation aligns with neighboring lease holders to provide fishermen consistent navigable routes to fishing grounds • SouthCoast Wind, the SouthCoast Wind FLO, and SouthCoast Wind FRs have been in close	Commercial and Recreational Fishing	BOEM, BSEE and USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		communication with industry stakeholders to share information, and to avoid sensitive areas and common fishing grounds inshore and offshore to the extent practicable		
O&M	**Actions that May Displace Biological Resources** Vessel activity and presence of infrastructure	• SouthCoast Wind will install subsea cables to target burial depth and consider use cable shielding materials to minimize potential but unlikely effects of EMF • Cable routing has been designed to minimize cable crossings, cable length, and overlap with known fishing areas, while also maximizing the portion of the cable that can be buried and maintained at target burial depth, in order to mitigate potential impacts on fishing activity	Commercial and Recreational Fishing	BSEE
O&M	**Gear Interactions** Entanglement and snags	• The target cable burial depths that have been established will mitigate the risk of potential impact for anticipated gear types, regardless of penetration depth • Safety zones surrounding each foundation will partially include the scour protection on the seabed within that zone, and it is unlikely that fixed or mobile gear will be set or towed close enough to interact with the scour protection surrounding each foundation, in the interest of vessel safety procedures • SouthCoast Wind will work with fishermen through a gear loss claim application form to determine if reimbursement is warranted in a process similar to the compensation application process already in place for potential gear loss due to geophysical and geotechnical survey activity • SouthCoast Wind has conducted a Cable Burial Risk Assessment to calculate the target cable lowering depth to minimize risks to the offshore export cables from damage, and to mitigate potential conflicts	Commercial and Recreational Fishing	BSEE

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		between commercial or recreational fishermen and the new structure • To minimize conflicts between fishing gear and the proposed Project's inter-array and offshore export cables, the inter-array cables will be buried at a target depth of 3.2 to 8.2 feet (1.0 to 2.5 meters), and the offshore export cables will be buried at a target depth of 3.2 to 13.1 feet (1.0 to 4.0 meters) • To minimize interference with fishing activities, SouthCoast Wind has sited the export cable corridors to minimize overlap with known areas of high fishing activity • Long-term monitoring of cable burial depth and condition will serve as another mitigation strategy, ensuring appropriate burial depth is maintained during the O&M phase • Where applicable, SouthCoast Wind will record required cable protection on electronic charts to be distributed to fishermen		
Construction, Decommissioning	Change in zoning exception or relief for the installation of the landing location landfall site and onshore substation	• SouthCoast Wind will work with the local authorities and MA EFSB and RI ESFB to facilitate the authorization of the required land use	Zoning and Land Use	Best practice - not an enforceable measure
Construction, Decommissioning	**Construction Areas and Vehicle Traffic** Accessibility disruption of neighboring land uses	• SouthCoast Wind will develop and implement a Traffic Management Plan prior to construction to minimize disruptions to residences and commercial establishments in the vicinity of onshore construction activities; pedestrian and bicycle safety and movement would also be addressed to minimize effects of construction • SouthCoast Wind will develop and implement a Construction Management Plan, including an onshore construction schedule, in consultation with the local	Zoning and Land Use	BOEM, MassDEP and RIDEM

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		authorities and relevant stakeholders to minimize effects on neighboring land uses to the extent feasible • SouthCoast Wind will coordinate with stakeholders to schedule work activities outside of major events taking place onshore • SouthCoast Wind will ensure that onshore construction activities comply with local regulatory authority requirements		
Construction, Decommissioning	Reduced enjoyment of neighboring land uses due to noise, vibration, and fugitive dust	• SouthCoast Wind will implement BMPs throughout the proposed Project phases to minimize potential effects • SouthCoast Wind will develop and implement an onshore construction schedule to minimize effects on neighboring land uses to the extent feasible • SouthCoast Wind will ensure that onshore construction activities comply with local regulatory authority requirements	Zoning and Land Use	Best practice - not an enforceable measure
Construction, Decommissioning	Disruption of use due to accidental releases	• SouthCoast Wind will implement BMPs throughout the proposed Project phases to minimize potential effects • SouthCoast Wind will follow the approved SMS and OSRP to avoid, control, and address any accidental releases during all proposed Project activities	Zoning and Land Use	Best practice - not an enforceable measure
O&M	Reduced enjoyment of neighboring land uses due to noise, vibration, and fugitive dust	• SouthCoast Wind will implement best practices throughout the proposed Project phases to minimize potential effects • SouthCoast Wind will develop and implement an onshore construction schedule to minimize effects on neighboring land uses to the extent feasible • SouthCoast Wind will ensure that onshore construction activities comply with local regulatory authority requirements	Zoning and Land Use	Best practice - not an enforceable measure

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
O&M	Accessibility disruption of neighboring land uses due to construction areas and vehicle traffic	• If unscheduled repairs are required, SouthCoast Wind will obtain an authorization from the local authorities as required • SouthCoast Wind will coordinate with stakeholders to schedule unscheduled repairs outside of major events taking place onshore, to the extent possible • SouthCoast Wind will ensure that unscheduled repairs comply with local regulatory authority requirements	Zoning and Land Use	Best practice - not an enforceable measure
O&M	Disruption of use due to accidental events	• SouthCoast Wind will implement best practices throughout the proposed Project phases to minimize potential effects • SouthCoast Wind will develop and implement an emergency response procedure to avoid, control and address any accidental releases during all proposed Project activities	Zoning and Land Use	Best practice - not an enforceable measure
Construction	**Actions that may Displace Human Uses/ Activities that may Displace or Impact Fishing and Recreation and Tourism/Accidental Events/ Altered Visual Conditions** Vessel operations and presence of offshore equipment	• SouthCoast Wind will coordinate directly with the USCG in response to distress/Search and Rescue events • SouthCoast Wind will post LNMs on the SouthCoast Wind website • SouthCoast Wind will submit LNMs to the USCG and Fleet Command prior to the commencement of offshore construction activities • SouthCoast Wind will implement construction safety zones in consultation with USCG and communicate to local mariners regarding upcoming and ongoing construction activities. • SouthCoast Wind will utilize on-scene safety vessel(s) and/or personnel to advise mariners of construction activity, as necessary • SouthCoast Wind will investigate means to update navigation charts with NOAA to improve communications for on-water activities	Navigation and Vessel Traffic	USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind will comply with regulatory requirements • SouthCoast Wind will utilize on-scene safety vessel(s) and/or personnel to advise mariners of construction activity, as necessary		
Construction	**Change in Ambient Lighting** Construction lighting	• SouthCoast Wind will utilize on-scene safety vessel(s) and/or personnel to advise mariners of construction activity, as necessary	Navigation and Vessel Traffic	Best practice - not an enforceable measure
O&M	**Actions that may Displace Human Uses/ Activities that may Displace or Impact Fishing and Recreation and Tourism/Accidental Events/ Altered Visual Conditions** Vessel operations and presence of structures	• SouthCoast Wind will coordinate directly with the USCG in response to distress/Search and Rescue events • Mariner diligence and offshore standard work safety practices will be established for all Project-related vessels • SouthCoast Wind will adopt best practice of an east-west orientation in the Lease Area with 1 nm (1.9 km) spacing between WTG/OSP rows. Layout orientation aligns with neighboring lease holders to provide fishermen consistent navigable routes to fishing grounds	Navigation and Vessel Traffic	Best practice - not an enforceable measure
O&M	**Actions that may Displace Human Uses/ Activities that may Displace or Impact Fishing and Recreation and Tourism/Accidental Events/ Altered Visual Conditions** Vessel operations and presence of structures	• SouthCoast Wind will include lighting and marking of offshore proposed Project structures according to permit requirements • Marking of structures will be aligned with letter and number marking of all offshore structures within the MA/RI WEA, improving SAR and general navigation • SouthCoast Wind will maintain the Project's distance from the established Traffic Separation Scheme	Navigation and Vessel Traffic	BOEM, BSEE, USCG
O&M	**Changes in Ambient Lighting** Lighting of offshore structures	• SouthCoast Wind will submit requests for PATON permits from the USCG that consider a range of issues related to navigational safety	Navigation and Vessel Traffic	USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Decommissioning	**Accidental Events** Vessel operations	• SouthCoast Wind will utilize on-scene safety vessel(s) and/or personnel to advise mariners of decommissioning activity, as necessary	Navigation and Vessel Traffic	Best practice - not an enforceable measure
Decommissioning	**Actions that may Displace Human Uses/ Activities that may Displace or Impact Fishing and Recreation and Tourism/Accidental Events/ Altered Visual Conditions** Presence of offshore equipment	• SouthCoast Wind will coordinate directly with the USCG in response to distress/Search and Rescue events • SouthCoast Wind will utilize on-scene safety vessel(s) and/or personnel to advise mariners of decommissioning activity, as necessary	Navigation and Vessel Traffic	Best practice - not an enforceable measure
Decommissioning	**Changes in Ambient Lighting** Decommissioning equipment lighting	• SouthCoast Wind will utilize on-scene safety vessel(s) and/or personnel to advise mariners of decommissioning activity, as necessary	Navigation and Vessel Traffic	Best practice - not an enforceable measure
Construction, O&M, Decommissioning	**Changes in Ambient Lighting** Introduced lighting	• SouthCoast Wind will comply with USCG, BOEM and FAA marking and lighting guidelines • SouthCoast Wind will utilize PATONs approved by USCG and installed in accordance with IALA Guidance (IALA, 2013) for the marking of man-made offshore structures • SouthCoast Wind will ensure marking of structures will be aligned with letter and number marking of all offshore structures within the MA/RI WEA, improving SAR and general navigation • SouthCoast Wind will coordinate with the USCG, Air Force, Navy, NORAD, and other military and national security stakeholders to implement operational curtailment of WTGs during search and rescue operations, or other national security emergencies, near the Lease Area, as necessary • SouthCoast Wind will avoid, minimize, or mitigate effects on navigation by equipping all Project-related	Other Marine Uses	BOEM, BSEE, USCG

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		vessels and relevant infrastructure with the required navigation marking and lighting and day shapes		
Construction, O&M, Decommissioning	**Installation and Maintenance of Infrastructure** Increased marine/vessel traffic and damage to existing cables/pipelines	• SouthCoast Wind will use well established standard techniques for adequately protecting existing and newly installed cables • SouthCoast Wind will develop cable crossing specifics in consultation with the cable owners as proposed Project planning continues • SouthCoast Wind will utilize on-scene safety vessel(s) and/or personnel to advise mariners of construction/ decommissioning activity, as necessary • SouthCoast Wind will investigate means to update navigation charts with NOAA to improve communications for on-water activities • SouthCoast Wind will establish mariner diligence and offshore standard work safety practices for all Project-related vessels	Other Marine Uses	Best practice - not an enforceable measure
Construction, O&M, Decommissioning	**Presence of Infrastructure** Obstruction to air navigation, and interference with radar systems	• SouthCoast Wind will work with the FAA and the owner/operator of any affected systems to ensure that appropriate mitigation measures are identified and implemented • SouthCoast Wind will use ADLS to reduce visual effects • SouthCoast Wind will coordinate with the DoD Siting Clearinghouse, FAA, and NORAD to determine potential effects on radars and NAVAIDS and identify appropriate mitigation measures • SouthCoast Wind will coordinate with NOAA and the Northeastern Regional Association of Coastal Ocean Observing Systems to determine potential effects on high-frequency radars and identify appropriate mitigation measures, as necessary	Other Marine Uses	Best practice - not an enforceable measure

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
O&M	**Installation and Maintenance of Infrastructure/Presence of Infrastructure** Use conflicts—military	• SouthCoast Wind will provide a 1 nm (1.9 km) space between offshore structures (WTGs and OSPs) providing room for anticipated vessels to transit through and safely maneuver within the proposed Offshore Project Area • SouthCoast Wind will align marking of structures with letter and number marking of all offshore structures within the MA/RI WEA, improving SAR and general navigation • SouthCoast Wind will liaise with the military and national security stakeholders to reduce potential conflicts. • SouthCoast Wind will ensure mariner diligence and offshore standard work safety practices are established for all Project-related vessels	Other Marine Uses	BOEM, BSEE, and USCG
Construction	**Unplanned Events** Allisions and collisions, unplanned releases, and occupational hazards	• SouthCoast Wind will operate under an approved SMS • SouthCoast Wind will utilize on-scene safety vessel(s) and/or personnel to advise mariners of decommissioning activity, as necessary • SouthCoast Wind will investigate means to update navigation charts with NOAA to improve communications for on-water activities • SouthCoast Wind will develop and implement an onshore Traffic Management Plan prior to construction to address vehicular, bicycle, and pedestrian safety • SouthCoast Wind will ensure onshore work would also be planned to be performed primarily off-season when there are fewer people in the area • SouthCoast Wind will operate under an approved OSRP that details prevention and control measures of unplanned releases in the Project Area • SouthCoast Wind will ensure Project Vessels will adhere to USCG regulations surrounding planned and unplanned discharges	Public Health and Safety	BOEM, USCG, MassDEP and RIDEM

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• SouthCoast Wind will prepare and submit an SWPPP for onshore construction activities before start of construction		
O&M	**Unplanned Events** Allisions and collisions, unplanned releases, and occupational hazards	• SouthCoast Wind will maintain the northeast approach Traffic Separation Scheme • Mariner diligence and offshore standard work safety practices will be established for all Project-related vessels • SouthCoast Wind will adopt best practice of an east-west orientation in the Lease Area with 1 nm (1.9 km) spacing between WTG/OSP rows. Layout orientation aligns with neighboring lease holders to provide fishermen consistent navigable routes to fishing grounds • SouthCoast Wind will include lighting and marking of offshore proposed Project structures according to permit requirements • Marking of structures will be aligned with letter and number marking of all offshore structures within the MA/RI WEA, improving SAR and general navigation. • In the event that scheduled or unscheduled repairs are required that would impede onshore traffic flow, an authorization will be obtained from the local authorities as required. • SouthCoast Wind will follow measures prescribed and detailed in the approved SMS and OSRP • SouthCoast Wind will operate under an approved OSRP that details prevention and control measures of unplanned releases in the Project Area • Project Vessels will adhere to USCG regulations surrounding planned and unplanned discharges	Public Health and Safety	BOEM, BSEE, USCG, MassDEP and RIDEM

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Applicant-Proposed Measures from COP Appendix O, SouthCoast Wind Marine Mammal and Sea Turtle Monitoring and Mitigation Plan (SouthCoast Wind 2024)				
PSO and Acoustic PSO (PAM Operator) Training, Experience and Responsibilities				
Construction	**Observer qualifications and training**	• PSOs and Acoustic PSOs (APSO / PAM Operators) will have met NMFS and BOEM training and experience requirements. • PSOs and APSOs will be employed by a third-party observer provider. Briefings between construction supervisors and crews and the PSO/APSO team will be held prior to the start of all pile driving activities, as well as when new personnel join the vessel(s). • At least one PSO on duty at all times will have prior experience working as a PSO. • APSOs responsible for determining if an acoustic detection originated from a NARW will be trained in identification of mysticete vocalizations.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS
	Responsibilities and authorities of PSOs	• PSOs will have no other responsibilities while on watch. • Any PSO or APSO on duty will have the authority to delay the start of operations or to call for a shutdown based on their observations or acoustic detection. • A clear line and method of communication between the PSOs/APSOs and pile-driving crew will be established and maintained to ensure mitigation measures are conveyed without delay.		
Visual Monitoring				
Construction	**Number of PSOs**	• A sufficient number of PSOs will be stationed aboard the installation and/or nearby support vessels to meet the following criteria: ○ At least two PSOs on duty during all pre-clearance periods and active pile driving; - At least one PSO on duty during all other daylight periods.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		○ A maximum of four consecutive hours on watch per PSO. ○ A maximum of 12 hours on watch during a 24-hour period.		
	Visual monitoring methods	• Observations will be conducted from the best safe vantage point(s) on the construction or nearby support vessel to ensure visibility of the clearance zones. • When conducting observations during pile driving, PSOs will scan systematically with the unaided eye, high magnification (25x) binoculars, and/or standard handheld (7x) binoculars to search continuously for marine mammals during all observational periods. • When monitoring at night, PSOs will monitor for marine mammals and other protected species using night-vision goggles with thermal clip-ons and a hand-held spotlight. • PSOs will watch for and record all marine mammal sightings regardless of the distance from the observer and/or sound source. • Distances to observed animals will be estimated with range finders, reticule binoculars, or clinometers when possible and based on the best estimate of the PSO when necessary. • PSOs will record watch effort and environmental conditions on a routine basis.		
	Visual monitoring during vessel transit	• PSOs and/or trained vessel crew will observe for marine mammals and sea turtles at all times when vessels are transiting to/from and in the Project Area and port. • PSOs and/or vessel crew will request ship-strike avoidance measures if necessary (see below).		
Acoustic Monitoring				

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Construction	**Number of APSOs**	• At least one APSO during all pre-clearance periods and active pile driving. • A maximum of 4 consecutive hours on watch per APSO. • A maximum of 12 hours of watch time per 24-hour period per APSO.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS
	Passive acoustic monitoring methods	• A real-time PAM system will be used to supplement visual monitoring during pre-piling clearance and throughout pile driving. • Use of PAM will allow initiation of pile driving when visual observation of the entire clearance zone is not possible due to poor visibility, including darkness. • A detailed description of the real-time PAM system will be developed during the Marine Mammal Protection Act Incidental Take Authorization process. • The PAM system may not be located on the pile-installation vessel to reduce masking of marine mammals sounds. • The APSOs will immediately communicate all acoustic detections of marine mammals to PSOs performing visual observations including any determination regarding species identification, distance, and bearing of the marine mammal.		
	Sound source verification	• A detailed plan for Sound Source Verification will be developed during the Marine Mammal Protection Act Incidental Take Authorization process. • Components of the plan will likely include: ○ Measurements of the largest of each pile type (monopiles and/or jacket piles) to be installed with and without noise attenuating systems to quantify the effectiveness of the system(s). ○ Measurements will be taken at distances designed to verify modeled distances to Level A and Level B		

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		thresholds and/or other mitigation action distances. ○ Measurement results will be used to modify, if necessary, distances to Level A and Level B thresholds and estimate effects in a post-construction monitoring report.		
Clearance Zones				
Construction	**Clearance zones for protected species**	• Because of the low probability of a long-term exposure event and for practical implementation reasons, it is anticipated that the Clearance Zones will be similar to those listed below, with the final distances to be determined during the MMPA ITA application process: • North Atlantic Right Whale: 1 km; - Mysticete whales (low-frequency cetaceans): 0.5 km; - Harbor porpoise (high-frequency cetaceans): 0.12 km; - All other marine mammals (mid-frequency cetaceans and pinnipeds): 0.05 km; and - Sea Turtles: 0.05 km.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS
Pre-start Clearance				
Construction	**Pre-start clearance**	• Prior to the beginning of each pile driving event, PSOs and APSOs will monitor for marine mammals and sea turtles for a minimum of 30 minutes and continue at all times during pile driving. • If a marine mammal is detected within or approaching the shutdown zone (via visual observation or PAM) during the preclearance period, pile driving will not begin until the animal(s) is confirmed to have exited the relevant shutdown zone, or until an additional time period has elapsed with no further sighting of the animal. • Additional time period will be 15 minutes for odontocetes and pinnipeds and 30 minutes for mysticetes and sea turtles.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Soft-Start				
Construction	**Soft-start**	• Soft-start procedures will be followed, to the extent practicable, at the beginning of each pile driving event or any time pile driving has stopped for longer than 30 minutes. • If a marine mammal is detected within or about to enter the shutdown zone during the soft-start procedure, pile driving will be delayed and measures will be followed as stated in Section 7.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS
Shutdowns				
Construction	**Shutdowns**	• PSOs or APSOs will request a shutdown of pile driving if a marine mammal or sea turtle is detected within or about to enter the applicable shutdown zone for that species (see Section 4). • If a shutdown is not feasible at that time in the installation process because of a risk to human or vessel safety or the risk of jeopardizing the installation process, a reduction in the hammer energy of the greatest extent possible will be considered and implemented. • Following shutdown, pile driving will restart using the same procedure described above during pre-start clearance.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS
Potential Additional Measure to Protect North Atlantic Right Whale				
Construction	**NARW protection measures**	• By concentrating construction activities when NARW are less likely to be present in the region (May 1 through December 31), including the Lease Area, the amount of activity to occur when more NARW are likely to be present can be reduced, thereby reducing the total potential impacts on NARW.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• To accomplish this, SouthCoast Wind will propose additional monitoring and mitigation measures to support the start (or continuation) of pile driving at night or in poor visibility conditions during the period when NARW are less likely to be present. • Specific monitoring tools and plans will be developed as a part of the MMPA ITA process, but may include the use of advanced infrared systems, real-time PAM, autonomous underwater vehicles, autonomous aerial vehicles, or other advanced technologies.		
Vessel Strike Avoidance				
Construction	**General measures**	• A minimum of one PSO or trained vessel crew will be present on all vessels when transiting. • Observers will maintain a vigilant watch for all marine mammals and slow down or stop vessels to avoid striking protected species. • Monitoring the NMFS NARW reporting systems from November 1 through May 30 and whenever a DMA is established in the operational area.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS
	Separation distances	• Maintaining >500-meter distance from any sighted NARW or an unidentified large marine mammal. • Maintaining >100-meter from all ESA-listed whales or humpback whales. • Maintaining >50 meters from all other marine mammals, with the exception of delphinids and pinnipeds that approach the vessel, in which case the vessel operator must avoid excessive speed or abrupt changes in direction		
	Actions given observed marine mammal	• If underway, vessels will steer a course away from any NARW at 10 kts or less until the 500-meter minimum separation distance has been established.		

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		• If a NARW comes within 100 meters, then the vessel will reduce speed and shift the engines into neutral, if safe to do so. The vessel will not engage engines until the NARW has moved beyond 100 meters, in which case, any vessel will steer a course away from the animal at 10 knots or less until the 500-meter minimum separation distance has been established. • If the vessel is stationary, the vessel will not engage engines until the NARW has moved beyond 100 meters, in which case any vessel will steer a course away from the animal at 10 knots or less until the 500-meter minimum separation distance has been established. • Report sightings of all dead or injured marine mammals or sea turtles within 24 hours.		
	Speed reduction	• Reducing speed of all vessels, except CTVs, to ≤10 knots between November 1 through May 30. • From November 1 through May 30, CTVs may travel at over 10 knots. However, if a NARW is detected via visual observation within or approaching the transit route, all CTVs will travel at 10 knots or less for the remainder of that day. • Operating vessels, except CTVs, will travel at speeds ≤10 knots in any DMA. • Reducing vessel speeds to ≤10 knots when mother/calf pairs, pods, or large assemblages of marine mammals are observed. • Complying with speed restrictions (≤10 knots) in NARW management areas including SMAs and active DMAs, except as noted previously for CTVs.		
Reporting Dead or Injured Marine Mammals				
Construction, O&M, Decommissioning	**Actions given a marine mammal is**	• The activity(ies) resulting in the injury/death will be stopped immediately.	Marine Mammals and Sea Turtles	BOEM, BSEE, and NMFS

Project Phase	Impact Producing Factors Potential Effect or Category	Description	Resource Area Mitigated	Anticipated Enforcing Agency
	taken in a prohibited manner by construction activities	• The incident will be reported to the NMFS Office of Protected Resources and the NMFS New England Stranding Network Coordinator. • The report will include all available information required by the IHA or the NMFS stranding report form. • SouthCoast Wind will not resume the activity which resulted in the injury until NMFS is able to review the circumstances of the prohibited take and authorize resumption of the activity(ies).		
	Actions given an unknown and recent observed dead or injured marine mammal	• SouthCoast Wind will immediately report the incident to the NMFS Office of Protected Resources and the NMFS New England Stranding Network Coordinator. • The report will include the same information identified for a take by construction activity. • Activities will continue while NMFS reviews the circumstances of the incident and works with SouthCoast Wind to determine whether modifications to the activities are appropriate.		
	Actions given observation of a dead or injured marine mammal not associated with or related to construction activities	• SouthCoast Wind will report the incident to the NMFS Office of Protected Resources and the NMFS New England Stranding Network Coordinator, within 24 hours of the discovery. • SouthCoast Wind will include any documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network including photographs and video footage if available. • Construction activity may continue.		

ACHP = Advisory Council on Historic Preservation; ADLS = Aircraft Detection Lighting System; APSO = acoustic protected species observer; ASLF = ancient submerged landform feature; BMP = best management practice; BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; BUAR = Board of Underwater Archaeological Resources; CFR = code of federal regulation; COP = Construction and Operations Plan; CRC = cultural resource consultant; CTV = crew transfer vessel; DMA = dynamic management area; DP = dynamic positioning; EFH = essential fish habitat; EJ = environmental justice; EMF = electromagnetic fields; EPA = Environmental Protection Agency; ESA = Endangered Species Act; FAA = Federal Aviation Administration; FLO = fisheries liaison officer; FR = fisheries representative; HDD = horizontal directional drilling; HRG = high-resolution geophysical; HVDC = high-voltage direct current; IALA = International Association of Marine Aids to Navigation and Lighthouse

Authorities; IHA = Incidental Harassment Authorization; ITA = Incidental Take Authorization; km = kilometer; km/hr = kilometer per hour; LNM = local notice to mariners; MA = Massachusetts; MA EFSB = Massachusetts Energy Facilities Siting Board; MassDEP = Massachusetts Department of Environmental Protection; MHC = Massachusetts Historical Commission; mph = mile per hour; NARW = North Atlantic right whale; NAVAIDS = navigational aids; NHESP = Natural Heritage & Endangered Species Program; nm = nautical mile; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; NORAD = North American Aerospace Defense Command; NOx = nitrogen oxides; NRHP = National Register of Historic Places; O&M = operations and maintenance; OSRP = oil spill response plan; OSP = offshore substation platform; PAM = passive acoustic monitoring; PATON = private aid to navigation; PSO = protected species observer; QMA = qualified marine archaeologist; RI = Rhode Island; RI EFSB = Rhode Island Energy Facility Siting Board; RIDEM = Rhode Island Department of Environmental Management; RIHPHC = Rhode Island Historical Preservation & Heritage Commission; SAR = search and rescue; SHPO = state historic preservation officer; SMS = safety management system; SPCC = spill prevention, control, and countermeasure; SWPPP = stormwater pollution prevention plan; THPO = Tribal Historic Preservation Officer; UDP = Unanticipated Discovery Plan; USCG = United States Coast Guard; USFWS = United States Fish and Wildlife Service; WEA = wind energy area; WTG = wind turbine generator

G.2 Agency-Proposed Mitigation Measures

Table G-2 identifies agency-proposed mitigation measures that have been proposed to mitigate and/or monitor potential impacts from the Project. The paragraphs below provide additional information regarding the mitigation measures.

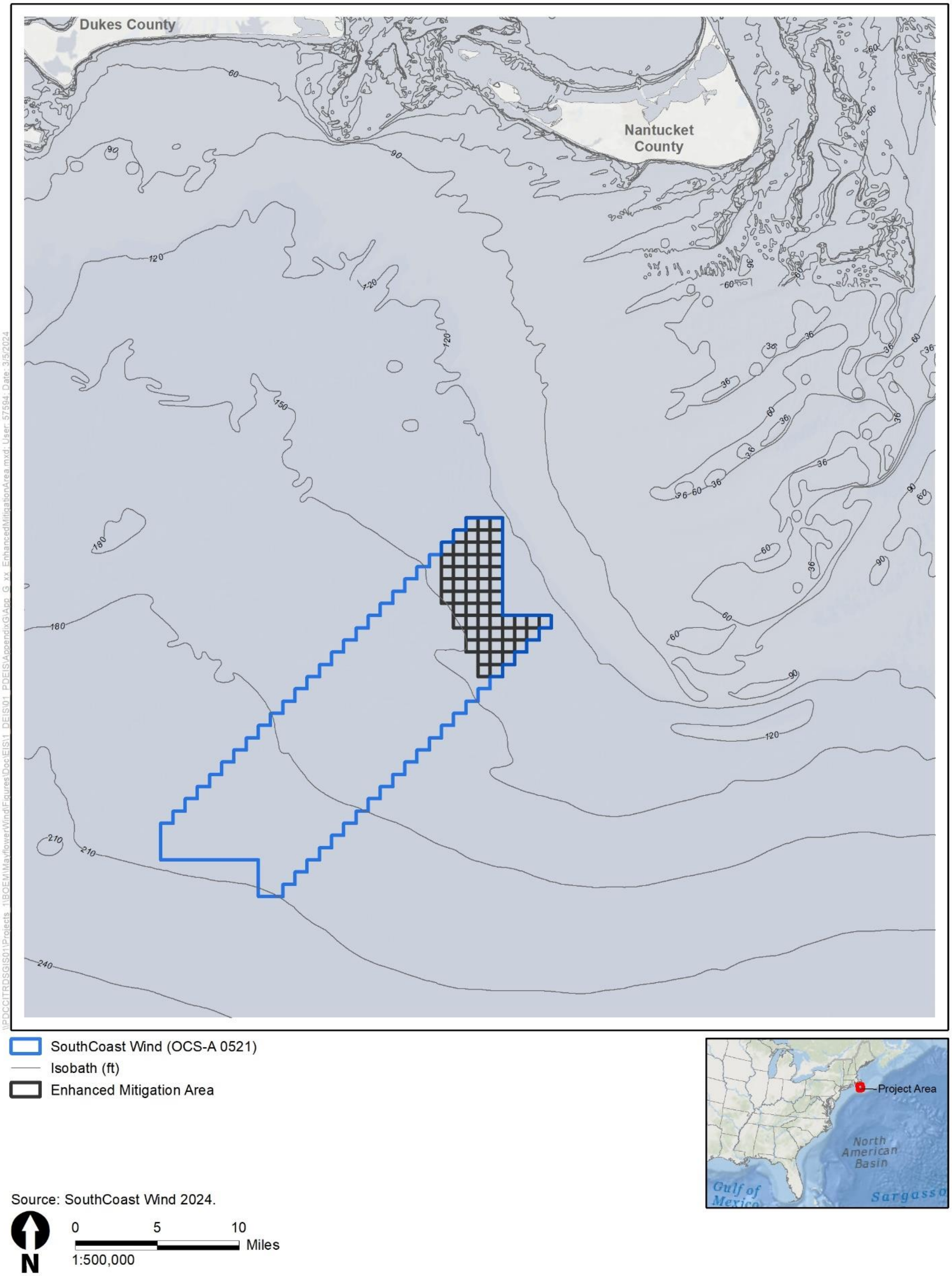

Figure G-1. SouthCoast Wind enhanced mitigation area

Table G-2. Mitigation and monitoring measures resulting from consultations

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
NHPA Section 106 Mitigation Measures from the Memorandum of Agreement					
CUL-1	Pre-C, C, O&M, D	Compliance with Section 106 Memorandum of Agreement	The Lessee will comply with stipulations of the *Memorandum of Agreement Among the Bureau of Ocean Energy Management, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Wampanoag Tribe Of Gay Head (Aquinnah), The State Historic Preservation Officers of Massachusetts and Rhode Island, Southcoast Wind Energy LLC, and The Advisory Council on Historic Preservation Regarding the SouthCoast Wind Project* (hereafter referred to as the MOA) as developed by BOEM through NHPA Section 106 consultations with federally recognized Tribes, Massachusetts and Rhode Island SHPOs, ACHP, and consulting parties to resolve adverse effects on historic properties. As defined in the Section 106 regulations, consulting parties include those who are property owners of or have demonstrated interest in the historic properties BOEM has determined would be adversely affected by the Project.	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Massachusetts Board of Underwater Archaeological Resources, Rhode Island Historical Preservation & Heritage Commission
CUL-2	C	Avoidance of Adverse Effects on Historic Properties in Marine Area of Potential Effect	Per MOA Stipulation I.A.1, the Lessee will comply with protective buffers recommended by the Qualified Marine Archaeologist (QMA) for 31 identified marine archaeological resources and seven ASLFs to avoid adverse effects on these historic properties in the marine APE.	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Massachusetts Board of Underwater Archaeological Resources, Rhode Island Historical Preservation & Heritage Commission
CUL-3	C	Funding and Implementation of Historic Properties Treatment Plan for Historic Properties in the Marine Area of Potential Effects	Per MOA Stipulation III.C.1 and the associated HPTP (MOA, Attachment 8), the Lessee will implement the measures described in the HPTP and fund these measures per the agreed-upon amounts in *Mitigation Funding Amounts* (MOA, Attachment 5) to resolve adverse effects on historic properties in the marine APE.	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Massachusetts Board of Underwater Archaeological Resources, Rhode Island Historical Preservation & Heritage Commission
CUL-4	Pre-C, C, O&M, D	Marine Archaeology Post-Review Discovery Plan	Per MOA Stipulation XI, if historic properties are discovered that may be historically significant or unanticipated effects on historic properties are found, or in the event of a post-review discovery of a historic property or unanticipated effects on a historic property prior to or during construction, installation, O&M, or decommissioning of the Project, the Lessee will implement the actions described in the post-review discovery plan (PRDP) for marine archaeology (MOA, Attachment 13).	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Board of Underwater Archaeological Resources, Rhode Island Historical Preservation & Heritage Commission
CUL-5	C	Archaeological Monitoring in the Terrestrial Area of Potential Effects	Per MOA Stipulation I.A.2, the Lessee will implement a construction monitoring program consistent with the monitoring plan for terrestrial archaeology (MOA, Attachments 3 and 4).	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Rhode Island Historical Preservation & Heritage Commission
CUL-6	C	Funding and Implementation of Historic Properties Treatment Plans for Historic Properties in the Terrestrial Area of Potential Effects	Per MOA Stipulation III.D.1 and the associated HPTP (MOA, Attachment 7), the Lessee will implement the measures described in the HPTP and fund these measures per the agreed-upon amounts in *Mitigation Funding Amounts* (MOA, Attachment 5) to resolve adverse effects on historic properties in the terrestrial APE.	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Rhode Island Historical Preservation & Heritage Commission

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
CUL-7	Pre-C, C, O&M, D	Terrestrial Archaeology Post-Review Discovery Plan	Per MOA Stipulation XI, if historic properties are discovered that may be historically significant or unanticipated effects on historic properties are found, or in the event of a post-review discovery of a historic property or unanticipated effects on a historic property prior to or during construction, installation, O&M, or decommissioning of the Project, the Lessee will implement the actions described in the PRDP for terrestrial archaeology (MOA, Attachment 14).	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Rhode Island Historical Preservation & Heritage Commission
CUL-8	C, O&M	Minimization of Adverse Effects on Historic Properties in the Visual Area of Potential Effects	Per MOA Stipulation II.A, the Lessee will implement measures for minimizing adverse effects on historic properties in the visual APE to decrease visual clutter, reduce visual contrast, and reduce light intrusion.	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Rhode Island Historical Preservation & Heritage Commission
CUL-9	C	Funding and Implementation of Historic Properties Treatment Plans for Historic Properties in the Visual Area of Potential Effects	Per MOA Stipulation III.C.1 and the associated HPTPs (MOA, Attachments 8–11), the Lessee will implement the measures described in these HPTPs and fund these measures per the agreed-upon amounts in *Mitigation Funding Amounts* (MOA, Attachment 5) to resolve adverse effects on historic properties in the visual APE.	Cultural	BOEM, BSEE, Massachusetts Historical Commission, Rhode Island Historical Preservation & Heritage Commission
Measures included in BOEM's NMFS BA that are Part of the Proposed Action for ESA Consultation (October 2024)					
BA-1	C	LOA Requirements	The measures required by the final MMPA LOA for Incidental Take Regulations would be incorporated into COP approval.	Marine Mammals	BOEM and BSEE
BA-2	C, O&M, D	Geophysical Surveys and ESA Species	SouthCoast Wind must comply with all the Project Design Criteria and Best Management Practices for Protected Species from the documents "Project Design Criteria and Best Management Practices for Protected Species Associated with Offshore Wind Data Collection" and "Offshore Wind Site Assessment and Site Characterization Activities Programmatic Consultation" that implement the integrated requirements for threatened and endangered species in the June 29, 2021, programmatic consultation under the ESA (revised November 22, 2021), as well as the June 29, 2021, NMFS Letter of Concurrence (LoC).	Marine Mammals, Sea Turtles, ESA-Listed Species	BOEM and BSEE
BA-4	C, O&M, D	Protected Species Detection and Vessel Strike Avoidance: Vessel Crew and Visual Observer Training Requirements	The Lessee must provide Project-specific training to all vessel crew members, Visual Observers, and Trained Lookouts on the identification of sea turtles and marine mammals, vessel strike avoidance and reporting protocols, and the associated regulations for avoiding vessel collisions with protected species. Reference materials for identifying sea turtles and marine mammals must be available aboard all Project vessels. Confirmation of the training and understanding of the requirements must be documented on a training course log sheet, and the Lessee must provide the log sheets to DOI upon request. The Lessee must communicate to all crew members its expectation for them to report sightings of sea turtles and marine mammals to the designated vessel contacts. The Lessee must communicate the process for reporting sea turtles and marine mammals (including live, entangled, and dead individuals) to the designated vessel contact and all crew members. The Lessee must post the reporting instructions including communication channels in highly visible locations aboard all Project vessels.	Marine Mammals, Sea Turtles	BOEM
BA-5	C, O&M, D	Protected Species Detection and Vessel Strike Avoidance: Vessel Observer Requirements	The Lessee must ensure that vessel operators and crew members maintain a vigilant watch for marine mammals and sea turtles, and reduce vessel speed, alter the vessel's course, or stop the vessel as necessary to avoid striking marine mammals or sea turtles. All vessels transiting to and from the SouthCoast Wind farm must have a trained lookout for NARWs on duty at all times, during which the trained lookout must monitor a vessel strike avoidance zone around the vessel. The trained lookout must maintain a vigilant watch at all times a vessel is underway, and when technically feasible, be capable of monitoring the 500-meter Vessel Strike Avoidance Zone for ESA-listed species and to maintain minimum separation distances. Alternative monitoring technology (e.g., night vision, thermal cameras) must be available to maintain a vigilant watch at night and in any other low visibility conditions. If a vessel is carrying a trained lookout for the purposes of maintaining watch for NARWs, a trained lookout for sea turtles is not required, provided that the trained lookout maintains watch for marine mammals and sea turtles. If the trained lookout is a vessel crew member, the lookout obligations, as noted above, must be that person's designated role and primary responsibility while the vessel is transiting. Vessel personnel must be provided an Atlantic reference guide to help identify marine mammals and sea turtles that may be encountered. Vessel personnel must also be provided material regarding NARW Seasonal Management Areas (SMAs), Dynamic Management Areas (DMAs), and Slow Zones, sightings information, and reporting. All observations must be recorded per reporting requirements.	Marine Mammals, Sea Turtles	BOEM

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			Outside of active watch duty, members of the monitoring team must check NMFS Right Whale Sighting Advisory System (RWSAS) for the presence of NARWs in the SouthCoast Wind farm. The trained lookout must check https://seaturtlesightings.org before each trip and report any detections of sea turtles in the vicinity of the planned transit to all vessel operators or captains and lookouts on duty that day. For all vessels operating north of the Virginia/North Carolina border, between June 1 and November 30, the Lessee must have a trained lookout posted on all vessel transits during all phases of the Project to observe for sea turtles. For all vessels operating south of the Virginia/North Carolina border, year-round, the Lessee must have a trained lookout posted on all vessel transits during all phases of the Project to observe for sea turtles. The trained lookout will communicate any sightings in real time to the captain to implement required avoidance measures.		
BA-6	Pre-C, C, O&M, D	Protected Species Detection and Vessel Strike Avoidance: Communication of Threatened and Endangered Species Sightings	The Lessee must ensure that whenever multiple Project vessels are operating, any visual detections of ESA-listed species (marine mammals and sea turtles) are communicated in near real time to a third-party Protected Species Observer (PSO), vessel captains, or both associated with other Project vessels.	Marine Mammals, Sea Turtles	BOEM
BA-7	C, O&M, D	Protected Species Detection and Vessel Strike Avoidance: Vessel Speed Requirements	Vessel captain and crew must maintain a vigilant watch for all protected species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any listed species. The presence of a single individual at the surface may indicate the presence of submerged animals in the vicinity; therefore, precautionary measures should always be exercised upon the sighting of a single individual. Vessels underway must not divert their course to approach any protected species. During construction, vessels of all sizes will operate port to port at 10 knots or less between November 1 and April 30 and while operating in the Lease Area, along the export cable route, or transit area to and from ports. Regardless of vessel size, vessel operators must reduce vessel speed to 10 knots (11.5 mph) or less while operating in any Seasonal Management Area (SMA) or visually detected Slow Zones. This requirement does not apply when necessary for the safety of the vessel or crew. Any such events must be reported (see reporting requirements). Otherwise, these speed limits do not apply in areas of Narragansett Bay or Long Island Sound where the presence of NARWs is not expected. The Lessee may only request a waiver from any visually triggered Slow Zone/DMA vessel speed reduction requirements during operations and maintenance, by submitting a vessel strike risk reduction plan that details revised measures and an analysis demonstrating that the measure(s) will provide a level of risk reduction at least equivalent to the vessel speed reduction measure(s) proposed for replacement. The plan included with the request must be provided to NMFS Greater Atlantic Regional Fisheries Office, Protected Resources Division and BOEM at least 90 days prior to the date scheduled for the activities for the waiver is requested. The plan must not be implemented unless NMFS and BOEM reach consensus on the appropriateness of the plan. BOEM encourages increased vigilance through voluntary implementation of best management practices to minimize vessel interactions with NARWs, and by voluntarily reducing speeds to 10 knots or less when operating within an acoustically triggered slow zone, and when feasible, avoid Slow Zones.	Marine Mammals, Sea Turtles	BOEM
BA-8	C, O&M, D	Vessel Strike Avoidance of Large Cetaceans	All vessel operators must check for information regarding mandatory or voluntary ship strike avoidance and daily information regarding NARW sighting locations. These media may include, but are not limited to: NOAA weather radio, U.S. Coast Guard NAVTEX and Channel 16 broadcasts, Notices to Mariners, the Whale Alert app, or WhaleMap website. Information about active SMAs and Slow Zones can be accessed at: https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-vessel-strikes-north-atlantic-right-whales If an ESA-listed whale or large unidentified whale is identified within 1,640 feet (500 meters) of the forward path of any vessel (90 degrees port to 90 degrees starboard), the vessel operator must immediately implement strike avoidance measures and steer a course away from the whale at 10 knots (18.5 kilometers per hour) or less until the vessel reaches a 1,640-feet (500 meter) separation distance from the whale. Trained lookouts, visual observers, vessel crew, or PSOs must notify the vessel captain of any whale observed or detected within 1,640 feet (500 meters) of the survey vessel. Upon notification, the vessel captain must immediately implement vessel strike avoidance procedures to maintain a separation distance of 1,640 feet (500 meters) or reduce vessel speed to allow the animal to travel away from the vessel. 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 execute the required vessel strike avoidance measures to avoid the animal. If an ESA-listed large whale is sighted within 656 feet (200 meters) of the forward path of a vessel, the vessel operator must initiate a full stop by reducing speed and shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel’s path and beyond 1,640 feet (500 meters). If stationary, the vessel must not engage engines until the ESA-listed large whale has moved beyond 1,640 feet (500 meters).	Marine Mammals	BOEM, NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
BA-9	C, O&M, D	Vessel Strike Avoidance of Small Cetaceans and Seals	If pinnipeds or small delphinids of the genera Delphinus, Lagenorhynchus, Stenella, or Tursiops are visually detected approaching the vessel (i.e., to bow ride) or towed equipment, vessel speed reduction, course alteration, and shutdown are not required. For small cetaceans and seals, all vessels must maintain a minimum separation distance of 164 feet (50 meters) to the maximum extent practicable, except when those animals voluntarily approach the vessel. When marine mammals are sighted while a vessel is underway, the vessel operator must endeavor to avoid violating the 164-foot (50-meter) separation distance by attempting to remain parallel to the animal's course and avoiding excessive speed or abrupt changes in vessel direction until the animal has left the area, except when taking such measures would threaten the safety of the vessel or crew. If marine mammals are sighted within the 164-foot separation distance, the vessel operator must reduce vessel speed and shift the engine to neutral, not engaging the engines until animals are beyond 164 feet (50 meters) from the vessel.	Marine Mammals	BOEM
BA-10	C, O&M, D	Vessel Strike Avoidance of Sea Turtles	The Lessee must slow down to 4 knots if a sea turtle is sighted within 328 feet (100 meters) of the operating vessel's forward path. The vessel operator must 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 the vessel may resume normal operations. 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 individual 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 November 30, all vessels must avoid transiting through areas of visible jellyfish aggregations or floating vegetation (e.g., *Sargassum* 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. All vessel crew members must be briefed on the identification of sea turtles and on regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all project vessels for identification of sea turtles. The expectation and process for reporting of sea turtles (including live, entangled, and dead individuals) must be clearly communicated and posted in highly visible locations aboard all project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process for crew members to report.	Sea Turtles	BOEM
BA-11	Pre-C, C, O&M, D	Reporting of All NARW Sightings	The Lessee must immediately report all NARWs observed at any time by PSOs or vessel personnel on any Project vessels, during any Project- related activity, or during vessel transit. Reports must be sent to: BOEM (at renewable_reporting@boem.gov) and BSEE (at protectedspecies@bsee.gov); the NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622); the Coast Guard (via Channel 16); and WhaleAlert (through the WhaleAlert app at http://www.whalealert.org/). The report must include the time, location, and number of animals.	Marine Mammals	BOEM
BA-12	Pre-C, C, O&M, D	Detected or Impacted Protected Species Reporting	The Lessee is responsible for reporting dead or injured protected species, regardless of whether they were observed during operations or due to Project activities. The Lessee must report any potential take, strikes, dead, or injured protected species caused by Project vessels or sighting of an injured or dead marine mammal or sea turtle, regardless of the cause, to the NMFS Greater Atlantic Regional Fisheries Office, Protected Resources Division (at nmfs.gar.incidental-take@noaa.gov), NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622), BOEM (at renewable_reporting@boem.gov), and BSEE (at protectedspecies@bsee.gov). Reporting must be as soon as practicable but no later than 24 hours from the time the incident took place (Detected or Impacted Protected Species Report). Staff responding to the hotline call will provide any instructions for the handling or disposing of any injured or dead protected species by individuals authorized to collect, possess, and transport sea turtles. Reports must include at a minimum: (1) survey name and applicable information (e.g., vessel name, station number); (2) GPS coordinates describing the location of the interaction (in decimal degrees); (3) gear type involved (e.g., bottom trawl, gillnet, longline); (4) soak time, gear configuration and any other pertinent gear information; (5) time and date of the interaction; and (6) identification of the animal to the species level. Additionally, the e-mail would transmit a copy of the NMFS Take Report Form and a link to or acknowledgement that a clear photograph or video of the animal was taken (multiple photographs are suggested, including at least one photograph of the head scutes). If reporting within 24 hours is not possible due to distance from shore or lack of ability to communicate via phone, fax, or email, reports would be submitted as soon as possible; late reports would be submitted with an explanation for the delay. At the end of each survey season, a report would be sent to NMFS that compiles all information on any observations and interactions with ESA-listed species. This report would also contain information on all survey activities that took place during the season including location of gear set, duration of soak/trawl, and total effort. The report on survey activities would be comprehensive of all activities, regardless of whether ESA-listed species were observed.	Marine Mammals, Sea Turtles, ESA-Listed Species	BOEM
BA-13	Pre-C, C, O&M, D	Detected or Impacted Dead Non-ESA-Listed Fish	Any occurrence of at least 10 dead non-ESA-listed fish within established shutdown or monitoring zones must also be reported to BOEM (at renewable_reporting@boem.gov) as soon as practicable (taking into account crew and vessel safety), but no later than 24 hours after the sighting.	ESA-Listed Species	BOEM

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
BA-14	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Pile-Driving Time-of-Year Restriction	The Lessee must not conduct any foundation pile-driving activities between December 1 and April 30. Pile driving must not occur in December unless unanticipated delays due to weather or technical problems arise that necessitate extending pile driving through December, and the pile driving is allowed by BOEM in accordance with the following procedures. The Lessee must notify BOEM in writing by September 1 that the Lessee believes that circumstances necessitate pile driving in December. The Lessee must submit to BOEM (at renewable_reporting@boem.gov) for written concurrence an enhanced survey plan for December 1 through December 31 to minimize the risk of exposure of NARWs to pile-driving noise, including noise from daily pre-construction geophysical surveys. BOEM will review the enhanced survey plan and provide comments, if any, on the plan within 30 calendar days of its submittal. The Lessee must resolve all comments on the enhanced survey plan to BOEM's satisfaction and receive BOEM's written concurrence before any pile driving occurs. However, the Lessee may conclusively presume BOEM's concurrence with the enhanced survey plan if BOEM provides no comments on the plan within 90 calendar days of its submittal. The Lessee must also follow the time-of-year enhanced mitigation measures specified in the applicable Biological Opinion. The Lessee must confirm adherence to time-of-year restrictions on pile driving in the pile-driving reports submitted with the FIR.	Marine Mammals, ESA-Listed Species	BOEM
BA-15	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Pile-Driving Weather, Time, and Visibility Restrictions	The Lessee must not conduct pile driving operations at any time when lighting or weather conditions (e.g., darkness, rain, fog, sea state) prevent visual monitoring of the full extent of the clearance and shutdown zones. In order to conduct nighttime pile driving, SouthCoast Wind would submit a Nighttime Pile Driving Plan (NPDP) as part of the Alternative Monitoring Plan (AMP) to BOEM and NMFS for approval. The NPDP will describe the methods, technologies, monitoring zones, and mitigation requirements for any nighttime pile driving activities. In the absence of an approved NPDP, all pile driving would be initiated during daytime and nighttime pile driving could only occur if unforeseen circumstances prevent the completion of pile driving during daylight hours and was deemed necessary to continue piling during the night to protect asset integrity or safety. The AMP, including the NPDP if nighttime pile driving is planned, must be submitted by the Lessee to BOEM and NMFS for review and approval 180 calendar days, but no later than 120 days, prior to the planned start of pile-driving. The full AMP may include deploying additional observers, alternative monitoring technologies such as night vision, thermal, and infrared technologies, and use of PAM and must demonstrate the ability and effectiveness to maintain clearance all pre-clearance and shutdown zones during daytime as outlined below in Part 1 and nighttime as outlined below in Part 2 to BOEM's and NMFS's satisfaction. The AMP must include two stand-alone components as described below: 1. Part 1 – Daytime when lighting or weather (e.g., fog, rain, sea state) conditions prevent visual monitoring of the full extent of the clearance and shutdown zones. Daytime being defined as one hour after civil sunrise to 1.5 hours before civil sunset. 2. Part 2 – Nighttime inclusive of weather conditions (e.g., fog, rain, sea state). Nighttime being defined as 1.5 hours before civil sunset to one hour after civil sunrise. The AMP should include, but is not limited to the following information: 1. Identification of night vision devices (e.g., mounted thermal/IR camera systems, hand-held or wearable NVDs, IR spotlights), if proposed for use to detect protected marine mammal and sea turtle species. 2. The AMP must demonstrate (through empirical evidence) the capability of the proposed monitoring methodology to detect marine mammals and sea turtles within the full extent of the established clearance and shutdown zones (i.e., species can be detected at the same distances and with similar confidence) with the same effectiveness as daytime visual monitoring (i.e., same detection probability). Only devices and methods demonstrated as being capable of detecting marine mammals and sea turtles to the maximum extent of the clearance and shutdown zones will be acceptable. 3. Evidence and discussion of the efficacy (range and accuracy) of each device proposed for low visibility monitoring must include an assessment of the results of field studies (e.g., Thayer Mahan demonstration), as well as supporting documentation regarding the efficacy of all proposed alternative monitoring methods (e.g., best scientific data available). 4. Procedures and timeframes for notifying NMFS and BOEM of SouthCoast Wind's intent to pursue nighttime pile driving. 5. Reporting procedures, contacts and timeframes. BOEM may request additional information, when appropriate, to assess the efficacy of the AMP.	Marine Mammals, ESA-Listed Species	BOEM
BA-16	Pre-C, C, O&M, D	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: PSO Requirements	. The Lessee must use PSOs provided by a third party. PSOs must have no Project- related tasks other than to observe, collect and report data, and communicate with and instruct relevant vessel crew regarding the presence of protected species and mitigation requirements (including brief alerts regarding maritime hazards). PSOs or any PAM operators serving as PSOs must have completed a commercial PSO training program for the Atlantic with an overall examination score of 80 percent or greater. The Lessee must provide training certificates for individual PSOs to BOEM upon request. And PSOs and PAM operators must be approved by NMFS before the start of a survey. Application requirements to become a NMFS-approved PSO for construction activities can be found online or for geological and geophysical surveys by sending an inquiry to nmfs.psoreview@noaa.gov. Specific PSO Requirements include:	Marine Mammals, Sea Turtles, ESA-Listed Species	BOEM, NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			1. At least one PSO must be on duty at all times as the lead PSO or as the PSO monitoring coordinator during pile driving. Total PSO coverage must be adequate to ensure effective monitoring to reliably detect whales and sea turtles in the identified clearance and shutdown zones and execute any pile driving delays or shutdown requirements. 2. At least one lead PSO must be present on each vessel. PSOs on transit vessels must be approved by NMFS but need not be authorized as a lead PSO. Lead PSOs must have prior approval from NMFS as an unconditionally approved PSO. 3. All PSOs on duty must be clearly listed and the lead PSO identified on daily data logs for each shift. 4. A sufficient number of PSOs, consistent with the Biological Opinion and as prescribed in the final Incidental Take Authorization (ITA), must be deployed to record data in real time and effectively monitor the required clearance, shutdown, or monitoring zone for the Project. 5. The duties of these PSOs include visual surveys in all directions around a pile; PAM; and continuous monitoring of sighted NARWs. 6. Where applicable, the number of PSOs deployed must meet the NARW enhanced seasonal monitoring requirements. A PSO must not be on watch for more than 4 consecutive hours and must be granted a break of no fewer than 2 hours after a 4-hour watch.		
BA-17	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Pile-Driving Monitoring Plan Requirements	The Lessee must submit a Pile-Driving Monitoring (PDM) Plan for review to BOEM (at renewable_reporting@boem.gov), BSEE (at OSWsubmittals@bsee.gov), and NMFS 180 calendar days, but no later than 120 days, before beginning the first pile-driving activities for the Project. DOI will review the PDM Plan and provide any comments on the plan within 90 calendar days of its submittal. The Lessee must resolve all comments on the PDM Plan to DOI's satisfaction before implementing the plan. If DOI provides no comments on the PDM Plan within 90 calendar days of its submittal, then the Lessee may conclusively presume DOI's concurrence with the plan. The PDM Plan must: 1. Contain information on the visual and PAM components of the monitoring describing all equipment, procedures, and protocols; 2. The PAM system must demonstrate a near-real-time capability of detection to the full extent of the 160 dB distance from the pile-driving location; 3. The PAM plan must include a detection confidence that a vocalization originated from within the clearance and shutdown zones to determine that a possible NARW has been detected. Any PAM detection of a NARW within the clearance/shutdown zone surrounding a pile must be treated the same as a visual observation and trigger any required delays in pile installation. 4. Ensure that the full extent of the harassment distances from piles are monitored for marine mammals and sea turtles to document all potential take; 5. Include number of PSOs or Native American monitors, or both, that will be used, the platforms or vessels upon which they will be deployed, and contact information for the PSO providers; 6. Include measures for enhanced monitoring capabilities in the event that poor visibility conditions unexpectedly arise, and pile driving cannot be stopped. Include an Alternative Monitoring Plan that provides for enhanced monitoring capabilities in the event that poor visibility conditions unexpectedly arise, and pile driving cannot be stopped. The Alternative Monitoring Plan must also include measures for deploying additional observers, using night vision goggles, or using PAM with the goal of ensuring the ability to maintain all clearance and shutdown zones in the event of unexpected poor visibility conditions. Describe a communication plan detailing the chain of command, mode of communication, and decision authority must be described. PSOs as determined by NMFS and BOEM must be used to monitor the area of the clearance and shutdown zones. Seasonal and species-specific clearance and shutdown zones must also be described in the PDM Plan including time-of-year requirements for NARWs. A copy of the approved PDM Plan must be in the possession of the lessee representative, the PSOs, impact-hammer operators, and any other relevant designees operating under the authority of the approved COP and carrying out the requirements on site.	Marine Mammals, Sea Turtles	BOEM, NMFS
BA-18	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Soft Start for Pile Driving	The Lessee must implement soft start techniques for all impact pile-driving, both at the beginning of a monopile installation and at any time following the cessation of impact pile-driving of 30 minutes or longer. The soft start procedure must include a minimum of 20 minutes of 4-6 strikes/minute at 10-20 percent of the maximum hammer energy.	ESA-Listed Species	BOEM
BA-19	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Pile-Driving Sound	The Lessee must ensure that the distance to the Level A harassment and Level B harassment thresholds, sea turtle injury and harassment thresholds, and Atlantic sturgeon injury and harassment thresholds are no larger than those modelled assuming 10 dB re 1 µPa noise attenuation is met by conducting field verification during pile-driving. The Lessee must submit a Sound Field Verification Plan (SFVP) for review and comment to the USACE, BOEM (at renewable_reporting@boem.gov), and NMFS (at nmfs.gar.incidental-take@noaa.gov) 180 calendar days, but no later than 120 days, before beginning the first pile-driving activities for the Project. DOI will review the SFVP and provide any comments on the plan within 30 calendar days of its submittal. The Lessee must resolve all comments on the SFVP to DOI's satisfaction before implementing the plan. The Lessee may conclusively presume DOI's concurrence with the SFVP if DOI	Sea Turtles, ESA-Listed Species	BOEM, NMFS, USACE

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		Field Verification Plan	provides no comments on the plan within 90 calendar days of its submittal. The Lessee must execute the SFVP and report the associated findings to BOEM for 3 monopile foundations, or as specified under the corresponding LOA for this action. The Lessee must conduct additional field measurements if it installs piles with a diameter greater than the initial piles, if it uses a greater hammer size or energy, or if it measures any additional foundations to support any request to decrease the distances specified for the clearance and shutdown zones. The Lessee must implement the SFVP requirements for verification of noise attenuation for at least 3 foundations for BOEM, in consultation with NMFS, to consider reducing zone distances. The Lessee must ensure that locations identified in the SFVP for each pile type are representative of other piles of that type to be installed and that the results are representative for predicting actual installation noise propagation for subsequent piles. The SFVP must describe how the effectiveness of the sound attenuation methodology will be evaluated. The SFVP must be sufficient to document impacts in Level B harassment zones for marine mammals and injury and behavioral disturbance zones for sea turtles and Atlantic sturgeon.		
BA-20	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Adaptive Refinement of Clearance Zones, Shutdown Zones, and Monitoring Protocols	The Lessee must reduce any unanticipated impacts on marine mammals and sea turtles by adjusting pile-driving monitoring protocols for clearance and shutdown zones, taking into account weekly monitoring results (see BA-28). Any proposed changes to monitoring protocols must be concurred with by DOI and NMFS before those protocols are implemented. Any reduction in the size of the clearance and shutdown zones for each foundation type must be based on at least 3 measurements submitted to BOEM and NMFS for review. For each 4,921 feet (1,500 meters) that a clearance or shutdown zone is increased based on the results from SFVP, the Lessee must deploy additional platforms and must deploy additional observers on those platforms. Should the shutdown zone for sei, fin, humpback, and sperm whales be decreased the full extent of the Level B harassment distance must be monitored using PAM and visual observations. Decreases in the distance of the clearance or shutdown zones for NARW and sea turtles are not permitted.	Marine Mammals, Sea Turtles	BOEM, NMFS
BA-21	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Pile-Driving Clearance Zones (No-go Zones) for Sea Turtles	The Lessee must minimize the exposure of ESA-listed sea turtles to noise that may result in injury or behavioral disturbance during pile-driving operations by tasking the PSOs to establish a clearance and shutdown zone for sea turtles during all pile-driving activities that is no less than 1,640 feet (500 meters) between 60 minutes before pile-driving activities, during pile driving and 30 minutes post-completion of pile-driving activity. Adherence to the 1,640-foot (500-meter) clearance and shutdown zones must be confirmed in the PSO reports	Sea Turtles	BOEM, NMFS
BA-22	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Impact Pile-Driving Clearance Zones (No-go Zones) for Marine Mammals	The Lessee must use visual monitoring by at least two PSOs and PAM during impact pile-driving activities following the standard protocols and data collection requirements. The Lessee must ensure that at least two PSOs are on duty on the impact pile driving platform and at least two PSO are on duty on a dedicated PSO vessel and establish the following clearance zones for NARWs to be used between 60 minutes before pile-driving activities and 30 minutes post-completion of pile-driving activity: • The Lessee must establish a clearance zone of 1.37 miles (2.2 kilometers) for large whales other than NARW using visual monitoring for impact pile driving. • The Lessee must also establish a PAM clearance zone of 3.1 miles (5 kilometers) and a PAM shutdown zone of 1.23 miles (2 kilometers) for NARWs. • Impact pile driving activity must be delayed when a NARW is visually observed by PSOs at any distance from the pile. Impact pile driving for all foundations must be delayed upon a confirmed PAM detection of a NARW, if the detection is confirmed to have been located within the 5 km clearance zone. • No pile driving may begin unless all clearance zones have been free of NARW for 30 minutes immediately before pile driving. The Lessee must deploy a real-time PAM system designed and verified to maintain a PAM clearance zone of 3.1 miles (5 km) and a shutdown zone of 1.23 miles (2 km) for all monopile foundations. • Real-time PAM must begin at least 60 minutes before pile driving to monitor a 3.1 mile (5 km) clearance zone. • The real-time PAM system must be configured to ensure that the PAM operator is able to review acoustic detections within approximately 15 minutes of the original detection in order to verify whether a NARW has been detected. • Impact pile driving must be suspended upon a confirmed PAM NARW vocalization within the PAM shutdown Zone detected and identified as a NARW. The detection will be treated as a NARW detection for mitigation purposes	Marine Mammals	BOEM
BA-23	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity:	The Lessee must use visual monitoring by at least two PSOs during vibratory pile-driving activities. The Lessee must ensure that PSOs are on a dedicated PSO vessel and establish clearance zones for NARWs to be used between 30 minutes before pile-driving activities and 30 minutes post-completion of pile-driving activity. For all ESA-listed Mysticete whales and sperm whales, a clearance zone of 4,921 feet (1,500 meters) is to be established. For sea turtles, a clearance zone of 1,640 feet (500 meters) is to be established.	Marine Mammals, ESA-Listed Species	BOEM

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		Vibratory Pile-Driving Clearance Zones (No-go Zones) for ESA-listed Species and Marine Mammals	Vibratory pile driving may begin only after PSOs have confirmed all clearance zones are clear of marine mammals. Vibratory pile driving must be suspended if a marine mammal is visually observed by PSOs within the shutdown zone. At all times of the year, any unidentified whale sighted by a PSO within 6,562 feet (2,000 meters) of the pile must be treated as if it were a NARW and trigger any required pre-construction delay or shutdowns during pile installation. Vibratory pile driving may begin only if all clearance zones are fully visible (e.g., not obscured by darkness, rain, fog, or snow) for at least 30 minutes as determined by the lead PSO. If conditions such as darkness, rain, fog, or snow prevent the visual detection of marine mammals in the clearance zones, construction activities must not begin until the full extent of all clearance zones are fully visible as determined by the lead PSO.		
BA-24	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Noise Mitigation for Impact Pile Driving	The Lessee must apply noise reduction technologies during all impact pile driving to minimize marine species noise exposure. The range measured to the Level B harassment threshold when noise mitigation devices are in use must be consistent with or less than the range modeled assuming 10 dB attenuation, determined via sound field verification of the modeled isopleth distances (e.g., Level B harassment distances). If a bubble curtain is used, the following requirements apply: Bubble curtains must distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column. 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. No parts of the ring or other objects may prevent full seafloor contact of the lowest bubble ring. The Lessee must train personnel in the proper balancing of air flow to the bubblers. The Lessee must submit an inspection and performance report to DOI within 72 hours following the performance test. Any modifications to attenuation devices to meet the performance standards must occur before impact driving occurs and maintenance or modifications completed must be included in the report. The Lessee must ensure PSOs follow all pile driving reporting instructions and requirements.	ESA-Listed Species	BOEM and USACE
BA-25	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Pile-Driving Noise Reporting and Clearance or Shutdown Zone Adjustment	The Lessee must measure pile-driving noise in the field for at least three monopile foundations and submit initial results to NMFS, USACE, and BOEM (at renewable_reporting@boem.gov) as soon as they are available. BOEM will discuss the results as soon as feasible. The Lessee may request modification of the clearance and shutdown zones based on these results but must meet or exceed minimum distances for threatened and endangered species specified in the Biological Opinion (e.g., 3,280 feet [1,000 meters] for large whales and 1,640 feet [500 meters] for sea turtles). If the field measurements indicate that the isopleths for noise exposure are larger than those considered in the approved COP, the Lessee must coordinate with BOEM, BSEE, NMFS, and USACE to implement additional sound attenuation measures or larger clearance or shutdown zones before driving any additional piles. NMFS does not anticipate considering any reductions in the clearance or shutdown zones for NARWs.	ESA-Listed Species	BOEM, BSEE, NMFS, and USACE
BA-26	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Pile-Driving Work Within a Slow Zone	If a visually triggered NARW Slow Zone overlaps with the NARW Shutdown Zone, the PAM system detection must extend to the largest practicable detection zone. PSOs must treat any PAM detection of NARWs in the clearance and shutdown zones the same as a visual detection and call for the required delays or shutdowns in pile installation.	Marine Mammals	BOEM
BA-27	C	Wind Turbine Foundations Pile Driving/Impact Hammer Activity: Submittal of Raw Field Data Collected for Marine Mammals and Sea Turtles in the Pile-Driving Shutdown Zone	Within 24 hours of detection, the Lessee must report to BOEM (at renewable_reporting@boem.gov) and BSEE (at protectedspecies@bsee.gov) the sighting of any marine mammal or sea turtle in the shutdown zone that results in a shutdown or a power-down. In addition, PSOs must submit the raw data collected in the field and daily report forms including the date, time, species, pile identification number, GPS 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 shutdown zone, time the pile driver was restarted or powered back up, and any photographs.	Marine Mammals, Sea Turtles, ESA-Listed Species	BOEM
BA-28	C	Wind Turbine Foundations Pile Driving/Impact	The Lessee must submit weekly PSO and PAM monitoring reports to DOI and NMFS during pile-driving. Weekly reports must document the daily start and stop times of all pile-driving, the daily start and stop times of associated observation periods by the PSOs, details on the deployment of PSOs, and all detections of marine mammals and sea turtles. The weekly reports must be submitted to BOEM (at renewable_reporting@boem.gov), BSEE (at OSWsubmittals@bsee.gov) and	ESA-Listed Species	BOEM, BSEE, NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
		Hammer Activity: Weekly and Final Pile-Driving Reports	NMFS Greater Atlantic Regional Fisheries Office, Protected Resources Division (at nmfs.gar.incidental- take@noaa.gov) every Wednesday during construction for the previous week (Sunday through Saturday) of monitoring of pile-driving activity. Weekly monitoring reports must include: Summaries of pile-driving activities and piles installed including, start and stop times, pile locations, and PSO coverage; Vessel operations (including port departures, number of vessels, type of vessel(s), and route); All protected species sightings; Vessel strike-avoidance measures taken; and any equipment shutdowns or takes that may have occurred. Weekly reports can consist of raw data. Required data and reports provided to DOI 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 efforts during pile-driving activities, and every week thereafter until the final reporting period upon conclusion of pile-driving activity. Any editing, review, and quality assurance checks must be completed only by the PSO provider prior to submission to NMFS and DOI. The Lessee must submit to DOI at renewable_reporting@boem.gov and OSWsubmittals@bsee.gov a final summary report of PSO monitoring 90 days following the completion of pile driving.		
BA-29	Pre-C, C, O&M, D	Marine Debris Awareness and Elimination: Marine Debris Awareness Training	The Lessee must ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the approved COP complete marine trash and debris awareness training annually. The training consists of two parts: (1) viewing a marine trash and debris training video or slide show (described below); and (2) receiving an explanation from management personnel that emphasizes their commitment to the requirements. The marine trash and debris training videos, training slide packs, and other marine debris related educational material may be obtained at https://www.bsee.gov/debris or by contacting BSEE. The training videos, slides, and related material may be downloaded directly from the website. Operators engaged in marine survey activities must continue to develop and use a marine trash and debris awareness training and certification process that reasonably assures that their employees and contractors are in fact trained. a. The training process would include the following elements: b. Viewing of either a video or slide show by the personnel specified above; c. An explanation from management personnel that emphasizes their commitment to the requirements; d. Attendance measures (initial and annual); and e. Recordkeeping and the availability of records for inspection by DOI. By January 31 of each year, the Lessee would submit to DOI an annual report that describes its marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. The Lessee would send the reports via email to BOEM (at renewable_reporting@boem.gov) and to BSEE (at OSWsubmittals@bsee.gov).	ESA-Listed Species	BOEM, BSEE
BA-30	Pre-C, C, O&M, D	Marine Debris Awareness and Elimination: Marine Debris Reporting	The Lessee must report to DOI (using the email address listed on DOI's most recent incident reporting guidance) all lost or discarded marine trash and debris. This report must be made monthly and submitted no later than the fifth day of the following month. The Lessee is not required to submit a report for those months in which no marine trash and debris was lost or discarded. In addition, the Lessee must submit a report within 48 hours of the incident (48-hour Report) if the marine trash or debris could: (a) cause undue harm or damage to natural resources, including their physical, atmospheric, and biological components, with particular attention to marine trash or debris that could entangle or be ingested by marine protected species; or (b) significantly interfere with OCS uses (e.g., because the marine trash or debris is likely to snag or damage fishing equipment or presents a hazard to navigation). The information in the 48-hour report must be the same as that listed for the monthly report, but only for the incident that triggered the 48-hour Report. The Lessee must report to DOI via email to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWsubmittals@bsee.gov) if the object is recovered and, as applicable, describe any substantial variance from the activities described in the Recovery Plan that were required during the recovery efforts. The Lessee must include and address information on unrecovered marine trash and debris in the description of the site clearance activities provided in the decommissioning application required under 30 C.F.R. § 585.906. Materials, equipment, tools, containers, and other items used in OCS activities which are of such shape or properly secured to prevent loss overboard. All markings must clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed.	ESA-Listed Species	BOEM, BSEE
BA-31	O&M, D	Marine Debris: Periodic Underwater Surveys, Reporting of Monofilament and Other Fishing Gear Around WTG Foundations	The Lessee must monitor indirect impacts associated with charter and recreational fishing gear lost from expected increases in fishing around WTG foundations by surveying at least 10 different WTGs in the SouthCoast Wind Lease Area annually. Survey design and effort may be modified based upon previous survey results with review and concurrence by DOI. The Lessee must conduct surveys by remotely operated vehicles, divers, or other means to determine the frequency and locations of marine debris. The Lessee must report the results of the surveys to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWsubmittals@bsee.gov) in an annual report, submitted by April 30 for the preceding calendar year. Reports must 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 must include daily survey reports that include the survey 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. BMPs will be coordinated with NOAA's marine debris program.	ESA-Listed Species	BOEM, BSEE

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
BA-32	C	Establishment of Shutdown Zones for Vibratory Pile Driving	Ensure that vibratory 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-meter) shutdown zone for all pile-driving activities. Adherence to the 1,640-foot (500-meter) shutdown zones must be reflected in the PSO reports. Any visual detection of sea turtles the 500-meter shutdown zones must trigger the required shutdown in pile installation. Upon a visual detection of a sea turtles entering or within the shutdown zone during pile-driving, SouthCoast Wind must shut down the pile-driving hammer (unless activities must proceed for human safety or for concerns of structural failure) from when the PSO observes, until: 1) The lead PSO verifies that the animal(s) voluntarily left and headed away from the clearance area; or 2) 30 minutes have elapsed without re-detection of the sea turtle(s) by the lead PSO Additionally, if shutdown is called for but SouthCoast Wind 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 to do so.	Sea Turtles	BOEM
BA-33	C, O&M, D	Sea turtle disentanglement	Vessels deploying fixed gear (e.g., pots/traps) must have adequate disentanglement equipment onboard, such as a (i.e., knife and boathook) onboard. Any disentanglement must occur consistent with the Northeast Atlantic Coast STDN Disentanglement Guidelines at https://www.reginfo.gov/public/do/DownloadDocument?objectID=102486501 and the procedures described in "Careful Release Protocols for Sea Turtle Release with Minimal Injury" (NOAA Technical Memorandum 580; https://repository.library.noaa.gov/view/noaa/3773).	Sea Turtles, ESA-Listed Species	BOEM, BSEE, NMFS
BA-34	C, O&M, D	Sea turtle/Atlantic sturgeon identification and data collection	Any sea turtles or Atlantic sturgeon caught or retrieved in any fisheries survey gear must first be identified to species or species group. Each ESA-listed species caught or retrieved must then be documented using appropriate equipment and data collection forms. Biological data collection, sample collection, and tagging activities must be conducted as outlined below. Live, uninjured animals must be returned to the water as quickly as possible after completing the required handling and documentation. a. The Sturgeon and Sea Turtle Take Standard Operating Procedures must be followed (https://media.fisheries.noaa.gov/2021-11/Sturgeon%20%26%20Sea%20Turtle%20Take%20SOPs_external_11032021.pdf). b. Survey vessels must have a passive integrated transponder (PIT) tag reader onboard capable of reading 134.2 kHz and 125 kHz encrypted tags (e.g., Biomark GPR Plus Handheld PIT Tag Reader). This reader must be used to scan any captured sea turtles and sturgeon for tags, and any tags found must be recorded on the take reporting form (see below). c. Genetic samples must be taken from all captured Atlantic sturgeon (alive or dead) to allow for identification of the DPS of origin of captured individuals and tracking of the amount of incidental take. This must be done in accordance with the Procedures for Obtaining Sturgeon Fin Clips (https://media.fisheries.noaa.gov/dam-migration/sturgeon_genetics_sampling_revised_june_2019.pdf). i. Fin clips must be sent to a NMFS-approved laboratory capable of performing genetic analysis and assignment to DPS of origin. SouthCoast Wind must cover all reasonable costs of the genetic analysis. Arrangements for shipping and analysis must be made before samples are submitted and confirmed in writing to NMFS within 60 days of the receipt of the Project BiOp with ITS. Results of genetic analyses, including assigned DPS of origin must be submitted to NMFS within 6 months of the sample collection. ii. Subsamples of all fin clips and accompanying metadata forms must be held and submitted to a tissue repository (e.g., the Atlantic Coast Sturgeon Tissue Research Repository) on a quarterly basis. The Sturgeon Genetic Sample Submission Form is available for download at: https://media.fisheries.noaa.gov/2021-02/Sturgeon%20Genetic%20Sample%20Submission%20sheet%20for%20S7_v1.1_Form%20to%20Use.xlsx?nullhttps://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-take-reporting-programmatics-greater-atlantic. d. All captured sea turtles and Atlantic sturgeon must be documented with required measurements and photographs. The animal's condition and any marks or injuries must be described. This information must be entered as part of the record for each incidental take. Particularly, a NMFS Take Report Form must be filled out for each individual sturgeon and sea turtle (download at: https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf?null) and submitted to NMFS as described in the take notification measure below.	Sea Turtles, ESA-Listed Species	BOEM, BSEE, NMFS
BA-35	C, O&M, D	Sea turtle/Atlantic sturgeon handling and resuscitation guidelines	Any sea turtles or Atlantic sturgeon caught and retrieved in gear used in fisheries surveys must be handled and resuscitated (if unresponsive) according to established protocols provided at-sea conditions are safe for those handling and resuscitating the animal(s) to do so. Specifically: a. Priority must be given to the handling and resuscitation of any sea turtles or sturgeon that are captured in the gear being used. Handling times for these species must be minimized, and if possible, kept to 15 minutes or less to limit the amount of stress placed on the animals. b. All survey vessels must have onboard copies of the sea turtle handling and resuscitation requirements (found at 50 CFR 223.206(d)(1)) before begging any on-water activity (download at: https://media.fisheries.noaa.gov/dam-migration/sea_turtle_handling_and_resuscitation_measures.pdf). These handling and resuscitation procedures must be carried out any time a sea turtle is incidentally captured and brought onboard the vessel during survey activities. c. If any sea turtles that appear injured, sick, or distressed, are caught and retrieved in fisheries survey gear, survey staff must immediately contact the Greater Atlantic Region Marine Animal Hotline at 866-755-6622 for further instructions and guidance on handling the animal, and potential coordination of transfer to a	Sea Turtles, ESA-Listed Species	BOEM, BSEE, NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			rehabilitation facility. If survey staff are unable to contact the hotline (e.g., due to distance from shore or lack of ability to communicate via phone), the USCG must be contacted via VHF marine radio on Channel 16. If required, hard-shelled sea turtles (i.e., non-leatherbacks) may be held on board for up to 24 hours and managed in accordance with handling instructions provided by the Hotline before transfer to a rehabilitation facility. d. Survey staff must attempt resuscitate any Atlantic sturgeon that are unresponsive or comatose by providing a running source of water over the gills as described in the Sturgeon Resuscitation Guidelines (https://media.fisheries.noaa.gov/dam-migration/sturgeon_resuscitation_card_06122020_508.pdf). e. If appropriate cold storage facilities are available on the survey vessel, any dead sea turtle or Atlantic sturgeon must be retained on board the survey vessel for transfer to an appropriately permitted partner or facility on shore unless NMFS indicates that storage is unnecessary, or storage is not safe. f. Any live sea turtles or Atlantic sturgeon caught and retrieved in gear used in any fisheries survey must ultimately be released according to established protocols including safety considerations.		
BA-36	C, O&M, D	Lost Survey Gear	If any survey gear is lost, all reasonable efforts that do not compromise human safety would be undertaken to recover the gear. All lost gear would be reported to NMFS (nmfs.gar.incidental-take@noaa.gov) and BSEE (OSWsubmittals@bsee.gov) within 24 hours of the documented time of missing or lost gear. This report would include information on any markings on the gear and any efforts undertaken or planned to recover the gear	ESA-Listed Species	NMFS, BSEE
Conservation Measures and Reasonable and Prudent Measures and Terms and Conditions from the USFWS Biological Opinion Issued September 1, 2023					
Conservation Measures					
1	Project design, O&M	Turbine configuration and maintenance	a. The WTG design provides a wind turbine air gap (minimum blade tip elevation to the sea surface) to minimize collision risk to marine birds (e.g., roseate terns) that may fly close to the ocean surface. b. To minimize attracting birds to operating turbines, SouthCoast Wind must install bird perching-deterrent devices where such devices can be safely deployed on WTGs and ESPs. The location of bird-deterrent devices proposed by SouthCoast Wind must be based on best management practices applicable to the appropriate operation and safe installation of the devices. SouthCoast Wind must submit for BOEM and Service approval a plan to deter perching on offshore infrastructure by listed species. The plan must include the type(s) and locations of bird perching-deterrent devices, include a maintenance plan for the life of the project, allow for modifications and updates as new information and technology become available, and track the efficacy of the deterrents. The plan will be based on best available science regarding the effectiveness of perching deterrent devices on minimizing collision risk.	Birds	BOEM, BSEE, and USFWS
2	O&M	Offshore Lighting	To aid safe navigation, SouthCoast Wind must comply with all Federal Aviation Administration (FAA), USCG, and BOEM lighting, marking, and signage requirements. a. SouthCoast Wind will use lighting technology that minimizes impacts on avian species to the extent practicable. b. SouthCoast Wind will implement an ADLS on WTGs and ESPs. SouthCoast Wind must use an FAA-approved vendor for the ADLS, which will activate the FAA hazard lighting only when an aircraft is in the vicinity of the wind facility to reduce visual impacts at night. SouthCoast Wind must confirm the use of an FAA-approved vendor for ADLS on WTGs and ESPs in the Fabrication and Installation Report. c. SouthCoast Wind is required to light each WTG and ESP in a manner that is visible by mariners in a 360-degree arc around the structure. Conditional on USCG approval, and to minimize the potential of attracting migratory birds, the top of each USCG-required marine navigation light will be shielded to minimize upward illumination. Coordination with the USCG regarding maritime navigation lighting occurs post-COP approval, generally at least 120 calendar days prior to installation. The Service will be afforded an opportunity to review a copy of SouthCoast Wind's application to USCG to establish Private Aids to Navigation (PATON), which includes a lighting, marking, and signaling plan. The PATON application will include design specifications for maritime navigation planning. Following approval of the PATON by the USCG, the BOEM and the Service will work together to evaluate the USCG-approved navigation lighting system, in order to characterize the color, intensity, and duration of any light from maritime lanterns that is likely to reach the typical flight heights of listed birds and will assess the degree to which the light is likely to attract or disorient listed birds. This information will be considered, as appropriate, in future estimates of projected collision levels, in any future updates to the ITS accompanying this BO, and in future iterations of the Compensatory Mitigation Plan, if any.	Birds, Bats	BOEM, BSEE, and USFWS
3	O&M	Collision Risk Model Support	The BOEM has funded the development of SCRAM, which builds on and improves earlier collision risk modeling frameworks. The Service fully supports SCRAM as a scientifically sound method for integrating best available information to assess collision risk for the listed bird species. The first generation of SCRAM was released in early 2023 and still reflects a number of consequential data gaps and uncertainties. The BOEM has already committed to funding Phase 2 of the development of SCRAM. We expect that the current limitations of SCRAM will decrease substantially over time as more tracking data are incorporated into the model (e.g., from more individual birds tagged in more geographic areas, improved bird tracking capabilities, and emerging tracking technologies), and as modeling methods and computing power continue to improve. Via this Conservation Measure, the BOEM commits to continue funding the refinement and advancement of SCRAM, or its	Birds	BOEM, BSEE, and USFWS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			successor, with the goal of continually improving the accuracy and robustness of collision mortality estimates. This commitment is subject to the allocation of sufficient funds to the BOEM from Congress. This commitment will remain in effect until one of the following occurs: iii. the SouthCoast Wind turbines cease operation; iv. the Service concurs that a robust weight of evidence has demonstrated that collision risks to all listed birds from SouthCoast Wind turbine operation are negligible (i.e., the risk of take from WTG operation is found to be discountable); or v. the Service concurs that further development of SCRAM (or its successor) is unlikely to improve the accuracy or robustness of collision mortality estimates.		
4	O&M	Collision Risk Model Utilization	The BOEM will work cooperatively with the Service to re-run the SCRAM model (or its successor) for the SouthCoast Wind project according to the following schedule: • At least annually for the first 3 years of WTG operation. • At least every other year for years 4 to 10 of WTG operation (i.e., years 4, 6, 8, and 10). • At least every 5 years between year 10 and the termination of WTG operation (i.e., years 15, 20, 25, and 30). Between these regularly scheduled model runs, the BOEM will also re-run the SCRAM model (or its successor) within 90 days of each major model release or update, and at any time upon request by the Service or SouthCoast Wind, and at any time as desired by the BOEM. Prior to each model run, the BOEM and the Service will reach agreement on model inputs based on best available science, and the agencies may opt for multiple model runs using a range of inputs to reflect uncertainties in the inputs." The above schedule may be altered upon the mutual agreement of the BOEM and the Service. The schedule is subject to sufficient allocation of funds to the BOEM from Congress. This commitment will remain in effect until one of the following occurs: i. the SouthCoast Wind turbines cease operation; ii. the Service concurs that a robust weight of evidence has demonstrated that collision risks to all listed birds from SouthCoast Wind turbine operation are negligible (i.e., the risk of take from WTG operation is found to be discountable); or iii. the Service concurs that further model runs are unlikely to improve the accuracy or robustness of collision mortality estimates.	Birds	BOEM, BSEE, and USFWS
5	C, O&M, D	Monitoring and Data Collection	An avian species monitoring plan for ESA-listed species and/or other priority species or groups will be developed and coordinated appropriate state wildlife agencies and the Service and implemented as required. The BOEM will require SouthCoast Wind to develop and implement an Avian and Bat Post- Construction Monitoring Plan (ABPCMP) based on the ABPCMF (SouthCoast BA, Appendix C) in coordination with the BSEE, the Service, appropriate state wildlife agencies, and other relevant regulatory agencies. Annual monitoring reports will be used to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring. Prior to or concurrent with offshore construction activities, SouthCoast Wind must submit an ABPCMP for BOEM, the BSEE and Service review. The BOEM, the BSEE and the Service will review the ABPCMP and provide any comments on the plan within 30 calendar days of its submittal. SouthCoast Wind must resolve all comments on the ABPCMP to the satisfaction of the BOEM, the BSEE and the Service before implementing the plan and prior to the start of WTG operations. The objectives of the monitoring plan will include: (1) to advance understanding of how the target species utilize the offshore airspace and do (or do not) interact with the wind farm; (2) to improve the collision estimates from SCRAM (or its successor) for the three listed bird species; and (3) to inform any efforts aimed at minimizing collisions (see Conservation Measures 1 and 2, above) or other project effects on target species. a. Monitoring. SouthCoast Wind must develop an ABPCMP The ABPCMP will allow for changing methods over time (see Conservation Measure 5.d, below) in order to regularly update and refine collision estimates for listed birds. The plan will include an initial monitoring phase involving deployment of Motus radio tags on listed birds, in conjunction with installation and operation of Motus Wildlife Tracking System (Motus) receiving stations on turbines in the Lease Area, following offshore Motus recommendations. The initial phase may also include deployment of satellite-based tracking technologies (e.g., Global Positioning System [GPS] or Argos tags). b. Annual Monitoring Reports. SouthCoast Wind must submit to the BOEM (at renewable_reporting@boem.gov), the BSEE (via TIMSWeb and at protectedspecies@bsee.gov), and the Service, a comprehensive report after each full year of monitoring (pre- and post-construction) within 12 months of completion of the last avian survey. The report must include all data, analyses, and summaries regarding ESA-listed and non-ESA-listed birds and bats. The BOEM, the BSEE, and the Service will use the annual monitoring reports to assess the need for reasonable revisions (based on subject matter expert analysis) to the ABPCMP. The BOEM, the BSEE, and the Service reserve the right to require reasonable revisions to the ABPCMP and may require new technologies as they become available for use in offshore environments.	Birds, Bats	BOEM, BSEE, and USFWS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			c. Post-Construction Quarterly Progress Reports. SouthCoast Wind must submit quarterly progress reports during the implementation of the ABPCMP to the BOEM (at renewable_reporting@boem.gov), the BSEE, and the Service by the 15th day of the month following the end of each quarter during the first full year that the Project is operational. The progress reports must include a summary of all work performed, an explanation of overall progress, and any technical problems encountered. d. Monitoring Plan Revisions. Within 30 calendar days of submitting the annual monitoring report (pursuant to Conservation Measure 5.b, above), SouthCoast Wind must meet with the BOEM, the BSEE, the Service, and appropriate state wildlife agencies to discuss the following: the monitoring results; the potential need for revisions to the ABPCMP, including technical refinements or additional monitoring; and the potential need for any additional efforts to reduce impacts. If, based on this annual review meeting, the BOEM and the Service jointly determine that revisions to the ABPCMP are necessary, the BOEM will require SouthCoast Wind to modify the ABPCMP. If the projected collision levels, as informed by monitoring results, deviate substantially from the effects analysis included in this BO, SouthCoast Wind must transmit to the BOEM recommendations for new mitigation measures and/or monitoring methods. The frequency, duration, and methods for various monitoring efforts in future revisions of the ABPCMP will be determined adaptively based on current technology and the evolving weight of evidence regarding the likely levels of collision mortality for each listed bird species. The effectiveness and cost of various technologies/methods will be key considerations when revising the plan. Grounds for revising the ABPCMP include, but are not limited to: i. greater than expected levels of collision of listed birds; ii. evolving data input needs (as determined by the BOEM and the Service) for SCRAM (or its successor); iii. changing technologies for tracking or otherwise monitoring listed birds in the offshore environment that are relevant to assessing collision risk; iv. new information or understanding of how listed birds utilize the offshore environment and/or interact with wind farms; and v. a need (as determined by the BOEM and the Service) for enhanced coordination and alignment of tracking, monitoring, and other data collection efforts for listed birds across multiple wind farms/leases on the OCS. The BOEM will require SouthCoast Wind to continue implementation of appropriate monitoring activities for listed birds (under the current and future versions of the ABPCMP) until: i. the SouthCoast Wind turbines cease operation; . the Service concurs that a robust weight of evidence has demonstrated that collision risks to all three listed birds from SouthCoast Wind turbine operation are negligible (i.e., the risk of take from WTG operation is found to be discountable); or i. the Service concurs that further data collection is unlikely to improve the accuracy or robustness of collision mortality estimates and is unlikely to improve the ability of the BOEM and SouthCoast Wind to reduce or offset collision mortality. e. Operational Reporting (Operations). SouthCoast Wind must submit to the BOEM (at renewable_reporting@boem.gov) and the BSEE (via TIMSWeb and at protectedspecies@bsee.gov) an annual report summarizing monthly operational data calculated from 10-minute supervisory control and data acquisition (SCADA) data for all turbines together in tabular format: the proportion of time the turbines were actually spinning each month, the average rotor speed (monthly 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. The BOEM and the BSEE will use this information as inputs for avian collision risk models to assess whether the results deviate substantially from the effects analysis included in this Opinion. f. Raw Data. SouthCoast Wind 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 the BOEM, the BSEE, and the Service, upon request for the duration of the lease. SouthCoast Wind must work with the BOEM to ensure the data are publicly available. All avian tracking data (i.e., from radio and satellite transmitters) will be stored, managed, and made available to the BOEM, the BSEE and the Service following the protocols and procedures outlined in the agency document entitled Guidance for Coordination of Data from Avian Tracking Studies, or its successor.		
6	C, O&M, D	Incidental Mortality and Reporting	SouthCoast Wind must provide an annual report to the BOEM, the BSEE, and the Service 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 contain the following information: the name of species (if possible), 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 United States Geological Survey's (USGS) Bird Banding Laboratory. Any occurrence of a dead ESA-listed bird or bat must be reported to the BOEM, the BSEE, and the Service as soon as practicable (taking into account crew and vessel safety), ideally within 24 hours and no more than two business days after the sighting. If practicable, the dead specimen will be carefully collected and preserved in the best possible state, contingent on the acquisition of any necessary wildlife permits and compliance with SouthCoast Wind health and safety standards. Species-specific Conservation Measures	Birds, Bats	BOEM, BSEE, and USFWS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			Northern long-eared bat and tri-colored bat • The northern long-eared bat is listed as a species of greatest conservation need in the 2015 Rhode Island Wildlife Action Plan. Northern long-eared bats use maternity roost sites during the summer and hibernacula sites during the winter, and the loss of these habitat features is a threat to northern long-eared bats. On April 8, 2022, SouthCoast Wind contacted RIDEM Division of Fish and Wildlife, for information on northern long- eared bat maternity roosts and hibernacula in the vicinity of the Project. According to her response, dated April 12, 2022, there are no known northern long-eared bat maternity roosts or hibernacula in or near (within 5 miles) the Project area. Conversion of foraging and roosting habitats is also expected to be minimal for the Project as the onshore Project components are planned to be installed primarily within roadways and roadway shoulders to mitigate impacts on rare species and tree clearing will be avoided. • Tree Clearing Time-of-Year Restrictions during construction. The Lessee (SouthCoast Wind) must not clear trees greater than 3 inches (7.6 centimeters) in diameter at breast height from June 1 to July 31 of any year to protect northern long-eared bats. The Lessee may choose to conduct presence/probable absence surveys pursuant to current USFWS protocols for purposes of requesting and obtaining a waiver from this time-of-year restriction on tree clearing. The Lessee must submit any requests for waivers from this time-of-year restriction to the Department of the Interior (DOI) and such requests must be approved in writing by DOI. • SouthCoast Wind will site Project components to avoid locating onshore facilities or landfall sites in or near significant fish and wildlife habitats, including known hibernacula, maternal roosting colonies or other concentration areas as practicable. The proposed onshore substation site and converter station will be constructed in primarily open, developed areas. • SouthCoast Wind will site Project components to avoid locating onshore facilities or landfall sites in or near significant fish and wildlife habitats, including known hibernacula, maternal roosting colonies or other concentration areas as practicable. The proposed onshore substation site and converter station will be constructed in primarily open, developed areas. • SouthCoast Wind will implement a Vegetation Management Plan as approved by National Heritage and Endangered Species Program (NHESP), RIDEM, and the Massachusetts Department of Agricultural Resources. • SouthCoast Wind will consult with BOEM and USFWS to discuss best management practices (BMPs) available to avoid and minimize potential effects from construction/decommissioning on bats. • SouthCoast Wind is requiring construction equipment to be operated such that the construction-related noise levels comply with applicable sections of the MassDEP Air Quality Regulation at 310 CMR 7.10, which would minimize impacts on bats. Sandplain gerardia • Incorporate use of horizontal directional drilling (HDD) at landfall locations to avoid disturbance to shorelines and coastal habitats to the extent practicable.		
Reasonable and Prudent Measures and Terms and Conditions					
1	Pre- O&M and O&M	Collision Minimization Report	Periodically review current technologies and methods for minimizing collision risk of 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.	Birds	BOEM, BSEE, and USFWS
2	Pre- O&M and O&M	Collision Detection Report	Periodically review current technologies and methods for minimizing collision risk of listed birds. a. Prior to the start of WTG operations at SouthCoast Wind, the BOEM must compile, from existing project documentation (e.g., the BA, other consultation documents, the final EIS, the COP), a stand-alone summary of technologies and methods that the BOEM evaluated to reduce or minimize bird collisions at the SouthCoast Wind WTGs. b. Within 5 years of the start of WTG operation, and then every 5 years for the life of the project, the BOEM must prepare a Collision Minimization Report (CMR), 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. c. The BOEM must distribute a draft CMR to the Service, SouthCoast Wind, and appropriate state agencies for a 60-day review period. The 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. d. Following issuance of the final CMR, the Service may call for a meeting. Within 60 days following a call for such a meeting, the BOEM must convene a meeting with the Service, SouthCoast Wind, and appropriate state agencies to discuss the CMR and seek consensus on whether implementation of any technologies/methods is warranted.	Birds	BOEM, BSEE, and USFWS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
NMFS EFH Conservation Recommendations issued September 23, 2024[1]					
EFH CR 1	Pre-C, C	Turbine installation	To minimize risk of adverse effects on Nantucket Shoals and associated tidal mixing fronts that overlap the lease area, development should first occur in the southern portion of the Lease Area (Project 2). Additional research and monitoring of operational effects on the Nantucket Shoals tidal front should be implemented to inform mitigation options prior to development in the northern portion of the Lease Area (Project 1).	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 2	C	Turbine removal	Should BOEM deem EFH CR #1 as infeasible for adoption, we recommend the maximum number of turbines feasible be removed at the northeastern end of the Lease Area to reduce the extent of impacts on EFH adjacent to Nantucket Shoals and overlap with Atlantic cod spawning areas.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 3	C	Oceanographic features monitoring program	Development and implementation of a monitoring program to evaluate changes to oceanographic features from project operations and understand impacts of those changes on the persistent tidal mixing front of Nantucket Shoals and associated EFH for managed species should be required. Development of the monitoring plan should be conducted in coordination with GARFO and NEFSC. Based on the results of this monitoring program, additional mitigation measures should be identified and implemented.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 4	C	Pile driving timing restriction	To minimize adverse effects on Atlantic cod spawning aggregations within and adjacent to the project area, and to reduce the risk of population-level effects on this species, no pile driving should occur in the Lease Area between November 1 and March 31 of each year.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 5	C	Bottom-disturbing construction activity timing restriction	In-water bottom-disturbing construction activities in the Lease Area or the Brayton Point export cable corridor (ECC) that overlap the Southern New England Habitat Area of Particular Concern (HAPC) should not be permitted to occur inshore of the 50-meter isobath between November 1 and March 31 of each year.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 6	C	UXO timing restriction	To the extent practicable, detonation of UXO/MEC, should not be conducted in the lease area or the Brayton Point ECC that overlaps the Southern New England HAPC from November 1 through March 31 of each year.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 7	C	HRG survey timing restriction	High-resolution geophysical (HRG) sub-bottom profiling (e.g., sparkers, boomers) survey activities should not be permitted to occur inshore of the 50-meter isobath within the Southern New England HAPC from November 1 through March 31 of each year.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 8	Pre-C, C, O&M, D	Passive acoustic and telemetry studies	Develop and implement passive acoustic and telemetry surveys within the Lease Area and the Brayton Point ECC to evaluate Atlantic cod spawning activity in the project area. This should be conducted prior to, during, and post construction to identify the full scope of the area affected by project construction and operation and to assess individual, synergistic, and cumulative effects of the Project on cod spawning activity. a) Specifically, provide continuous monitoring of Atlantic cod spawning aggregations within, and immediately adjacent to, the Lease Area between November 1 and March 31 prior to the construction of the project, during project construction, and a minimum of 5 years post construction. b) Increase coverage of passive acoustic receivers within the Southern New England HAPC and analyze for Atlantic cod spawning activity. c) Add an additional glider and increased tagging of Atlantic cod to the ongoing survey to increase the spatial coverage and extend coverage in the SouthCoast Wind Project area and adjacent areas. The ongoing survey should focus on adding survey coverage (i.e., increase the number of glider tracts) within the Project area to provide detection of cod spawning activity within the project area before, during, and after construction. d) The survey coverage should extend outside the Lease Area within areas where project effects occur (e.g., wind wake effects) to assess individual, synergistic, and cumulative effects of the project construction and operation on the distribution of cod spawning activity.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS

[1] NMFS issued conservation recommendations to BOEM, BSEE, USACE, and EPA for the SouthCoast Wind project via letter dated September 23, 2024. As required by section 305(b)(4)(B) of the Magnuson-Stevens Act, BOEM and co-action agencies will provide a detailed response to these conservation recommendations to NMFS regarding which measures will be adopted, partially adopted, or not adopted. At the time of FEIS issuance, BOEM and co-action agencies have not made final determinations regarding which conservation recommendations each agency intends to adopt or partially adopt. As such, the full list of conservation recommendations received from NMFS is included in this document.

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			e) Data and results from this study should be made available to NOAA Fisheries Habitat and Ecosystem Services Division (HESD) at NMFS.GAR.HESDoffshorewind@noaa.gov.		
EFH CR 9		Converter station relocation	Relocate the converter station (and associated cooling water intake system [CWIS]) offshore of the overlapping benthic ridge feature (located at the 45-meter isobath) to locations closer to 50 meters or greater depths to minimize impacts on existing biogenic habitat, EFH from entertainment of eggs and larvae that are concentrated in this area as a result of the Nantucket Shoals tidal front, and to reduce impacts on Atlantic cod spawning activity.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 10	C	Converter station technology	The converter station CWIS should be retrofitted with a closed-cycle cooling system when the technology is made commercially viable. If a closed-loop system is deemed infeasible at the time of construction, the feasibility of upgrading the proposed CWIS with a closed-cycle cooling system and/or incorporating best available technologies should be evaluated every 5 years upon re-application of the National Pollutant Discharge Elimination System (NPDES) permit for operation of the converter station. This should be included as a condition of Construction and Operation Plan (COP) approval and the NPDES permit.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 11	C	Converter station	The converter station CWIS should be required to use one dedicated intake pump or dual pump operation at reduced capacity equipped with a variable frequency drive (VFD) to minimize water withdrawals and reduce the extent of entrainment of eggs and larvae.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 12	C, O&M, D	Ichthyoplankton and Zooplankton monitoring	Ichthyoplankton and zooplankton monitoring at the converter station (and associated CWIS) should be required for the life of the project. All data and results from the ichthyoplankton and thermal monitoring should be made available to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 13	Pre-C	Ichthyoplankton and Zooplankton monitoring plan	An ichthyoplankton and zooplankton monitoring plan should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov for review and comment prior to finalizing requirements of the NPDES permit to determine if increased sampling frequency and/or additional recommendations are necessary.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 14	Pre-C, C	Seabed preparation	Seabed preparation and associated IAC cable installation should not be permitted to occur in the Lease Area where comprehensive, high-resolution geotechnical and geophysical surveys and benthic habitat mapping have not been conducted and their results analyzed.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 15	Pre-C, C	Acoustic survey data	Collection of acoustic data (bathymetry, multi-beam backscatter, side-scan sonar) and ground truthing of the habitats that occur in the Lease Area through comprehensive, high-resolution benthic surveys with seafloor sampling for CR#14 should be required prior to construction. Survey data should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov to determine if additional conservation recommendations (CRs) are needed, including recommendations for micrositing IACs to minimize impacts on sensitive habitats.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 16	C	Benthic habitat avoidance	Site the Brayton Point ECC (between KP Segments 55–58) along the northeastern edge of the cable corridor to avoid and minimize sensitive benthic habitats associated with Brown's Ledge. KP Segment numbers are based on labels identified in the benthic data viewer. Compensatory mitigation should be provided for unavoidable impacts.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 17	C	Microsite WTGs	Microsite WTGs off of benthic ridge features with associated biogenic habitats formed by the active tidal front areas. Benthic ridge features are delineated based on the high-resolution multibeam backscatter, side scan sonar, and sediment profile and plan view imaging (SPI/PV) data provided in the benthic data viewer. Specifically, the following WTGs should be microsited: a) BK39 should be shifted the maximum allowable distance west. b) BL38 should be shifted the maximum allowable distance west. c) BL39 should be sifted the maximum allowable distance west. d) BL42 should be shifted the maximum allowable distance east. e) BL43 should be sited outside of the active tidal front and associated benthic ridge feature. f) BM40 should be shifted the maximum allowable distance east. g) BM41 should be shifted the maximum allowable distance east.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
EFH CR 18	C	Dredge material placement	Dredge material should not be placed within sensitive benthic habitats for any required dredging along the Brayton Point ECC. Habitat maps (based on high-resolution multibeam backscatter, side scan sonar, and boulders) delineating sensitive benthic habitat areas should be provided to vessel operators to facilitate avoidance of these areas.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 19	C	Boulder relocation	To minimize impacts on sensitive benthic habitats from boulder/cobble removal/relocation activities, boulders and cobbles should (i) be relocated in areas immediately adjacent to existing similar complex bottom; (ii) placed in a manner that does not hinder navigation or impede commercial fishing; and (iii) avoid impacts on existing complex habitats. 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.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 20	C	Boulder relocation	A boulder plow should not be permitted to be used for boulder relocation in the project area due to the limited control the plow has on avoiding adverse impacts on existing sensitive habitats and fishing operations.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 21	Pre-C	Boulder study results	Results from SouthCoast Wind's boulder study, which is planned to be completed in the third and/or fourth quarter of 2024 should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov prior to construction to determine if additional CRs are needed. The report should include information on how EFH CR #17 and EFH #18 will be implemented into boulder relocation activities.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 22	Pre-C, C, O&M, D	Seafloor surveying and monitoring	In all project areas where seafloor preparation activities include the use of plows, jets, grapnel runs or similar methods, post-construction acoustic surveys capable of detecting bathymetry changes of 0.5 meter 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 NMFS HESD in a viewable format at NMFS.GAR.HESDoffshorewind@noaa.gov.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 23			Berms exceeding three feet (from existing grade) that are created through the use of plows, jets, or other similar methods should be restored to pre-construction conditions.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 24	C	Anchoring	Avoid anchoring or placing jack-up barge spud cans or footings on/in sensitive benthic habitats including any area where large boulders (>/= 0.5 meter in diameter) or medium to high multibeam backscatter returns occur. Habitat maps (based on high-resolution multibeam backscatter, side scan sonar, and boulders) delineating sensitive benthic habitat areas should be provided to vessel operators to facilitate avoidance of these areas.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 25	C	Anchoring	During cable installation, 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.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 26	C	Anchoring	Vessels must remain stationary, and dynamic positioning systems (DPS) or mid-line buoys on anchor chains should be required to minimize impacts on benthic habitats.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 27	C	Vessel Anchoring Plan	Results from SouthCoast Wind's comprehensive vessel anchoring plan should include information on how EFH CRs # 22-24 will be implemented into anchoring activities for the Lease Area and entirety of Brayton Point ECC and provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov prior to construction to determine if additional CRs are needed.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 28	C	Scour protection material	Use natural or engineered stone of consistent grain size that mimics natural seafloor substrates (rock option proposed in the EFH assessment) to minimize the impacts of habitat conversion from cable protection and scour protection. 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, use bioactive concrete (i.e., with bio-enhancing	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			admixtures) as the primary scour protection (e.g., concrete mattresses) or veneer of natural or engineered rounded stone with bio-enhancing admixtures should be overlaid to support biotic growth.		
EFH CR 29	C	Scour protection material	Plastics/recycled polyesters/net material (i.e., rock-filled mesh bags, fronded mattresses) should not be used as cable protection or scour protection outside temporary use (6 months or less) during construction activities.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 30	C	Temperate reef mitigation plan	Mitigate for permanent loss of temperate reefs within the Southern New England HAPC resulting from installation of the Brayton Point ECC and the use of cable protection. Specifically, the mitigation plan should identify (i) type of cable protection used between KP segments 76-84; (ii) estimated extent of area affected by installation of cable protection; and (iii) a plan outlining specifically how permanent impacts on temperate reefs between KP 84 and KP 76 will be offset/compensated. The mitigation plan should be provided to NMFS HESD atNMFS.GAR.HESDoffshorewind@noaa.gov for a 60 day review and comment prior to installation of cable protection.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 31	C	Marine debris removal	Retain and discard to an upland facility any debris encountered during site preparation grapnel runs. Do not abandon debris in place or return debris overboard.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 32	C	Suction bucket foundations	Suction bucket foundations should be installed where feasible to minimize acoustic effects on EFH and Atlantic cod spawning.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 33	C	Noise Mitigation Plan	The use of noise mitigating measures should be required during pile driving construction in the nearshore and offshore project areas, including the use of soft start procedures and the deployment of noise dampening equipment such as bubble curtains or double-bubble curtains.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 34	C	Fish Kill Notification Plan	Notify NMFS HESD within 24 hours of any evidence of a fish kill observed during construction activity. Notification should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov along with contingency plans to resolve the issue. a) During occurrences of at least 10 dead non-ESA-listed fish observed within established shutdown or clearance zones, Protected Species Observers (PSOs) or project staff should collect images and representative samples of different sized cohorts from each species present for subsequent necropsies. Depending on the magnitude of the observed occurrence, PSOs should aim to collect up to 30 individuals, representative of the observed size range of each species, if less than 30 individuals are observed for any one species then all individuals should be collected. Collected images and necropsy results should be shared with NMFSHESD at NMFS.GAR.HESDoffshorewind@noaa.gov. b) If dead non-ESA-listed fish are observed repeatedly within established shutdown or clearance zones in association with pile driving activities, and necropsies find evidence of construction-related trauma and/or mortality (acoustic trauma, barotrauma, etc.), further investigations should be required to understand the underlying mechanism resulting in mortality. Specifically, if more than 100 individuals are observed in a single occurrence, or cumulatively reported across multiple shutdown or clearance zones, subsequent pile driving activities should be monitored in-situ. Potential techniques include the use of ROVs or BRUVs. c) A contingency plan outlining in-situ monitoring techniques and additional proposed mitigation measures should be provided with notification of a fish kill that meets or exceeds the threshold of more than 100 individuals as described above. A draft contingency plan should be developed prior to commencement of pile driving activities and adapted as needed based on conditions in the field. Monitoring results should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov. Additional recommendations may be provided based on our review of monitoring results.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 35	Pre-C, C	Minimization to impacts on benthic habitat	Locate the Brayton Point ECC onshore (Alternative C in the EIS) to avoid adverse impacts on the Narragansett Bay Estuary and associated sensitive benthic habitats, including, HAPC for juvenile Atlantic cod, temperate reefs, and sensitive life stages for federally managed species that rely on the Sakonnet River and Mount Hope Bay.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 36	C	Microsite cables	Microsite the Brayton Point ECC (between KP segments 31 - 41) to avoid and minimize impacts on sensitive benthic features. Habitat maps (based on high-resolution multibeam backscatter, side scan sonar, and boulders) delineating sensitive habitat areas should be	Benthic, Finfish, Invertebrates, and	BOEM, BSEE, and NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			provided to vessel operators to facilitate avoidance of these areas.	Essential Fish Habitat	
EFH CR 37	Pre-C, C	Temperate reef mitigation plan	Mitigate for permanent loss of temperate reefs at the mouth of the Sakonnet River resulting from installation of the Brayton Point ECC between KP segments 33-35, and 37-42. Specifically, the mitigation plan should identify (i) type of cable protection used between KP segments listed above; (ii) estimated extent of area affected by installation of cable and cable protection; and (iii) a plan outlining specifically how permanent impacts on temperate reefs between KP segments listed above will be offset/compensated. The mitigation plan should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov for a 60 day review and comment prior to installation of Brayton Point ECC and cable protection.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 38	Pre-C, C	Benthic mitigation plan	Mitigate for permanent loss of rocky habitats (pebble-gravel, cobble, boulder, and Crepidula spp. beds with/without attached macroalgae) within juvenile Atlantic cod and summer flounder HAPC in the Sakonnet River and Mount Hope Bay resulting from the installation of the Brayton Point ECC and the use of cable protection between KP segments 0-2, 6-10, 15-19, 20-27, and 33-35. Specifically, the mitigation plan should identify (i) type of cable protection used between KP segments listed above; (ii) estimated extent of area affected by installation of cable and cable protection; and (iii) a plan outlining specifically how permanent impacts on juvenile cod HAPC between the KP segments listed above will be offset/compensated. The mitigation plan should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov for a 60 day review and comment prior to installation of Brayton Point ECC and cable protection.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 39	C	Landfall option	Require the use of the eastern shoreline option for the sea-to-shore transition of the Brayton Point ECC to Brayton Point to avoid the biogenic habitats (i.e., tube-building polychaete beds) at the western shoreline landfall.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 40	C	Microsite cables	Microsite the Brayton Point ECC to avoid important biogenic habitats (i.e., tube-building polychaete beds) in Mount Hope Bay. Targeted video and/or still imagery must be conducted in Mount Hope Bay to delineate the extent of biogenic habitats to inform micrositing within the cable corridor. Compensatory mitigation should occur for unavoidable permanent impacts from habitat conversion.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 41	Pre-C, C	Minimization to impacts on benthic habitats	Undertake sampling for contaminated sediments in Mount Hope Bay throughout the project area, including along the cable route and the HDD exit pits prior to commencement of seabed preparation and cable installation. Results of the sediment sampling should be provided to NMFS HESD for review to determine if any additional EFH CRs are warranted.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	USACE and NMFS
EFH CR 42	C	Trench avoidance in open nearshore/ estuarine waters	Use confined dredging with a closed clamshell/environmental bucket dredge for excavation at the HDD exit pits in areas that contain elevated levels of contaminants. Dispose of all excavated material at a suitable upland location, and backfill the HDD exit pits with suitable, clean material.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	USACE and NMFS
EFH CR 43	C	In-water work time restrictions: estuarine/ inshore (back bay waters)	Avoid in-water work including seabed preparation, cable installation, HDD pit excavation, cable protection installation, and other extractive or turbidity/sediment generating activities from January 15 through October 14 of any year to minimize impacts on winter flounder early life stages (eggs, larvae) in the nearshore waters to depths of 5 m, diadromous fish migrations, and shellfish.	Finfish, Invertebrates, and Essential Fish Habitat	USACE and NMFS
EFH CR 44	Pre-C, C	Minimization to impacts on benthic habitats	In all inshore/estuarine habitats where seafloor preparation and cable installation activities will occur, impacts on benthic habitats should be avoided and minimized through the use of HDD with confined dredging of excavation pits.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	USACE and NMFS
EFH CR 45	C	Anchoring	Anchoring associated with cable installation for the Brayton Point ECC should be consistent with the Project's easements. Consultation should be re-initiated for any anchoring activities that occur outside the easement.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 46	Pre-C	Frac-out plans	Frac-out plans should be developed for all areas where HDD is proposed to be used. A copy of the final plan should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov prior to construction.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
EFH CR 47	Pre-C	Shellfish survey	A shellfish survey should be conducted prior to the commencement of dredging at all the HDD exit pits to identify high densities of shellfish. Shellfish beds that are identified should be relocated in coordination with Rhode Island Department of Environmental Management (RIDEM) and Massachusetts Division of Marine Fisheries (MA DMF) prior to commencement of in-water work.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 48	Pre-C	Benthic and Fisheries Habitat Monitoring Plans	We recommend the Monitoring Plans (Fisheries and Benthic) be updated to include the following: a) Pre-construction/baseline monitoring for a minimum of three years prior to any construction activities and continue annually for a minimum of five years post construction. This is particularly relevant to the fisheries monitoring surveys and the cable-associated physical disturbance survey. b) Expansion of the sexual maturity staging and spawning condition lab investigation to include Atlantic cod. Deceased cod should be collected, opportunistically, from the ventless trap and trawl surveys to better understand the spawning conditions present within the project area. c) Expand the number of cable segment replicates in the hard-bottom novel surfaces survey. Specifically, include at least three segments for each type of material used for cable armoring (if multiple types of materials are used for cable armoring) replicated across four distinct areas where the project proposes the use of cable armoring; inter-array cables, offshore export cable, and inshore export cable areas including three armored segment survey stations within both Narragansett Bay and Rhode Island Sound. If cable armoring is used in Mt. Hope Bay, one of the Narragansett Bay sites should be within Mt. Hope Bay. d) Invasive species (e.g., Didemnum vexillum) monitoring as a discrete data analysis component within both the hard-bottom-novel surfaces and cable-associated physical disturbance surveys to track the fragmentation and spread of invasive and non-native species across the lease as a result of project development. e) Project-wide collection of acoustic data (multibeam bathymetry and backscatter and side scan sonar) post-construction to measure the total area subject to physical change as a result of lease development. Post-construction acoustic surveys should be able to answer 1.) How much soft-bottom habitat across the lease has been converted to hard bottom; 2.) How much hard-bottom habitat across the lease has been converted to soft-bottom; 3.) How much natural hard-bottom habitat across the lease has been converted into man-made hard-bottom; 4.) How much total man-made hard bottom has been introduced into the project area (Lease Area and OECC); 5.) How much hard-bottom habitats have been impacted (i.e., relocated, fragmented, reduced in complexity, etc.) by the project compared with pre-construction surveys.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 49	Pre-C, C, O&M, D	In-situ Monitoring Program	Develop an in situ project specific monitoring program to address impacts of the operation of the SouthCoast Wind 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 would facilitate more effective or efficient mitigation recommendations. Incorporation of this monitoring recommendation would further align the monitoring efforts at SouthCoast Wind 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 project specific, in-situ, monitoring program should measure the stressors created by project operation on the ecosystem from operational noise, electromagnetic fields (EMF), wind wake effects, and the presence of structures. Studies should also evaluate the biological effects of those stressors on commercially important species in the project area such as American lobster (*Homarus americanus*), Atlantic cod, Atlantic sea scallops (*Placopecten magellanicus*), black sea bass (*Centropristis striata*), hard clam (*Mercenaria mercenaria*), Jonah crab (*Cancer borealis*), monkfish (*Lophius americanus*), scup, skates, summer flounder, channeled whelk (*Busycotypus canaliculatus*) and knobbed whelk (*Busycon carica*). Monitoring plans should include the collection of a minimum of three years of baseline data, during construction, and a minimum of five 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 ROD issuance. A response to NOAA Fisheries comments should be provided. 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 effects on sound pressure, particle motion, and substrate vibration extend from the individual WTGs and the SouthCoast Wind Farm collectively? How far do effects on sound pressure, particle motion, and substrate vibration extend from the individual WTGs and the SouthCoast Wind Farm collectively? i. What effect do these operational noise effects have on the distribution of larvae for species with designated EFH in the project area and prey for these species (i.e., sand lance)? b) What is the spatial distribution of the EMF emissions around inter-array and export cables? The EMF study for the export cables should include measures to monitor 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 the inter-array and export cables create a physical barrier (either from the presence of structure or from EMF exposure) to mobile benthic species, particularly whelks and Jonah crab	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			c) How far does the marine and atmospheric wind wake extend from the SouthCoast Wind Farm during operation? (See EFH CR#3) i. What are the effects on physical water column properties, primary and secondary production, and larval dispersal for species with designated EFH in the project area?		
EFH CR 50	C, O&M, D	Spill preventative measures	Require the implementation of preventive measures 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.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 51	C, O&M	Anti-corrosion protection measures	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 BMPs for reducing spills should be implemented if reapplied offshore.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
EFH CR 52	C	Reinitiation of consultation	The EFH consultation should be reinitiated a) If the proposed action deviates in any way from what is described in the EFH assessment for Project 1 and/or Project 2; b) Once data is collected and processed for IAC routes; c) Prior to the construction and installation of Project 2, including activities associated with the construction and operation of the Falmouth contingency cable; d) Prior to decommissioning WTGs to ensure that the impact to 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 five years prior to proposed decommissioning.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat	BOEM, BSEE, and NMFS
FWCA CR 1	C, O&M, D	Fish and Wildlife Coordination Act (FWCA): Scientific Surveys	The lessee 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. SouthCoast Wind'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.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat; Commercial Fisheries and For-Hire Recreational Fishing	USACE and NMFS
FWCA CR 2	C	FWCA: Notification of location of relocated boulders, created berms, and scour protection	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, Finfish, Invertebrates, and Essential Fish Habitat; Commercial Fisheries and For-Hire Recreational Fishing	USACE and NMFS
FWCA CR 3	C, O&M, D	FWCA: Whelk and hard clam survey plan	A whelk and hard clam survey plan should be developed for review and comment by NMFS. This survey may be incorporated as part of the Fisheries Monitoring Plan for the project. The survey should specifically investigate the potential changes in distribution and abundance of the species throughout the project area, pre- and post- development with an emphasis on the impacts within the inshore portion of the OECC within Narragansett Bay. The survey should focus on specific impact producing factors and the in-situ responses to those factors by individuals. Of particular concern, is the creation of artificial boundaries (i.e., EMF exposure from the OECC, berms created from scour protection, etc.) that may limit the movement of the species, the fragmentation of contiguous hard clam beds, and the biological response of hard clams to EMF exposure. The plan should be provided to NMFS HESD at NMFS.GAR.HESDoffshorewind@noaa.gov for a 60 day review and comment as soon as possible and at least 120 days prior to commencement of construction.	Benthic, Finfish, Invertebrates, and Essential Fish Habitat; Commercial Fisheries and For-Hire Recreational Fishing	USACE and NMFS
Draft NMFS Biological Opinion Reasonable and Prudent Measures dated October 24, 2024[2]					

[2] On October 24, 2024, NMFS provided draft RPMs to BOEM, USACE, BSEE and EPA for review as part of the ESA Section 7 consultation process for the SouthCoast Wind project. ESA Section 7 consultation was still ongoing at the time preparation of the FEIS was completed. The Lessee must adhere to the Biological Opinion, including the finalized RPMs and implementing terms and conditions, issued by NMFS for the SouthCoast Wind project.

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
RPM 1	C	WTG and OSP installation	Effects on ESA-listed species must be minimized and monitored during WTG and OSP foundation installation.	ESA-listed Fish, Marine Mammals, Sea Turtles	BOEM, BSEE, and NMFS
RPM 2	C	UXO detonation	Effects to ESA-listed species must be minimized and monitored during UXO/MEC detonations.	ESA-listed Fish, Marine Mammals, Sea Turtles	BOEM, BSEE, and NMFS
RPM 3	O&M	Hydrodynamic monitoring	Effects to North Atlantic right whales from hydrodynamic effects (wakes) around foundations must be monitored.	Marine Mammals	BOEM, BSEE, and NMFS
RPM 4	C, O&M, D	Onsite observation and reporting	Effects to, or interactions with, ESA-listed species must be properly documented during all phases of the proposed action, and all incidental take must be reported to NMFS GARFO.	ESA-listed Fish, Marine Mammals, Sea Turtles	BOEM, BSEE, and NMFS
RPM 5	C	Review of plans	Plans must be prepared that describe the implementation of activities and/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.	ESA-listed Fish, Marine Mammals, Sea Turtles	BOEM, BSEE, and NMFS
RPM 6	C, O&M, D	Onsite observation and inspection	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 by appropriate agency personnel 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 Incidental Take Statement.	ESA-listed Fish, Marine Mammals, Sea Turtles	BOEM, BSEE, and NMFS
DOD Measures Resulting from Military Aviation and Installation Assurance Siting Clearinghouse Review dated August 10, 2022					
1	Pre- O&M and O&M	NORAD notification and Radar adverse impact management (RAM)	1) The Lessee will notify NORAD 30-60 days ahead of project completion and when the project is complete and operational for RAM scheduling. 2) The Lessee will contribute funds ($80,000) toward the execution of the RAM. 3) The Lessee will curtail when necessary for National Security or Defense Purposes as described in the agreement executed between BOEM and the Lessee for lease of the Project site.	Other uses (Military Use)	BOEM, BSEE, DoD
2	Pre- O&M and O&M	Distributed optical fiber sensing	BOEM will require that the Lessee provide information regarding deployment of distributed fiber-optic sensing technology to facilitate a Department of the Navy risk assessment and will require the Lessee to mitigate risk to national security, if identified.	Other uses (Military Use)	BOEM, BSEE, DoD/DON

[a] Pre-C = prior to construction; C = construction; O&M = operations and maintenance; D = Decommissioning

AMP = alternative monitoring plan; ASLF = ancient submerged landform feature; BiOP = 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; dB = decibel; DMA = Dynamic Management Area; DOI = Department of the Interior; DPS = distinct population segment; ESA = Endangered Species Act; GPR = global pocket reader; GPS = global positioning system; HPTP = Historic Property Treatment Plan; HVAC = high-voltage alternating current; HVDC = high-voltage direct current; IHA = Incidental Harassment Authorization; IOOS = Integrated Ocean Observing System; ITA = incidental take authorization; ITS = incidental take statement; JPEG = joint photographic experts group; km = kilometer; km/hr = kilometer per hour; LOA = Letter of Authorization; mph = mile per hour; MMPA = Marine Mammal Protection Act; NARW = North Atlantic right whale; NAVTEX = Navigational Telex; NCEI = National Centers for Environmental Information; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; NRHP = National Register of Historic Places; OCS = Outer Continental Shelf; OSP = offshore substation platform; PAM = passive acoustic monitoring; PDM = pile-driving monitoring; PIT = passive integrated transponder; PSO = protected species observer; RPM = Reasonable and Prudent Measure; SFVP = Sound Field Verification Plan; SMA = Seasonal Management Area; STDN = Sea Turtle Disentanglement Network; TIFF = tag image file format; USACE = United States Army Corp of Engineers; USCG = United States Coast Guard; USFWS = United States Fish and Wildlife Service; VHF = Very High Frequency; WTG = wind turbine generator

G.3 Additional Mitigation and Monitoring Measures

Table G-2 identifies agency-proposed mitigation measures that have been proposed to mitigate and/or monitor potential impacts from the Project. The paragraphs below provide additional information regarding the mitigation measures.

Table G-3. Additional Mitigation and Monitoring Measures

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
BOEM-Proposed Air Quality Mitigation Measures					
AQ-1	C, O&M, D	Engines that meet or exceed emission control requirements	Use engines manufactured and installed to meet or exceed emission control requirements. Engine manufacturers will incorporate pollution control measures into their designs. Techniques used could include: ensuring complete combustion in the engines, by control of the combustion air, controlling fuel flow, ensuring complete mixing, and staging combustion; avoiding hot spots in the combustion process that can form NO_X, by staging combustion, injecting water, recirculating flue gas, and otherwise cooling the system; and using post- combustion controls to remove air pollutants after they have formed, by adding particulate filters, oxidation catalysts, and selective catalytic reduction systems.	Air Quality	Best practice – not an enforceable measure
AQ-2	C, O&M, D	Vessel engines that meet or exceed applicable marine engine standards	Vessel engines will use a combination of combustion and post-combustion controls to meet or exceed applicable marine engine standards, including: The International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI (for foreign vessels); 40 CFR Part 89 (for Tier 1 and 2 domestic marine diesel engines smaller than 37 kW); Control of Emissions from Marine Compression-Ignition Engines; 40 CFR Part 94 (for Tier 1 and 2 domestic marine diesel engines larger than 37 kW); and Control of Emissions from New and In- Use Marine Compression-Ignition Engines and Vessels, 40 CFR Part 1042 (for Tier 3 and 4 domestic marine diesel engines). On-road engines, nonroad engines, and aircraft engines will meet or exceed similar standards.	Air Quality	Best practice – not an enforceable measure
AQ-3	C, O&M, D	Best available engines/fuels	Use the best available engines/fuels. Construction vessels will be supplied by contractors for temporary use on the Project. For O&M, SouthCoast Wind can specify the vessel used through long-term contracting or outright purchase. Nonroad engine emissions will be minimized using engines compliant with 40 CFR 1039, Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines, i.e., "Tier 4" engines, where practicable.	Air Quality	Best practice – not an enforceable measure
AQ-4	C, O&M, D	Marine diesel fuel will comply with the fuel sulfur limit of 15 ppm	Marine diesel fuel will comply with the fuel sulfur limit of 15 ppm per 40 CFR 80, which is the same limit as onshore ULSD. For heavier residual fuel oils used in Category 2 and Category 3 engines, and for engines on foreign vessels, the Project will comply with the fuel oil sulfur content limit of 1,000 ppm set in MARPOL VI and corresponding USEPA regulations. Nonroad engines will use ULSD. The use of clean fuels will minimize emissions from fuel impurities and allow for cleaner combustion.	Air Quality	Best practice – not an enforceable measure
AQ-5	Pre-C, C, O&M, D	BMPs, innovative tools and/or technologies to minimize emissions from vessel operations	Implement BMPs and investigate the use of innovative tools and/or technologies to minimize air emissions from vessel operations. Specifically, SouthCoast Wind will optimize construction and O&M activities to minimize vessel operating times and loads. This will include weather monitoring, forecasting, and Project tracking to minimize emissions resulting from non-productive time, and incentives for contractor fuel savings.	Air Quality	Best practice – not an enforceable measure
AQ-6	Pre-C, C, O&M, D	Meet or exceed permit requirements and comply with all applicable air quality regulatory requirements	Air permit requirements will be met or exceeded, and SouthCoast Wind will comply with all applicable air quality regulatory requirements. A key element will be obtaining the OCS air permit. SouthCoast Wind will comply with other air- related regulatory requirements by using engines manufactured and maintained in compliance with the appropriate standards, which include New Source Performance Standards, National Emissions Standards for Hazardous Air Pollutants, and federal standards for nonroad and marine diesel engines. If onshore stationary equipment triggers any requirement to obtain a Massachusetts or Rhode Island air permit, as applicable (including obtaining coverage under a general permit), SouthCoast Wind will obtain the required permit.	Air Quality	USEPA and state (Massachusetts or Rhode Island, as applicable)
AQ-7	Pre-C	Document in OCS air permit compliance with air quality requirements	Any required OCS air permit will address documentation of compliance with ambient air standards, documentation of no adverse impact on air quality related values at Class I Areas, control technology review, and emission offsets.	Air Quality	USEPA and state (Massachusetts or Rhode Island, as applicable)
AQ-8	O&M	Use SF_6-free switchgear	This mitigation measure requires that the applicant use SF_6-free switchgear. BOEM is proposing additional mitigation requirements to minimize SF_6 emissions in the event that the applicant is not able to use SF_6-free switch gear. The additional mitigation is as follows:	Air Quality	BOEM

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			• Follow manufacturer recommendations for limiting leaks and for service and repair of the affected breakers and switches. • Perform repairs promptly when significant leaks are detected. • Conduct visual inspections of the switchgear and monitoring equipment according to manufacturer recommendations. • Create alarms based on the pressure readings in the breakers and switches, so leaks can be detected when substantial SF_6 leakage occurs. Upon a detectable pressure drop that is greater than 10% of the original pressure (accounting for ambient air conditions), perform maintenance to fix seals as soon as feasible. If an event requires removal of SF_6, the affected major component(s) will be replaced with new component(s). • Capture and recycle any SF_6 removed from breakers and switches during maintenance. Keep a log of all detected leaks and maintenance procedures potentially affecting SF_6 emissions from circuit breakers/switches.		
BOEM-Proposed Scenic and Visual Mitigation Measures					
SV-1	C, O&M	Scenic and Visual Impact Monitoring Plan	In coordination with BOEM, SouthCoast Wind will prepare and implement a scenic and visual resource monitoring plan that monitors and compares the visual effects of the wind farm during construction and O&M (daytime and nighttime) to the findings in the COP Visual Impact Assessment and verifies the accuracy of the visual simulations (photo and video). The monitoring plan should include monitoring and documenting the meteorological influences on actual wind turbine visibility over a duration of time from selected onshore key observation points, as determined by BOEM and the developer. In addition, SouthCoast Wind will include monitoring the operation of ADLS in the monitoring plan. SouthCoast Wind will monitor the frequency that the ADLS is operative documenting when (dates and time) the aviation warning lights are in the on position and the duration of each event. Details for monitoring and reporting procedures are to be included in the plan.	Scenic and Visual Resources	BOEM and BSEE
BOEM-Proposed Bird and Bat Mitigation Measures					
BRT-1	C, O&M	Compensatory Mitigation for Piping Plover, Red Knot, and Roseate Tern	At least 180 days prior to the start of commissioning of the first WTG, the Lessee must distribute a Compensatory Mitigation Plan to BOEM, BSEE, and the USFWS for review and comment. BOEM, BSEE, and USFWS will review the Compensatory Mitigation Plan and provide any comments on the plan to the Lessee within 60 days of its submittal. The Lessee must resolve all comments on the Compensatory Mitigation Plan to BOEM's and BSEE's satisfaction before implementing the plan and before commissioning of the first WTG. The Compensatory Mitigation Plan must provide compensatory mitigation actions to offset take of Piping Plover, Red Knot, and Roseate Tern for the first 5 years of WTG operation. The Compensatory Mitigation Plan must include a) detailed description of the mitigation actions; b) the specific location for each mitigation action; c) a timeline for completion of the mitigation measures; d) itemized costs for implementing the mitigation actions; e) details of the mitigation mechanisms (e.g., mitigation agreement, applicant-proposed mitigation; and f) monitoring to ensure the effectiveness of the mitigation actions in offsetting take.	Birds	BOEM, BSEE, USFWS
BOEM-proposed Nantucket Shoals Mitigation Measures					
NS-1	O&M	HVDC open-loop cooling system avoidance area	To minimize potential impacts on zooplankton from impingement and entrainment in offshore wind HVDC converter station open-loop cooling systems, no open-loop cooling systems would be permitted in the enhanced mitigation area of the Lease Area. No geographic restrictions on the offshore export cable corridor, nor the installation of an HVAC OSP are included in this mitigation measure.	Finfish and Invertebrates, Marine Mammals	BOEM and NMFS
NS-2	C, O&M	Pile-driven foundations only	Only monopile or piled jacket foundations may be used in the enhanced mitigation area, which would minimize the overall structure impact on benthic prey species.	Benthic Resources	BOEM and NMFS
NS-3	C	Vessel-strike avoidance	A real-time detection and reporting PAM system must be implemented during the construction period. The PAM system must operate in the enhanced mitigation area 24 hours per day. The system must be capable of detection of NARW vocalizations, report the detections to a PAM operator in near-real time, and share all detections with NMFS. Upon a confirmed detection of a NARW, all project construction and crew transfer vessels of all sizes must travel at 10 knots or less in a 10-square-kilometer area around the location of the detection. Speed restriction must remain in place until there are no PAM detections within 48 hours of implementation of the speed restrictions, or daily aerial surveys result in no NARW sightings within 48 hours of implementation of the speed restrictions.	Marine Mammals	BOEM, BSEE, and NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
NS-4	C	Pile-driving time of Year restriction in enhanced mitigation area	Pile driving within the enhanced mitigation area will occur only between June 1 to October 31 when NARW presence is at its lowest.	Marine Mammals, Sea Turtles, and Finfish and Invertebrates	BOEM, BSEE, and NMFS
NS-5	C	Pile driving shut down provisions in enhanced mitigation area	SouthCoast Wind will be required to implement a real-time monitoring system (PAM or aerial imagery) capable of detecting and localizing the direction of NARW calls in the enhanced mitigation area (Figure G-1). If directly measured or modeled Level A or Level B received sound levels from offshore pile driving occur within the enhanced mitigation area when NARW are detected, subsequent pile driving shall be suspended until NARWs are confirmed through acoustic monitoring or visual surveillance to be clear of the enhanced mitigation area for 48 hours.	Marine Mammals	BOEM, BSEE, and NMFS
Other Agency-Proposed Mitigation Measures					
OU-1	C, O&M	Federal survey mitigation implementation strategy for the Northeast U.S. region	BOEM is committed to working with NOAA toward a long-term regional solution to account for changes in survey methodologies because of offshore wind farms. NOAA Fisheries and BOEM published (December 2022) a Federal Survey Mitigation Strategy for the Northeast U.S. Region to address anticipated impacts of offshore wind energy development on NOAA Fisheries' scientific surveys. This strategy also defines stakeholders, partners, and other ocean users that will be engaged throughout the process and identifies potential resources for successful implementation. Activities described in the strategy are designed to mitigate the effect of offshore wind energy development on NOAA Fisheries surveys and is referred to as the Federal Survey Mitigation Program. The mitigation program will include survey-specific mitigation plans for each affected survey including both vessel and aerial surveys. The strategy is intended to guide the implementation of the mitigation program through the duration of wind energy development in the Northeast U.S. region.	Other Uses – Scientific Research and Surveys	BOEM, BSEE, and NMFS
OU-2	C, O&M	High-frequency radar system mitigation	High-Frequency Radar Interference Analysis and Mitigation The Lessee's Project has the potential to interfere with oceanographic high-frequency (HF) radar systems in the U.S. Integrated Ocean Observing System (IOOS®), which is managed by the IOOS Office within the National Oceanic and Atmospheric Administration (NOAA) pursuant to the Integrated Coastal and Ocean Observation System Act of 2009 (Pub. L. No. 111-11), as amended by the Coordinated Ocean Observation and Research Act of 2020 (Pub. L. No. 116-271, Title I), codified at 33 U.S.C. 3601–3610 (referred to herein as "IOOS HF-radar"). IOOS HF-radar measures the sea state, including ocean surface current velocity and waves in near real time. These data have many vital uses ("mission objectives"), including tracking and predicting the movement of spills of hazardous materials or other pollutants, monitoring water quality, and predicting sea state for safe marine navigation. The U.S. Coast Guard also integrates IOOS HF-radar data into its Search and Rescue systems. The Lessee's Project is within the measurement range of one IOOS HF-radar system operated by University of Massachusetts Dartmouth in Nauset, MA (NAUS), two IOOS HF-radar system operated by Woods Hole Oceanographic Institute (WHOI) and four IOOS HF-radar systems operated by Rutgers University in Amagansett, New York (AMAG), Block Island, RI Long-range SeaSonde (BLCK), Martha's Vineyard, MA (MVCO), and Nantucket, MA SeaSonde (NANT). 1.1 Mitigation Requirement Due to the potential interference with IOOS HF-radar and the risk to public health, safety, and the environment, the Lessee must mitigate unacceptable interference with IOOS HF-radar from the Project. The Lessee must mitigate interference before commissioning the first WTG or before blades start spinning, whichever is earlier, and interference mitigation must continue throughout operations and decommissioning until the point of decommissioning where all rotor blades are removed. Interference is considered unacceptable if, as determined by BOEM in consultation with NOAA's IOOS Office, IOOS HF-radar performance falls or may fall outside any of the specific radar systems' operational parameters or fails or may fail to meet IOOS's mission objectives. 1.2 Mitigation Review The Lessee must submit to BOEM documentation demonstrating how it will mitigate unacceptable interference with IOOS HF-radar systems in accordance with Section 1.1. The Lessee must submit this documentation to BOEM at least 120 days prior to commissioning the first WTG or the start of blades spinning, whichever is earlier. If, after consultation with the NOAA IOOS Office, BOEM deems the mitigation acceptable, the Lessee must conduct activities in accordance with the proposed mitigations. If, after consultation with NOAA IOOS Office, BOEM deems the mitigation unacceptable, the Lessee must resolve all comments on the documentation to BOEM's satisfaction. 1.3 Mitigation Agreement	Other Uses – Radar Systems	BOEM and NOAA IOOS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			The Lessee is encouraged to enter into an agreement with the NOAA IOOS Office to implement mitigation measures, and any such Mitigation Agreement may satisfy the requirement to mitigate unacceptable interference with IOOS HF-radar. The point of contact for the development of a Mitigation Agreement with the NOAA IOOS Office is the Surface Currents Program Manager, whose contact information is available at https://ioos.noaa.gov/about/meet-the-ioos-program-office/ and upon request from BOEM. If the parties reach a mitigation agreement, the Lessee must submit the agreement to BOEM. The Lessee may satisfy its obligations under Section 1.2 by providing BOEM with an executed Mitigation Agreement between the Lessee and NOAA IOOS. If there is any discrepancy between Section 1.2 and the terms of a Mitigation Agreement, the terms of the Mitigation Agreement will prevail. 1.4 Mitigation Data Requirements Mitigation required under Section 1.2 must address the following: 1.4.1 Before commissioning the first WTG or before blades start spinning, whichever is earlier, and continuing throughout the life of the Lessee's Project until the point of decommissioning when all rotor blades are removed, the Lessee must make publicly available via NOAA IOOS near real-time, accurate numerical telemetry of surface current velocity, wave height, wave period, wave direction, and other oceanographic data measured at the Lessee's Project locations selected by the Lessee in coordination with the NOAA IOOS Office. 1.4.2 If requested by the NOAA IOOS Office, the Lessee must share with IOOS accurate numerical time-series data of blade rotation rates, nacelle bearing angles, and other information about the operational state of each WTG in the Lease Area to aid interference mitigation. 1.5 Additional Notification and Mitigation 1.5.1 If at any time the NOAA IOOS Office or an HF-radar operator informs the Lessee that the Lessee's Project will cause unacceptable interference to an HF-radar system, the Lessee must notify BOEM of the determination and propose new or modified mitigation pursuant to Section 1.5.2 as soon as possible and no later than 30 days from the date on which the determination was communicated. 1.5.2 If a mitigation measure other than that identified in Section 1.2 is proposed, then the Lessee must submit information on the proposed mitigation measure to BOEM for its review and concurrence. If, after consultation with the NOAA IOOS Office, BOEM deems the mitigation acceptable, the Lessee must conduct activities in accordance with the proposed mitigations. The Lessee must resolve all comments on the documentation to BOEM's satisfaction, in consultation with the NOAA IOOS Office, prior to implementation of the mitigation.		
CF-2	C, O&M	Compensation for lost fishing income	The lessee shall implement a compensation program for lost income for commercial and recreational fishermen and other eligible fishing interests for construction and operations consistent with BOEM's draft guidance for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585 or as modified in response to public comment.	Commercial Fisheries and For-Hire Recreational Fisheries	BOEM
CF-3	O&M	Mobile gear friendly cable protection measures	Cable protection measures should reflect the pre-existing conditions at the site. This mitigation measure chiefly ensures that seafloor cable protection does not introduce new hangs for mobile fishing gear. Thus, the cable protection measures should be trawl-friendly with tapered/sloped edges. If cable protection is necessary in "non-trawlable" habitat, such as rocky habitat, then the lessee should consider using materials that mirror the benthic environment.	Commercial Fisheries and For-Hire Recreational Fisheries	BOEM
CF-4	C, O&M, D	Fishing Gear and Anchor Strike Incident Reporting	SouthCoast Wind will report fishing gear and anchor strike incidents that fall below or are not captured by the regulatory thresholds outlined in 30 CFR §§ 285.832 and 285.833. Reports will be filed annually during construction and decommissioning, and every 5 years during operations.	Commercial Fisheries and For-Hire Recreational Fisheries	BOEM, USCG
CF-5	C, O&M	Shoreside seafood business analysis	In addition to the compensation proposed by SouthCoast Wind, BOEM would require SouthCoast Wind to ensure that compensation includes losses to shoreside businesses. The lessee shall analyze the impacts on shoreside seafood businesses adjacent to ports. The shoreside seafood business analysis would be used to further supplement funds available for settling claims of lost (unrecovered) economic activity as a result of the SouthCoast Wind project.	Commercial Fisheries and For-Hire Recreational Fisheries	BOEM
NAV-1	C, O&M	Consult on aid to navigation impacts	Prior to cable installation, SouthCoast Wind will consult with USCG regarding potential impacts on federal aids to navigation from cable installation and maintenance.	Navigation	BOEM, BSEE
NAV-2	O&M	Operations Center	SouthCoast Wind will operate a 24-hour operations center with direct communications with the USCG.	Navigation	BOEM, BSEE

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
NAV-3	Pre-C, C, O&M, D	Mariner Communication and Outreach Plan	SouthCoast Wind will develop and implement a Mariner Communication and Outreach Plan that covers all project phases from pre-construction to decommissioning and that facilitates coordination with all mariners, including the commercial shipping industry, commercial and for-hire fishing industries, and other recreational users. The Mariner Communication and Outreach Plan will include the following components: e. During Project design, coordinating in-water construction activities to avoid and minimize disruptions; f. At least 90 days prior to commencing in-water construction activities in any construction season, consultation with stakeholders on an approximate schedule of activities and existing uses within the Project area. Make good faith efforts to accommodate those existing uses. The results of these good faith consultations can be summarized in a report and submitted to the federal agency(ies) prior to the start of each construction season; g. Following COP approval, notice of proposed changes which have the potential to impact fishing or maritime resources or activities; h. Notices to commence construction activities, conduct maintenance activities, and commence decommissioning; i. Status reports during construction with specific information on construction activities and locations for upcoming activities in the next 1–2 weeks; j. Post-construction notice of: (i) all cable protection measure locations (including protection type and charted location); (ii) any areas where the identified burial depth is less than target burial depth; and (iii) other obstructions to navigation created by the Project; and Post all notices described above to the Project website with information on how to opt-in for alerts.	Navigation	BOEM, BSEE
MA-1	C	Sand Wave Leveling and Boulder Clearance	Sand wave leveling and boulder clearance should be limited to the extent practicable. Best efforts should be made to microsite to avoid these areas.	Benthic Resources; EFH	BOEM, BSEE
MA-2	C, O&M	Long-Term Passive Acoustic Monitoring	The Lessee must conduct long-term monitoring of ambient noise, marine mammal and commercially important fish vocalizations in the Lease Area before, during, and following construction. The Lessee must conduct continuous recording at least 1 year before construction, during construction, initial operation, and for at least 3 but no more than 10 full calendar years of operation to monitor for potential noise impacts. The Lessee must meet with BOEM and BSEE at least 60 days prior to conclusion of the third full calendar year of operation monitoring (and at least 60 days prior to the conclusion of each subsequent year until monitoring is concluded) to discuss: 1) monitoring conducted to-date, 2) the need for continued monitoring, and 3) if monitoring is continued, whether adjustments to the monitoring are warranted. The instrument(s) must be configured to ensure that the specific locations of vocalizing NARW anywhere within the Lease Area could be identified, based on the assumption of a 10 km detection range for their calls. The lessee may execute the implementation of this condition through Option 1 or Option 2, as below. The timing requirement (i.e., monitoring for at least 3 but no more than 10 full calendar years of operation) will be reevaluated by BOEM and BSEE at the end of the third year and each year subsequently thereafter at the request of the Lessee (at a maximum frequency of requests of once per year). a. Option 1 - Lessee Conducts Long-term Passive Acoustic Monitoring. The Lessee must conduct PAM, including data processing and archiving following the Regional Wildlife Science Collaborative (RWSC) best practices to ensure data comparability and transparency. PAM instrumentation must be deployed to allow for identification of any NARW that vocalize anywhere within the Lease Area. The sampling rate (minimum 10 kHz) of the recorders must prioritize baleen whale detections but must also have a minimum capability to record noise from vessels, pile-driving, and WTG operation in the Lease Area. The system must be configured for continuous recording over the entire year. If temporal gaps in recording are expected, the Lessee must ensure that additional recorders can be deployed to fill gaps. The Lessee must use trawl-resistant moorings to ensure that instruments are not lost and must replace any lost instruments as soon as possible. The Lessee must also notify BOEM if this occurs. The Lessee must follow the best practices outlined in the RWSC best practices document, unless otherwise required through conditions of COP approval. The best practices include engaging with the RWSC, calibrating the instruments, running QA/QC on the raw data, following the templates for reporting species vocalizations, and preparing the data for archiving at National Centers for Ecological Information (NCEI). Although section III of the RWSC best practices document specifies steps for Section 106	Marine Mammals	BOEM, BSEE

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			compliance, the Lessee must instead follow the conditions outlined in Section 7.13 and the Section 106 Memorandum of Agreement. In terms of data processing, the Lessee must document the occurrence of whale vocalizations (calls of NARW, humpback, sei, fin, and minke whales, as well as odontocete clicks, as available based on sample rate) using automatic or manual detection methods. In addition, data must be processed with either manual or automatic detection software to detect vocalizations of spawning cod. The Lessee must submit a log of these detections as well as the detection methodology to BOEM (at renewable_reporting@boem.gov), BSEE (at protectedspecies@bsee.gov) and NMFS (at nmfs.pacmdata@noaa.gov) within 120 days following each recorder retrieval. All raw data must be sent to the NCEI Passive Acoustic Data archive on an annual basis and the Lessee must follow NCEI guidance for packaging the data and pay the fee. iv. Long-term Passive Acoustic Monitoring Plan. The Lessee must prepare and implement a Long-term PAM Plan under this option. No later than 120 days prior to instrument deployment and before any construction begins, the Lessee must submit to BOEM and BSEE (renewable_reporting@boem.gov and OSWsubmittals@bsee.gov) the Long-term PAM Plan that describes all proposed equipment (including number and configuration of instruments), deployment locations, mooring design, detection review methodology, and other procedures and protocols related to the required use of PAM. As the Lessee prepares the Long-term PAM Plan, it must coordinate with the RWSC. BOEM and BSEE will review the Long-term PAM Plan and provide comments, if any, on the plan within 45 days of its submittal. The Lessee may be required to submit a modified Long-term PAM Plan based on feedback from BOEM and BSEE. The Lessee must address all outstanding comments to BOEM's and BSEE's satisfaction and will need to receive written concurrence from BOEM and BSEE. If BOEM or BSEE do not provide comments on the Long-term PAM Plan within 45 days of its submittal, the Lessee may conclusively presume BOEM's and BSEE's 's concurrence with the Long-term PAM Plan. Option 2 – Economic and Other Contributions to BOEM's Environmental Studies Program. As an alternative to conducting long-term PAM in the Lease Area, the Lessee may opt to make an economic contribution to BOEM's Environmental Studies Partnership for an Offshore Wind Energy Regional Observation Network (POWERON) initiative on an annual basis and cooperate with the POWERON team to allow access to the Lease Area for deployment, regular servicing, and retrieval of instruments. The Lessee's economic contribution will provide for all activities necessary to conduct PAM within the Lease Area, such as vessel and staff time for regular servicing of instruments, QA/QC on data, data processing to obtain vocalizations of sound-producing species and ambient noise metrics, as well as long-term archiving of data at NCEI. At the Lessee's request, the amount of the economic contribution will be estimated by BOEM's Environmental Studies Program. The Lessee will also be invited to contribute to discussions about the scientific approach of the POWERON initiative via the RWSC. The Lessee may request temporary withholding of the public release (placement into the NCEI public data archive) of raw acoustic data collected within the Lease Area for up to 180 days after it is collected. During this temporary hold, the Lessee may be provided a copy of the raw PAM data that was collected in the Lease Area or ROW after it has been cleared for any national security concerns under the RWSC best practices document.		

G.4 Lessee Authorization and Permit Conditions

Table G-4 to be included with lessee authorization and permit conditions from CZMA, USEPA, NMFS, and USACE in the Final EIS if finalized.

Table G-4. Lessee authorization and permit conditions

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
Federal Consistency Conditions Issued [Date]					
Massachusetts Office of Coastal Zone Management Consistency Conditions Issued October 21, 2024					
1	Pre-C	Permitting	SCW Project 2 – SCW LLC shall obtain and provide to CZM the required signed final MassDEP Chapter 91 license (and associated Wetlands Protection Act Order of Conditions or Superseding Order of Conditions) for the offshore export cable in state waters with a	Multiple	MACZM

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			landfall site in Somerset, Massachusetts. SCW Project 2 proposes to use the same offshore export cable corridor assessed by MassDEP for the SCW Project 1 Chapter 91 License.		
Rhode Island Coastal Resources Management Council Consistency Conditions Issued December 19, 2023					
1	C	Cable installation	Regarding all export cable installation activity subject to the Council's federal consistency review authority, SouthCoast Wind Energy LLC shall use all reasonable efforts to locate and install export cables outside complex and sensitive benthic habitat areas and, where siting outside of such areas is not possible, use reasonable efforts to micro-site cable locations to minimize adverse impacts on pertinent coastal resources. In any circumstance, SouthCoast Wind Energy LLC is not required to act against its own business interests by taking every possible action to avoid impacts, incur unlimited costs, or take unlimited time in meeting this condition. Avoidance, minimization, and mitigation will reduce the reasonably foreseeable effects on Rhode Island coastal resources and uses, including effects on those resources and uses with the same characteristics, values, and resources as found in Rhode Island State Waters.	Benthic, Commercial Fisheries and For-Hire Recreational Fishing	RICRMC
2	C	Cable burial depth	In furtherance of using reasonable efforts to avoid and minimize impacts on complex and sensitive benthic habitat areas, SouthCoast Wind Energy LLC shall provide notice to the Council of locations where the target cable burial depth range of 3.2 feet to 13.1 feet has not been achieved and the locations of secondary cable protection (i.e., mattresses, rock bags, etc.). Such notice shall consist of a written description of the area and a map(s) sufficient to see details of the project cable burial paths in order to overlay with tow lines. At a minimum, the written description must include the cable burial depth achieved and a description of the surrounding benthic conditions. Notice shall be provided to the Council within 30 days of SouthCoast Wind completing the as-built survey for each export cable.	Benthic, Commercial Fisheries and For-Hire Recreational Fishing	RICRMC
3	C	Boulder relocation	Where applicable, SouthCoast Wind Energy LLC shall make all reasonable efforts to relocate boulders within the same area/environment and group boulders with nearby existing boulders. Furthermore, where boulders are relocated, SouthCoast Wind Energy LLC shall provide notice to the Council of the original boulder locations as well as the new boulder locations. Notice shall be the same as the notice requirement stated in Condition 2. The relocation/grouping of boulders with existing boulders will further avoid, minimize, and mitigate impacts on resource habitats and minimize the creation of new hangs for the fishing industry to the extent practicable.	Benthic, Commercial Fisheries and For-Hire Recreational Fishing	RICRMC
4	C	Cable installation	Cables shall be no further apart than necessary for installation, maintenance, and operational activities in order to minimize unnecessary impacts on coastal uses and resources.	Multiple	RICRMC
5	Pre-C	Fisheries and benthic research and monitoring plan	SouthCoast Wind Energy LLC shall conduct the fisheries research and monitoring plan and the benthic habitat research and monitoring plan that receive final approval from the Bureau of Ocean Energy Management as part of the Record of Decision approving SouthCoast Wind Construction and Operations Plan. Findings from each relevant monitoring plan shall be supplied to the Council on an annual basis once reports are available to SouthCoast Wind. This information will facilitate the Coastal Resources Management Council's continued monitoring of activities described in the Outer Continental Shelf (OCS) plans to make certain that activities continue to conform to both federal and State requirements.	Benthic, Commercial Fisheries and For-Hire Recreational Fishing	RICRMC
NMFS Proposed Incidental Take Regulations and Associated 5-year Letter of Authorization Issued [Draft Issued on June 27 2024]					
1	General Conditions	Pre-C, C, O&M, D	SouthCoast Wind must comply with the following general measures: a) A copy of any issued LOA must be in the possession of SouthCoast Wind and its designees, all vessel operators, visual protected species observers (PSOs), passive acoustic monitoring (PAM) operators, pile driver operators, and any other relevant designees operating under the authority of the issued LOA; b) SouthCoast Wind must conduct training for construction supervisors, construction crews, and the PSO and PAM team prior to the start of all 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 description of the training program must be provided to NMFS at least 60 days prior to the initial training before in-water activities begin. Confirmation of all required training must be documented on a training course log sheet and reported to NMFS Office of Protected Resources prior to initiating project activities; c) SouthCoast Wind is required to use available sources of information on North Atlantic right whale presence to aid in monitoring efforts. These include daily monitoring of the Right Whale Sighting Advisory System, consulting of the WhaleAlert	Marine Mammals	NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			app, and monitoring of the Coast Guard's Very High Frequency (VHF) Channel 16 to receive notifications of marine mammal sightings and information associated with any Dynamic Management Areas (DMA) and Slow Zones; d) Any marine mammal observation by project personnel must be immediately communicated to any on-duty PSOs and PAM operator(s). Any large whale observation or acoustic detection by any project personnel must be conveyed to all vessel captains; e) 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 clearance zone prior to beginning a specified activity, the activity must be delayed. If an activity is ongoing and 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 shutdown zone, the activity must be shut down (i.e., cease) immediately unless shutdown would result in imminent risk of injury or loss of life to an individual, pile refusal, or pile instability. The activity must not commence or resume until the animal(s) has been confirmed to have left the clearance or shutdown zones and is on a path away from the applicable zone or after 30 minutes for all baleen whale species and sperm whales, and 15 minutes for all other species; f) In the event that a large whale is sighted or acoustically detected that cannot be confirmed as a non-North Atlantic right whale, it must be treated as if it were a North Atlantic right whale for purposes of mitigation; (7) For in-water construction heavy machinery activities listed in section 1(a), if a marine mammal is detected within or about to enter 10 meters (m) (32.8 feet (ft)) of equipment, SouthCoast Wind must cease operations until the marine mammal has moved more than 10 m on a path away from the activity to avoid direct interaction with equipment; g) All vessels must be equipped with a properly installed, operational Automatic Identification System (AIS) device and SouthCoast Wind must report all Maritime Mobile Service Identify (MMSI) numbers to NMFS Office of Protected Resources prior to use of any project vessels; h) By accepting a LOA, SouthCoast Wind consents to on-site observation and inspections by Federal agency personnel (including NOAA personnel) during activities described in this subpart, for the purposes of evaluating the implementation and effectiveness of measures contained within this LOA; and i) It is prohibited to assault, harm, harass (including sexually harass), oppose, impede, intimidate, impair, or in any way influence or interfere with a PSO, PAM operator, or vessel crew member acting as an observer, or attempt the same. This prohibition includes, but is not limited to, any action that interferes with an observer's responsibilities or that creates an intimidating, hostile, or offensive environment. Personnel may report any violations to the NMFS Office of Law Enforcement.		
2	Pre-C, C, O&M, D	Vessel Strike Avoidance	SouthCoast Wind must comply with the following vessel strike avoidance measures while in the specific geographic region unless a deviation is necessary to maintain safe maneuvering speed and justified because the vessel is in an area where oceanographic, hydrographic, and/or meteorological conditions severely restrict the maneuverability of the vessel; an emergency situation presents a threat to the health, safety, life of a person; or when a vessel is actively engaged in emergency rescue or response duties, including vessel-in distress or environmental crisis response. An emergency is defined as a serious event that occurs without warning and requires immediate action to avert, control, or remedy harm. Speed over ground will be used to measure all vessel speeds: a) Prior to the start of the Project's activities involving vessels, all vessel personnel must receive a protected species training that covers, at a minimum, identification of marine mammals that have the potential to occur in the specified geographical region; detection and observation methods 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); sighting communication protocols; all vessel strike avoidance mitigation requirements; and information and resources available to the project personnel regarding the applicability of Federal laws and regulations for protected species. This training must be repeated for any new vessel personnel who join the project. Confirmation of the vessel personnel training and understanding of the LOA requirements must be documented on a training course log sheet and reported to NMFS within 30 days of completion of training, prior to personnel joining vessel operations; b) All vessel operators, operating at any speed and regardless of their vessel's size, and dedicated visual observers must maintain a vigilant watch for all marine mammals and operators must slow down, stop their vessel, or alter course 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 degrees (°) direction of the forward path of the vessel (90° port to	Marine Mammals	NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			90° starboard) located at an appropriate vantage point for ensuring vessels are maintaining required separation distances. Dedicated visual observers may be PSOs or crew members, but crew members responsible for these duties must be provided sufficient training by SouthCoast Wind to distinguish marine mammals from other phenomena and must be able to identify a marine mammal as a North Atlantic right whale, other large whale (defined in this context as sperm whales or baleen whales other than North Atlantic right whales), or other marine mammals. Dedicated visual observers must be equipped with alternative monitoring technology (e.g., night vision devices, infrared cameras) for periods of low visibility (e.g., darkness, rain, fog, etc.). The dedicated visual observer must not have any other duties while observing and must receive prior training on protected species detection and identification, vessel strike avoidance procedures, how and when to communicate with the vessel captain, and reporting requirements in this subsection and LOA; c) At the onset of transiting and continuously thereafter, vessel operators and dedicated visual observers must monitor the U.S. Coast Guard VHF Channel 16, over which North Atlantic right whale sightings are broadcasted. At the onset of transiting and at least once every 4 hours, vessel operators and/or trained crew member(s) must also monitor the project's Situational Awareness System (if applicable), WhaleAlert, and relevant NOAA information systems such as the Right Whale Sighting Advisory System (RWSAS) for the presence of North Atlantic right whales; d) Prior to transit, vessel operators must check for information regarding the establishment of Seasonal and Dynamic Management Areas, Slow Zones, and any information regarding North Atlantic right whale sighting locations; e) All vessel operators must abide by vessel speed regulations (50 CFR 224.105). Nothing in this subsection exempts vessels from any other applicable marine mammal speed or approach regulations; f) All vessel operators, regardless of their vessel's size, must immediately reduce vessel speed to 10 knots (11.5 mph) or less for at least 24 hours when a North Atlantic right whale is sighted at any distance by any project-related personnel or acoustically detected by any project-related PAM system. Each subsequent observation or acoustic detection in the Project area shall trigger an additional 24-hour period. If a North Atlantic right whale is reported by project personnel or via any of the monitoring systems (see paragraph (b)(4)) within 10 km of a transiting vessel, that vessel must operate at 10 knots (11.5 mph) or less for 24 hours following the reported detection; g) In the event that a DMA or Slow Zone is established that overlaps with an area where a project-associated vessel is operating, that vessel, regardless of size, must transit that area at 10 knots (11.5 mph) or less; h) Between November 1st and April 30th, all vessels, regardless of size, must operate at 10 knots (11.5 mph) or less in the specified geographical region, except for vessels while transiting in Narragansett Bay or Long Island Sound; i) All vessels, regardless of size, must immediately reduce speed to 10 knots (11.5 mph) or less when any large whale (other than a North Atlantic right whale), mother/calf pairs, or large assemblages of non-delphinid cetaceans are observed within 500 m (0.31 mi) of a transiting vessel; j) If a vessel is traveling at any speed greater than 10 knots (11.5 mph) (i.e., no speed restrictions are enacted) in the transit corridor (defined as from a port to the Lease Area or return), in addition to the required dedicated visual observer, SouthCoast Wind must monitor the transit corridor in real-time with PAM prior to and during transits. If a North Atlantic right whale is detected via visual observation or PAM within or approaching the transit corridor, all vessels in the transit corridor must travel at 10 knots (11.5 mph) or less for 24 hours following the detection. Each subsequent detection shall trigger a 24-hour reset. A slowdown in the transit corridor expires when there has been no further North Atlantic right whale visual or acoustic detection in the transit corridor in the past 24 hours; k) All vessels must maintain a minimum separation distance of 500 m from North Atlantic right whales. If underway, all vessels must steer a course away from any sighted North Atlantic right whale at 10 knots (11.5 mph) or less such that the 500-m minimum separation distance requirement is not violated. If a North Atlantic right whale is sighted within 500 m of an underway vessel, that vessel must turn away from the whale(s), reduce speed and shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 m; l) All vessels must maintain a minimum separation distance of 100 m (328 ft) from sperm whales and non-North Atlantic right whale baleen whales. If one of these species is sighted within 100 m (328 ft) of an underway vessel, the vessel must turn away from the whale(s), reduce speed, and shift the engine(s) to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 100 m (328 ft); m) All vessels must maintain a minimum separation distance of 50 m (164 ft) from all delphinid cetaceans and pinnipeds with an exception made for those that approach the vessel (e.g., bow-riding dolphins). If a delphinid cetacean or pinniped is sighted		

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			within 50 m (164 ft) of a transiting vessel, that vessel must turn away from the animal(s), reduce speed, and 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 m (164 ft); n) All vessels underway must not divert or alter course to approach any marine mammal; and o) SouthCoast Wind must submit a Marine Mammal Vessel Strike Avoidance Plan 180 days prior to the planned start of vessel activity that provides details on all relevant mitigation and monitoring measures for marine mammals, vessel speeds and transit protocols from all planned ports, vessel-based observer protocols for transiting vessels, communication and reporting plans, and proposed alternative monitoring equipment in varying weather conditions, darkness, sea states, and in consideration of the use of artificial lighting. If SouthCoast Wind plans to implement PAM in any transit corridor to allow vessel transit above 10 knots (11.5 mph), the plan must describe how PAM, in combination with visual observations, will be conducted. If a plan is not submitted and approved by NMFS prior to vessel operations, all project vessels must travel at speeds of 10 knots (11.5 mph) or less. SouthCoast Wind must comply with any approved Marine Mammal Vessel Strike Avoidance Plan.		
3	C	WTG and OSP foundation installation	The following requirements apply to vibratory and impact pile driving activities associated with the installation of WTG and OSP foundations: a) Foundation pile driving activities must not occur January 1 through May 15 throughout the Lease Area. From October 16 through May 31, impact and vibratory pile driving must not occur at locations in SouthCoast's Lease Area within the North Atlantic right whale Enhanced Mitigation Area (NARW EMA; defined as 20 km (12.4 mi) of the 30-m (98-ft) isobath on the west side of Nantucket Shoals); b) Outside of the NARW EMA, foundation pile driving must not be planned for December; however, it may occur only if necessary to complete planned pile driving within a given year and with prior approval by NMFS and implementation of enhanced mitigation and monitoring in accordance with an approved Enhanced Mitigation and Monitoring Plan. SouthCoast Wind must notify NMFS in writing by September 1 of that year if circumstances are expected to necessitate pile driving in December; c) In the NARW EMA, SouthCoast must install foundations as quickly as possible and sequence them from the northeast corner of the Lease Area to the southwest corner such that foundation installation in positions closest to Nantucket Shoals are completed during the period of lowest North Atlantic right whale occurrence in that area; d) Monopiles must be no larger than a tapered 9/16-m diameter monopile design and pin piles must be no larger than 4.5-m diameter design. The minimum amount of hammer energy necessary to effectively and safely install and maintain the integrity of the piles must be used. Impact hammer energies must not exceed 6,600 kilojoules (kJ) for monopile installations and 3,500 kJ for pin pile installations; e) SouthCoast must not initiate pile driving earlier than 1 hour after civil sunrise or later than 1.5 hours prior to civil sunset unless SouthCoast submits and NMFS approves a Nighttime Pile Driving Monitoring Plan that demonstrates the efficacy of their low visibility visual monitoring technology (e.g., night vision devices, Infrared (IR) cameras) to effectively monitor the mitigation zones in low visibility conditions. SouthCoast must submit this plan or plans (if separate Daytime Reduced Visibility and Nighttime Monitoring Plans are prepared) at least 180 calendar days before foundation installation is planned to begin. SouthCoast must submit a separate Plan describing daytime reduced visibility monitoring if the information in the Nighttime Monitoring Plan does not sufficiently apply to all low-visibility monitoring. f) SouthCoast Wind must utilize a soft-start protocol at the beginning of foundation installation for each impact pile driving event and at any time following a cessation of impact pile driving for 30 minutes or longer; g) SouthCoast Wind must deploy, at minimum, a double-bubble curtain during all foundation pile driving; i. The double-bubble curtain must distribute air bubbles using an air flow rate of at least 0.5 m3 /(min*m). The double-bubble curtain 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 adjustments to the air supply and operating pressure such that the maximum possible sound attenuation performance of the bubble curtain(s) is achieved. ii. 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.	Marine Mammals	NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			iii. No parts of the ring or other objects may prevent full seafloor contact with a bubble curtain ring. iv. SouthCoast Wind must inspect and carry out maintenance on the noise attenuation systems prior to every pile driving event and prepare and submit a Noise Attenuation System (NAS) inspection/performance report. For piles for which Thorough SFV (T-SFV) is carried out, this report must be submitted no later than when the interim T-SFV report is submitted for the respective pile. Performance reports for all Abbreviated SFV (A-SFV) conducted for subsequent piles must be submitted with the weekly pile driving reports. All reports must be submitted by email to pr.itp.monitoringreports@noaa.gov h) SouthCoast Wind must utilize PSOs. Each monitoring platform must have at least three on-duty PSOs. PSOs must be located on the pile driving vessel as well as on a minimum of three PSO-dedicated vessels inside the NARW EMA June 1 through July 31 and outside the NARW EMA June 1 through November 30, and a minimum of four PSO-dedicated vessels within the NARW EMA August 1-October 15 and throughout the Lease Area May 16-31 and December 1-31 (if pile driving in December is deemed necessary and approved by NMFS); i) Concurrent with visual monitoring, SouthCoast Wind must utilize PAM operator(s), as described in a NMFS-approved PAM Plan, who must conduct real-time acoustic monitoring of marine mammals for 60 minutes before, during, and 30 minutes after completion of impact and vibratory pile driving for each pile. PAM operators must immediately communicate all detections of marine mammals to the Lead PSO, including any determination regarding species identification, distance, and bearing and the degree of confidence in the determination; j) To increase situational awareness prior to pile driving, the PAM operator must review PAM data collected within the 24 hours prior to a pile installation; k) The PAM system must be able to detect marine mammal vocalizations, maximize baleen whale detections, and detect North Atlantic right whale vocalizations up to a distance of 10 km (6.2 mi) and 15 km (9.3mi) during pin pile and monopile installation, respectively. NMFS recognizes that detectability of each species' vocalizations will vary based on vocalization characteristics (e.g., frequency content, source level), acoustic propagation conditions, and competing noise sources), such that other marine mammal species (e.g., harbor porpoise) may not be detected out to 10 km (6.2 mi) or 15 km (9.3 mi); l) SouthCoast Wind must submit a Passive Acoustic Monitoring Plan (PAM Plan) to NMFS Office of Protected Resources for review and approval at least 180 days prior to the planned start of foundation installation activities and abide by the Plan, if approved. m) SouthCoast Wind must establish clearance and shutdown zones, which must be measured using the radial distance from the pile being driven. All clearance zones must be monitored by PSOs for at least 60 minutes prior to monitoring prior to, during, and 30 minutes after each foundation installation and must be confirmed to be free of marine mammals for 30 minutes immediately prior to the beginning of soft-start procedures or vibratory pile driving. If a marine mammal (other than a North Atlantic right whale) is detected within or about to enter the applicable clearance zones during this 30-minute time period, vibratory and impact pile driving 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 30 minutes for all baleen whale species and sperm whales and 15 minutes for all other species; n) For North Atlantic right whales, any visual observation by a PSO at any distance, or acoustic detection within the 10-km (6.2-mi) (pin pile) and 15-km (9.32-mi) (monopile) PAM clearance and shutdown zones must trigger a delay to the commencement or shutdown of pile driving. Within the NARW EMA August 1- October 15 and throughout the Lease Area May 16-31 and December 1-31 (if pile driving in December is deemed necessary and approved by NMFS), for any acoustic detection within the North Atlantic right whale PAM clearance and shutdown zones or sighting of 1 or 2 North Atlantic right whales, SouthCoast Wind must delay commencement of or shutdown pile driving for 24 hours. For any sighting of 3 or more North Atlantic right whales, SouthCoast Wind must delay commencement of or shutdown pile driving for 48 hours. Prior to beginning clearance at the pile driving location after these periods, SouthCoast must conduct a vessel-based survey to visually clear the 10-km (6.2-mi) zone, if installing pin piles that day, or 15-km (9.32- mi) zone, if installing monopiles; o) If visibility decreases such that the entire clearance zone is not visible, at minimum, PSOs must be able to visually clear (i.e., confirm no marine mammals are present) the minimum visibility zone. The entire minimum visibility zone must be visible (i.e., not obscured by dark, rain, fog, etc.) for the full 60 minutes immediately prior to commencing impact and vibratory pile driving;		

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			p) If a marine mammal is detected (visually or acoustically) entering or within the respective shutdown zone after pile driving has begun, the PSO or PAM operator must call for a shutdown of pile driving and SouthCoast Wind must stop pile driving 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 risk of pile refusal or pile instability. If pile driving is not shut down due to one of these situations, SouthCoast Wind must reduce hammer energy to the lowest level practicable to maintain stability; q) If pile driving has been shut down due to the presence of a marine mammal other than a North Atlantic right whale, pile driving must not restart until either the marine mammal(s) has voluntarily left the species-specific clearance zone 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. The specific time periods are 30 minutes for all non-North Atlantic right whale baleen whale species and sperm whales and 15 minutes for all other species. In cases where these criteria are not met, pile driving may restart only if necessary to maintain pile stability at which time SouthCoast Wind must use the lowest hammer energy practicable to maintain stability; r) SouthCoast Wind must submit a Pile Driving Marine Mammal Monitoring Plan to NMFS Office of Protected Resources for review and approval at least 180 days prior to planned start of foundation pile driving and abide by the Plan, if approved. SouthCoast Wind must obtain both NMFS Office of Protected Resources and NMFS Greater Atlantic Regional Fisheries Office Protected Resources Division's concurrence with this Plan prior to the start of any pile driving; s) SouthCoast Wind must perform T-SFV measurements during installation of, at minimum, the first three WTG monopile foundations, first four WTG pin piles, and all OSP jacket foundation pin piles; t) T-SFV measurements must continue until T-SFV of at least three consecutive monopiles or four consecutive pin piles demonstrate noise levels are at or below those modeled, assuming 10 decibels (dB) of attenuation. Subsequent T-SFV measurements are also required should larger piles be installed or if additional monopiles or pin piles supporting jacket foundations are driven that may produce louder sound fields than those previously measured (e.g., from higher hammer energy, greater number of strikes); i. T-SFV measurements must be 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 m (2,460 ft) and three additional ranges selected such that measurement of modeled Level A harassment and Level B harassment isopleths are accurate, feasible, and avoids extrapolation (i.e., recorder spacing is approximately logarithmic and significant gaps near expected isopleths are avoided). At least one additional measurement at an azimuth 90 degrees from the transect array at 750 m (2,460 ft) must be made. At each location, there must be a near bottom and mid-water column hydrophone (acoustic recorder); ii. If any of the T-SFV results indicate that distances to harassment isopleths were exceeded, then SouthCoast Wind must implement additional measures for all subsequent foundation installations to ensure the measured distances to the Level A harassment and Level B harassment threshold isopleths do not exceed those modeled assuming 10-dB attenuation. SouthCoast Wind must also increase clearance, shutdown, and/or Level B harassment zone sizes to those identified by NMFS until T-SFV measurements on at least three additional monopiles or four pin piles demonstrate distances to harassment threshold isopleths meet or are less than those modeled assuming 10-dB of attenuation. For every 1,500 m (4,900 ft) 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 clearance and/or shutdown zone(s), with each PSO responsible for scanning no more than 120 degrees (°) out to a radius no greater than 1,500 m (4,900 ft). SouthCoast Wind must optimize the sound attenuation systems (e.g., ensure hose maintenance, pressure testing) to, at least, meet noise levels modeled, assuming 10-dB attenuation, within three monopiles or four pin piles, or else foundation installation activities must cease until NMFS and SouthCoast Wind can evaluate potential reasons for louder than anticipated noise levels. Alternatively, if SouthCoast determines T-SFV results demonstrate noise levels are within those modeled assuming 10-dB attenuation, SouthCoast may proceed to the next pile after submitting the interim report to NMFS; u) SouthCoast Wind also must conduct A-SFV, using at least one acoustic recorder (consisting of a bottom and mid-water column hydrophone) for every foundation for which T-SFV monitoring is not conducted. All A-SFV data must be included in weekly reports. Any indication that distances to the identified Level A harassment and Level B harassment threshold		

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			isopleths for marine mammals may be exceeded based on this abbreviated monitoring must be addressed by SouthCoast Wind in the weekly report, including an explanation of factors that contributed to the exceedance and corrective actions that were taken to avoid exceedance on subsequent foundations. SouthCoast Wind must meet with NMFS within two business days of SouthCoast Wind's submission of a report that includes an exceedance to discuss if any additional action is necessary; v) The SFV measurement systems must have a sensitivity for the expected sound levels from pile driving received at the nominal ranges throughout the installation of the pile. The frequency range of SFV measurement systems must cover the range of at least 20 hertz (Hz) to 20 kilohertz (kHz). The SFV measurement systems must be designed to have omnidirectional sensitivity so that the broadband received level of all pile driving exceeds the system noise floor by at least 10 dB. The dynamic range of the SFV measurement system must be sufficient such that signals are detected at each location, and the signals avoid poor signal-to-noise ratios for low amplitude signals and avoid clipping, nonlinearity, and saturation for high amplitude signals; w) SouthCoast must ensure that all hydrophones used in SFV measurements systems have undergone a full system, traceable laboratory calibration conforming to International Electrotechnical Commission (IEC) 60565, or an equivalent standard procedure from a factory or accredited source, at a date not to exceed 2 years before deployment, to guarantee each hydrophone receives accurate sound levels. Additional in situ calibration checks using a pistonphone must be performed before and after each hydrophone deployment. If the measurement system employs filters via hardware or software (e.g., high-pass, low-pass), which is not already accounted for by the calibration, the filter performance (i.e., the filter's frequency response) must be known, reported, and the data corrected for the filter's effect before analysis; x) SouthCoast Wind must be prepared with additional equipment (e.g., hydrophones, recording devices, hydrophone calibrators, cables, batteries), which exceeds the amount of equipment necessary to perform the measurements, such that technical issues can be mitigated before measurement; y) If any of the SFV measurements from any pile indicate that the distance to any isopleth of concern is greater than those modeled assuming 10-dB attenuation, before the next pile is installed, SouthCoast Wind must implement the following measures, as applicable: identify and propose for review and concurrence; additional, modified, and/or alternative noise attenuation measures or operational changes that present a reasonable likelihood of reducing sound levels to the modeled distances; provide a written explanation to NMFS Office of Protected Resources supporting that determination, and request concurrence to proceed; and, following NMFS Office of Protected Resources' concurrence, deploy those additional measures on any subsequent piles that are installed (e.g., if threshold distances are exceeded on pile 1, then additional measures must be deployed before installing pile 2); z) If SFV 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) for three consecutive monopiles or four consecutive pin piles, SouthCoast Wind may submit a request to NMFS Office of Protected Resources for a modification of the mitigation zones for non-North Atlantic right whale species. Mitigation zones for North Atlantic right whales cannot be decreased; aa) SouthCoast must measure background noise (i.e., noise absent pile driving) for 30 minutes before and after each pile installation; bb) SouthCoast must conduct SFV measurements during turbine operations to estimate turbine operation source levels, in accordance with a NMFS-approved WTG Operational SFV Plan; and cc) SouthCoast Wind must submit SFV Plans for T-SFV and A-SFV for foundation installation to NMFS Office of Protected Resources for review and approval at least 180 days prior to planned start of foundation installation activities and abide by the Plan if approved. Pile driving may not occur until NMFS provides SouthCoast concurrence that implementation of the Foundation Installation SFV Plan meets the requirements in the LOA.		
4	C	UXO/MEC detonation	The following requirements apply to Unexploded Ordnances and Munitions and Explosives of Concern (UXO/MEC) detonation: a) Upon encountering a UXO/MEC, SouthCoast Wind can only resort to high-order removal (i.e., detonation) if all other means of removal are impracticable (i.e., As Low As Reasonably Practicable (ALARP) risk mitigation procedure)) and this determination must be documented and submitted to NMFS; b) UXO/MEC detonations must not occur December 1 through April 30;	Marine Mammals	NMFS

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			c) UXO/MEC detonations must only occur during daylight hours (1 hour after civil sunrise through 1.5 hours prior to civil sunset; d) No more than one detonation can occur within a 24-hour period. No more than 10 detonations may occur throughout the effective period of the LOA; e) SouthCoast Wind must deploy, at minimum, a double-bubble curtain during all UXO/MEC detonations and comply with the following requirements related to noise abatement; i. The bubble curtain(s) must distribute air bubbles using an air flow rate of at least 0.5 m3 /(min*m). 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 adjustments to the air supply and operating pressure such that the maximum possible noise attenuation performance of the bubble curtain(s) is achieved; ii. 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; iii. No parts of the ring or other objects may prevent full seafloor contact; iv. 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 SouthCoast Wind within 72 hours following the performance test. SouthCoast Wind must then submit that report to NMFS Office of Protected Resources; v. Corrections to the bubble ring(s) to meet the performance standards in this paragraph (5) must occur prior to UXO/MEC detonations. If SouthCoast Wind uses a noise mitigation device in addition to the bubble curtain, SouthCoast Wind must maintain similar quality control measures as described in this paragraph (5); and vi. (vi) SouthCoast Wind must inspect and carry out maintenance on the noise attenuation system prior to every UXO/MEC detonation and prepare and submit a Noise Attenuation System (NAS) inspection/performance report as soon as it is available to NMFS Office of Protected Resources. f) SouthCoast Wind must conduct SFV during all UXO/MEC detonations at a minimum of three locations (with hydrophones at two water depths at each location) along a transect from each detonation site in a direction toward deeper water, in accordance with the following requirements: i. SouthCoast Wind must empirically determine source levels (peak and cumulative sound exposure level), the ranges to the Level A harassment and Level B harassment threshold isopleths and the transmission loss coefficient(s). SouthCoast Wind 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; ii. The SFV measurement systems must have a sensitivity for the expected sound levels from detonations received at the nominal ranges throughout the detonation. The dynamic range of the SFV measurement systems must be sufficient such that at each location, the signals avoid poor signal-to noise ratios for low amplitude signals and the signals avoid clipping, nonlinearity, and saturation for high amplitude signals; iii. All hydrophones used for SFV measurements are required to have undergone a full system, traceable laboratory calibration conforming to International Electrotechnical Commission (IEC) 60565, or an equivalent standard procedure, from a factory or accredited source to ensure the hydrophone receives accurate sound levels, at a date not to exceed 2 years before deployment. Additional in-situ calibration checks using a pistonphone are required to be performed before and after each hydrophone deployment. If the measurement system employs filters via hardware or software (e.g., high-pass, low-pass, etc.), which is not already accounted for by the calibration, the filter performance (i.e., the filter's frequency response) must be known, reported, and the data corrected before analysis; iv. SouthCoast Wind must be prepared with additional equipment (e.g., hydrophones, recording devices, hydrophone calibrators, cables, batteries, etc.), which exceeds the amount of equipment necessary to perform the measurements, such that technical issues can be mitigated before measurement; v. SouthCoast Wind must submit SFV reports within 72 hours after each UXO/MEC detonation; vi. If SFV measurements collected for a UXO/MEC detonation event 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), SouthCoast Wind must implement additional noise mitigation measures prior to the		

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			next UXO/MEC detonation. SouthCoast Wind must provide written notification to NMFS Office of Protected Resources of the changes planned for the next detonation within 24 hours prior to implementation. Subsequent UXO/MEC detonation activities must not occur until NMFS and SouthCoast Wind can evaluate the situation and ensure future detonations will not exceed noise levels modeled assuming 10-dB attenuation; and vii. SouthCoast Wind must optimize the noise attenuation systems (e.g., ensure hose maintenance, pressure testing) to, at least, meet noise levels modeled, assuming 10-dB attenuation. g) SouthCoast Wind must establish and implement clearance zones for UXO/MEC detonations using both visual and acoustic monitoring. UXO/MEC clearance zones are specific to the known charge weight size of the UXO/MEC to be detonated; if charge weight is unknown or uncertain then the clearance zone identified for the largest charge weight (i.e., E12) must be implemented; h) At least three on-duty PSOs must be stationed on each monitoring platform and monitoring for 60 minutes prior to, during, and 30 minutes after each UXO/MEC detonation. The number of platforms is contingent upon the size of the UXO/MEC detonation and must be sufficient such that PSOs are able to visually clear the entire clearance zone. Concurrently, at least one PAM operator must be actively monitoring for marine mammals with PAM 60 minutes before, during, and 30 minutes after detonation. SouthCoast must identify the number of platforms planned for each size class and describe all monitoring protocols in the UXO/MEC Detonation Marine Mammal Monitoring Plan; and i) All clearance zones must be confirmed to be acoustically free of marine mammals for 30 minutes prior to a detonation. 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 30 minutes for all baleen whale species and sperm whales and 15 minutes for all other species.		
5	C	HRG Surveys	The following requirements apply to HRG surveys operating sub-bottom profilers (SBPs) (e.g., boomers, sparkers, and Compressed High Intensity Radiated Pulse (CHIRPS)) (hereinafter referred to as "acoustic sources"): a) SouthCoast Wind must establish and implement clearance and shutdown zones for HRG surveys using visual monitoring. These zones must be measured using the radial distance(s) from the acoustic source(s) currently in use; b) SouthCoast must utilize PSO(s), as described in Section 4(a). Visual monitoring must begin no less than 30 minutes prior to initiation of specified acoustic sources and must continue until 30 minutes after use of specified acoustic sources ceases. Any PSO on duty has the authority to delay the start of survey operations or shutdown operations if a marine mammal is detected within the applicable zones. When delay or shutdown is instructed by a PSO, the mitigative action must be taken and any dispute resolved only following deactivation; c) Prior to starting the survey and after receiving confirmation from the PSOs that the clearance zone is clear of any marine mammals, SouthCoast Wind is required to ramp-up acoustic sources to half power for 5 minutes prior to commencing full power, unless the equipment operates on a binary on/off switch (in which case rampup is not required). Any ramp-up of acoustic sources may 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 the initiation of survey activities using a specified acoustic source. Ramp-ups must be scheduled so as to minimize the time spent with the source activated; d) Prior to a ramp-up procedure starting, the acoustic source operator must notify the Lead PSO of the planned start of ramp-up. The notification time must not be less than 60 minutes prior to the planned ramp-up or activation in order to allow the PSO(s) time to monitor the clearance zone(s) for 30 minutes prior to the initiation of ramp-up or activation (pre-start clearance). During this 30-minute clearance period, the entire applicable clearance zones must be visible e) A PSO conducting clearance observations must be notified again immediately prior to reinitiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed. f) If a marine mammal is observed within a clearance zone during the 30 minute 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 periods are 30 minutes for all baleen whale species and sperm whales and 15 minutes for all other species;	Marine Mammals	NMFS

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			g) In any case when the clearance process has begun in conditions with good visibility, including via the use of night vision/reduced visibility monitoring equipment (infrared (IR)/thermal camera), and the Lead PSO has determined that the clearance zones are clear of marine mammals, survey operations may commence (i.e., no delay is required) despite periods of inclement weather and/or loss of daylight. Ramp-up may occur at times of poor visibility, including nighttime, if required visual monitoring has occurred with no detections of marine mammals in the 30 minutes prior to beginning ramp-up; h) Once the survey has commenced, SouthCoast Wind must shut down acoustic sources if a marine mammal enters a respective shutdown zone. In cases when the shutdown zones become obscured for brief periods (less than 30 minutes) 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 of this section is detected in the shutdown zone; i) If an acoustic source has been shut down due to the presence of a marine mammal, the use of an acoustic source may not commence or resume until the animal(s) has been confirmed to have left the Level B harassment zone or until a full 30 minutes for all baleen whale species and sperm whales and 15 minutes for all other species have elapsed with no further sighting. If an acoustic source is shut down for reasons other than mitigation (e.g., mechanical difficulty) for less than 30 minutes, it may be activated again without ramp-up only if PSOs have maintained constant observation and no additional detections of any marine mammal occurred within the respective shutdown zones. If an acoustic source is shut down for a period longer than 30 minutes, then all clearance and ramp-up procedures must be initiated; j) If multiple HRG vessels are operating concurrently, any observations of marine mammals must be communicated to PSOs on all nearby survey vessels; and k) Should an autonomous survey vehicle (ASV) be used during HRG surveys, the ASV must remain with 800 m (2,635 ft) of the primary vessel while conducting survey operations; two PSOs must be stationed on the mother vessel at the best vantage points to monitor the clearance and shutdown zones around the ASV; at least one PSO must monitor the output of a thermal high-definition camera installed on the mother vessel to monitor the field-of-view around the ASV using a hand-held tablet, and during periods of reduced visibility (e.g., darkness, rain, or fog), PSOs must use night-vision goggles with thermal clip-ons and a hand-held spotlight to monitor the clearance and shutdown zones around the ASV.		
6	C, O&M	Fisheries monitoring surveys	The following measures apply during fisheries monitoring surveys and must be implemented by SouthCoast Wind: a) Marine mammal monitoring must be conducted within 1 nm (1.85 km) from the planned survey location by the trained captain and/or a member of the scientific crew for 15 minutes prior to deploying gear, throughout gear deployment and use, and for 15 minutes after haul back; b) All captains and crew conducting fishery surveys must be trained in marine mammal detection and identification; c) Gear must not be deployed if there is a risk of interaction with marine mammals. Gear must not be deployed until a minimum of 15 consecutive minutes have elapsed during which no marine mammal sightings within 1 nm (1,852 m) of the sampling station have occurred; d) If marine mammals are sighted within 1 nm of the planned location (i.e., station) within the 15 minutes prior to gear deployment, then SouthCoast Wind 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, SouthCoast Wind must move again to an area visibly clear of marine mammals or skip the station; e) If a marine mammal is at risk of interacting with deployed gear or 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 must slow its speed and maneuver the vessel away from the animals to minimize potential interactions with the observed animal; f) Survey gear must be deployed as soon as possible once the vessel arrives on station and after fulfilling the requirements in (f)(1) and (f)(3);	Marine Mammals	NMFS

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			g) SouthCoast Wind must maintain visual marine mammal monitoring effort during the entire period of time that gear is in the water (i.e., throughout gear deployment, fishing, and retrieval). If marine mammals are sighted before the gear is fully removed from the water, SouthCoast Wind will take the most appropriate action to avoid marine mammal interaction; h) All fisheries monitoring gear must be fully cleaned and repaired (if damaged) before each use/deployment; i) SouthCoast Wind's fixed gear must comply with the Atlantic Large Whale Take Reduction Plan regulations at 50 CFR 229.32 during fisheries monitoring surveys; j) Trawl tows must be limited to a maximum of 20 minute trawl-time and trawl tows must not exceed at a speed of 3.0 knots (3.5 mph); k) All gear must be emptied as close to the deck/sorting area and as quickly as possible after retrieval; l) During trawl surveys, vessel or scientific crew must open the cod end of the trawl net close to the deck in order to avoid injury to animals that may be caught in the gear; m) All fishery survey-related lines must include the breaking strength of all lines being less than 1,700 pounds (lbs; 771 kilograms (kg)). This may be accomplished by using whole buoy line that has a breaking strength of 1,700 lbs (771 kg); or buoy line with weak inserts that result in line having an overall breaking strength of 1,700 lbs (771 kg); n) During any survey that uses vertical lines, buoy lines must be weighted and must not float at the surface of the water. All groundlines must be composed entirely of sinking lines. 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; o) All in-water survey gear, including buoys, must be properly labeled with the scientific permit number or identification as SouthCoast Wind's research gear. All labels and markings on the gear, buoys, and buoy lines must also be compliant with the applicable regulations, and all buoy markings must comply with instructions received by the NOAA Greater Atlantic Regional Fisheries Office Protected Resources Division; p) All survey gear must be removed from the water whenever not in active survey use (i.e., no wet storage); q) All reasonable efforts that do not compromise human safety must be undertaken to recover gear; r) Any lost gear associated with the fishery surveys must be reported to the NOAA Greater Atlantic Regional Fisheries Office Protected Resources Division within 24 hours.		
7	C, O&M, D	PSO and PAM operator qualifications	SouthCoast Wind must implement the following measures applicable to PSOs and PAM operators: a) SouthCoast Wind must use NMFS-approved PSOs and PAM operators that are employed by a third-party observer provider. PSOs and PAM operators must have no tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant personnel regarding the presence of marine mammals and mitigation requirements; b) All 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. The educational requirements may be waived if the PSO or PAM operator has acquired the relevant experience and skills for visually and/or acoustically detecting marine mammals in a range of environmental conditions (e.g., sea state, visibility) within zone sizes equivalent to the clearance and shutdown zones required by these regulations. Requests for such a waiver must be submitted to NMFS Office of Protected Resources prior to or when SouthCoast Wind requests PSO and PAM operator approvals and must include written justification describing alternative experience. Alternate experience that may be considered includes, but is not limited to, conducting academic, commercial, or government-sponsored marine mammal visual and/or acoustic surveys or previous work experience as a PSO/PAM operator. All PSO's and PAM operators should demonstrate good standing and consistently good performance of all assigned duties; c) 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, writing skills sufficient to document observations 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; d) All PSOs must be trained in northwestern Atlantic Ocean 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	Marine Mammals	NMFS

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			with all required and relevant software and equipment necessary during observations (as described in paragraphs (b)(2) and (b)(3) of this section); e) All PSOs and PAM operators must have successfully completed a PSO, PAM, or refresher training course within the last 5 years and obtained a certificate of course completion that must be submitted to NMFS. This requirement is waived for any PSOs and PAM operators that completed a relevant training course more than five years prior to seeking approval but have been working consistently as a PSO or PAM operator within the past five years; f) At least one on-duty PSO and PAM operator, where applicable, per platform must be designated as a Lead during each of the specified activities; g) PSOs are responsible for obtaining NMFS' approval. NMFS may approve PSOs as conditional or unconditional. An unconditionally approved PSO is one who has completed training within the last 5 years and attained the experience (i.e., demonstrate experience with monitoring for marine mammals at clearance and shutdown zone sizes similar to those produced during the respective activity) or for PSOs who completed training more than five years previously and have worked in the specified role consistently for at least the past 5 years. A conditionally approved PSO may be one who has completed training in the last 5 years but has not yet attained the requisite field experience. To qualify as a Lead PSO, the person must be unconditionally approved and demonstrate that they have a minimum of 90 days of at-sea experience in the specific role, with the conclusion of the most recent relevant experience not more than 18 months previous to deployment and must also have experience specifically monitoring baleen whale species; h) PSOs for HRG surveys may be unconditionally or conditionally approved. A conditionally approved PSO for HRG surveys must be paired with an unconditionally approved PSO; i) PSOs and PAM operators for foundation installation and UXO detonation must be unconditionally approved; j) For all prospective project PSOs and PAM operators, SouthCoast Wind must submit resumes, NMFS approval letters, and certificates of completion of NMFS-approved PSO and/or PAM training/courses to NMFS' Office of Protected Resources for review and confirmation of their approval for specific roles at least 90 days prior to commencement of the activities requiring PSOs/PAM operators, or at least 30 days prior to when new PSOs/PAM operators are required after activities have commenced. Resumes must include information related to relevant education, experience, and training, including role, deployment dates and duration (i.e., number of days as a PSO or PAM operator per project), location and description of each prior PSO or PAM operator experience (i.e., zone sizes monitored, how monitoring supported mitigation, PAM system/software utilized); k) For prospective PSOs and PAM operators not previously approved by NMFS or for PSOs and PAM operators whose approval is not current (i.e., approval date is more than 5 years prior to the start of monitoring duties), SouthCoast Wind must submit the list of pre-approved PSOs and PAM operators for qualification verification at least 60 days prior to PSO and PAM operator use. Resumes must include information detailed in 217.335(a)(9). Resumes must be accompanied by certificate of completion of a NMFS-approved PSO and/or PAM training/course l) PAM operators are responsible for obtaining NMFS' approval. To be approved as a PAM operator, the person must meet the following qualifications: the PAM operator must have completed a PAM Operator training course, and demonstrate prior experience using PAM software, equipment, and real-time acoustic detection systems. They must demonstrate that they have prior experience independently analyzing archived and/or real-time PAM data to identify and classify baleen whale and other marine mammal vocalizations by species, including North Atlantic right whale and humpback whale vocalizations, and experience with deconflicting multiple species' vocalizations that are similar and/or received concurrently. PAM operators must be independent observers (i.e., not construction personnel), trained to use relevant project-specific PAM software and equipment, and must also be able to test software and hardware functionality prior to beginning real-time monitoring. The PAM operator must be able to identify and classify marine mammal acoustic detections by species in real-time (prioritizing North Atlantic right whales and noting other marine mammal vocalizations, when detected). At a minimum, for each acoustic detection, the PAM operator must be able to categorically determine whether a North Atlantic right whale is detected, possibly detected, or not detected, and notify the Lead PSO of any confirmed or possible detections, including baleen whale detections that cannot be identified to species. If the PAM software is capable of localization of sounds or deriving bearings and distance, the PAM operators must demonstrate experience using this technique; m) PSOs may work as PAM operators and vice versa if NMFS approves each individual for both roles; however, they may only perform one role at any one time and must not exceed work time restrictions, which must be tallied cumulatively; and		

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			n) All PSOs and PAM operators must complete a Permits and Environmental Compliance Plan training that must be held by the Project compliance representative(s) prior to the start of in-water project activities and whenever new PSOs and PAM operators join the marine mammal monitoring team. PSOs and PAM operators must also complete training and orientation with the construction operation to provide for personal safety.		
8	C, O&M, D	General PSO and PAM operator requirements	The following measures apply to PSOs and PAM operators and must be implemented by SouthCoast Wind: a) All PSOs must be located at the best vantage point(s) on any platform, as determined by the Lead PSO, in order to collectively 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. PAM operators may be located on a vessel or remotely on-shore but must have a computer station equipped with a data collection software system and acoustic data analysis software available wherever they are stationed, and data or data products must be streamed in real-time or in near real-time to allow PAM operators to provide assistance to on-duty PSOs in determining if mitigation is required (i.e., delay or shutdown); b) PSOs must use high magnification (25x) binoculars, standard handheld (7x) binoculars, and the naked eye to search continuously for marine mammals during visual monitoring. During foundation installation, at least three PSOs on each dedicated PSO 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. PAM operators must use a NMFS-approved PAM system to conduct acoustic monitoring; c) During periods of low visibility (e.g., darkness, rain, fog, poor weather conditions), PSOs must use alternative technology (e.g., infrared or thermal cameras) to monitor the mitigation zones; d) 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; and e) SouthCoast Wind must ensure that 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 PSO monitoring reports;	Marine Mammals	NMFS
9	C, O&M, D	Reporting	SouthCoast Wind must comply with the following reporting measures: a) Prior to initiation of project activities, SouthCoast Wind must demonstrate in a report submitted to NMFS Office of Protected Resources (pr.itp.monitoringreports@noaa.gov) that all required training for SouthCoast Wind personnel, including the vessel crews, vessel captains, PSOs, and PAM operators has been completed; b) SouthCoast Wind must use a standardized reporting system. All data collected related to the Project must be recorded using industry-standard software that is installed on field laptops and/or tablets. Unless stated otherwise, all reports must be submitted to NMFS Office of Protected Resources (PR.ITP.MonitoringReports@noaa.gov), dates must be in MM/DD/YYYY format, and location information must be provided in Decimal Degrees and with the coordinate system information (e.g., NAD83, WGS84); c) For all visual monitoring efforts and marine mammal sightings, the following information must be collected and reported to NMFS Office of Protected Resources: the date and time that monitored activity begins or ends; the construction activities occurring during each observation period; the watch status (i.e., sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform); the PSO who sighted the animal; the time of sighting; the weather parameters (e.g., wind speed, percent cloud cover, visibility) and 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); the pace of the animal(s); the estimated number of animals (minimum/maximum/high/low/best); the estimated number of animals by cohort (e.g., adults, yearlings, juveniles, calves, group composition, etc.); the 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); the description of any marine mammal behavioral observations (e.g., feeding or traveling), definitions of any behavioral categories used (e.g., travel means directed movement at moderate speed), and observed changes in behavior, including an assessment of behavioral responses thought to have resulted from the specific activity; the animal's closest distance (i.e., closest point of approach) and bearing from the pile being driven, UXO/MEC detonation site, or specified HRG equipment; estimated time entered or spent within the Level A harassment and/or Level B harassment zone(s); status of any noise attenuation device(s) at time of sighting (e.g., double-bubble curtain on); specific phase of activity (e.g., ramp-up of HRG equipment, HRG acoustic source on/off, soft-start for pile	Marine Mammals	NMFS

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			driving, active pile driving); the timing and 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.); other human activity in the area; and other applicable information, as required in any LOA issued under section 5 herein; d) For all PAM deployments, the following information must be recorded and reported to NMFS: location of hydrophone (latitude and 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 Universal Coordinated Time (UTC); i.e., Eastern Standard Time (EST) time zone is UTC-5); duration of recordings (start/end dates and times; in International Organization for Standardization (ISO) 8601 format, yyyymm-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 (µPa)); 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); i. For each detection, the following information the following information must be noted: species identification (if possible); call type, number of calls (if known) and number of species (if simultaneous calls detected); 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 location (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; duration of detection file and minimum and maximum frequencies viewed/monitored/used in detection (in Hz); and name of PAM operator(s) on duty. e) SouthCoast Wind must compile and submit weekly reports during foundation installation containing marine mammal monitoring and A-SFV data to NMFS Office of Protected Resources (pr.itp.monitoringreports@noaa.gov). Weekly reports are due on Wednesday for the previous week (Sunday – Saturday). In the reports, SouthCoast must provide the daily start and stop of all pile driving; 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 noise attenuation system(s) used and its performance. The weekly report must also identify which turbines were installed, and when/if any become operational (a map must be provided). f) SouthCoast Wind must compile and submit monthly reports to NMFS Office of Protected Resources (pr.itp.monitoringreports@noaa.gov) during foundation installation 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, MMSI number, and route), number of piles installed, table(s) including all visual and acoustic 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 were installed and when/if any became operational (a map must be provided). Full PAM detection data and metadata must also 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-reportingsystem-templates; g) SouthCoast Wind must submit a draft annual marine mammal monitoring report to NMFS (PR.ITP.monitoringreports@noaa.gov) no later than March 31, annually, which contains data for all specified activities. The draft and final reports must detail the following: 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) and a comparison with the number of authorized takes 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; operational details (i.e., days and duration of impact and vibratory pile driving, number of UXO/MEC detonations, days and amount of HRG survey effort, etc.); PAM systems used; the results, effectiveness, and which noise attenuation systems were used during relevant activities (i.e., foundation pile driving); summarized information related to situational reporting; and any other important information relevant to the Project, including additional information that may be identified through the adaptive management process. The final annual report must be prepared and submitted within 30 calendar days following the receipt of any comments from NMFS on the draft report;		

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			h) In addition to the 48-hour interim reports, SouthCoast Wind must submit a draft annual SFV report to NMFS (PR.ITP.monitoringreports@noaa.gov) no later than 90 days after SFV is completed for the year. The final annual SFV report must be prepared and submitted within 30 calendar days (or longer upon approval by SouthCoast Wind must submit its draft 5-year report to NMFS Office of Protected Resources (PR.ITP.monitoringreports@noaa.gov) 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 (or longer upon approval by NMFS) following receipt of any NMFS Office of Protected Resources comments on the draft report; i) SouthCoast Wind must provide the initial results of the T-SFV measurements to NMFS Office of Protected Resources (PR.ITP.monitoringreports@noaa.gov) in an interim report after each foundation installation event as soon as they are available, but no later than 48 hours after each completion of T-SFV for a given foundation. The report must include, at minimum: pile identifier name, location of the pile and each hydrophone array in latitude/longitude; depths of each hydrophone; hammer energies/schedule used during pile driving including the total number of strikes and the maximum hammer energy; the model-estimated acoustic ranges (R95%) to compare with the real-world sound field measurements; peak sound pressure level (SPLpk), root-mean-square sound pressure level that contains 90 percent of the acoustic energy (SPLrms), and sound exposure level (SEL, in single strike for impact pile driving, SELss and SEL over 1-second interval for vibratory pile driving) for each hydrophone, including at least the maximum, arithmetic mean, minimum, median (L50) and L5 (95 percent exceedance) statistics for each metric; estimated ranges to marine mammal Level A harassment and Level B harassment acoustic isopleths estimated using SFV data, calculated using the maximum-over-depth L5 (95 percent exceedance level, maximum of both hydrophones) of the associated sound metric; comparison of modeled results assuming 10-dB attenuation against the measured marine mammal Level A harassment and Level B harassment acoustic isopleths; estimated transmission loss coefficients; one-third-octave band SEL spectra for impact and vibratory pile driving for each hydrophone; if filtering is applied, full filter characteristics must be reported; and hydrophone specifications including the type, model, and sensitivity. SouthCoast Wind must also report any immediate observations which are suspected to have a significant impact on the results including but not limited to: observed noise mitigation system issues, obstructions along the measurement transect, technical issues with hydrophones or recording devices, interfering noise sources (e.g., vessel traffic). If any in-situ calibration checks for hydrophones reveal a calibration drift greater than 0.75 dB, that pistonphone calibration checks are inconclusive, or that calibration checks are otherwise not effectively performed, SouthCoast Wind must indicate full details of the calibration procedure and results, and any associated issues in the 48-hour interim reports; j) All A-SFV results must be included in the weekly reports. Any indications that distances to the identified Level A harassment and Level B harassment threshold isopleths for marine mammals were exceeded must be addressed by SouthCoast Wind in the reports, including an explanation of factors that contributed to the exceedance and corrective actions that were taken to avoid exceedance on subsequent piles, if applicable; k) SouthCoast Wind must provide NMFS Office of Protected Resources 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 requirement 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 charge size, and any other information available on the characteristics of the UXO/MEC; l) SouthCoast Wind must submit SFV results for a UXO/MEC detonation in a report submitted to NMFS Office of Protected Resources (PR.ITP.MonitoringReports@noaa.gov) prior to detonating a subsequent UXO/MEC, or within the relevant weekly report, whichever comes first; m) SouthCoast must submit bubble curtain performance reports for foundation installations within 48 hours of each bubble curtain deployment; n) The final results of all SFV measurements from each foundation installation and UXO/MEC detonation must be submitted as soon as possible, but no later than 90 days following completion of all annual SFV measurements. The final reports must include all details included in the interim reports and descriptions of any notable occurrences, explanations for results that were not anticipated, and mitigative actions taken during foundation installation to reduce noise levels (e.g., cleaning and redeploying bubble curtain hose). The final report must also include at least the maximum, mean, minimum, median (L50) and L5 (95 percent exceedance) statistics for each metric; the SEL and SPL power spectral density and/or one-third octave band levels (usually calculated as decidecade band levels) at the receiver locations should be reported; range of transmission		

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			loss coefficients; the local environmental conditions, such as wind speed, transmission loss data collected on-site (or the sound velocity profile); baseline pre- and postactivity ambient sound levels (broadband and/or within frequencies of concern); a description of depth and sediment type, as documented in the Construction and Operation Plan (COP), at the acoustic buoy and foundation installation and UXO/MEC detonation locations; the measured ranges to the Level A harassment and Level B harassment threshold isopleths; hammer energies required for pile installation and the number of strikes per pile; the hydrophone equipment and methods (i.e., recording device, bandwidth/sampling rate; distance from the pile where recordings were made; the depth of recording device(s)); a description of the SFV measurement 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; the spatial configuration of the noise attenuation device(s) relative to the pile; a description of the noise abatement system and operational parameters (e.g., bubble flow rate, distance deployed from the pile, etc.), and any action taken to adjust the noise abatement system. A discussion which includes any observations that are suspected to have had a significant influence on the results including, but not limited to: observed noise mitigation system issues, obstructions along the measurement transect, technical issues with hydrophones or recording devices, deviation of propagation environment from that assumed for acoustic modeling, vessel noise interference; o) If at any time during the project SouthCoast Wind becomes aware of any issue or issues which may (to any reasonable subject-matter expert, including the persons performing the measurements and analysis) call into question the validity of any measured ranges to Level A harassment or Level B harassment threshold isopleths to a significant degree, which were previously transmitted or communicated to NMFS Office of Protected Resources, SouthCoast Wind must inform NMFS Office of Protected Resources within 1 business day of becoming aware of this issue or before the next pile is driven, whichever comes first. p) If a North Atlantic right whale is acoustically detected at any time by a project-related PAM system, SouthCoast Wind must ensure the detection is reported as soon as possible to NMFS, but no longer than 24 hours after the detection via the 24-hour North Atlantic right whale Detection Template (https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reportingsystem-templates). Calling the hotline is not necessary when reporting PAM detections via the template; q) Full detection data, metadata, and location of recorders (or GPS tracks, if applicable) from all real-time hydrophones used for monitoring during foundation installations and UXO/MEC detonations must be submitted within 90 calendar days following completion of activities requiring PAM for mitigation via the International Organization for Standardization (ISO) standard metadata forms available on the NMFS Passive Acoustic Reporting System website (https://www.fisheries.noaa.gov/resource/document/passive-acousticreportingsystem-templates). Submit the completed data templates to nmfs.nec.pacmdata@noaa.gov. The full acoustic recordings from real-time systems must also be sent to the National Centers for Environmental Information (NCEI) for archiving within 90 days following completion of activities requiring PAM for mitigation. Submission details can be found at: https://www.ncei.noaa.gov/products/passive-acoustic-data; r) SouthCoast Wind must submit situational reports if specific circumstances occur, including but not limited to the following: i. All instances wherein an exemption to any of the requirements in the regulations and/or this LOA is taken must be reported to the NMFS Office of Protected Resources within 24 hours; ii. If a North Atlantic right whale is observed at any time by PSOs or project personnel, SouthCoast Wind must ensure the sighting is immediately (if not feasible, as soon as possible and no longer than 24 hours after the sighting) reported to NMFS, the U.S. Coast Guard, and the Right Whale Sightings Advisory System (RWSAS). If in the Northeast Region (Maine to Virginia/North Carolina border) call (866-755-6622). If in the Southeast Region (North Carolina to Florida) call (877-WHALE-HELP or 877-942- 5343). If circumstances arise where calling NMFS is not possible, reports must be made to the U.S. Coast Guard via channel 16 or through the WhaleAlert app (http://www.whalealert.org/). The sighting report must include the time, date, and location of the sighting, number of whales, animal description/certainty of sighting (provide photos/video if taken), evidence of previous or current entanglement, Lease Area/project name, PSO/personnel name, PSO provider company (if applicable), and reporter's contact information; iii. If a North Atlantic right whale is observed at any time by PSOs or project personnel, SouthCoast Wind must submit a summary report to NMFS Greater Atlantic Regional Fisheries (GARFO; nmfs.gar.incidentaltake@noaa.gov), NMFS		

#	Proposed Project Phase [a]	Mitigation & Monitoring Measures	Description	Resource Area Mitigated	Anticipated Enforcing Agency
			Office of Protected Resources (PR.ITP.MonitoringReports@noaa.gov) and NMFS Northeast Fisheries Science Center (NEFSC; ne.rw.survey@noaa.gov) within 24 hours with the above information and the vessel/platform from which the sighting was made, activity the vessel/platform was engaged in at time of sighting, project construction and/or survey activity at the time of the sighting (e.g., pile driving, cable installation, HRG survey), distance from vessel/platform to sighting at time of detection, and any mitigation actions taken in response to the sighting; iv. In the event that personnel involved in the Project discover a stranded, entangled, injured, or dead marine mammal, SouthCoast Wind must immediately report the observation to NMFS. If in the Greater Atlantic Region (Maine to Virginia) call the NMFS Greater Atlantic Stranding Hotline (866-755-6622); if in the Southeast Region (North Carolina to Florida), call the NMFS Southeast Stranding Hotline (877-942-5343). Separately, SouthCoast Wind must report the incident to NMFS Office of Protected Resources (PR.ITP.MonitoringReports@noaa.gov); if in the Greater Atlantic region (Maine to Virginia), to NMFS Greater Atlantic Regional Fisheries Office (GARFO; nmfs.gar.incidental-take@noaa.gov, nmfs.gar.stranding@noaa.gov); if in the Southeast region (North Carolina to Florida), to NMFS Southeast Regional Office (SERO; secmammalreports@noaa.gov); and to the U.S. Coast Guard, as soon as feasible but within 24-hours. The report (via phone or email) must include contact (name, phone number, etc.), the time, date, and location 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 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; and v. In the event of a vessel strike of a marine mammal by any vessel associated with the Project or if project activities cause a non-auditory injury or death of a marine mammal, SouthCoast Wind must immediately report the incident to NMFS. If in the Greater Atlantic Region (Maine to Virginia) call the NMFS Greater Atlantic Stranding Hotline (866-755- 6622) and if in the Southeast Region (North Carolina to Florida) call the NMFS Southeast Stranding Hotline (877-942-5343). Separately, SouthCoast Wind must immediately report the incident to NMFS Office of Protected Resources (PR.ITP.MonitoringReports@noaa.gov) and, if in the Greater Atlantic region (Maine to Virginia), NMFS GARFO (nmfs.gar.incidental-take@noaa.gov, nmfs.gar.stranding@noaa.gov) or, if in the Southeast region (North Carolina to Florida), NMFS SERO (secmammalreports@noaa.gov). The report must include the time, date, and location of the incident; species identification (if known) or description of the animal(s) involved; vessel size and motor configuration (inboard, outboard, jet propulsion); vessel's speed leading up to and during the incident; vessel's course/heading and what operations were being conducted (if applicable); status of all sound sources in use; 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; environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike; estimated size and length of animal that was struck; description of the behavior of the marine mammal immediately preceding and following the strike; if available, description of the presence and behavior of any other marine mammals immediately preceding the strike; 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 to the extent practicable, photographs or video footage of the animal(s). SouthCoast Wind must immediately cease all on-water activities until the NMFS Office of Protected Resources 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 Office of Protected Resources may impose additional measures to minimize the likelihood of further prohibited take and ensure MMPA compliance. SouthCoast Wind may not resume their activities until notified by NMFS Office of Protected Resources; and s) Any lost gear associated with the fishery surveys must be reported to the NOAA Greater Atlantic Regional Fisheries Office Protected Resources Division (nmfs.gar.incidentaltake@noaa.gov) as soon as possible or 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.		

References Cited

SouthCoast Wind Energy, LLC (Mayflower Wind). 2024. Mayflower Wind Construction and Operations Plan. https://www.boem.gov/renewable-energy/state-activities/southcoast-wind-formerly-mayflower-wind.

Attachment G-1: SouthCoast Wind Request for Incidental Take Regulations Mitigation Measures

This attachment contains the mitigation measures proposed by SouthCoast Wind in its Request for Incidental Take Regulations application. BOEM anticipates that BOEM, BSEE, and NMFS would be the enforcing agencies for these measures.

Attachment G-2: SouthCoast Wind Draft Post-Construction Avian and Bat Monitoring Framework

11 Mitigation Measures

The monitoring and mitigation methods described below are intended to reduce or eliminate exposure of marine mammals to underwater sound levels that could constitute "take" under the MMPA. Many of the monitoring and mitigation methods are applicable across all Project activities while others will be specific to the following activities:

- WTG and OSP foundation installation using impact pile driving,
- WTG and OSP foundation installation using vibratory pile driving,
- High resolution geophysical (HRG) and remotely operated vehicle (ROV) surveys, and
- UXO detonation.

11.1 Standard Mitigation and Monitoring Requirements for all Project Activities

11.1.1 Protected Species Observer (PSO) and Acoustic Protected Species Observer (APSO) Experience and Responsibilities

11.1.1.1 Observer Qualifications and Training

- All PSOs and APSOs will have met NMFS and BOEM training and experience requirements (including a NMFS-approved PSO training course).
- PSOs and APSOs will be employed by a third-party observer provider.
- Briefings between construction supervisors and crews and the PSO/APSO team will be held prior to the start of all Project activities as well as when new personnel join the vessel(s).
- The PSO team and the APSO team will each have a lead observer (Lead PSO and Lead APSO) who will be unconditionally approved by NMFS and have a minimum of 90 days at-sea experience in a northwestern Atlantic Ocean environment performing the visual (Lead PSO) or acoustic role (Lead APSO), with the conclusion of the most recent relevant experience no more than 18 months previous.
- APSOs responsible for determining if an acoustic detection originated from a NARW will be trained in identification of mysticete vocalizations.

11.1.1.2 *Responsibilities and Authorities of PSOs and APSOs*

- PSOs will not have tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence of marine mammals and mitigation requirements.
- Lead PSOs carry the same duties as PSOs and also manage the activities associated with the PSO team, PAM team, and SFV team.
- Any PSO or APSO on duty will have authority to delay the start of operations or to call for a shutdown based on their observations or acoustic detections.
- Lead APSOs will be able to troubleshoot the acoustic equipment and assist in making final decisions regarding species identifications, localization, and other acoustic monitoring details that will be relayed to the Lead PSO.
- A clear line and method of communication between the PSOs and APSOs will be established and maintained to ensure mitigation measures are conveyed without delay.

11.1.2 Visual Monitoring

- PSOs and APSOs will be on watch for a maximum of four consecutive hours followed by a break of at least two hours between watches and will conduct a maximum of 12 hours of observation per 24-hour period.
- Each PSO and APSO will be provided with one 8-hour break per 24-hour period to sleep.
- Observations will be conducted (or electronic monitoring equipment installed) from the best safe vantage point(s) on the vessel or base of operations to ensure visibility of the shutdown zones.
- SouthCoast Wind is exploring opportunities to use currently available technologies to conduct monitoring using PSOs and APSOs who may be stationed in locations other than offshore vessels (e.g., onshore); however, this does not exempt onsite PSO requirements

described throughout section 11 (e.g., PSOs onboard the pile driving vessel, detonation vessel, or HRG survey vessel)
    - Onshore monitoring may include the use of imagery or data transmitted in real time (or near real time) from sensors located offshore. For example, EO, IR, or PAM sensors may be located on a variety of potential platforms.
- When conducting observations during Project activities, PSOs will scan systematically with the unaided eye, high-magnification (25 x 150 mm) binoculars, and/or standard handheld (7 x 50 mm) binoculars or other electronic methods to search continuously for marine mammals during all observational periods.
- When monitoring at night, or in low visibility conditions, PSOs will monitor for marine mammals and other protected species using night-vision devices with thermal clip-ons, a hand-held spotlight, and/or a mounted thermal camera system or other electronic methods.
- PSOs will watch for and record all marine mammal sightings regardless of the distance from the observer and/or sound source.
- Distances to observed animals will be estimated with range finders, reticle binoculars, clinometers when possible, or other electronic methods and based on the best estimate of the PSO when necessary.
- PSOs will record watch effort and environmental conditions on a routine basis.
- Members of the PSO and/or APSO team will consult with NMFS' NARW reporting system for the presence of NARWs in the Project Area.

11.1.3 Visual Monitoring During Vessel Transit

- PSOs and/or trained vessel crew will observe for marine mammals at all times when vessels are transiting to/from and within the Project Area and port.
- PSOs and/or vessel crew will request vessel-strike avoidance measures if necessary (Section 11.1.5).

11.1.4 Acoustic Monitoring

Acoustic monitoring and mitigation measures stated below will be followed during WTG and OSP foundation installation requiring pile driving only.

11.1.4.1 Passive Acoustic Monitoring Methods

- APSOs will rotate on a 4-hour basis when monitoring from a 24-hour operation vessel or base of operations.
- A real-time PAM system will be used to supplement visual monitoring during all pre-start clearance, piling, and post-piling monitoring periods.
- Use of PAM will allow initiation of pile driving when visual observation of the entire pre-start clearance zone is not possible due to poor visibility, including darkness during nighttime operations.
- There will be one APSO on duty during both daytime and nighttime/low visibility monitoring.
- APSOs will immediately communicate all acoustic detections of marine mammals to PSOs performing visual observations including any determination regarding species identification, distance, and bearing of the marine mammal.

- The PAM system will not be located on the pile installation vessel to reduce masking of marine mammal sounds.
- A detailed description of the real-time PAM system will be developed and submitted to NMFS and BOEM for review and approval.

11.1.4.2 *Sound Source Verification*

A detailed plan for Sound Source Verification (SSV) will be developed and submitted to NMFS prior to planned start of pile driving and UXO detonations.

- Pile Driving
    - Measurement of each pile type (monopiles and/or piled jackets) to be installed to determine the sound levels produced and effectiveness of the NAS(s).
    - Procedures for how measurement results will be used to justify any requested changes to planned monitoring and mitigation distances.
    - Measurements of received levels will be taken at 750 m and other various distances and azimuths relative to the pile location designed to gather data on sounds produced during installation scenarios specific to the Project (Figure 14). These measurements will be used to validate the modeled sound levels at 750 and other distances as provided in Appendix G1 of Appendix A to this application. These measurements are designed to assess whether or not the distances to the Level A and Level B harassment isopleths and/or other mitigation action distances align with the distances modelled.
        - SSV will include at least one recorder in each of the four azimuths around the pile (to capture potential directivity of the sound field). Additionally, there will be 3-4 recorders (one bottom and one mid-water column at each location) along one azimuth that is likely to see the lowest propagation loss to allow assessment of the modelled Level A and Level B isopleths.
- UXO Detonation
    - Measurements will be made for each UXO/MEC that must be detonated using the method described above for pile driving.

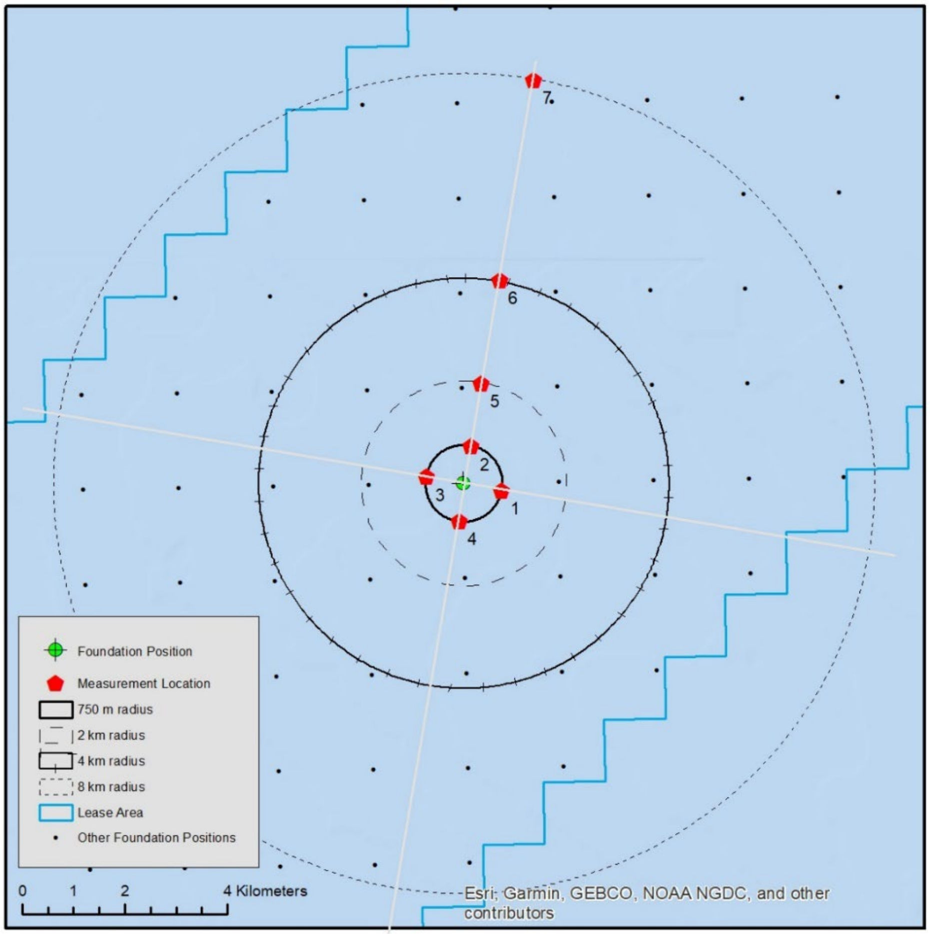

Figure 14. Conceptual design of sound source verification measurement locations relative to a foundation installation.

11.1.5 Vessel Strike Avoidance

All vessels, including those transiting to and from local ports and the Project Area, will follow the vessel strike avoidance measures outlined below, except in cases where following these requirements would put the safety of the vessel or crew at risk.

11.1.5.1 General Measures

- Captain, first mate, and/or designated vessel personnel working offshore will receive training on marine mammal awareness and vessel strike avoidance measures.
- All vessels will have a minimum of one dedicated observer on watch (NMFS-approved PSO or trained crew member with no other concurrent duties) with standard equipment for daytime monitoring (handheld binoculars) and alternative equipment for low visibility conditions (night-vision devices and/or IR sensor). The dedicated observers will be trained in detection and identification of protected species, vessel strike minimization procedures and how and when to communicate with the vessel operator.
- Observers will maintain a vigilant watch for all marine mammals and slow down, change course, slow down or stop vessels to avoid striking protected species.

- PSOs, vessel captains or operators, and dedicated visual observers will continuously monitor all NMFS NARW reporting systems (Right Whale Sighting Advisory System [RWSAS], WhaleAlert, and VHF channel 16).

11.1.5.2 Separation Distances

- Vessels will maintain, to the extent practicable, separation distances of:
    - >500 m distance from any sighted NARW or an unidentified large marine mammal,
    - >100 m from sperm whales and all other baleen whales,
    - >50 m from all other marine mammals, with the exception of animals approaching the vessel (e.g., delphinids and pinnipeds), in which case the vessel operator must avoid excessive speed or abrupt changes in direction.

11.1.5.3 Actions given observed marine mammal

- If underway, all vessels will steer a course away from any sighted NARW at a distance greater than 500 m from the vessel and immediately leave the area at a slow safe speed (10 kts or less):
    - If a NARW comes within 500 m of an underway vessel, the vessel will reduce speed and shift the engines into neutral, if safe to do so;
    - The vessel will not engage engines until the NARW has moved outside of the vessel's path and beyond the 500 m minimum separation distance;
    - If the vessel is stationary, the vessel will not engage engines until the NARW has moved beyond 500 m;
    - If a whale is observed but cannot be confirmed as a species other than a NARW, the vessel operator will assume that it is a NARW and take the appropriate mitigation measures as described above.
- If a vessel comes within 100 m of a non-NARW whale:
    - If underway, the vessel must attempt to remain parallel to the animal's course, reduce speed and shift the engine to neutral, if safe to do so, and must not engage the engines until the whale (e.g., large whale and/or ESA-listed whales besides NARW) has moved outside of the vessel's path and beyond 100 m.
    - If stationary, the vessel must not engage engines until the whale has moved beyond 100 m.
- All underway vessels will, to the maximum extent practicable, attempt to maintain a separation distance of 50 from all delphinid cetaceans and pinnipeds with the exception made for those that approach the vessel (e.g., bow riding dolphins).
    - Underway vessels will not divert to approach any small cetacean, seal, sea turtle, or giant manta ray;
    - If a delphinid cetacean that is not bow riding or a pinniped is sighted within 50 m of an underway vessel, that vessel will shift the engine to neutral. Engines will not be engaged until the animal(s) has moved outside of the vessel's path and beyond 50 m.
- All sightings of dead or injured marine mammals or sea turtles will be reported within 24 hours (Section 11.1.7).

11.1.5.4 Speed Reduction

- Vessels will comply with current mandatory measures stipulated in the NOAA NARW Vessel Strike Reduction Regulations;
- All vessels, regardless of size, will transit at 10 knots or less within any active NARW SMA and Slow Zone (i.e., DMA or acoustically-triggered Slow Zones)
- During migratory and calving periods from **November 1 to April 30**, all project vessels will operate at 10 knots or less when in the Project Area;
- All vessel speeds will be reduced to ≤10 kts when mother/calf pairs, pods, or large assemblages of marine mammals are observed;
- SouthCoast Wind will implement (or participate in a joint program, if developed) a PAM system designed to detect NARW within the transit corridor and additional visual monitoring measures as described below. A Vessel Strike Avoidance Plan that provides a more detailed description of the equipment and methods to conduct the monitoring summarized here will be provided to NMFS at least 90-days prior to commencement of vessel movements associated with the activities covered by the requested incidental take regulations.
  - Acoustic Monitoring
    - A PAM system consisting of near real-time bottom mounted and/or mobile acoustic monitoring systems will be installed such that NARW and other large whale calls made in or near the corridor can be detected and transmitted to the transiting vessel (either directly or through an operations base).
    - The detections will be used to determine areas along the transit corridor where vessels would be allowed to travel at >10 kts when no other speed restrictions are in place (e.g., 10 knot speed restriction in SMAs and DMAs);
    - Any detection of a large whale (including NARW) via the PAM system within the transit corridor will trigger a 10 knot or less speed restriction for all Project vessels until the whale can be confirmed visually beyond 500 m of the vessel or 24 hours following the detection and any re-detection has passed.
  - If the PAM system temporarily stops working the following procedures will be followed.
    - All vessels, regardless of size, will transit at <10 kts in all SMAs (applicable November 1st to April 30th) and DMAs (at any time of year).
    - Between May 1 and October 31, all vessels, regardless of size, will transit at >10 kts and implement the visual monitoring measures with a dedicated observers as described above.

11.1.6 Data Recording

- All data will be recorded based on standard PSO collection requirements using industry-standard software.
- Data recorded will include information related to ongoing operations, observation methods and effort, visibility conditions, marine mammal detections, and any mitigation actions requested and enacted.

11.1.7 Reporting

The following situations would require reporting as defined below:

- If a stranded, entangled, injured, or dead protected species is observed, the sighting will be reported immediately and within 24 hours to NMFS Sighting Advisory System (SAS) hotline.
- Any NARW sightings will be reported as soon as feasible and no later than within 24 hours to the NMFS Right Whale Sighting Advisory System (RWSAS) hotline (866-755-6622) or via the Whale Alert Application.
- If a marine mammal is taken in a prohibited manner by Project activities, the following actions will occur:
    - Activity operations resulting in the injury/death will cease immediately.
    - The incident will be reported to the NMFS OPR (301-427-8401), NMFS New England Stranding Network Coordinator, and the Greater Atlantic Regional Fisheries Office (GARFO) no later than within 24 hours.
    - Additional reporting by the vessel captain or PSO onboard will be to NMFS Fisheries Marine Mammal and Sea Turtle Stranding and Entanglement Hotline (866-775-6622), or alternative electronic reporting systems as approved by the NMFS stranding program, as well as the U.S. Coast Guard (USCG).
    - The report will include all available information required by the ITR or the NMFS stranding report form.
    - SouthCoast Wind will not resume the activity which resulted in the injury until NMFS OPR is able to review the circumstances of the incident determine the appropriate course of action.
- Actions given an unknown and recent observed dead or injured marine mammal:
    - SouthCoast Wind will immediately report the incident to the NMFS OPR and the NMFS New England Stranding Network Coordinator (as stated above).
    - The report will include the same information identified for a take by construction activity.
    - Activities will continue while NMFS reviews the circumstances of the incident and works with SouthCoast Wind to determine whether modifications to the activities are appropriate.
- Actions given observation of a dead or injured marine mammal not associated with or related to construction activities:
    - SouthCoast Wind will report the incident to the NMFS OPR and the NMFS New England Stranding Network Coordinator, within 24 hours of the discovery.
    - SouthCoast Wind will include any documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network including photographs and video footage if available.
    - Construction activities may continue.

11.1.7.1 Data and Final Reports will be prepared using the following protocols:

- All vessels will utilize a standardized data entry format.
- A quality assurance/ quality control (QA/QC'd) database of all sightings and associated details (e.g., distance from vessel, behavior, species, group size/composition) within and

outside of the designated shutdown zone, monitoring effort, environmental conditions, and Project-related activity will be provided after field operations and reporting are complete.

- During all pile driving activities, weekly reporting summarizing sightings, detections, and activities will be provided to NMFS and BOEM on the Wednesday following a Sunday-Saturday period.
- Monthly reports will be required during all pile driving activities including all information in the weekly reports, including project activities carried out in the previous month, vessel transits (number, type of vessel MMSI number and route), number of piles installed, all detections of marine mammals, and any mitigative actions taken.
- Monthly reports will be submitted to NMFS on the 15th of the month for the previous month.
- Final reports will follow a standardized format for PSO reporting from activities requiring marine mammal mitigation and monitoring.
- An annual report summarizing the prior year's activities will be provided to NMFS and BOEM 90-days after completion of each 12-month period during the effectiveness of the ITRs.

11.2 WTG and OSP Foundation Installation

Monitoring and mitigation protocols applicable to impact and vibratory pile driving during SouthCoast Wind construction are described further in the following subsections. Impact and vibratory pile driving may be initiated after dark or during daytime reduced visibility periods following the protocols in Section 11.2.3 and Section 11.2.4.

11.2.1 Monitoring Equipment

The following types of equipment will be used to monitor for marine mammals from one or more locations.

- Reticle binoculars
- Mounted thermal/IR camera system
  - The camera systems may be automated with detection alerts that will be checked by a PSO on duty; however, cameras may not be manned by a dedicated observer.
- Mounted "big-eye" binocular
- Monitoring station for real time PAM system (impact pile driving only)
- The selected PAM system will transmit real time data to PAM monitoring stations on the vessels and/or shore side monitoring station.
- Hand-held or wearable NVDs
- IR spotlights
- Data collection software system
- PSO-dedicated VHF radios
- Digital single-lens reflex camera equipped with 300-mm lens

11.2.2 Daytime Visual Monitoring

Visual monitoring will occur from the construction vessel and two dedicated PSO vessels. Daytime visual monitoring is defined by the period between nautical twilight rise and set for the region. Visual monitoring measures below intend to provide complete visual coverage of the pre-start clearance zone during the pre-start clearance period prior to pile driving and the shutdown zones during impact and vibratory pile driving. The following visual monitoring protocols include:

- Three on duty PSOs will keep watch from each platform (the pile driving vessel and two PSO vessels) during the pre-start clearance period, throughout pile driving, and 30 minutes after piling is completed.
- At least three PSOs on duty on each platform during all other daylight periods.
- PSOs will monitor for at least 60 minutes before, during, and 30 minutes after each piling event.
- One PSO will monitor areas closer to the pile being stalled for smaller marine mammals using the naked eye, reticle binoculars and/or other electronic method(s) while two PSOs scan farther from the pile using the mounted big eye binoculars and/or other electronic method(s).
- PSO will monitor the NMFS NARW reporting systems including WhaleAlert and SAS once every 4-hour shift during Project related activities.

11.2.3 Daytime Periods of Reduced Visibility

These measures will apply during the pre-start clearance period, during active pile driving, and 30 minutes after piling is completed.

- If the Level B harassment zone is obscured, the three PSOs on watch will continue to monitor the shutdown zone utilizing thermal camera systems and/or other electronic method(s) and PAM.
- During nighttime or low visibility conditions, the three PSOs on watch will monitor the shutdown zone with the mounted IR camera (further described in 11.2.4), available handheld night vision, and/or other electronic method(s).
- All on-duty PSOs will be in contact with the APSOs who will monitor the PAM systems for acoustic detections of marine mammals that are vocalizing in the area (impact pile driving only).

11.2.4 Nighttime Visual Monitoring

During nighttime operations, night vision equipment (night vision goggles) and infrared/thermal imaging technology will be used. Recent studies have concluded that the use of infrared/thermal imaging technology allow for the detection of marine mammals at night (Verfuss et al. 2018). Guazzo et al (2019) showed that probability of detecting a large whale blow by a commercially available infrared camera was similar at night as during the day; camera monitoring distance was 2.1 km (1.3 mi) from an elevated vantage point at night versus 3 km (1.9 mi) for daylight visual monitoring from the same location. The following nighttime piling monitoring and mitigation methods use the best currently available technology to mitigate potential impacts and result in the least practicable adverse impact.

- During nighttime operations, visual PSOs on-watch will work in three person teams observing with an NVDs and/or monitoring IR thermal imaging camera systems. There will also be an APSO on duty conducting acoustic monitoring in coordination with the visual PSOs.

- The PSOs on duty will monitor for marine mammals and other protected species using night-vision goggles with thermal clip-ons, a hand-held spotlight (one set plus a backup set) and/or other electronic method(s), such that PSOs can focus observations in any direction.
- If possible, deck lights will be extinguished or dimmed during night observations when using the NVDs (strong lights compromise the NVD detection abilities); alternatively, if the deck lights must remain on for safety reasons, the PSO will attempt to use the NVDs in areas away from potential interference by these lights.

SouthCoast will prepare a more detailed description of the anticipated efficacy of the technologies it intends to use during nighttime monitoring and describe how they will be used to monitor the pre-start clearance and shutdown zones. This will be provided to NMFS after publication of the draft ITRs so that it can be considered during preparation of the Final ITRs.

11.2.5 Acoustic Monitoring

Since visual observations within the applicable shutdown zones can become impaired at night or during daylight hours due to fog, rain, or high sea states, visual monitoring with thermal and NVDs will be supplemented by PAM during these periods. An APSO will be on watch during all pre-start clearance, piling, and post-piling monitoring periods (daylight, reduced visibility, and nighttime monitoring). A combination of alternative monitoring measures, including PAM, has been demonstrated to have comparable detection rates (although limited to vocalizing individuals) to daytime visual detections for several species (Smith et al., 2020).

- There will be one APSO on duty who will begin monitoring at least 60 minutes prior to initiation of pile driving, continue throughout piling, and extend at least 30 minutes post installation during both daytime and nighttime/low visibility conditions; All on-duty PSOs will be in contact with the APSO on duty, who will monitor the PAM systems for acoustic detections of marine mammals that are vocalizing in the area.
- For real-time PAM systems, at least one APSO will be designated to monitor each system by viewing data or data products that are streamed in real-time or near real-time to a computer workstation and monitor located on a Project vessel or onshore.
- The PAM operator will inform the PSOs on duty of animal detections approaching or within the applicable mitigation zones via the data collection software system (i.e., Mystcetus or similar system) or other direct forms of communication (radio, phone, messaging app). The PSO will then be responsible for requesting that any necessary mitigation procedures are implemented.
- The PAM system will have the capability of monitoring up to 10 km from the pile.
- A PAM Plan will be submitted to NMFS and BOEM prior to the planned start of pile driving.

11.2.6 Pre-Start Clearance

A pre-start clearance period will be implemented for all foundation installation occurring both inside and outside the 20-km area of concern (as described in Section 1). For foundations installed within the 20-km area of concern (June 1 through October 15), a minimum visibility zone[1] of 4,900 m for pin pile and 7,500 m for monopile installation will be implemented. For OSP foundations (and WTG jacket foundations, if installed) installed throughout the rest of the Lease Area (outside the area of concern), a minimum visibility zone[2] of 2,600 m for pin pile and 3,700 m for monopile and pin pile installation will be implemented. For impact pile driving, PAM will begin 60 minutes prior to the start of pile driving. Pre-start clearance zones will follow the same zone sizes as presented below in Section 11.2.9.

- Visual monitoring will begin at least 60 minutes prior to the start of impact pile driving and 30 minutes prior to the start of vibratory pile driving;
- To begin the clearance process, PSOs will visually clear (i.e., confirm no observation of marine mammals) the relevant minimum visibility zone for 30 minutes immediately prior to commencing foundation installation activities.
    - If PSOs cannot visually monitor the relevant minimum visibility zone prior to the start of pile driving, pile driving operations will not commence.
- Once the clearance process has begun, visual monitoring will be conducted (including the use of IR and NVD systems, as appropriate) and PAM for at least 60 minutes prior to the start of soft-start;
- If a marine mammal is observed entering or within the relevant clearance zone, pile driving activity will be delayed.
- An acoustic detection localized to a position within the relevant clearance zone(s) will trigger a delay.
- Impact and/or vibratory pile driving may commence when either the marine mammal(s) has voluntarily left the specific clearance zone and been visually or acoustically confirmed beyond that clearance zone, or, when the additional time period has elapsed with no further sighting or acoustic detection (i.e., 15 minutes for odontocetes [excluding sperm whales] and pinnipeds, and 30 minutes for sperm and baleen whales [including NARWs]).
    - In cases where these criteria cannot be met, pile driving may restart only if necessary to maintain pile stability at which time SouthCoast Wind will use the lowest hammer energy practicable to maintain stability.

11.2.7 Soft Start

- Soft start procedures will be followed, to the extent practicable, at the beginning of each pile driving event or any time pile driving has stopped for longer than 30 minutes.
- A soft start procedure will not begin until the relevant clearance zone has been cleared by the visual PSO or APSOs.
- If a marine mammal is detected within or about to enter the relevant clearance zone, prior to or during the soft-start procedure, pile driving will be delayed until the animal has been

[1] The minimum visibility zone sizes implemented during foundation installation of pin piles and monopiles within the 20-km area of concern are set equal to the largest Level B harassment zone (unweighted acoustic ranges to 160 dB re 1 µPa sound pressure level in summer) modeled at for each substructure type assuming 10 dB of noise attenuation.
[2] The minimum visibility zone sizes implemented during foundation installation of pin piles and monopiles occurring throughout the rest of the Lease Area (outside the area of concern) are set equal to the second largest low-frequency Level A SEL_{cum} exposure ranges ($ER_{95\%}$) with 10 dB of noise attenuation for foundation installation across Year 1 and Year 2.

observed exiting the relevant clearance zone or until an additional time period has elapsed with no further sighting (i.e., 15 minutes for odontocetes [excluding sperm whales] and pinnipeds and 30 minutes for sperm and baleen whales [including NARWs]).

11.2.8 Shutdowns

- If conditions change such that PSOs cannot monitor the relevant shutdown zone following the commencement of pile driving, the PSO will request an immediate shutdown.
- If a marine mammal is detected entering or within the respective shutdown zone after pile driving has commenced, an immediate shutdown of pile driving will be requested unless the Chief Engineer or Vessel Captain determine shutdown is not feasible.
- If a shutdown is not feasible at that time in the installation process due to a 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 risk of jeopardizing the installation process (pile refusal or instability), a reduction in the hammer energy of the greatest extent possible will be implemented.
- The shutdown zone will be continually monitored by PSOs and APSOs during any pauses in pile driving.
- If a marine mammal is sighted within the shutdown zone during a pause in piling, resumption of pile driving will be delayed until the animal(s) has exited the relevant shutdown zone or an additional time period has elapsed with no further sighting of the animal that triggered the shutdown (15 minutes for odontocetes [excluding sperm whales] and pinnipeds and 30 minutes for sperm and baleen whales [including NARWs]).
- Following shutdown, pile driving will restart using the same procedure described above in Section 11.2.7.

11.2.9 Shutdown Zones

The shutdown zones below (Section 11.2.9.1 through 11.2.9.6) are based upon the Level A exposure ranges with 10 dB of noise attenuation for foundation installation across Year 1 and Year 2 (further details in Section 6.3). If the shutdown zone is equivalent to the "NAS perimeter", this means the outside perimeter of the NAS. Therefore, any animals occurring within the NAS would trigger a shutdown. The NARW shutdown zones (Section 11.2.9.1 through 11.2.9.6) are based on the requirement that a visual or acoustic observation of a NARW at any distance will result in immediate shutdown measures described in Section 11.2.8. Foundation installations include 9/16 m (tapered) diameter WTG monopiles and 4.5 m WTG and OSP jacket pin piles installed using impact pile driving only during Year 1. During Year 2, foundations may be installed using only impact pile driving or may use a combination of vibratory and impact pile driving. The shutdown zones are the largest zone sizes expected to result from foundation installations for each installation schedule, except in cases where a single species (e.g. fin whales) had a much larger modeled exposure range than other large cetaceans and the next largest zone size was selected. If smaller diameter piles, lower maximum hammer energies and/or total strikes per pile, or more effective NAS are decided upon and used during the construction activities, modeled Level A exposure ranges applicable to those revised parameters would be used, likely resulting in shorter shutdown zone distances than those shown below based on current maximum pile size and hammer energy assumptions.

11.2.9.1 WTG Monopile and WTG Jacket Installations Using Only Impact Driving in Summer

WTG Monopile Impact Driving

- Low-Frequency Cetaceans: 3,500 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: 200 m

WTG Jacket Impact Driving

- Low-Frequency Cetaceans: 2,000 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: NAS perimeter

11.2.9.2 WTG Monopile and WTG Jacket Installations Using Only Impact Driving in Winter

WTG Monopile Impact Driving

- Low-Frequency Cetaceans: 3,700 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: 200 m

WTG Jacket Impact Driving

- Low-Frequency Cetaceans: 2,300 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: 400 m

11.2.9.3 WTG Monopile and Jacket Foundations using Combined Vibratory and Impact Driving (Year 2 only) in Summer

WTG Monopile during Impact driving

- Low-Frequency Cetaceans: 3,500 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: 200 m

WTG Monopile during Vibratory driving

- Low-Frequency Cetaceans: 200 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: NAS perimeter

WTG Jacket during Impact driving

- Low-Frequency Cetaceans: 1,900 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: NAS perimeter

<u>WTG Jacket during Vibratory driving</u>

- Low-Frequency Cetaceans: NAS perimeter
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: NAS perimeter

11.2.9.4 *Concurrent Installation of One WTG Monopile and Four OSP Jacket Pin Piles in Summer*

<u>WTG Monopile during Impact driving</u>

- Low-Frequency Cetaceans: 3,500 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: 300 m

11.2.9.5 *Concurrent Installation of Four WTG Jacket Pin Piles and Four OSP Jacket Pin Piles in Summer*

<u>WTG Jacket during Impact driving</u>

- Low-Frequency Cetaceans: 2,600 m
- NARW: At any distance
- Mid-Frequency Cetaceans: NAS perimeter
- High-Frequency Cetaceans: NAS perimeter
- Seals: 200 m

11.2.10Post-Piling Monitoring

- PSOs will continue to survey the shutdown zone throughout the duration of pile installation and for a minimum of 30 minutes after piling has been completed.

11.2.11 Noise Attenuation

Several recent studies summarizing the effectiveness of noise attenuation systems (NAS) have shown that broadband sound levels are likely to be reduced by anywhere from 7 to 17 dB, depending on the environment, pile size, and the size, configuration and number of systems used . The single bubble curtain applied in shallow water environments regularly achieves 7-8 dB broadband attenuation (Lucke et al. 2011; Rustemeier et al. 2012; Bellmann 2014; Bellman 2019). More recent in situ measurements during installation of large monopiles (~8 m) for WTGs in comparable water depths and conditions indicate that attenuation levels of 10 dB are readily achieved for a single bubble curtain (Bellman 2019; Bellmann et al. 2020). Large bubble curtains tend to perform better and more reliably, particularly when deployed with two rings (Koschinski and Ludemann 2013; Bellmann 2014; Nehls et al. 2016). A California Department of Transportation study tested several small, single, bubble curtain systems and found that the best attenuation systems resulted in 10-15 dB of attenuation (Buehler et al. 2015). Buehler et al. (2015) concluded that attenuation greater than 10 dB could not be reliably predicted from small, single, bubble curtains because sound transmitted through the seabed and re-radiated into the water column is the dominant sound in the water for bubble curtains deployed immediately around the pile. Combinations of systems (e.g., double big bubble curtain, hydrodsound damper plus single big bubble curtain) potentially achieve much higher attenuation. The type and number of NAS to be used during construction have not yet been determined. Based on prior measurements this combination of NAS are reasonably expected to achieve far greater than 10 dB broadband attenuation of impact pile driving sounds. SouthCoast Wind will operate NAS to meet noise levels modeled (10 dB attenuation) and will not exceed these levels. However, if SSV suggests noise levels are louder than modeled, additional noise attenuation measures will be implemented to further reduce noise levels to at least those modeled.

11.2.12 Sound Source Verification

- SSV measures will be followed as stated in Section 11.1.4.2.

11.2.13 Potential Additional Measures to Protect North Atlantic Right Whales

To complete installation within as few years as possible during the multiple year installation campaign expected for the entire Lease Area build-out, impact pile driving 24-hours per day is deemed necessary.

- The period from January through April is when the highest number of NARW are present in the region which means foundation installations during this period would likely result in greater potential impacts to this species. To reduce the need for foundation installations during this period and associated impacts to the NARW, SouthCoast Wind may conduct nighttime pile driving of monopile or piled jacket foundations during time periods when the fewest number of NARW are likely to be present in the region. Specific measures will include:
    - Concentrating pile driving activities when NARW are less likely to be present within the region (May 15 through December 31), including in the Lease Area.
    - Specific monitoring tools and plans will be developed as a part of the ongoing ITR Application process, but may include the use of advanced infrared systems, near real-time PAM, autonomous underwater vehicles, autonomous aerial vehicles, or other advanced technologies that could improve the probability of detecting marine mammals at night.

As a result of concerns related to potential NARW use of the Nantucket Shoals region outside of the January–April period, additional mitigation and monitoring measures have been proposed in a NARW mitigation and monitoring plan for pile driving. These measures include the commitment to only use impact pile driving in specified areas of the Lease Area (Project 1) and to monitor and mitigate for NARW within the Level B disturbance zones for impact pile driving. These measures also include a commitment that no pile driving for foundation installations will occur from January 1 through May 14 each year. On top of the seasonal description described, no pile driving for WTG or OSP foundation installations will occur within the 20-km area of concern during the month of May or after October 15.

Please refer to the *Supplemental North Atlantic Right Whale Monitoring and Mitigation Plan for Pile Driving* submitted separately for additional details.

11.3 HRG Surveys

HRG survey activities may be required during construction and the operations and maintenance (O&M) phases of the Project. When necessary, HRG survey operations will be conducted 24-hours per day, although some vessels may only operate during daylight hours. The following mitigation and monitoring measures for HRG surveys apply only to sound sources with operating frequencies below 180 kHz. There are no mitigation or monitoring protocols required for sources operating >180 kHz.

Additionally, shutdown, pre-start clearance, and ramp-up procedures will not be conducted during HRG operations using only non-impulsive sources (e.g., USBL and parametric sub-bottom profilers) other than non-parametric sub-bottom profilers (e.g., CHIRPs). Pre-start clearance and ramp-up, but not shutdown will be conducted when using non-impulsive, non-parametric sub-bottom profilers.

11.3.1 Monitoring Equipment

- Two pairs of reticle binoculars;
- Two hand-held or wearable night vision devices (NVDs);
- Two IR spotlights;
- One data collection software system;
- Two PSO-dedicated very high frequency (VHF) radios;
- One digital single-lens reflex camera equipped with a 300-mm lens.

11.3.2 Visual Monitoring

- Four PSOs on board any 24-hour survey vessels.
- Two PSOs on board any daylight survey vessels.
- One PSO on watch during all daylight surveying.
- Two PSOs on watch during nighttime surveying.
- Vessels conducting activities in very-shallow waters:
  - One visual PSO will be onboard
  - The vessel captain (or crew member on watch) will conduct observations when the PSO is on required breaks;
  - The PSO on duty will remain available to confirm sightings and any related mitigation measures while on break.
- PSOs will begin observation of the shutdown zones prior to initiation of HRG survey operations and will continue throughout the survey activity and/or while equipment operation below 180 kHz is in use.
- PSO will monitor the NMFS NARW reporting systems including WhaleAlert and SAS once every 4-hour shift during Project related activities.

11.3.3 Daytime Visual Monitoring

The following protocols will be applied to visual monitoring during daytime surveys:

- One PSO on watch during pre-start clearance periods and all source operations.

- PSOs will use reticle binoculars and the naked eye to scan the shutdown zone for marine mammals.

11.3.4 Nighttime and Low Visibility Monitoring

Visual monitoring during nighttime surveys or periods of low visibility will utilize the following protocols:

- The Lead PSO will determine if conditions warrant implementing reduced visibility protocols.
- Two PSOs on watch during pre-start clearance periods, all operations, and for 30 minutes following use of HRG sources operating below 180 kHz.
- Each PSO will monitor for marine mammals and other protected species using night-vision goggles with thermal clip-ons and a hand-held spotlight (one set plus a back-up set), such that PSOs can focus observations in any direction.

11.3.5 Shutdown Zones

PSOs will establish and monitor marine mammal shutdown zones. Distances to shutdown zones will be from any acoustic sources, not the distance from the vessel. Shutdown zones will be as follows:

- 500 m from NARW for use of impulsive acoustic sources (e.g., boomers and/or sparkers) and non-impulsive nonparametric sub-bottom profilers; and
- 100 m from all other marine mammals for use of impulsive acoustic sources (e.g., boomers and/or sparkers), except for delphinids when approaching the vessel or towed acoustic sources, shutdown is not required.

11.3.6 Pre-Start Clearance

PSOs will establish and monitor pre-start clearance zones. Distances to pre-start clearance zones for HRG surveys will be the same as those for shutdown zones described above.

- PSOs will conduct 30 minutes of pre-start clearance observation prior to the initiation of HRG operations.
- The pre-start clearance zones must be visible using the naked eye or appropriate technology during the entire pre-start clearance period for operations to start. If the pre-start clearance zones are not visible, source operations <180 kHz will not commence.
- Ramp-up may not be initiated if any marine mammal(s) is detected within its respective pre-start clearance zone.
- If a marine mammal is observed entering or within the pre-start clearance zones during the pre-start clearance period, relevant acoustic sources must not be initiated until the marine mammal(s) is confirmed by visual observation to have exited the relevant zone, or, until an additional time period has elapsed with no further sighting of the animal (15 minutes for odontocetes [excluding sperm whales] and pinnipeds and 30 minutes for sperm and baleen whales [including NARWs]).

11.3.7 Ramp-Up

- The ramp-up procedure will not be initiated during periods of inclement conditions or if the pre-start clearance zones cannot be adequately monitored by the PSOs, using the appropriate visual technology for a 30-minute period immediately prior to ramp-up.
- Ramp-up will begin with the power of the smallest acoustic equipment at its lowest practical power output. When technically feasible, the power will then be gradually turned up and other acoustic sources added in a way such that the source level would increase gradually.
- Ramp-up activities will be delayed if marine mammal(s) enters its respective shutdown zone.
- Ramp-up will continue if the animal(s) has been observed exiting its respective shutdown zone, or until an additional time period has elapsed with no further sighting of the animal (15 minutes for odontocetes [excluding sperm whales], and 30 minutes for sperm and baleen whales [including NARW]).

11.3.8 Shutdowns

- Immediate shutdown of impulsive, non-parametric HRG survey equipment other than CHRIP sub-bottom profilers operating at frequencies <180 kHz is required if a marine mammal is observed within or entering the relevant shutdown zone.
- Any PSO on duty has the authority to call for shutdown of acoustic sources. When there is certainty regarding the need for mitigation action on the basis of visual detection, the relevant PSOs must call for such action immediately.
- Upon implementation of a shutdown, survey equipment may be reactivated when all marine mammals that triggered the shutdown have been confirmed by visual observation to have exited the relevant shutdown zone or an additional time period has elapsed with no further sighting of the animal that triggered the shutdown (15 minutes for odontocetes [excluding sperm whales] and pinnipeds, and 30 minutes for sperm and baleen whales [including NARWs]).
- If the acoustic source is shutdown for reasons other than mitigation (e.g., mechanical difficulty) for less than 30 minutes, the acoustic sources may be reactivated as soon as is practicable at full operational level if PSOs have maintained constant visual observation during the shutdown and no visual detections of marine mammals occurred within the applicable shutdown zone during that time.
- If the acoustic source is shutdown for a period longer than 30 minutes or PSOs were unable to maintain constant observation, then ramp-up and pre-start clearance procedures will be initiated as described in Sections 11.3.6 and 11.3.7.
- If delphinids are visually detected approaching the vessel or towed acoustic sources, shutdown is not required.

11.3.9 Sound Source Verification

- In 2019, NMFS expressed concerns with HRG sound source verification measurements previously collected in offshore wind leases in the Northeast and recommended developers requesting incidental take authorization to estimate zones of potential impact using standard modeling guidance (NMFS 2020e) SouthCoast Wind did not collect SSV measurements for 2019-2021 surveys and does not plan to collect SSV measurements as part of the planned surveys pre- and post-construction.

11.4 UXO Detonation

For UXOs that are positively identified in proximity to planned activities on the seabed, several alternative strategies will be considered prior to detonating the UXO in place. These may include relocating the activity away from the UXO (avoidance), moving the UXO away from the activity (lift and shift), cutting the UXO open to apportion large ammunition or deactivate fused munitions, using shaped charges to reduce the net explosive yield of a UXO (low-order detonation), or using shaped charges to ignite the explosive materials and allow them to burn at a slow rate rather than detonate instantaneously (deflagration). Only after these alternatives are considered would a decision to detonate the UXO in place be made. If deflagration is conducted, mitigation and a monitoring measure would be implemented as if it was a high order detonation based on UXO size. Decision on removal method will be made in consultation with a UXO specialist and in coordination with the agencies with regulatory oversite of UXO. For detonations that cannot be avoided due to safety considerations, a number of mitigation measures will be employed by SouthCoast Wind. No more than a single UXO will be detonated in a 24-hour period.

11.4.1 Monitoring Equipment

The equipment to be used during UXO detonations is shown in the table below (Table 58).

Table 58. Equipment use for all marine mammal monitoring vessels during pre-start clearance and post-detonation monitoring.

Item	Daytime Number on Each PSO Vessel
Reticle binoculars	2
Mounted "big-eye" binocular	1
Monitoring station for real time PAM system[1]	1
Data collection software system	1
PSO-dedicated VHF radios	2
Digital single-lens reflex camera equipped with 300-mm lens	1

PSO = protected species observer; VHF=very high frequency.

[1]The selected PAM system will transmit real time data to PAM monitoring stations on the vessels and/or a shore side monitoring station.

11.4.2 Pre-Start Clearance

All mitigation and monitoring zones assume the use of an NAS resulting in a 10 dB reduction of noise levels. Mitigation and monitoring zones specific to marine mammal hearing groups for the five different charge weight bins are presented in Table 59.

- A 60-minute pre-start clearance period will be implemented prior to any UXO detonation;

- The pre-start clearance zone (see distances to low-frequency cetacean thresholds in Table 59) must be fully visible for at least 60 minutes and all marine mammal(s) must be confirmed to be outside of the pre-start clearance zone for at least 30 minutes prior to commencing detonation;
- The pre-start clearance zone size will be dependent on the charge weight of the identified UXO, which will be determined prior to detonation. If the charge weight is determined to be unknown or uncertain, the largest pre-start clearance zone size (charge weight bin E12) will be used throughout the pre-start clearance period.
- All marine mammals must be confirmed to be out of the pre-start clearance zone prior to initiating detonation;
- If a marine mammal is observed entering or within the relevant pre-start 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 pre-start clearance zone and been visually confirmed beyond that pre-start clearance zone, or after 15 minutes for odontocetes [excluding sperm whales] and pinnipeds, and 30 minutes for sperm and baleen whales [including NARWs]) with no further sightings.

Table 59. Mitigation and Monitoring Zones Associated with In-Situ UXO Detonation of Binned Charge Weights, with a 10 dB Noise Attenuation System.

Marine Mammal Hearing Groups	UXO Charge Weight[1]										
	E4 (2.3 kg)		E6 (9.1 kg)		E8 (45.4 kg)		E10 (227 kg)		E12 (454 kg)		
	Pre-Start Clearance Zone[2] (m)	Level B Harassment Zone (m)	Pre-Start Clearance Zone (m)	Level B Harassment Zone (m)	Pre-Start Clearance Zone (m)	Level B Harassment Zone (m)	Pre-Start Clearance Zone (m)	Level B Harassment Zone (m)	Pre-Start Clearance Zone (m)	Level B Harassment Zone (m)	PAM Monitoring Zone (km)
Export Cable Corridor											
Low-Frequency Cetaceans	800	2,800	1,500	4,500	2,900	7,300	4,200	10,300	4,900	11,800	15
Mid-Frequency Cetaceans	100	500	200	800	300	1,300	500	2,100	600	2,500	15
High-Frequency Cetaceans	2,500	6,200	3,500	7,900	4,900	10,100	6,600	12,600	7,400	13,700	15
Phocid Pinnipeds	300	1,300	500	2,200	1,000	3,900	1,900	6,000	2,600	7,100	15
Lease Area											
Low-Frequency Cetaceans	400	2,900	800	4,700	1,800	7,500	3,400	10,500	4,300	11,900	15
Mid-Frequency Cetaceans	50	500	50	800	100	1,300	300	2,200	400	2,600	15
High-Frequency Cetaceans	2,200	6,200	3,200	8,000	4,900	10,300	7,200	12,900	8,700	14,100	15

Phocid Pinnipeds	100	1,500	200	2,400	600	3,900	1,200	6,000	1,600	7,000	15

kg = kilograms; m = meters

[1] UXO charge weights are groups of similar munitions defined by the U.S. Navy and binned into five categories (E4-E12) by weight (equivalent weight in TNT). For this assessment, four project sites (S1-S4) were chosen and modeled (see Hannay and Zykov 2021) for the detonation of each charge weight bin.

[2] Pre-start clearance zones were calculated by selecting the largest Level A threshold (the larger of either the PK or SEL noise metric). The chosen values were the most conservative per charge weight bin across each of the four modeled sites.

11.4.3 Visual Monitoring

- The number of vessels deployed will depend on the pre-start clearance zone size (as described in section 11.4.2) and safety set back distance from the detonation. A sufficient number of vessels will be deployed to cover the clearance and shutdown zones as described in Section 11.4.3.1 and Section 11.4.3.2.
- PSOs will visually monitor the relevant Low Frequency Cetacean pre-start clearance zone depending on the identified charge weight. This zone encompasses the maximum Level A exposure ranges for all marine mammal species except harbor porpoise, where Level A take has been requested due to the large zone sizes associated with High Frequency cetaceans.

11.4.3.1 Detonation Vessel Measures

- Three PSOs on duty on the detonation vessel;
- Three PSOs will maintain watch at all times during the pre-start clearance period and 30 minutes after the detonation event;
    - Each PSO will be responsible for monitoring a 120-degree sector with the unaided eye and reticle binoculars to provide additional coverage beyond the pre-start clearance zone away from the detonation location.
- The three visual PSOs onboard the detonation vessel will monitor out to the relevant pre-start clearance zone (shown in Table 59) at least 30 minutes prior to a detonation event; There will be a PAM operator on duty conducting acoustic monitoring in coordination with the visual PSOs during all pre-start clearance periods and post-detonation monitoring periods.

11.4.3.2 Additional PSO Vessel Measures

- Based on the relevant pre-start clearance zones (determined by the identified charge weight) for low-frequency cetaceans shown in Table 59, an additional PSO vessel will be used for UXO charge weight bins E10 and E12;
- The additional PSO vessel will circle the detonation vessel at or near the relevant pre-start clearance zone distance (4 – 5 km for charge weight bins E10 – E12);
- The additional PSO vessel will circumnavigate the detonation vessel at 7 – 10 knots during the pre-start clearance period, throughout the detonation event (as allowed by safety consideration), and during post-detonation monitoring;
- Visual monitoring will be conducted on the additional PSO vessel following the same methods as described above for the detonation vessel.
    - Additionally, the three PSOs on duty will be responsible for monitoring a 120-degree sector with the unaided eye and reticle binoculars to provide additional coverage inside the relevant pre-start clearance zone towards the detonation vessel as well as beyond the pre-start clearance zone away from the detonation location.

11.4.4 Acoustic Monitoring

- There will be one PAM team for all deployed PSO vessels;
- PAM will be conducted in the daylight only as no UXO will be detonated during nighttime hours;

- There will be a PAM operator stationed on at least one of the dedicated monitoring vessels (primary or secondary) in addition to the PSO; or located remotely/onshore;
- PAM will begin 60 minutes prior to a detonation event;
- PAM operator will be on duty during all pre-start clearance periods and post-detonation monitoring periods;
- Acoustic monitoring will extend beyond the Low Frequency Cetacean pre-start clearance zone for a given charge weight (Section 11.4.2);
- For real-time PAM systems, at least one PAM operator will be designated to monitor each system by viewing data or data products that are streamed in real-time or near real-time to a computer workstation and monitor located on a Project vessel or onshore;
- PAM operator will inform the Lead PSO on duty of animal detections approaching or within applicable ranges of interest to the detonation activity via the data collection software system;
- PAM devices used may include independent (e.g., autonomous or moored remote) systems.
- The PAM system will have the capability of monitoring up to 15 km from the detonation location.

11.4.5 Noise Attenuation

SouthCoast Wind will use an NAS for all detonation events as feasible and will strive to achieving the modeled ranges associated with 10 dB of noise attenuation (see Section 6.3.2). Zones without 10 dB attenuation would be implemented if use of a big bubble curtain was not feasible due to location, depth, or safety related constraints. If a NAS system is not feasible, SouthCoast Wind will implement mitigation measures for the larger unmitigated zone sizes with deployment of vessels adequate to cover the entire pre-start clearance zones.

11.4.6 Seasonal Restriction

- No UXO detonations are planned between January and April.

11.4.7 Post UXO Detonation Monitoring

- Post-detonation monitoring will occur for 30 minutes.

11.4.8 Sound Source Verification

- SSV measurements will be made for each UXO/MEC that must be detonated using the method summarized in Section 11.1.4.2.
- A sound field verification plan for UXO detonation will be submitted to NMFS 180 days prior to planned start of UXO detonations.

Attachment G-3: SouthCoast Wind North Atlantic Right Whale Monitoring and Mitigation Plan for Pile Driving

SOUTHCOAST WIND

SouthCoast Wind Draft Post-Construction Avian and Bat Monitoring Framework

Document Revision	B
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Glossary

Acronym	Definition
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
cm	centimeter
COP	Construction and Operations Plan
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ft	feet
FAA	Federal Aviation Administration
GPS	Global Positioning System
kt	knots
m	meter
MA/RI WEA	Massachusetts and Rhode Island Wind Energy Area
MESA	Massachusetts Endangered Species Act
nm	nautical mile
NEPA	National Environmental Policy Act
OCS	Outer Continental Shelf
OEC	Offshore Export Cable
OSP	Offshore Substation Platform
RINHP	Rhode Island Natural Heritage Program
RSZ	Rotor swept zone
USGS	United States Geological Society
USFWS	United States Fish and Wildlife Service
WTG	Wind Turbine Generator

1. Introduction

SouthCoast Wind Energy LLC (SouthCoast Wind; formerly known as Mayflower Wind), a 50:50 joint venture between Shell New Energies US LLC and OW North America LLC, proposes an offshore wind renewable energy generation project (the Project) located in federal waters off the southern coast of Massachusetts in the Outer Continental Shelf (OCS) Lease Area OCS-A 0521 (Lease Area). The Project will consist of 149 positions to be occupied by wind turbine generators (WTGs) and offshore substation platforms (OSPs). This draft *SouthCoast Wind Avian and Bat Monitoring Framework* (the Framework) pertains to the offshore portions of the Project within the Lease Area only and does not apply to the offshore export cables, cable landfall sites, or onshore portions of the Project.

For the development of the Construction and Operations Plan (COP), SouthCoast Wind conducted an Avian Exposure Risk Assessment (COP Appendix I1) and a Bat Risk Assessment (COP Appendix I2). To support the development of the Avian Exposure Risk Assessment, SouthCoast Wind conducted high-definition aerial surveys of the Lease Area from November 2019 through October 2020. The data collected were based on images captured using a grid-based survey design with a 1.5-centimeter (cm) resolution ground sampling distance. Digital still imagery was captured during each survey, each of which employed a global positioning system (GPS)-linked camera platform using a flight management system to ensure the survey tracks were flown with a high degree of accuracy over the SouthCoast Wind Lease Area. The survey altitude was held at approximately 414.5 meters (m; 1,360 feet [ft]) to optimize coverage and minimize interference from cloud cover, and the aircraft was flown at a target ground speed of approximately 120 knots (kt) to reduce motion blur and ensure high image quality. The aerial digital survey captured images along nine lines spaced approximately 2 km across-track within the Lease Area and 1 nautical mile (nm) buffer. The captured images covered a minimum of 40% of the transect area per survey (i.e., approximately 6,233 hectares [15,403 acres]; sample area). Surveys were conducted monthly and sampling effort was increased during the migratory period for terns and other species of concern.

1.1 Avoidance, Minimization, and Mitigation Measures

SouthCoast Wind has taken steps to avoid, minimize, and mitigate impacts to birds and bats during Project construction, operation, and decommissioning. The Lease Area is located approximately 25 nm south of Martha's Vineyard and 20 nm south of Nantucket, Massachusetts. This offshore location for the siting of the WTGs and OSPs will help to avoid exposure to coastal birds and bats.

During construction, SouthCoast Wind will minimize lighting, to the extent practicable, to reduce potential attraction of birds and bats to vessels and structures. SouthCoast Wind will ensure that lighting on WTGs will be executed in accordance with Federal Aviation Administration (FAA) regulations and lighting on OSPs will be minimized to that required for navigation safety to reduce potential attraction of birds and bats to the extent practicable. During operations, SouthCoast Wind will significantly minimize Project lighting that would attract birds and bats by implementing an Aircraft Detection Lighting System (ADLS) that is expected to limit FAA and BOEM required lighting to less than five minutes per year (see COP Appendix Y3, Aircraft Detection Lighting System Efficacy Analysis).

1.2 Monitoring Goals and Objectives

This Framework serves to outline SouthCoast Wind's approach to post-construction avian and bat monitoring, overarching monitoring objectives, proposed monitoring elements, and reporting requirements. The measures proposed herein are intended to support the advancement of the understanding of bird and bat interactions and address the uncertainty on bird and bat use (particularly for federally listed species) of the offshore environment and the potential collision impacts from operating the offshore Project components. The scope of monitoring in this draft Framework is designed to meet federal requirements 30 CFR 585.626(b)(15) and 585.633(b) and is scaled to the size and risk profile of the Project with a focus on species of conservation concern (e.g., federally- and state-listed species). This draft Framework will also support the Bureau of Ocean Energy Management's (BOEM) Endangered Species Act Section 7 Consultation and the Environmental Impact Statement (EIS).

A detailed *Avian and Bat Post-Construction Monitoring Plan* (Monitoring Plan), based on this Framework, will be developed in coordination with BOEM, U.S. Fish and Wildlife Service (USFWS), and other relevant regulatory agencies as the National Environmental Policy Act (NEPA) process for the Project progresses. Where feasible, monitoring conducted in the Lease Area will be coordinated with monitoring at other offshore wind projects in the Massachusetts and Rhode Island Wind Energy Areas (MA/RI WEAs) to facilitate integrated analyses across a broader geographic area. **Table 1** below highlights the proposed avian and bat monitoring objectives and methods.

Table 1. Monitoring Objectives, General Approaches to be Used, and Types of Data Generated

Taxa	Monitoring Objective	Approach	Duration	Time of Year, Frequency	Coverage
Bats	Monitor occurrence of bats	Acoustics	At least 2 years	Late winter/ early spring – late fall/early winter, nightly to the extent practicable	Up to 2 OSPs
Birds	Monitor occurrence of birds	Acoustics	At least 2 years	Late winter/ early spring – late fall/early winter, nightly to the extent practicable	Up to 2 OSPs
Birds	Monitor occurrence of ESA-listed birds	Motus tags	At least 3 years	Continuous	TBD based on agency consultation
Birds	Monitor occurrence of nocturnal migratory birds	Radar	Up to 2 years	TBD based on agency consultation	One unit; location TBD
Birds	Monitor movement of marine birds around WTGs	Radar	Up to 2 years	TBD based on agency consultation	One unit; location TBD
Both	Document mortality	Incidental Observations	Project lifetime	Continuous	WTGs and OSPs

2. Bat Acoustic Monitoring

Although little is known about bat migration and movements over marine habitats, both historical and contemporary records have documented bat offshore activity in North America. Several bat species have been observed roosting on ships and offshore installations at sea (Stantec, 2018; Thompson et al., 2015; Ahlén et al., 2009) or at remote islands (Johnson et al., 2011; Cryan & Brown, 2007), suggesting some level of movements over water. SouthCoast Wind plans to conduct bat acoustic monitoring to assess bat activity within the Lease Area, targeting key data gaps related to species presence/composition, temporal patterns of activity, and correlation with weather and atmospheric conditions.

Acoustic monitoring of bat presence will be conducted for at least two years post-construction. Appropriate bat detector devices will be installed on various offshore Project components in the Lease Area (WTGs and OSPs) in early spring or late winter and removed in late fall or early winter after migration. SouthCoast Wind will work with BOEM, USFWS, and other relevant regulatory agencies to determine the optimal monitoring locations and durations. The detector devices will record calls of both cave-hibernating bats, including the northern long-eared bat (*Myotis septentrionalis*), and migratory tree bats. The resulting information can be used to identify bats to species. All acoustic data recorded will be processed with approved software to filter out poor-quality data and identify the presence of bat calls. High-frequency calls can then be classified by an experienced acoustician to the highest resolution possible (e.g., species, genus, family).

Collected bat call data will be identified and analyzed to understand relationships with time of day, season, and weather/atmospheric conditions to the extent practicable. The results will provide information on bat presence offshore and the conditions under which they may occur near offshore Project components.

3. Bird Acoustic Monitoring

Several bird groups are known to migrate offshore at night, including songbirds and shorebirds (Adams et al., 2015; Loring et al., 2021). However, there is limited understanding of the timing, species composition, and total avian abundance of these migratory movements offshore. Birds produce flight calls during migration, which are species-specific vocalizations given primarily during sustained flight (Farnsworth, 2005), and as a result, acoustic detectors can be used to study their presence in the Project Area. The detectors continuously record data during a pre-determined schedule, allowing for high-resolution species occurrence data.

SouthCoast Wind will conduct acoustic monitoring with detectors during the same period as bat acoustic monitoring (early spring or late winter – late fall or early winter, for at least two years of the Project). Due to noise interference with WTGs, bird acoustic detectors will only be installed on OSPs.

Collected bird acoustic data will be identified and analyzed to understand relationships with time of day, season, and weather/atmospheric conditions to the extent practicable. The results will provide information on bird presence offshore and the conditions under which they may occur near offshore Project components.

4. Motus Tracking Network and Use by ESA-Listed Birds Study

A total of 83 marine bird species are known to regularly occur off the coast of the eastern United States (Nisbet et al., 2013). SouthCoast Wind has conducted an Avian Exposure Risk Assessment (COP Appendix I1) to identify marine and coastal bird species listed as threatened or endangered under the Endangered Species Act (ESA), Massachusetts Endangered Species Act (MESA) (including Special Concern species) and/or Rhode Island Natural Heritage Program (RINHP) that may be present within the Offshore Project Area. To gain a better understanding of the presence and movements of ESA-listed birds in the Lease Area, SouthCoast Wind plans to install offshore automated telemetry receiving stations (Motus receivers) and contribute funding to Motus-tagging efforts to address this existing data gap. The exact species to be studied will be determined in consultation with federal agencies and will depend on existing, ongoing field efforts. The Motus receivers will also provide opportunistic presence/absence data on other species carrying Motus tags, such as migratory songbirds and bats.

Tagging efforts will be conducted post-construction, and movements of Motus-tagged ESA-listed birds in the vicinity of the Lease Area will be monitored for at least three years post-construction, during the spring, summer, and fall. Motus receivers will be installed within the Lease Area to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations will be selected in accordance with current guidance documents, such as the *Draft Guidance for Pre- and Post-Construction Monitoring to Detect Changes in Marine Bird Distributions and Habitat Use Related to Offshore Wind Development*. SouthCoast Wind will work with USFWS to determine appropriate funding and support to be provided to researchers working with ESA-listed birds.

ESA-listed bird presence/absence in the Lease Area will be analyzed by comparing detections within the Lease Area to coastal receiver towers. All detections can be analyzed to understand relationships with time of day, season, and weather.

5. Radar Monitoring: Nocturnal Migrants

Nocturnal migrants, including songbirds and shorebirds, are documented to fly offshore (Adams et al. 2015, Loring et al. 2021). Breeding songbirds that occur in the region are mostly neotropical migrants, flying north to south along the U.S. Atlantic Coast to the tropical regions of Mexico, the Caribbean, and Central and South America. During migration, songbirds mostly travel at night at high altitudes and regularly cross large bodies of water, including the Mediterranean Sea and the Gulf of Mexico (Bruderer & Lietchi, 1999; Gauthreaux & Belser, 1999). Various songbird species may traverse the Lease Area during migration periods. During migration, most songbirds fly at altitudes between 295 to 1,969 ft (90 and 600 m) (NYSERDA, 2015), with a large proportion of migratory movements occurring above the rotor swept zone (RSZ) of most offshore WTGs. However, flight heights vary according to species and conditions. For shorebird species, evidence suggests that many species migrate at flight heights over 2,000 feet (610 m), which are above the RSZ of most offshore WTGs (approximately 837 ft [255 m]) as described in Senner et al. (2018) and Green (2004). It is therefore expected that shorebird occurrence in the Lease Area for most species is possible but is expected to be uncommon and limited to spring and fall migration periods.

Since nocturnal migration events are episodic and cannot be detected during daytime surveys, there is uncertainty on the timing and intensity of migration offshore. Similar to other MA/RI WEA offshore wind projects, SouthCoast Wind will monitor nocturnal migrants with 3D radar for up to two years post-construction to record the passage rates (flux) of migrants and their flight heights. Specific radar system(s), location, time of year, and methodology will be determined in consultation with USFWS closer to the commencement of Project operations. The results of such radar monitoring could be related to time of year and weather conditions, to increase the understanding on when nocturnal migrants may have higher collision risk.

6. Radar Monitoring: Marine Bird Avoidance

Some marine birds, including loons and sea ducks, have been shown to exhibit avoidance of offshore wind farms (Furness et al., 2013). Loons are among the species identified as most vulnerable to displacement (Heinänen et al., 2020; Furness et al., 2013; Garthe & Hüppop, 2004). Sea ducks are also vulnerable to displacement. Avoidance behavior has been documented for several species, including black scoter and common eider (Desholm & Kahlert, 2005, Larsen & Guillemette, 2007) and studies have also documented sea ducks increasing their altitude to avoid WTGs at night (Desholm & Kahlert, 2005). SouthCoast Wind is considering conducting up to 2 years of radar study to collect data on macro (and potentially meso) avoidance rates. The radar would run continuously to collect data at times when birds vulnerable to displacement are present. These data on macro-avoidance would support understanding of both displacement and collision vulnerability.

7. Documentation of Dead and Injured Birds and Bats

Several factors influence the risk of collision with offshore wind project components for birds, including behavior, season, weather, and lighting. In general, species using marine habitats have exhibited lower collision rates than those documented at terrestrial wind facilities, although data from offshore operational sites are very limited (Adams et al., 2017; Thaxter et al., 2017). SouthCoast Wind will implement a reporting system to document dead or injured birds or bats found incidentally on vessels and offshore Project structures during construction, operation, and decommissioning. The location will be marked using GPS, an Incident Reporting Form will be filled out, and digital photographs will be taken. Any animals detected that could be ESA-listed will have their identity confirmed by consulting biologists, and a report will be submitted to the designated staff at SouthCoast Wind who will then report it to BOEM, USFWS, and other relevant regulatory agencies. Carcasses with federal or research bands or tags will be reported to the U.S. Geological Survey (USGS) Bird Band Laboratory at https://www.pwrc.usgs.gov/bbl/.

8. Adaptive Monitoring and Management

Over the course of monitoring, SouthCoast Wind will work with BOEM, USFWS, MassWildlife, RIDEM, and other relevant regulatory agencies to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring based on an ongoing assessment of monitoring results. Potential triggers for adaptive monitoring may include, but are not limited to, equipment failure, an unexpected impact to birds or bats identified through monitoring, or new opportunities to collaborate with other projects in the region. The Monitoring Plan will include a series of potential adaptive monitoring actions, developed in coordination with BOEM, USFWS, and other relevant regulatory agencies. In addition to Adaptive Monitoring, SouthCoast Wind will use an Adaptive Management approach in which ongoing bird and bat data collection in offshore wind lease areas will be used to inform Project operations and conservation mitigation strategies, as available and applicable. This should result in reductions of direct and indirect impacts of operations throughout the lifetime of the Project.

9. Reporting

SouthCoast Wind will submit an annual Monitoring Report to BOEM summarizing post-construction monitoring activities, preliminary results as available, and any proposed changes in the monitoring program. SouthCoast Wind will consult with BOEM and USFWS, as necessary, to discuss the report and adaptive changes to the Monitoring Plan.

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Appendix H: Seascape, Landscape, and Visual Impact Assessment

H.1 Introduction

This appendix describes the Seascape, Landscape, and Visual Impact Assessment (SLVIA) methodology and key findings that the Bureau of Ocean Energy Management (BOEM) used to identify the potential impacts of offshore wind structures (wind turbine generators [WTGs] and offshore substation platforms [OSPs]) on scenic and visual resources in the geographic analysis area. This SLVIA methodology applies to any offshore wind energy development proposed for the Outer Continental Shelf (OCS) and incorporates by reference the detailed description of the methodology described in the *Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States* (BOEM 2021). Section H.2, *Method of Analysis*, describes the specific methodology used to apply the SLVIA methodology to the SouthCoast Wind Construction and Operations Plan (COP) (SouthCoast Wind 2024) and Section H.3, *Results,* summarizes the wind farm distances, fields of view (FOVs), noticeable elements, visual contrasts, scale of change, and prominence that contributed to the determination of impact levels for each key observation point (KOP) under the Proposed Action and each of the action alternatives that include modifications to WTG array layouts. Maps of scenic resources present in the geographic analysis area are included in Section 3.6.9, *Scenic and Visual Resources*. Visual simulations of the Proposed Action alone, other ongoing and planned offshore wind projects without the Proposed Action, and other offshore wind projects in combination with the Proposed Action are included in Attachment H-1, *Cumulative Visual Simulations*.

H.2 Method of Analysis

The SLVIA has two separate but linked parts: the seascape, open ocean, and landscape impact assessment (SLIA) and visual impact analysis (VIA). The SLIA analyzes and evaluates sensitivity, susceptibility, and magnitude of change in consideration of 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 the 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.

The VIA analyzes and evaluates the impacts on people of adding the proposed development to views from selected viewpoints. The 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 and, in the VIA, the impact receptors are people. The inclusion of both the SLIA and VIA in the BOEM SLVIA methodology is consistent with the National Environmental Policy Act (NEPA)’s objective of providing Americans with aesthetically and culturally pleasing surroundings and its requirement to consider all potentially significant impacts of development.

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. The SLVIA offshore geographic analysis area consists of the earth curvature-based extent of the zone of theoretical visibility and zones of visual influence (COP Appendix T; SouthCoast Wind 2024), as follows.

- The offshore turbine array area where the WTGs and OSP would be located plus a 42.8-mile (68.9-kilometer) radius area. This distance is the maximum extent within which a seascape, open ocean, landscape, or visual effect could occur, given visibility of the maximum height of the WTG rotor (1,066 feet [324.9 meters]).
- The OSP (maximum height of 344.5 feet [105 meters]) would potentially be visible to a distance of 25.5 miles (41.0 kilometers).

WTG visibility would be variable through the day depending on many factors. View angle, sun angle, and atmospheric conditions would affect the WTG visibility. Visual contrast of WTGs would vary throughout the day depending on the visual character of the horizon's backdrop and whether the WTGs are backlit, side-lit, or front-lit. If less visual contrast is apparent in the morning hours, then it is likely that the visual contrast may be more pronounced in the afternoon. The inverse is possible, as well. These effects are also influenced by varying atmospheric conditions, direction of view, distance between the viewer and the WTGs, and elevation of the viewer.

At closer distances, approximately 12 miles or closer, the form of the WTG may be the dominant visual element creating the 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.

As the elevation of the viewer increases, the lesser the effect Earth curvature (EC) has on the visible height of individual WTGs.

While the shoreline has a prevailing southward viewing direction, localized views may vary from southeast to west. All cardinal directions are conceivable when viewing from a lighthouse or a water vessel at sea. When viewing from onshore toward a southerly direction and scanning to the east and west, the color of the horizon backdrop often will vary. Variation will continue as the sun arcs across the sky from sunrise to sunset. Depending on sun angle, the backdrop sky color may have various intensities of white to gray and sky blue to pale blue to dark blue-gray. Partly cloudy to overcast conditions will also influence the color make-up of the horizon's backdrop. The sunrise and sunset have varying degrees of light blue to dark blue, light and dark purples intermixed with oranges, yellows, and reds. Partly cloudy skies may increase the remarkable color effects during the sunset and sunrise periods of the day.

When placing WTGs offshore, the visual interplay and contrasting elements in form, line, color, and texture may vary with the ever-changing character of the backdrop. Front-lit WTGs may have strong color contrast against a darker gray sky, giving definition to the WTG's vertical form and line contrast to the ocean's horizontal character and the line where the sea meets sky, or visually dissipates against a whiter backdrop created by high levels of evaporative atmospheric moisture during clear sunny days. Partly cloudy skies may create varying degrees of sunlight reflecting off the white wind turbines, placing some WTGs in the shadow and making them appear a darker gray and less conspicuous while highlighting others with a bright white 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 corresponding backdrop.

These variations through the course of the day may result in periods of moderate to major visual effects while at other times of day would have minor or negligible effects.

The onshore geographic analysis area includes landfalls, buried onshore export cables, an onshore substation and up to two converter stations, and transmission connections to the electric grid. The visual impacts of onshore components are assessed in Chapter 3, Section 3.6.9, *Scenic and Visual Resources*.

The SLVIA methodology and parameters consider local stakeholders' identity, culture, values, and issues and the understanding of baseline maritime conditions. Project activities for all stages of the Project life cycle (construction and installation, operations and maintenance [O&M], and decommissioning) are assessed against the environmental baseline to identify the potential interactions between the Project and the seascape, landscape, and viewers. Potential impacts are assessed to determine an impact level consistent with the definitions in Table H-1.

Table H-1. Definitions of potential adverse impact levels

Impact Level	Historic Properties under Section 106 of the NHPA	Visual Resources
Negligible	Adverse	SLIA: Very little or no effect on seascape/landscape unit character, features, elements, or key qualities either because unit lacks distinctive character, features, elements, or key qualities; values for these are low; or Project visibility is minimal. VIA: Very little or no effect on viewers' experiences because Project visibility/contrast/magnitude of change is minimal, or view receptor sensitivity/susceptibility/value is minimal.
Minor	Adverse	SLIA: The Project would introduce features that may have low to medium levels of visual prominence in the geographic area of an ocean/seascape/landscape character unit. The Project features may introduce a visual character that is somewhat 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: The visibility of the 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. The viewer receptor sensitivity/susceptibility/value is low. If the value, susceptibility, and viewer concern for change is medium or high, then evaluate

Impact Level	Historic Properties under Section 106 of the NHPA	Visual Resources
		the nature of the sensitivity 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	Adverse	SLIA: The 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 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 the key qualities. In areas affected by large magnitudes of change, the unit's features, elements or key qualities have low susceptibility or value. VIA: The visibility of the Project would introduce a moderate to large level of change to the view's character; may have a moderate to large level 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. The viewer receptor sensitivity/susceptibility/value is medium to low. 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, then evaluate the nature of the sensitivity to determine if elevating the impact to the next level is justified.
Major	Adverse	SLIA: The Project would introduce features that would have dominant levels of visual prominence in the geographic area of an ocean/seascape/landscape character unit. The 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 Project would introduce a major level of character change to the view; would attract, hold, and dominate the viewer's attention; and would 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, then evaluate the nature of the sensitivity 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, then evaluate the nature of the sensitivity to determine if lowering the impact to moderate is justified.

H.3 Results

H.3.1 Proposed Action

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 as Attachment 3 to the *SouthCoast Wind Visual Impact Assessment Report* (COP Appendix T; SouthCoast Wind 2024) indicate that daytime and nighttime visibility of WTGs and OSPs would be noticeable to the casual observer from seascape character areas, the open ocean character area, landscape character areas, and viewer viewpoints. Based on COP VIA Appendix T, Table 5-5 (SouthCoast Wind 2024), acreages of character areas overall in the offshore geographic analysis area and within the offshore wind farm viewshed are listed in Table H-2. Applicable effects from the Proposed Action and alternatives on seascape character units, the open ocean character unit, and landscape character units are listed throughout this appendix.

Table H-2. Area of landscape/seascape and ocean character types within the Offshore Project area viewsheds

Landcover/Open Ocean	Acres (hectares) of Landscape/ Seascape and Ocean Character Type	Acres (hectares) within Area of Potential Visual Impact	Percentage of Landscape/Seascape Character Type in Area of Potential Visual Impact
Martha's Vineyard Viewshed			
Coastal Bluffs	100.92 (40.77)	31.81 (12.87)	31.52
Coastal Scrub	5,873.36 (2,372.84)	1,534.77 (621.10)	26.13
Commercial	278.91 (112.68)	0.41 (0.17)	0.15
Dunes	396.73 (160.28)	183.78 (74.37)	46.32
Environmental Justice Community	8,246.23 (3,331.48)	1315.42 (532.33)	15.95
Fields/Meadows	22.6 (9.13)	19.47 (7.88)	86.15
Forests/Woodlands	59,350.69 (23,977.68)	4,237.71 (1,714.94)	7.14
Historic	866.03 (349.88)	4.02 (1.63)	0.46
Light Industrial	866.59 (350.1)	1.56 (0.63)	0.18
Ocean Beach	469.48 (189.99)	469.48 (189.99)	64.20
Rural/Suburban Residential	56,058.02 (22,647.44)	5,461.30 (2,210.11)	9.74
Ponds/Tidal Marsh	10,221.75 (4,129.59)	3,340.65 (1,351.91)	32.68
Village/Town	2,254.34 (910.75)	2.85 (1.16)	0.13

Landcover/Open Ocean	Acres (hectares) of Landscape/ Seascape and Ocean Character Type	Acres (hectares) within Area of Potential Visual Impact	Percentage of Landscape/Seascape Character Type in Area of Potential Visual Impact
Nantucket Viewshed			
Coastal Bluffs	38.14 (15.41)	5.35 (2.17)	14.03
Coastal Scrub	17,529.77 (7,082.03)	4,331.89 (1,753.05)	24.71
Commercial	158.77 (64.14)	23.55 (9.53)	14.83
Dunes	500.4 (202.16)	363.07 (146.93)	72.56
Environmental Justice Community	2,287.93 (924.32)	236.79 (95.83)	10.35
Fields/Meadows	208.8 (84.35)	97.64 (39.52)	46.76
Forests/Woodlands	371.52 (150.1)	6.03 (2.44)	1.62
Historic	36,160.62 (14,608.89)	7,208.19 (2,917.05)	19.93
Light Industrial	631.99 (255.32)	458.88 (185.70)	72.61
Ocean Beach	677.76 (273.81)	393.93 (159.42)	58.12
Parks/Developed Recreation	1,157.75 (467.73)	335.89 (135.93)	29.01
Rural/Suburban Residential	3,800.08 (1,535.23)	867.69 (351.14)	22.83
Ponds/Tidal Marsh	5,620.06 (2,270.51)	104.94 (42.47)	1.87
Village/Town	1,694.94 (684.76)	9.73 (3.94)	0.57
Ocean Character Type			
Open Ocean	5,200,000 (2,100,000)	5,200,000 (2,100,000)	-

Source: COP Appendix T, Table 5-5; SouthCoast Wind 2024

Distances from beach KOPs to the Proposed Action WTG and OSP array would range from the following.

- 37.2 miles (59.9 kilometers) from KOP-16-MV Squibnocket Beach on the western extent of the geographic analysis area.
- 23.3 miles (37.5 kilometers) from KOP-11-N Miacomet Beach, which is the closest KOP to the front edge of the WTG array,
- 26.5 miles (42.6 kilometers) from KOP-6-N Tom Nevers Beach on the eastern extent of the geographic analysis area.

The noticeable daytime and nighttime elements of the Project's WTGs and OSP and their viewshed distances are listed in Table H-3. Each WTG would have two L-864 flashing-red obstruction lights on the top of the nacelle, one of which is required to be lit (BOEM 2021). WTGs would have additional intermediate lighting on the tower utilizing low-intensity red-flashing (L-810) obstruction lighting. Line-of-sight calculations for onshore viewers (5.9-foot [1.8-meter] eye level) are based on intervening EC screening (7.98 inches [20.3 centimeters] height per mile). Heights of WTG and substation components are stated relative to mean lower low water (MLLW) and highest astronomical tide.

Atmospheric refraction of light rays causes fluctuations in the extents and appearances of offshore and onshore facilities. It results from the bending of light rays between viewers and objects due to current air temperature, water vapor, and barometric pressure (Bislins 2022). Based on the average sea level refraction calculation coefficient of 0.17 (Bislins 2022) applied to the turbine blade tip viewshed distance of 42.8 miles (68.9 kilometers), the 1,066.3-foot (325.0-meter) turbines may be projected upward to increased visibility from 0.0 feet (0.0 meters) to 192 feet (58.5 meters) above the horizon. The nearest beach viewers, located at 23.3 miles (37.5 kilometers) from the Lease Area, may see increased visibility of the 1,066.3-foot (325.0-meter) turbines from 790 feet (240.8 meters) to 844 feet (257.3 meters) above the horizon. Variability of daytime and nighttime atmospheric refraction-based visibility occurs with sea level's continuous increases and decreases in temperature, water vapor, and barometric pressure.

Table H-4 and Table H-5 indicate the Proposed Action's effects based on horizontal FOV and vertical FOV, respectively, defined as the earth curvature-based extent of the observable landscape seen at any given moment, usually measured in degrees (BOEM 2021). The horizontal FOV for each KOP is listed in COP Appendix T (SouthCoast Wind 2024). FOVs are valid and reliable indicators of the magnitude of view occupation by Proposed Action facilities. Typical human perception extends to 124° in the horizontal axis and 55° in the vertical axis. The nearest shoreline viewers would be 23.3 miles (37.5 kilometers) from the Wind Farm Area. EC, at this distance, reduces the observable height above the horizon of the nearest WTG from 1,066 feet (324.9 meters) MLLW to 788 feet (244 meters), resulting in occupation of 0.4° and 0.7 percent of the vertical view. WTGs would further diminish in perceived size with distance and EC.

Table H-3. Heights of noticeable [a] WTG elements and substations and visible distances [b]

Noticeable Element	Height in Feet (meters)	Visible Distance [b] in Miles (kilometers)
Rotor Blade Tip	1,066.3 (325.0) MLLW	0–42.8 (68.9)
Aviation Light	624 (190.2) MLLW	0–33.5 (53.9)
Nacelle	614 (187.1) MLLW	0–33.3 (53.6)
Hub	605.1 (184.4) MLLW	0–30.0 (48.3)
OSP	344.5 (105) MLLW	0–25.5 (41.0)
Mid-tower Light	302 (92) MLLW	0–24.2 (38.9)
Yellow Tower Base Color	50 (15) HAT	0–11.4 (18.3)

[a] Perception of Project elements, from 5.5 feet (1.7 meters) human eye level while standing at mean sea level, involves static distance-related sizes, forms, lines, colors, and textures; variable daytime lighting conditions; variable nighttime light conditions; and variable meteorological conditions.
[b] Based on intervening EC and clear-day conditions.
HAT = highest astronomical tide

Table H-4. Horizontal FOV occupied by the Proposed Action

Noticeable Element	Width miles (kilometers)	Distance miles (kilometers)	Horizontal FOV	Human FOV	Percent of FOV
Wind Farm	9.8 (15.8)	23.3 (37.5)	22.8°	124°	18%

Table H-5. Vertical FOV occupied by the Proposed Action

Noticeable Element	Height feet (meters)	Distance miles (kilometers)	Height Above Horizon [a] feet (meters)	Vertical FOV	Human FOV	Percent of FOV
Rotor Blade Tip	1,066 feet (324.9) MLLW	23.3 (37.5)	788 (244)	0.4°	55°	0.7%

[a] Based on intervening EC and clear-day conditions.

Table H-6 lists the wind farm's distances, horizontal FOVs, noticeable features based on their heights and EC, and visual contrasts. The analysis considers the introduction of WTGs and OSP to an open ocean baseline. The scale, size, contrast, and prominence of change focuses on the following.

- Arrangement of WTGs and OSP in the view.
- Horizontal FOV and vertical FOV scale of the wind farm array, based on WTG and OSP size and number.
- Position of the array in the open ocean.
- Position of the array in the view.
- Turbine array's distance from the viewer.

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 in comparison with the wind farm. Distance and observer elevation considerations are informed by the VIA simulations (COP Appendix T; SouthCoast Wind 2024), EC calculations, horizontal FOV, and vertical FOV in undeveloped open ocean. The wind farm and nearest WTGs would be:

- Unavoidably dominant features in the offshore view between 0 and 5 miles (0–8 kilometers) distance.
- Strongly pervasive features in the onshore to offshore view between 5 and 12 miles (8–19.3 kilometers) distance.
- Clearly visible features in the onshore to offshore view between 12 and 28 miles (19.3–45.1 kilometers) distance.
- Low on the horizon, but persistent features in the onshore to offshore view between 28 and 31 miles (45.1–49.9 kilometers) distance.
- Intermittently noticed features in the onshore to offshore view between 31 and 42.8 miles (49.9–68.9 kilometers) distance.
- Below the horizon beyond 42.8 miles (68.9 kilometers) distance.

Visual contrast determinations involve comparisons of characteristics of the seascape, open ocean, and landscape before and after Project implementation. The range of potential contrasts includes strong, moderate, weak, and none (BOEM 2021). The strongest daytime contrasts would result from tranquil and flat seas combined with sunlit WTG towers, nacelles, 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 back-lit 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 modulated by varied landscape elements. The strongest nighttime contrasts would result from dark skies (absent moonlight) combined with aviation lights, activated lighting on the OSP, mid-tower lights, and Project lighting reflections on low clouds and active (non-reflective) surf, and the dark-sky light dome. The weakest nighttime contrasts would result from moonlit, cloudless skies; tranquil (reflective) seas; Aircraft Detection Lighting System (ADLS) activation; and only mid-tower lights.

The seascape character units, open ocean character unit, landscape character units, and viewer experiences would be affected by the Proposed Action's noticeable features; applicable distances and FOV extents; open views versus view framing and intervening foregrounds; form, line, color, and texture contrasts; scale of change; and prominence in the characteristic seascape and landscape. Higher impact levels would stem from unique, extensive, and long-term appearance of strongly contrasting, large, and prominent vertical structures in the otherwise horizontal seascape environment, where structures are an unexpected element and viewer experience is of formerly open views of high-sensitivity seascape, open ocean, and landscape and from high sensitivity view receptors.

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Table H-6. Wind farm distances, FOVs, noticeable elements, visual contrasts, scale of change, and prominence (magnitude of change)

KOP [a]	Distance in Miles (kilometers)						Proposed Action FOV Degrees (% of 124°)	Noticeable Elements [g] & Impact Level	Contrast, Scale of Change, and Prominence							
	Proposed Action	Alternative C-1	Alternative C-2	Alternative D	Alternative E	Alternative F			Proposed Action Form	Proposed Action Line	Proposed Action Color	Proposed Action Texture	Proposed Action Scale	Proposed Action Prominence [h]	Alternatives C-1, C-2, E, F	Alternative D
KOP-1-O [b]	0–42.8 (0–68.9)	0–42.8 (0–68.9)	0–42.8 (0–68.9)	0–42.8 (0–68.9)	0–42.8 (0–68.9)	0–42.8 (0–68.9)	124° (100%)	R, AL, N, H, O, M, and Y [g] **Major**	Strong	Strong	Strong	Strong	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-2_O	5–42.8 (0–68.9)	5–42.8 (0–68.9)	5–42.8 (0–68.9)	5–42.8 (0–68.9)	5–42.8 (0–68.9)	5–42.8 (0–68.9)	124° (100%)	R, AL, N, H, O, M, and Y **Major**	Strong	Strong	Strong	Strong	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-1-MV [c]	30.9 (49.7)	30.9 (49.7)	30.9 (49.7)	30.9 (49.7)	30.9 (49.7)	30.9 (49.7)	27° (22%)	R, AL, and N **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-2-MV	31.0 (49.8)	31.0 (49.8)	31.0 (49.8)	31.0 (49.8)	31.0 (49.8)	31.0 (49.8)	27° (22%)	R, AL, N, and H **Minor**	Weak	Weak	Weak	Weak	Small	1	Same as Proposed Action	Same as Proposed Action
KOP-3-MV	31.4 (50.5)	31.4 (50.5)	31.4 (50.5)	31.4 (50.5)	31.4 (50.5)	31.4 (50.5)	27° (22%)	R, AL, and N **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-4-MV	32.2 (51.8)	32.2 (51.8)	32.2 (51.8)	32.2 (51.8)	32.2 (51.8)	32.2 (51.8)	29° (24%)	R, AL, and N **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-6-MV	33.6 (54.1)	33.6 (54.1)	33.6 (54.1)	33.6 (54.1)	33.6 (54.1)	33.6 (54.1)	32° (26%)	R **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-9-MV	36.9 (59.4)	36.9 (59.4)	36.9 (59.4)	36.9 (59.4)	36.9 (59.4)	36.9 (59.4)	30° (24%)	R **Minor**	Weak	Weak	Weak	Weak	Small	1	Same as Proposed Action	Same as Proposed Action
KOP-16-MV	37.2 (59.9)	37.2 (59.9)	37.2 (59.9)	37.2 (59.9)	37.2 (59.9)	37.2 (59.9)	32° (26%)	R **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-19-MV [i]	41.2 (66.3)	41.2 (66.3)	41.2 (66.3)	41.2 (66.3)	41.2 (66.3)	41.2 (66.3)	30° (24%)	R, AL, N, and H **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-2-N [d]	24.4 (42.6)	24.4 (42.6)	24.4 (42.6)	24.7 (39.7)	24.4 (42.6)	24.4 (42.6)	24° (19%)	R, AL, N, H, and O **Moderate**	Weak	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-3-N	24.3 (39.1)	24.3 (39.1)	24.3 (39.1)	24.4 (39.3)	24.3 (39.1)	24.3 (39.1)	24° (19%)	R, AL, N, H, and O **Moderate**	Weak	Weak	Moderate	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-6-N	26.5 (42.6)	26.5 (42.6)	26.5 (42.6)	27.2 (43.8)	26.5 (42.6)	26.5 (42.6)	17° (14%)	R, AL, N, and H **Moderate**	Weak	Weak	Moderate	Weak	Medium	3	Same as Proposed Action	Same as Proposed Action

KOP [a]	Distance in Miles (kilometers)						Proposed Action FOV Degrees (% of 124°)	Noticeable Elements [g] & Impact Level	Contrast, Scale of Change, and Prominence							
	Proposed Action	Alternative C-1	Alternative C-2	Alternative D	Alternative E	Alternative F			Proposed Action Form	Proposed Action Line	Proposed Action Color	Proposed Action Texture	Proposed Action Scale	Proposed Action Prominence [h]	Alternatives C-1, C-2, E, F	Alternative D
KOP-8-N (Day)	25.6 (41.2)	25.6 (41.2)	25.6 (41.2)	26.2 (42.2)	25.6 (41.2)	25.6 (41.2)	19° (15%)	R, AL, N, and H **Moderate**	Weak	Weak	Weak	Weak	Medium	3	Same as Proposed Action	Same as Proposed Action
KOP-8-N (Night)	25.6 (41.2)	25.6 (41.2)	25.6 (41.2)	26.2 (42.2)	25.6 (41.2)	25.6 (41.2)	19° (15%)	R, AL, N, and H **Moderate**	Weak	Weak	Strong	Weak	Medium	5	Same as Proposed Action	Same as Proposed Action
KOP-10-N	24.2 (38.9)	24.2 (38.9)	24.2 (38.9)	24.7 (39.7)	24.2 (38.9)	24.2 (38.9)	22° (18%)	R, AL, N, H, O, and M **Moderate**	Moderate	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-11-N	23.3 (37.5)	23.3 (37.5)	23.3 (37.5)	23.7 (38.1)	23.3 (37.5)	23.3 (37.5)	23° (19%)	R, AL, N, H, O, and M **Moderate**	Moderate	Weak	Moderate	Weak		3	Same as Proposed Action	Same as Proposed Action
KOP-12-N (Day)	23.5 (37.8)	23.5 (37.8)	23.5 (37.8)	23.8 (38.3)	23.5 (37.8)	23.5 (37.8)	24° (19%)	R, AL, N, H, O, and M **Moderate**	Moderate	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-12-N (Night)	23.5 (37.8)	23.5 (37.8)	23.5 (37.8)	23.8 (38.3)	23.5 (37.8)	23.5 (37.8)	24° (19%)	R, AL, N, H, O, and M **Moderate**	Moderate	Moderate	Strong	Weak	Medium	5	Same as Proposed Action	Same as Proposed Action
KOP-13-N	23.6 (38.0)	23.6 (38.0)	23.6 (38.0)	24.0 (38.6)	23.6 (38.0)	23.6 (38.0)	26° (21%)	R, AL, N, H, O, and M **Moderate**	Moderate	Moderate	Moderate	Weak	Medium	3	Same as Proposed Action	Same as Proposed Action
KOP-16-N	23.8 (38.3)	23.8 (38.3)	23.8 (38.3)	24.0 (38.6)	23.8 (38.3)	23.8 (38.3)	26° (21%)	R, AL, N, H, O, and M **Moderate**	Moderate	Weak	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-17-N	24.0 (38.6)	24.0 (38.6)	24.0 (38.6)	24.4 (39.3)	24.0 (38.6)	24.0 (38.6)	24° (19%)	R, AL, N, H, O, and M **Moderate**	Moderate	Weak	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-18-N	23.4 (37.7)	23.4 (37.7)	23.4 (37.7)	23.8 (38.3)	23.4 (37.7)	23.4 (37.7)	24° (19%)	R, AL, N, H, O, and M **Moderate**	Moderate	Weak	Moderate	Weak	Small	4	Same as Proposed Action	Same as Proposed Action
KOP-20-N	24.8 (39.9)	24.8 (39.9)	24.8 (39.9)	25.4 (40.9)	24.8 (39.9)	24.8 (39.9)	21° (17%)	R, AL, N, H, and O **Moderate**	Moderate	Weak	Moderate	Weak	Medium	2	Same as Proposed Action	Same as Proposed Action
KOP-21-N	29.4 (47.3)	29.4 (47.3)	29.4 (47.3)	29.9 (48.1)	29.4 (47.3)	29.4 (47.3)	17° (14%)	R, AL, N, H, O, and M **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-22-N	24.2 (38.9)	24.2 (38.9)	24.2 (38.9)	24.4 (39.3)	24.2 (38.9)	24.2 (38.9)	26° (21%)	R, AL, N, H, O, and M **Moderate**	Moderate	Weak	Moderate	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-1-BP [e]	0.4 (0.7)	NA	NA	NA	NA	NA	NA	Unseen **Negligible**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action

KOP [a]	Distance in Miles (kilometers)						Proposed Action FOV Degrees (% of 124°)	Noticeable Elements [g] & Impact Level	Contrast, Scale of Change, and Prominence							
	Proposed Action	Alternative C-1	Alternative C-2	Alternative D	Alternative E	Alternative F			Proposed Action Form	Proposed Action Line	Proposed Action Color	Proposed Action Texture	Proposed Action Scale	Proposed Action Prominence [h]	Alternatives C-1, C-2, E, F	Alternative D
KOP-3-BP	0.5 (0.8)	NA	NA	NA	NA	NA	NA	Unseen **Negligible**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-4-BP	0.8 (1.3)	NA	NA	NA	NA	NA	NA	Unseen **Negligible**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-44-C [f]	0.1 (0.2)	NA	NA	NA	NA	NA	NA	Structures **Major**	Strong	Strong	Strong	Strong	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-46-C	0.2 (0.3)	NA	NA	NA	NA	NA	NA	Structures **Major**	Strong	Strong	Strong	Moderate	Large	5	Same as Proposed Action	Same as Proposed Action
KOP-47-C	0.2 (0.3)	NA	NA	NA	NA	NA	NA	Structures **Major**	Strong	Strong	Strong	Moderate	Large	5	Same as Proposed Action	Same as Proposed Action
KOP-49-C	0.3 (0.4)	NA	NA	NA	NA	NA	NA	Structures **Moderate**	Moderate	Weak	Moderate	Weak	Medium	3	Same as Proposed Action	Same as Proposed Action

[a] KOP-1-MV = Wasque Point. KOP-2-MV = Wasque Point Reservation. KOP-3-MV = Wasque Avenue, KOP-4-MV = South Beach, KOP-6-MV = Long Point Beach, KOP-9-MV = 322 South Road, KOP-16-MV = Squibnocket Beach, KOP-19-MV Gay Head Lighthouse, KOP-2-N = Sanford Farm Barn Overlook, KOP-3-N = Madaket Beach, KOP-6-N = Tom Nevers Beach, KOP-8-N = Tom Nevers Field, KOP-10-N = Nobadeer Beach, KOP-11-N = Miacomet Beach and Pond, KOP-12-N = Cisco Beach, KOP-13-N = Hummock Pond Road Bike Path, KOP-16-N = Head of Plains, KOP-17-N Bartlett's Farm, KOP-18-N = Ladies Beach, KOP-20-N = Madequecham 1, KOP-21-N Sankaty Head Lighthouse, KOP-22-N = Madaket Beach at Sunset, KOP-1-O Recreational Fishing, Pleasure, and Tour Boat Area, KOP-2-O Commercial and Cruise Ship Shipping Lanes, KOP-1-BP = Brayton Point Beach, KOP-3-BP = Sycamore Street, KOP-4-BP = Route 103 at Anthony Bridge, KOP-44-C = Oak Grove Cemetery, KOP-46-C = Goodwill Park, KOP-47-C = Lawrence Lynch Site Road - Gifford Street Substation Road, and KOP-49-C = Two Ponds

[b] O = Ocean

[c] MV = Martha's Vineyard

[d] N = Nantucket

[e] BP – Brayton Point

[f] C= Cape Cod

[g] Noticeable elements: R = rotor, AL = aviation light, N = nacelle, H = hub, O = OSP, M = mid-tower light, Y = yellow tower base color

[h] WTGs and OSP visibility: 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).

[i] Elevated lighthouse viewpoint

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Construction involving moving and stationary visual feature contrasts to forms, lines, colors, textures, scale, and prominence in formerly open ocean may have more effect on viewers than operational and decommissioning impacts, where the viewing context is existing WTGs and substations. Construction impacts would be temporary and would include the following.

- Daytime and nighttime movement of installation vessels, cranes, and other equipment visible in the open ocean in and around the Lease Area.
- Dawn, dusk, and nighttime construction lighting on WTGs and OSP.
- Beach, other sensitive land-based, and boat and cruise ship views of WTGs and OSP under construction.
- Laying of the offshore and onshore buried export cables and the connections between offshore and onshore export cables at landing sites.
- Activities along the onshore landfalls, export cable routes, and Brayton Point and Falmouth onshore converter station and substation sites.

Operational effects would be similar to those of end-stage construction and would be long term and fully reversible.

Proposed Action impacts on high-sensitivity open ocean character would be **major**. The daytime and nighttime (lighting) presence of the WTGs, OSP, and construction and O&M vessel traffic would change perception of this area from natural, undeveloped open ocean to a developed wind energy environment characterized by visually dominant WTGs and OSP.

Maintenance activities would cause **minor** effects on open ocean character by increased O&M vessel traffic to and from the Wind Farm Area. Increases in these vessel movements would be noticeable to offshore viewers but are unlikely to have a significant effect.

Decommissioning would involve the removal of all offshore structures and is expected to follow the reverse of the construction activity. Decommissioning activities would cause effects similar to those of construction activities.

Daytime lighting of WTGs is not required. ADLS would reduce nighttime impact levels from **major** or **moderate** to **negligible**, due to substantially limited hours of lighting. Residual impacts would result from the presence of continuously flashing lights, a sky light dome, and reflections on clouds during those limited hours. Lights of the up to five OSPs, when lit for maintenance, potentially would be visible from beaches and adjoining land and the built environment during hours of darkness. The nighttime sky light dome and cloud lighting caused by reflections from the water surface may be seen from distances beyond the 42.8-mile (68.9-kilometer) geographic analysis area, depending on variable ocean surface and meteorological reflectivity. The onshore substation and converter stations' nighttime lighting would be visible in their immediate neighborhoods during the hours of darkness and similar in magnitude and extent to existing conditions.

Table H-7 lists the Proposed Action's noticeable features based on their heights, distances, and EC.

Table H-7. Noticeable elements and impacts by seascape character unit, open ocean character unit, landscape character unit, and KOP for the Proposed Action

Noticeable Elements [a] Impacts	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
R, AL, N, H, O, M, and Y **Major**	Open Ocean Character Unit KOP-1-O Recreational Fishing, Pleasure, and Tour Boat Area KOP-2-O Commercial and Cruise Ship Shipping Lanes
R, AL, N, H, O, and M **Major**	KOP-8-N Tom Nevers Field-Nighttime [b] KOP-12-N Cisco Beach-Nighttime [b]
R, AL, N, H, O, and M **Moderate**	Seascape and Landscape Character Units KOP-8-N Tom Nevers Field-Daytime KOP-10-N Nobadeer Beach KOP-11-N Miacomet Beach and Pond KOP-12-N Cisco Beach-Daytime KOP-13-N Hummock Pond Road Bike Path KOP-16-N Head of Plains KOP-17-N Bartlett's Farm KOP-18-N Ladies Beach KOP-22-N Madaket Beach at Sunset
R, AL, N, H, O, and M **Minor**	KOP-19-MV Gay Head Lighthouse (Elevated viewpoint)
R, AL, N, H, and O **Moderate**	KOP-2-N Sanford Farm Barn Overlook KOP-3-N Madaket Beach KOP-20-N Madequecham 1
R, AL, N, H, and O **Minor**	KOP-21-N Sankaty Head Lighthouse (Elevated viewpoint)
R, AL, N, and H **Minor**	KOP-2-MV Wasque Point Reservation KOP-6-N Tom Nevers Beach
R, AL, and N **Minor**	Landscape Character Units KOP-1-MV Wasque Point KOP-3-MV Wasque Avenue KOP-4-MV South Beach
R **Minor**	KOP-6-MV Long Point Beach KOP-9-MV 322 South Road KOP-16-MV Squibnocket Beach
R, AL, N, H, O, and M **Negligible**	KOP-8-N Tom Nevers Field-Nighttime [c] KOP-12-N Cisco Beach-Nighttime [c]
Onshore substation structures **Major**	KOP-44-C Oak Grove Cemetery KOP-46-C Goodwill Park KOP-47-C Lawrence Lynch Site Road - Gifford Street Substation Road
Onshore substation structures **Moderate**	KOP-49-C Two Ponds
Onshore substation structures **Negligible**	KOP-1-BP Brayton Point Beach KOP-3-BP Sycamore Street KOP-4-BP Route 103 at Anthony Bridge

[a] R = rotor, AL = aviation light, N = nacelle, H = hub, O = OSP, M = mid-tower light, Y = yellow tower base color
[b] Major impacts when ADLS is activated.
[c] Negligible impacts when ADLS is not activated.

Table H-8 summarizes the Proposed Action's noticeability based on distance and effects on the seascape units, open ocean unit, landscape units, and KOPs. Noticeability is based on the offshore wind turbine visibility work by Robert Sullivan (Sullivan et al. 2013).

Table H-8. Wind farm distance effects by seascape character unit, open ocean character unit, landscape character unit, and KOP for the Proposed Action

Distance in Miles (km) Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
0–40.0 (0–64.4) Dominant/Major to Minor Noticeability	Open Ocean Character Unit KOP-1-O Recreational Fishing, Pleasure, and Tour Boat Area
5.0–40.0 (8.0–64.4) Dominant/Major to Minor Noticeability	Open Ocean Character Unit KOP-2-O Cruise Ship Shipping Lanes
23.5-25.6 (37.8-41.2) Dominant/Major Noticeability	KOP-8-N Tom Nevers Field-Nighttime KOP-12-N Cisco Beach-Nighttime
23.3–24.2 (37.5–38.9) Moderate Noticeability	Seascape Character Units: • Ocean • Sound • Beachfront • Coastal Bluff • Coastal Dune • Boardwalk • Coastal Scrub • Commercial • Forests/Woodlands • Institutional • Park • Preserve • Residential • Salt Pond • Transportation • Village/Town KOPs: KOP-8-N Tom Nevers Field-Daytime KOP-10-N Nobadeer Beach KOP-11-N Miacomet Beach and Pond KOP-12-N Cisco Beach-Daytime KOP-13-N Hummock Pond Road Bike Path KOP-16-N Head of Plains KOP-17-N Bartlett's Farm KOP-18-N Ladies Beach KOP-20-N Madequecham 1 KOP-22-N Madaket Beach at Sunset

Distance in Miles (km) Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
24.3–33.6 (39.1–54.1) Minor Noticeability	Seascape Character Units: • Ocean • Sound • Beachfront • Coastal Bluff • Coastal Dune • Boardwalk • Coastal Scrub • Commercial • Forests/Woodlands • Institutional • Park • Preserve • Residential • Salt Pond • Transportation • Village/Town Landscape Character Units: • Agriculture • Coastal Scrub • Commercial • Estuary • Forests/Woodlands • Institutional • Light Industrial • Marshland • Park • Preserve • Residential • Salt Pond • Pond Shoreline • Transportation • Village/Town KOPs: KOP-1-MV Wasque Point KOP-2-MV Wasque Point Reservation KOP-3-MV Wasque Avenue KOP-4-MV South Beach KOP-6-MV Long Point Beach KOP-9-MV 322 South Road KOP-16-MV Squibnocket Beach KOP-2-N Sanford Farm Barn Overlook KOP-3-N Madaket Beach KOP-6-N Tom Nevers Beach KOP-8-N Tom Nevers Field-Daytime
29.4-41.2 (47.3-66.3) Minor Noticeability	KOP-21-N Sankaty Head Lighthouse (elevated viewpoint) KOP-19-MV Gay Head Lighthouse (elevated viewpoint)

Distance in Miles (km) Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
31.1–42.8 (50.1–68.9) Minor to Negligible Noticeability	Landscape Character Units: • Agriculture • Coastal Scrub • Commercial • Estuary • Forests/Woodlands • Institutional • Light Industrial • Marshland • Park • Preserve • Residential • Salt Pond • Pond Shoreline • Transportation • Village/Town

km = kilometers

Table H-9 summarizes the Proposed Action's wind farm percent of FOV occupied by the wind farm, and effects on the seascape units, landscape units, and KOPs' viewer experience. FOV measures consider size, horizontal extent, and vertical extent of the facilities and indicate the scale of impact in comparison with the typical 124-degree human view cone. The WTG array's configuration results in narrower angles and shorter distances from Nantucket and wider angles from Martha's Vineyard's greater distances. Thus, moderate to minor effects involve both distance's noticeable elements and FOV measures.

Table H-9. Wind farm percent of FOV and effects by seascape character unit, open ocean character unit, landscape character unit, and KOP for the Proposed Action

Percent (°) of 124° FOV POV [a] Effects [b]	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
100% (124°) to 16% (20°) Dominant/Major to Minor	Open Ocean Character Unit KOP-1-O Recreational Fishing, Pleasure, and Tour Boat Area KOP-2-O Cruise Ship Shipping Lanes
21% (26°) to 17% (19°) Moderate	Seascape Character Units: • Ocean • Sound • Beachfront • Coastal Bluff • Coastal Dune • Boardwalk • Coastal Scrub • Commercial • Forests/Woodlands • Institutional • Park • Preserve • Residential

Percent (°) of 124° FOV POV [a] Effects [b]	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
	• Salt Pond • Transportation • Village/Town Landscape Character Units: • Agriculture • Coastal Scrub • Commercial • Estuary • Forests/Woodlands • Institutional • Light Industrial • Marshland • Park • Preserve • Residential • Salt Pond • Pond Shoreline • Transportation • Village/Town KOP-8-N Tom Nevers Field-Daytime KOP-10-N Nobadeer Beach KOP-11-N Miacomet Beach and Pond KOP-12-N Cisco Beach-Daytime KOP-13-N Hummock Pond Road Bike Path KOP-16-N Head of Plains KOP-17-N Bartlett's Farm KOP-18-N Ladies Beach KOP-20-N Madequecham 1 KOP-22-N Madaket Beach at Sunset
26% (32°) to 14% (17°) Minor to Moderate	Seascape Character Units: • Ocean • Sound • Beachfront • Coastal Bluff • Coastal Dune • Boardwalk • Coastal Scrub • Commercial • Forests/Woodlands • Institutional • Park • Preserve • Residential • Salt Pond • Transportation • Village/Town Landscape Character Units: • Agriculture

Percent (°) of 124° FOV POV [a] Effects [b]	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
	• Coastal Scrub • Commercial • Estuary • Forests/Woodlands • Institutional • Light Industrial • Marshland • Park • Preserve • Residential • Salt Pond • Pond Shoreline • Transportation • Village/Town KOP-1-MV Wasque Point KOP-2-MV Wasque Point Reservation KOP-3-MV Wasque Avenue KOP-4-MV South Beach KOP-6-MV Long Point Beach KOP-9-MV 322 South Road KOP-16-MV Squibnocket Beach KOP-19-MV Gay Head Lighthouse (elevated viewpoint) KOP-2-N Sanford Farm Barn Overlook KOP-3-N Madaket Beach KOP-6-N Tom Nevers Beach KOP-21-N Sankaty Head Lighthouse (elevated viewpoint)

[a] Percent of view
[b] Wind farm array configuration results in narrower angles from Nantucket and wider angles from Martha's Vineyard's greater distances. Thus, overall moderate to minor effects involve distance and noticeable elements.

Foreground influence assessments, involving the presence of intervening or framing elements and their influence on effects of Project characteristics, are based on each KOP's locale photography and visual simulations (Attachment 3 of Appendix T; SouthCoast Wind 2024) and summarized in Table H-10.

Table H-10. Foreground view framing and intervening elements for the Proposed Action

Foreground Element(s) Influence	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
Open Ocean Negligible Influence	Open Ocean Character Unit KOP-1-O Recreational Fishing, Pleasure, and Tour Boat Area KOP-2-O Cruise Ship Shipping Lanes
Beach, Dunes, and Ocean Minor Influence	Seascape Character Units: • Ocean • Sound • Beachfront • Coastal Bluff • Coastal Dune • Boardwalk • Coastal Scrub • Commercial • Forests/Woodlands • Institutional • Park • Preserve • Residential • Salt Pond • Transportation • Village/Town KOP-1-MV Wasque Point KOP-4-MV South Beach KOP-6-MV Long Point Beach KOP-16-MV Squibnocket Beach KOP-6-N Tom Nevers Beach KOP-10-N Nobadeer Beach KOP-11-N Miacomet Beach and Pond KOP-12-N Cisco Beach-Daytime KOP-18-N Ladies Beach KOP-20-N Madequecham 1 KOP-22-N Madaket Beach at Sunset
Buildings, Vegetation, and Topography Moderate to Dominant Influence	Landscape Character Units: • Agriculture • Coastal Scrub • Commercial • Estuary • Forests/Woodlands • Institutional • Light Industrial • Marshland • Park • Preserve • Residential • Salt Pond • Pond Shoreline • Transportation • Village/Town

Foreground Element(s) Influence	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
	KOP-2-N Sanford Farm Barn Overlook KOP-3-N Madaket Beach

Proposed Action contrasts in the characteristic seascape and landscape, as perceived in views from each KOP, are based on visual simulations (COP Appendix T, Attachment 3; SouthCoast Wind 2024). Seascape unit view contrasts are estimated based on similar open view conditions in ocean environments. Landscape and seascape compatibility and photography conditions for each viewpoint are presented in COP Appendix T, Table 5-6 and Table 5-7, and Attachment T.1, Table 3-1 (SouthCoast Wind 2024). The COP landscape and seascape evaluation-scale ranges from faint, apparent, conspicuous, and prominent to dominant. Onshore viewpoints Oak Grove Cemetery, Goodwill Park, and Lawrence Lynch site road would result in prominent and dominant conditions. Offshore potential viewpoints' evaluations range from faint to dominant. Visual contrast determinations involve comparisons of characteristics of the seascape and landscape before and after Proposed Action implementation. The range of potential contrasts includes strong, moderate, weak, and none. The strongest daytime contrasts would result from tranquil and flat seas combined with sunlit WTG towers, nacelles, flickering rotors, and the yellow tower base color against a dark background sky and an undifferentiated foreground. 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 modulated by varied landscape elements. The strongest nighttime contrasts would result from dark skies (absent moonlight) combined with aviation lights, activated lighting on the OSP mid-tower lights, and Project lighting reflections on low clouds and active (non-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.

Photographic comparisons of characteristics of the seascape's and landscape's existing conditions and Proposed Action implementation are included in COP Appendix T, Attachment 3 (SouthCoast Wind 2024) for each of the KOPs in the following summary tables. Visual contrast determinations are listed in Table H-11.

Table H-11. Visual contrasts to seascape, open ocean, landscape, and KOPs for the Proposed Action

Contrast Rating Effects	Seascape, Open Ocean, Landscape, and Offshore and Onshore Key Observation Points
Strong Contrasts **Major**	Open Ocean KOP-1-O Recreational Fishing, Pleasure, and Tour Boat Area KOP-2-O Cruise Ship Shipping Lanes
Strong Contrasts (Limited Timeframe) **Moderate**	KOP-8-N Tom Nevers Field-Nighttime (the limited timeframe due to ADLS results in downward rating from Major to Negligible) KOP-12-N Cisco Beach-Nighttime (the limited timeframe due to ADLS results in downward rating from Major to Negligible)
Moderate Contrasts **Moderate**	Seascapes and Landscapes within 28 miles (kilometers) in the Wind Farm Area viewshed KOP-3-N Madaket Beach

Contrast Rating Effects	Seascape, Open Ocean, Landscape, and Offshore and Onshore Key Observation Points
	KOP-6-N Tom Nevers Beach KOP-8-N Tom Nevers Field-Daytime KOP-10-N Nobadeer Beach KOP-11-N Miacomet Beach and Pond KOP-12-N Cisco Beach-Daytime KOP-13-N Hummock Pond Road Bike Path KOP-16-N Head of Plains KOP-17-N Bartlett's Farm KOP-18-N Ladies Beach KOP-20-N Madequecham 1 KOP-22-N Madaket Beach
Weak Contrasts **Minor**	Seascapes and Landscapes beyond 28 miles (kilometers) in the Wind Farm Area viewshed KOP-1-MV Wasque Point KOP-2-MV Wasque Point Reservation KOP-3-MV Wasque Avenue KOP-4-MV South Beach KOP-6-MV Long Point Beach KOP-9-MV 322 South Road KOP-16-MV Squibnocket Beach KOP-19-MV Gay Head Lighthouse (Elevated viewpoint) KOP-2-N Sanford Farm Barn Overlook KOP-21-N Sankaty Head Lighthouse (Elevated viewpoint)
None to very weak **Negligible**	Seascapes, Landscapes, and viewer locations not in the Wind Farm Development Area viewshed

Table H-12 summarizes sensitivity, susceptibility, and magnitude of change in consideration of Proposed Action impacts on the seascape character units, open ocean character unit, and landscape character units throughout the geographic analysis area. The seascape, open ocean, and landscape criteria listed in Table H-1 and consideration of the preceding assessments would result in impact levels for character units as shown in Table H-12.

Table H-12. Proposed Action impacts on seascape character, open ocean character, and landscape character

Level of Impact	Seascape Character Units, Open Ocean Character Unit, and Landscape Character Units
Major	SLIA: Open Ocean Character Unit
Moderate	SLIA: Seascape Character Units and Landscape Character Units within the viewshed and within 28 miles of WTGs
Minor	SLIA: Seascape Character Units and Landscape Character Units within the viewshed and beyond 28 miles of WTGs
Negligible	SLIA: Seascape Character Units and Landscape Character Units outside of the WTG viewshed

SLIA = seascape, open ocean, and landscape impact assessment

Table H-13 summarizes Proposed Action impacts on viewer experience (KOP locations) throughout the geographic analysis area. The viewer experience criteria listed in Table H-1 and consideration of the preceding assessments would result in impact levels for KOPs as shown in Table H-13.

Table H-13. Impact levels on viewer experience for the Proposed Action

Impact Level	Offshore and Onshore Key Observation Points
Major	VIA: KOP-1-O Recreational Fishing, Pleasure, and Tour Boat Area KOP-2-O Commercial and Cruise Ship Shipping Lanes KOP-8-N Tom Nevers Field-Nighttime [a] KOP-12-N Cisco Beach-Nighttime [a] KOP-44-C Oak Grove Cemetery KOP-46-C Goodwill Park KOP-47-C Lawrence Lynch Site
Moderate	VIA: KOP-8-N Tom Nevers Field-Daytime KOP-10-N Nobadeer Beach KOP-11-N Miacomet Beach and Pond KOP-12-N Cisco Beach-Daytime KOP-13-N Hummock Pond Road Bike Path KOP-16-N Head of Plains KOP-17-N Bartlett's Farm KOP-18-N Ladies Beach KOP-20-N Madequecham 1 KOP-22-N Madaket Beach at Sunset KOP-49-C Two Ponds
Minor	VIA: KOP-1-MV Wasque Point KOP-2-MV Wasque Point Reservation KOP-3-MV Wasque Avenue KOP-4-MV South Beach KOP-6-MV Long Point Beach KOP-9-MV 322 South Road KOP-16-MV Squibnocket Beach KOP-19-MV Gay Head Lighthouse (Elevated viewpoint) KOP-2-N Sanford Farm Barn Overlook KOP-3-N Madaket Beach KOP-6-N Tom Nevers Beach KOP-21-N Sankaty Head Lighthouse (Elevated viewpoint)
Negligible	KOP-8-N Tom Nevers Field-Nighttime [b] KOP-12-N Cisco Beach-Nighttime [b] KOP-1-BP Brayton Point Beach KOP-3-BP Sycamore Street KOP-4-BP Route 103 at Anthony Bridge

[a] Major impacts when ADLS is activated.
[b] Negligible impacts when ADLS is not activated.

H.3.1.1 Cumulative Impacts of the Proposed Action

NEPA requires consideration of other reasonably foreseeable activities in the Project's viewshed and the Project's incremental effects on seascape character, open ocean character, landscape character, and viewer experience. These effects include direct physical effects on the seascape, open ocean, and landscape or changes to the distinct character of the seascape, open ocean, and landscape.

Effects on seascape character, open ocean character, and landscape character can occur in the following conditions (SLVIA Chapter 8; BOEM 2021).

- Multi-project WTGs and OSPs visible within or from the open ocean character unit as overlapping or adjacent features and elements.
- Multi-project WTGs and OSPs visible from seascape character units as overlapping or adjacent features and elements.
- Multi-project WTGs and OSPs visible from landscape character units as overlapping or adjacent features and elements.

Effects on viewer experience can occur in the following conditions (SLVIA Chapter 8; BOEM 2021).

- Multi-project WTGs and OSPs visible as overlapping features and elements.
- Multi-project WTGs and OSPs visible as adjacent features and elements.
- Multi-project WTGs and OSPs visible as viewers move through the seascape, open ocean, and landscape.

Attachment H-1 portrays simulations of the incremental effects of the Project in the context of other offshore wind projects, from a total of eight KOPs: five KOPs on Nantucket Island; an additional nighttime simulation for one of these KOPs (Cisco Beach); and two KOPs on Martha's Vineyard.

The visual simulations portray five incremental construction scenarios, as follows.

- Scenario 1: 2023–2025 Project Construction (Vineyard Wind, South Fork Wind, Revolution Wind, Sunrise Wind and New England Wind).
- Scenario 2: SouthCoast Wind Project Construction with prior 2023–2025 Project Construction (from Scenario 1).
- Scenario 3: 2024–2030 Project Construction (New England Wind II, Vineyard Wind Northeast [formerly Liberty Wind], Beacon Wind and Bay State Wind) with prior 2023–2025 Project Construction (Vineyard Wind, South Fork Wind, Revolution Wind, Sunrise Wind and New England Wind) and SouthCoast Wind Project Construction.
- Scenario 4 (full buildout): 2023–2025 Project Construction (Vineyard Wind, South Fork Wind, Revolution Wind, Sunrise Wind and New England Wind) and 2024–2030 Project Construction (New England Wind II, Vineyard Wind Northeast [formerly Liberty Wind], Beacon Wind and Bay State Wind) without SouthCoast Wind Project Construction.

- Scenario 5: The Project without other foreseeable planned activities.

The number of offshore wind structures simulated in Attachment H-1 differs slightly from the number of structures assumed in Appendix D, *Planned Activities Scenario*. This is due to the timing of when these documents were developed and the assumptions used in developing the layouts for the simulations. While the number of structures in the individual lease areas vary, the total number of structures assumed across the Massachusetts and Rhode Island lease areas is very similar between the two documents, with Appendix D assuming development of 1,069 structures and the cumulative visual simulations assuming development of 1,063 structures, a difference of only six structures. The number of offshore structures identified in both documents are estimates of reasonably foreseeable offshore wind development and are subject to change as lessees submit COPs and refine their development plans. BOEM believes the simulations presented in Attachment H-1 provide a reasonable approximation of the scale of visual impacts that would occur from development of the Proposed Action in combination with other ongoing and planned offshore wind projects.

Consideration of effects of other wind farms on seascape character, open ocean character, and landscape character is listed in Table H-14.

Consideration of effects on viewer experience of other wind farms is listed in Table H-15.

Consideration of effects on seascape character, open ocean character, and landscape character of other wind farms in combination with the Proposed Action is listed in Table H-16.

Consideration of effects on viewer experience of other wind farms in combination with the Proposed Action is listed in Table H-17.

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Table H-14. Other wind farms' seascape, open ocean, and landscape units cumulative wind farm distances, FOVs, noticeable elements, visual contrasts, scale of change, and prominence

Character Unit	Distance in miles (kilometers) [c]								FOV Degrees (% of 124°)	Noticeable Elements [d] & Impact Level	Visual Contrast, Scale of Change, and Prominence					
	BSW [a]	BW [a]	VWN [a]	NEW [a]	SFW [a]	SW [a]	RW [a]	VW [a]			Form	Line	Color	Texture	Scale	Prominence [e]
Martha's Vineyard Seascape (Beaches) [b]	15.0 (24.1)	29.2 (47.0)	45.6 (73.4)	22.9 (36.8)	21.9 (35.2)	16.8 (27.0)	12.2 (19.6)	19.2 (30.9)	134° (109%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Strong	Large	6 to 0
Open Ocean	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	82° to 360° (66 to 290%)	R, AL, N, H, O, M, and Y to R **Major**	Strong to Weak to Screened	Strong to Weak to Screened	Strong to Weak Screened	Strong to Weak to Screened	Large to NA	6 to 0
Martha's Vineyard Landscape [f]	15.2 (24.4)	29.4 (47.3)	45.8 (73.7)	23.1 (37.1)	22.1 (35.5)	17.0 (27.3)	12.4 (19.9)	19.4 (31.2)	134° (109%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Strong	Large	6 to 0
Nantucket Seascape (Beaches) [b]	17.4 (28.0)	19.4 (31.2)	32.0 (51.5)	29.1 (46.8)	47.2 (76.0)	35.2 (56.6)	34.6 (55.7)	15.5 (24.9)	104° (84%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Strong	Large to NA	6 to 0
Nantucket Landscape [f]	17.6 (28.3)	19.6 (31.5)	32.2 (51.8)	29.3 (47.1)	47.4 (76.3)	35.4 (56.9)	34.8 (56.0)	15.7 (25.2)	104° (84%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Strong	Large to NA	6 to 0

[a] BSW = Bay State Wind, BW = Beacon Wind, VWN = Vineyard Wind Northeast, NEW = New England Wind, SFW = South Fork Wind, SW = Sunrise Wind, RW = Revolution Wind, and VW = Vineyard Wind
[b] The most conservative onshore case involves the seaward edge of the beach nearest the projects. The seascape unit edge is 3.45 miles (kilometers) offshore (Massachusetts jurisdictional boundary).
[c] Due to Earth's curvature and known WTG heights, those WTGs beyond 42.8 miles (68.9 kilometers) would not be visible from ground level plus 5.5 feet (1.7 meters).
[d] Noticeable elements: R = rotor, AL = aviation light, N = nacelle, H = hub, O = OSP, M = mid-tower light, Y = yellow tower base color.
[e] WTGs and OSP Prominence (visibility): 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).
[f] The seaward edge between landscape and seascape varies. The most conservative case is 0.2-mile (0.3-kilometer) landward distance from seaward beach edge.

Table H-15. Other wind farms' cumulative viewer experience wind farm distances, FOVs, noticeable elements, visual contrasts, scale of change, and prominence

Viewer [a]	Distance in miles (kilometers) [d]								FOV Degrees (% of 124°)	Noticeable Elements [c] & Impact Level	Visual Contrast, Scale of Change, and Prominence					
	BSW [b]	BW [b]	VWN [b]	NEW [b]	SFW [b]	SW [b]	RW [b]	VW [b]			Form	Line	Color	Texture	Scale	Prominence [e]
KOP-1-MV	14.9 (24.0)	23.2 (37.3)	39.7 (63.9)	25.9 (40.7)	36.6 (58.9)	27.3 (43.9)	25.1 (40.4)	14.8 (23.8)	114° (92%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Strong	Large	6
KOP-2-N	19.7 (31.7)	20.5 (33.0)	31.9 (51.3)	30.9 (49.7)	49.7 (80.0)	38.1 (61,3)	37.1 (59.7)	16.9 (27.2)	96° (77%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Strong	Large	6
KOP-22-N	17.4 (28.0)	19.4 (31.2)	32.0 (51.5)	29.1 (46.8)	47.2 (76.0)	35.2 (56.6)	34.6 (55.7)	15.5 (24.9)	104° (84%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Strong	Large	6
KOP-6-N	27.2 (43.8)	26.2 (42.2)	32.6 (52.5)	33.7 (54.2)	57.9 (93.2)	45.9 (73.9)	45.4 (73.1)	23.0 (37.0)	89° (72%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Strong	Large	6
KOP-12-N Day	19.1 (30.7)	19.7 (31.7)	31.2 (50.2)	27.6 (44.4)	49.4 (79.5)	37.6 (60.5)	37.0 (59.5)	16.2 (26.1)	99° (80%)	R, AL, N, H, O, and M **Major**	Strong	Strong to Weak to NA	Strong to Weak to NA	Strong to Weak to NA	Large	6
KOP-12-N Night	19.1 (30.7)	19.7 (31.7)	31.2 (50.2)	27.6 (44.4)	49.4 (79.5)	37.6 (60.5)	37.0 (59.5)	16.2 (26.1)	99° (80%)	AL **Moderate** [e]	Strong	Strong	Strong	Strong	Large	6
KOP-16-MV	15.0 (24.1)	29.2 (47.0)	45.6 (73.4)	22.9 (36.8)	21.9 (35.2)	16.8 (27.0)	13.4 (21.6)	19.2 (30.9)	134° (109%)	R, AL, N, H, O, and M **Major**	Strong to Weak to NA	Strong to Weak to NA	Strong to Weak to NA	Strong to Weak to NA	Large	6
KOP-16-N	18.2 (29.3)	19.4 (31.2)	31.5 (50.7)	29.5 (47.5)	48.7 (78.4)	36.5 (58.7)	35.5 (57.1)	15.7 (25.3)	101° (81%)	R, AL, N, H, O, and M **Major**	Strong to Weak	Strong	Strong	Strong	Large	6
KOP-19-MV	17.3 (27.8)	32.9 (52.9)	49.4 (79.5)	25.9 (41.7)	20.6 (33.1)	18.2 (29.3)	13.7 (22.0)	23.9 (38.5)	127° (102%)	R, AL, N, H, O, and M **Major**	Strong	Strong	Strong	Moderate	Large	6

[a] KOP-1-MV Wasque Point, KOP-2-N Sanford Barn Overlook, KOP-22-N Madaket Beach at Sunset, KOP-6-N Tom Nevers Beach, KOP-12-N Cisco Beach, KOP-16-MV Squibnocket Beach, KOP-16-N Head of Plains, and KOP-19-MV Gay Head Lighthouse
[b] BSW = Bay State Wind, BW = Beacon Wind, VWN = Vineyard Wind Northeast, NEW = New England Wind, SFW = South Fork Wind, SW = Sunrise Wind, RW = Revolution Wind, and VW = Vineyard Wind
[c] Noticeable elements: R = rotor, AL = aviation light, N = nacelle, H = hub, O = OSP, M = mid-tower light, Y = yellow tower base color
[d] Due to earth's curvature and known WTG heights, those WTGs beyond 42.8 miles (68.9 kilometers) would not be visible from ground level plus 5.5 feet (1.7 meters).
[e] WTGs and OSP (onshore) visibility: 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).

Table H-16. SouthCoast Wind and other wind farms' seascape, open ocean, and landscape units cumulative wind farm distances, FOVs, noticeable elements, visual contrasts, scale of change, and prominence

Character Unit	Distance in miles (kilometers) [c]									FOV Degrees (% of 124°)	Noticeable Elements [d] & Impact Level	Contrast, Scale of Change, and Prominence							
	BSW [b]	BW [b]	VWN [b]	SC [b]	NEW [b]	SFW [b]	SW [b]	RW [b]	VW [b]			Form	Line	Color	Texture	Scale	Prominence [e]	Alternatives C-1, C-2, E, F	Alternative D
Martha's Vineyard Seascape (Beaches) [a]	15.0 (24.1)	29.2 (47.0)	45.6 (73.4)	37.2 (59.9)	22.9 (36.8)	21.9 (35.2)	16.8 (27.0)	12.2 (19.6)	19.2 (30.9)	134° (109%)	R, AL, N, H, O, M **Major**	Strong to Weak	Moderate to Weak	Strong to Weak	Moderate to Weak	Large	6	Same as Proposed Action	Same as Proposed Action
Open Ocean	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	0 to 42.8 (0 to 68.9)	82° to 360° (66to 290%)	R, AL, N, H, O, M, and Y **Major**	Strong	Strong	Strong	Strong	Large	6	Same as Proposed Action	Same as Proposed Action
Martha's Vineyard Landscape [f]	15.2 (24.4)	29.4 (47.3)	45.8 (73.7)	37.2 (60.2)	23.1 (37.1)	22.1 (35.5)	17.0 (27.3)	12.4 (19.9)	19.4 (31.2)	134° (109%)	R, AL, N, H, O, M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
Nantucket Seascape (Beaches) [a]	17.4 (28.0)	19.4 (31.2)	32.0 (51.5)	24.3 (39.1)	29.1 (46.8)	47.2 (76.0)	35.2 (56.6)	34.6 (55.7)	15.5 (24.9)	104° (84%)	R, AL, N, H, O, M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
Nantucket Landscape [f]	17.6 (28.0)	19.6 (31.2)	32.2 (51.5)	24.5 (39.1)	29.3 (47.1)	47.4 (76.3)	35.4 (56.9)	34.8 (56.0)	15.7 (25.2)	104° (84%)	R, AL, N, H, O, M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action

[a] The most conservative onshore case involves the seaward edge of the beach nearest the projects. The seascape unit edge is 3.45 miles (kilometers) offshore, (Massachusetts jurisdictional boundary).
[b] BSW = Bay State Wind, BW = Beacon Wind, VWN = Vineyard Wind Northeast, SC = SouthCoast Wind, NEW = New England Wind, SFW = South Fork Wind, SW = Sunrise Wind, RW = Revolution Wind, and VW = Vineyard Wind
[c] Due to earth's curvature and known WTG heights, those WTGs beyond 42.8 miles (68.9 kilometers) would not be visible from ground level plus 5.5 feet (1.7 meters).
[d] Noticeable elements: R = rotor, AL = aviation light, N = nacelle, H = hub, O = OSP, M = mid-tower light, Y = yellow tower base color
[e] WTGs and OSP (onshore) visibility: 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).
[f] The seaward edge between landscape and seascape varies. The most conservative case is 1.0-mile (1.6-kilometer) distance from seaward beach edge.

Table H-17. SouthCoast wind and other wind farms' cumulative viewer experience wind farm distances, FOVs, noticeable elements, visual contrasts, scale of change, and prominence

Viewer [a]	Distance in miles (kilometers) [c]									FOV Degrees (% of 124°)	Noticeable Elements [d] & Impact Level	Contrast, Scale of Change, and Prominence							
	BSW [b]	BW [b]	VWN [b]	SC [b]	NEW [b]	SFW [b]	SW [b]	RW [b]	VW [b]			Form	Line	Color	Texture	Scale	Prominence [e]	Alternatives C-1, C-2, E, F	Alternative D
KOP-1-MV	14.9 (24.0)	23.2 (37.3)	39.7 (63.9)	30.9 (49.7)	25.9 (40.7)	36.6 (58.9)	27.3 (43.9)	25.1 (40.4)	14.8 (23.8)	114° (92%)	R, AL, N, H, O, and M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-2-N	19.7 (31.7)	20.5 (33.0)	31.9 (51.3)	24.4 (42.6)	30.9 (49.7)	49.7 (80.0)	38.1 (61,3)	37.1 (59.7)	16.9 (27.2)	96° (77%)	R, AL, N, H, O, and M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-22-N	17.4 (28.0)	19.4 (31.2)	32.0 (51.5)	24.3 (39.1)	29.1 (46.8)	47.2 (76.0)	35.2 (56.6)	34.6 (55.7)	15.5 (24.9)	104° (84%)	R, AL, N, H, O, and M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-6-N	27.2 (43.8)	26.2 (42.2)	32.6 (52.5)	26.5 (42.6)	33.7 (54.2)	57.9 (93.2)	45.9 (73.9)	45.4 (73.1)	23.0 (37.0)	89° (72%)	R, AL, N, H, O, and M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-12-N Day	19.1 (30.7)	19.7 (31.7)	31.2 (50.2)	23.5 (37.8)	27.6 (44.4)	49.4 (79.5)	37.6 (60.5)	37.0 (59.5)	16.2 (26.1)	99° (80%)	R, AL, N, H, O, and M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action

Viewer [a]	Distance in miles (kilometers) [c]									FOV Degrees (% of 124°)	Noticeable Elements [d] & Impact Level	Contrast, Scale of Change, and Prominence							
	BSW [b]	BW [b]	VWN [b]	SC [b]	NEW [b]	SFW [b]	SW [b]	RW [b]	VW [b]			Form	Line	Color	Texture	Scale	Prominence [e]	Alternatives C-1, C-2, E, F	Alternative D
KOP-12-N Night	19.1 (30.7)	19.7 (31.7)	31.2 (50.2)	23.5 (37.8)	27.6 (44.4)	49.4 (79.5)	37.6 (60.5)	37.0 (59.5)	16.2 (26.1)	99° (80%)	AL **Major**	Moderate	Moderate	Moderate	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-16-MV	15.0 (24.1)	29.2 (47.0)	45.6 (73.4)	37.2 (59.9)	22.9 (36.8)	21.9 (35.2)	16.8 (27.0)	13.4 (21.6)	19.2 (30.9)	134° (109%)	R, AL, N, H, O, and M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-16-N	18.2 (29.3)	19.4 (31.2)	31.5 (50.7)	23.8 (38.3)	29.5 (47.5)	48.7 (78.4)	36.5 (58.7)	35.5 (57.1)	15.7 (25.3)	101° (81%)	R, AL, N, H, O, and M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-19-MV	17.3 (27.8)	32.9 (52.9)	49.4 (79.5)	41.2 (66.3)	25.9 (41.7)	20.6 (33.1)	18.2 (29.3)	13.7 (22.0)	23.9 (38.5)	127° (102%)	R, AL, N, H, O, and M **Major**	Strong	Moderate	Strong	Moderate	Large	6	Same as Proposed Action	Same as Proposed Action

[a] KOP-1-MV Wasque Point, KOP-2-N Sanford Barn Overlook, KOP-22-N Madaket Beach at Sunset, KOP-6-N Tom Nevers Beach, KOP-12-N Cisco Beach, KOP-16-MV Squibnocket Beach, KOP-16-N Head of Plains, and KOP-19-MV Gay Head Lighthouse.
[b] BSW = Bay State Wind, BW = Beacon Wind, VWN = Vineyard Wind Northeast, SC = SouthCoast Wind, NEW = New England Wind, SFW = South Fork Wind, SW = Sunrise Wind, RW = Revolution Wind, and VW = Vineyard Wind.
[c] Due to earth's curvature and known WTG heights, those WTGs beyond 42.8 miles (68.9 kilometers) would not be visible from ground level plus 5.5 feet (1.7 meters).
[d] Noticeable elements: R = rotor, AL = aviation light, N = nacelle, H = hub, O = OSP, M = mid-tower light, Y = yellow tower base color.
[e] WTGs and OSP (onshore) visibility: 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).

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H.3.2 Alternative C

Under Alternative C, the export cable route to Brayton Point would be rerouted onshore and follow one of two alternative corridors to avoid sensitive fish habitat in the Sakonnet River. Installation of these onshore export cables and infrastructure would result in localized, temporary visual impacts near construction sites due to land disturbance for vegetation clearing, site grading or trenching, and construction staging. These impacts would last through construction and continue until disturbed areas are restored.

H.3.3 Alternative D

Table H-18 and Table H-19 list Alternative D wind farm width-, height-, and distance-related occupation of views from the nearest shoreline area. These results indicate slight changes to the FOV results compared to the Proposed Action (Table H-4 and Table H-5).

Table H-18 Horizontal FOV occupied by Alternative D

Noticeable Element	Width miles (kilometers)	Distance miles (kilometers)	Horizontal FOV	Human FOV	Percent of FOV
D WTGs	12.3 (19.8)	23.6 (37.9)	26.2°	124°	21%

Table H-19 Vertical FOV occupied by Alternative D

Noticeable Element	Height feet (m) MLLW	Distance miles (kilometers)	Visible Height [a] feet (m)	Vertical FOV	Human FOV	Percent of FOV
D Rotor Blade Tip	1,066.3 (325.0)	23.6 (37.9)	779 (237)	0.3°	55°	0.5%

[1] Based on intervening EC and clear-day conditions.
M = meters; km = kilometers.

H.3.4 Alternatives E and F

Installation of different foundation types under Alternatives E-1, E-2, and E-3 would not change the most prominent visible aspects of WTGs and OSPs (e.g., blade height, hub height) and, therefore, would have no meaningful difference in impacts on seascape, open ocean, and landscape character units and viewer experience compared to the Proposed Action. The reduction in the number of cables installed along the Falmouth offshore export cable route under Alternative F may reduce the number of vessel trips required to install the cables, but this slight reduction in vessel activity would have no meaningful difference in impacts compared to the Proposed Action.

H.4 Seascape, Open Ocean, and Landscape Impact Assessment Summary

The SLIA considers the 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 H-20 summarizes the effects of the character of the offshore and onshore components of the Project with the aspects that contribute to the distinctive character of the seascape, open ocean, and landscape areas from which the Project would be visible (BOEM 2021).

H.5 Visual Impact Assessment Summary

The VIA considers the characteristics of the view receptor, characteristics of the view toward the Project facilities, and the experiential impacts of the Projects. Table H-21 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 Project (BOEM 2021).

Table H-20. Seascape character, open ocean character, landscape character and impact levels

Character Unit	Affected Environment										Proposed Action									Impact Levels				
	Unit Susceptibility			Unit Value			Project Visibility				Character Key Feature Change [a]			Character Key Element Change [b]			Character Key Quality Change [c]			Proposed Action				Alternatives C, D, E, and F
	High	Medium	Low	High	Medium	Low	Dominant	Substantial	Low	Unseen	High	Medium	Low	High	Medium	Low	High	Medium	Low	Major	Moderate	Minor	Negligible	Impact Level
Open Ocean	X			X			X				X			X			X			X				Same as Proposed Action
Martha's Vineyard Seascape Ocean				X					X				X		X			X			X			Same as Proposed Action
Martha's Vineyard Seascape Beach				X					X			X			X			X				X		Same as Proposed Action
Nantucket Seascape Ocean	X			X				X				X			X		X			X				Same as Proposed Action
Nantucket Seascape Beach	X			X				X				X			X		X			X				Same as Proposed Action
Martha's Vineyard Landscape		X		X					X				X			X			X			X		Same as Proposed Action
Nantucket Landscape	X			X				X				X			X			X				X		Same as Proposed Action

[a] Key Features = The distinctive visual attributes of the seascape, open ocean, or landscape character area.
[b] Key Elements = The essential visual components of the seascape, open ocean, or landscape character area.
[c] Key Quality = The main value factor of the seascape, open ocean, or landscape character area.

Table H-21. Viewer sensitivity, receptor susceptibility, view value, viewer experience, and impact levels

KOP [a]	Affected Environment									Viewer Experience				Impact Levels				
	Viewer Sensitivity			Receptor Susceptibility			View Value			Distance-Noticeable Elements-HFOV-VFOV-Contrast-Scale-Prominence Effects				Proposed Action				Alternatives C, D, E, and F
	High	Medium	Low	High	Medium	Low	High	Medium	Low	Dominant	Substantial	Low	Unseen	Major	Moderate	Minor	Negligible	Impact Levels
KOP-1-O	X			X			X			X				X				Same as Proposed Action
KOP-2_O	X			X			X			X				X				Same as Proposed Action
KOP-1-MV	X			X			X					X				X		Same as Proposed Action
KOP-2-MV	X			X			X					X				X		Same as Proposed Action
KOP-3-MV	X			X			X					X				X		Same as Proposed Action
KOP-4-MV	X			X			X					X				X		Same as Proposed Action
KOP-6-MV	X			X			X					X				X		Same as Proposed Action
KOP-9-MV	X			X			X					X				X		Same as Proposed Action
KOP-16-MV	X			X			X					X				X		Same as Proposed Action
KOP-19-MV [b]	X			X			X					X				X		Same as Proposed Action
KOP-2-N	X			X			X				X				X			Same as Proposed Action
KOP-3-N	X			X			X				X				X			Same as Proposed Action
KOP-6-N	X			X			X				X				X			Same as Proposed Action
KOP-8-N (Day)	X			X			X				X				X			Same as Proposed Action

KOP [a]	Affected Environment									Viewer Experience				Impact Levels				
	Viewer Sensitivity			Receptor Susceptibility			View Value			Distance-Noticeable Elements-HFOV-VFOV-Contrast-Scale-Prominence Effects				Proposed Action				Alternatives C, D, E, and F
	High	Medium	Low	High	Medium	Low	High	Medium	Low	Dominant	Substantial	Low	Unseen	Major	Moderate	Minor	Negligible	Impact Levels
KOP-8-N (Night)	X			X			X				X				X			Same as Proposed Action
KOP-10-N	X			X			X				X				X			Same as Proposed Action
KOP-11-N	X			X			X				X				X			Same as Proposed Action
KOP-12-N (Day)	X			X			X				X				X			Same as Proposed Action
KOP-12-N (Night)	X			X			X				X				X			Same as Proposed Action
KOP-13-N	X			X			X				X				X			Same as Proposed Action
KOP-16-N	X			X			X				X				X			Same as Proposed Action
KOP-17-N	X			X			X				X				X			Same as Proposed Action
KOP-18-N	X			X			X				X				X			Same as Proposed Action
KOP-20-N	X			X			X				X				X			Same as Proposed Action
KOP-21-N	X			X			X					X				X		Same as Proposed Action
KOP-22-N	X			X			X				X				X			Same as Proposed Action
KOP-1-BP	X			X			X						X				X	Same as Proposed Action
KOP-3-BP	X			X			X						X				X	Same as Proposed Action
KOP-4-BP	X			X			X						X				X	Same as Proposed Action
KOP-44-C	X			X			X			X				X				Same as Proposed Action
KOP-46-C	X			X			X			X				X				Same as Proposed Action
KOP-47-C	X			X			X			X				X				Same as Proposed Action
KOP-49-C	X			X			X				X				X			Same as Proposed Action

HFOV = horizontal field of view; VFOV = vertical field of view

[a] KOP-1-MV = Wasque Point. KOP-2-MV = Wasque Point Reservation. KOP-3-MV = Wasque Avenue, KOP-4-MV = South Beach, KOP-6-MV = Long Point Beach, KOP-9-MV = 322 South Road, KOP-16-MV = Squibnocket Beach, KOP-19-MV Gay Head Lighthouse, KOP-2-N = Sanford Farm Barn Overlook, KOP-3-N = Madaket Beach, KOP-6-N = Tom Nevers Beach, KOP-8-N = Tom Nevers Field, KOP-10-N = Nobadeer Beach, KOP-11-N = Miacomet Beach and Pond, KOP-12-N = Cisco Beach, KOP-13-N = Hummock Pond Road Bike Path, KOP-16-N = Head of Plains, KOP-17-N Bartlett's Farm, KOP-18-N = Ladies Beach, KOP-20-N = Madequecham 1, KOP-21-N Sankaty Head Lighthouse, KOP-22-N = Madaket Beach at Sunset, KOP-1-O Recreational Fishing, Pleasure, and Tour Boat Area, KOP-2-O Commercial and Cruise Ship Shipping Lanes, KOP-1-BP = Brayton Point Beach, KOP-3-BP = Sycamore Street, KOP-4-BP = Route 103 at Anthony Bridge, KOP-44-C = Oak Grove Cemetery, KOP-46-C = Goodwill Park, KOP-47-C = Lawrence Lynch Site Road - Gifford Street Substation Road, and KOP-49-C = Two Ponds

[b] Elevated observation deck or lighthouse.

H.6 References

Bislins, Walter. 2022. Advanced Earth Curvature Calculator. Available: http://walter.bislins.ch/bloge/index.asp?page=Advanced+Earth+Curvature+Calculator.

Bureau of Ocean Energy Management (BOEM). 2021. Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States. OCS Study BOEM 2021-032. April.

National Association of Environmental Professionals (NAEP). 2012. Offshore Wind Turbine Visibility and Visual Impact Thresholds. Available: https://blmwyomingvisual.anl.gov/docs/EnvPractice_Offshore%20Wind%20Turbine%20Visibility%20and%20Visual%20Impact%20Threshold%20Distances.pdf.

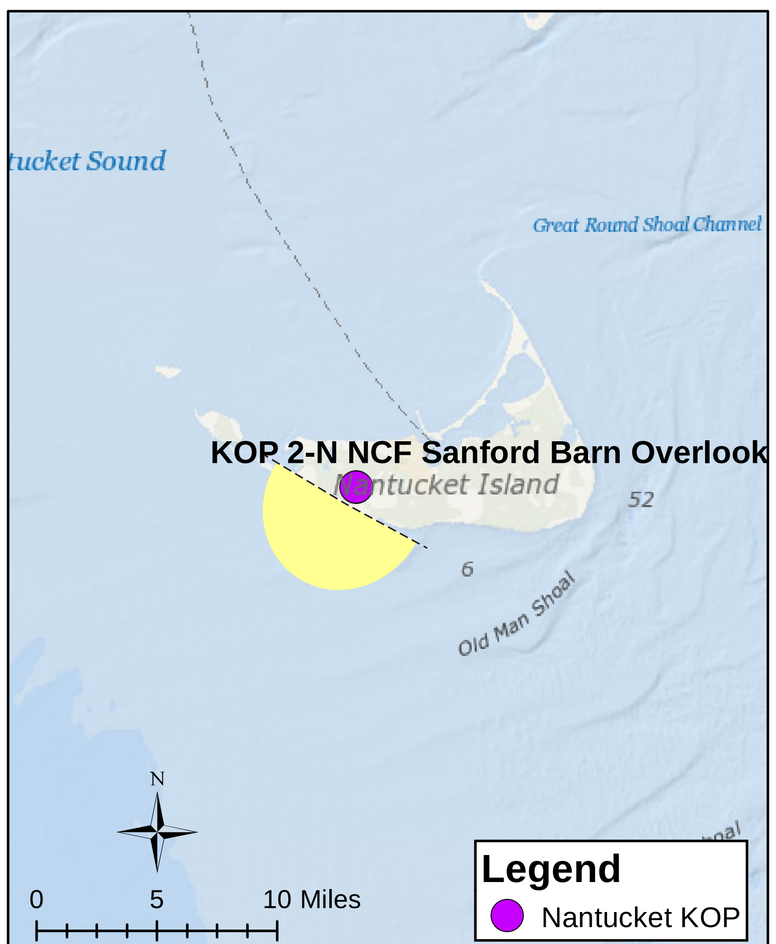
SouthCoast Wind Energy LLC (SouthCoast Wind). 2024. SouthCoast Wind Construction and Operations Plan. Available: https://www.boem.gov/renewable-energy/state-activities/southcoast-wind.

Attachment H-1: SouthCoast Wind Cumulative Visual Simulations

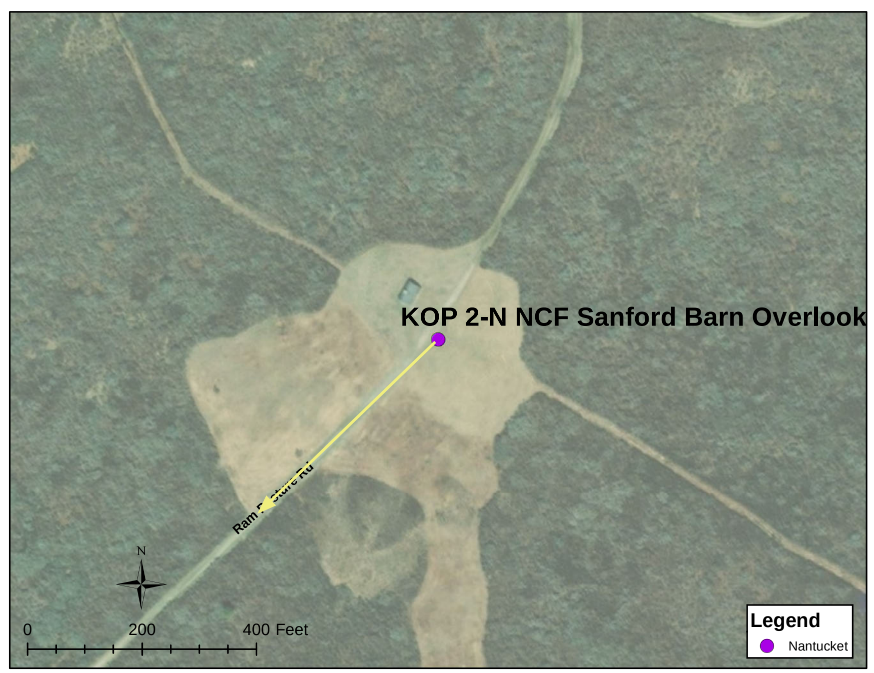
KOP 2-N Sanford Farm Barn - Scenario 1

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 182°
Vertical Field of View: 40°
Nearest WTG: 17 mi / 27 km
Furthest Visible WTG: 62 mi / 100 km
Potential Number of Structures Visible: 237
Potential Number of Structures Not Visible: 212

PHOTOGRAPH AND SITE

Time of photograph: 10:54AM
Date of photograph: 6-26-20
L/SCA: Ocean beach
Viewing direction: South (230°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

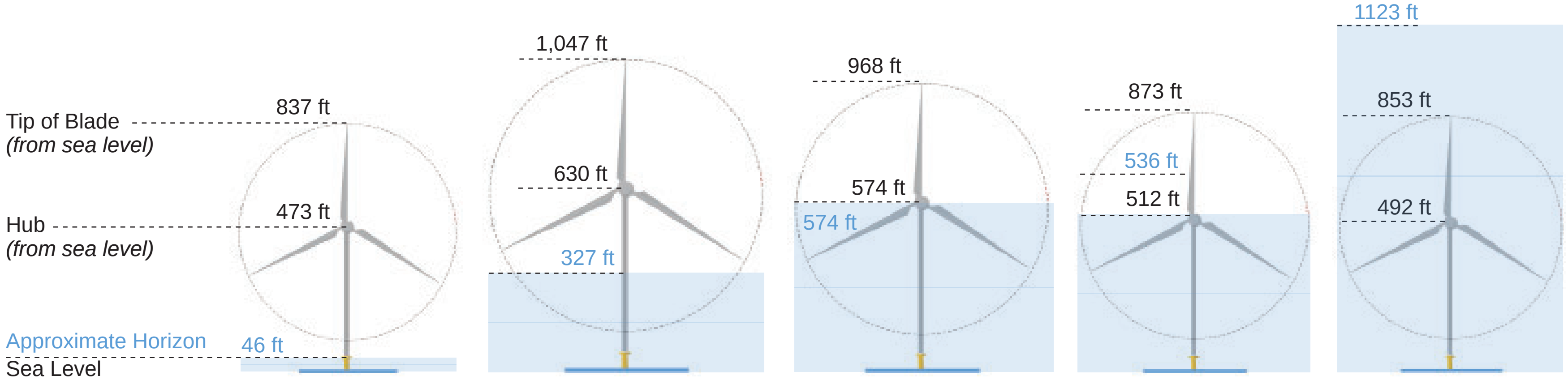
CAMERA

Camera Elevation: 50 ft /15.2 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
	729 ft rotor diameter	837 ft rotor diameter	787 ft rotor diameter	722 ft rotor diameter	722 ft rotor diameter

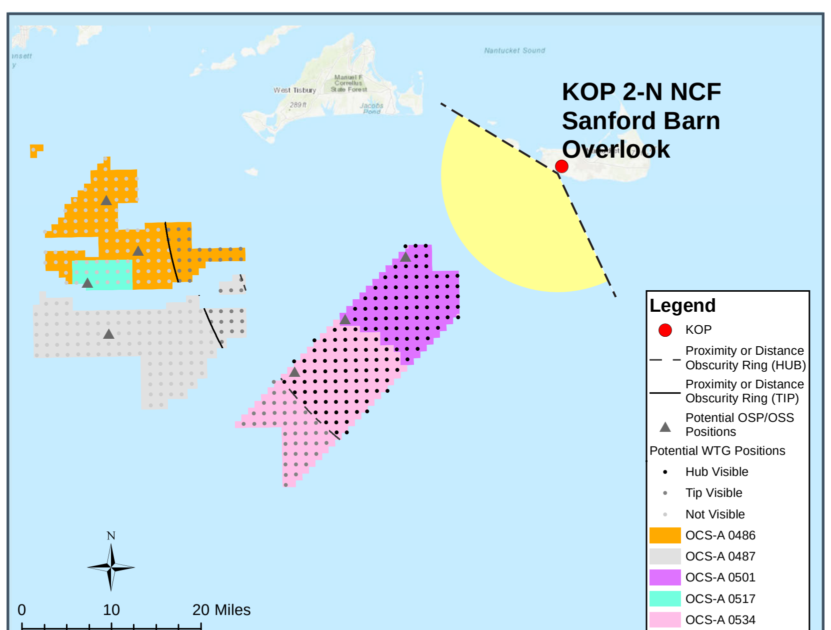


	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	77	120	16	24	0
Distance to Closest Structure	17 mi (27 km)	31 mi (50 km)	38 mi (61 km)	37 mi (60 km)	50 mi (80 km)
Distance to Furthest Structure	30 mi (48 km)	47 mi (76 km)	62 mi (100 km)	59 mi (95 km)	56 mi (90 km)

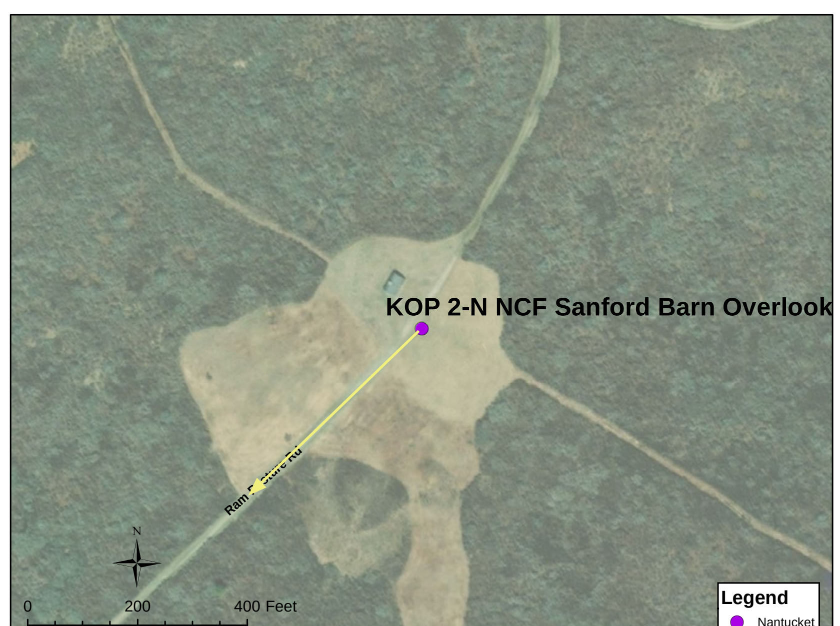
KOP 2-N Sanford Farm Barn - Scenario 1 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 17 mi / 27 km

Furthest Visible WTG: 62 mi / 100 km

Potential Number of Structures Visible: 237

Potential Number of Structures Not Visible: 212

PHOTOGRAPH AND SITE

Time of photograph: 10:54AM

Date of photograph: 6-26-20

L/SCA: Ocean beach

Viewing direction: South (194°)

Latitude: 41.265608°N

Longitude: 70.150001°W

Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 68° F

Humidity: 81%

Wind Dir & Speed: S 12 mph

Weather Condition: Hazy

CAMERA

Camera Elevation: 50 ft /15.2 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

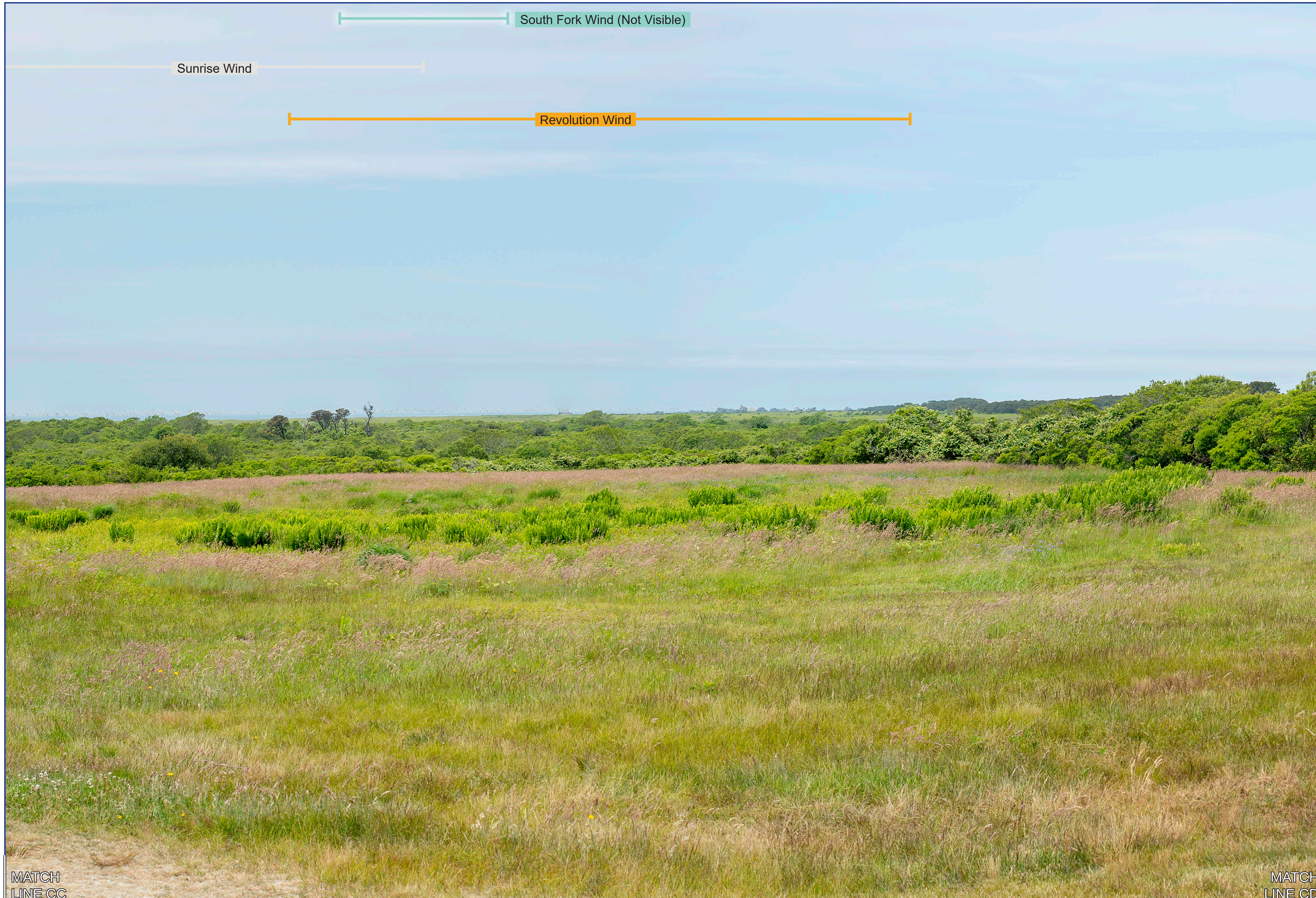
SIMULATED CONDITIONS

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

MATCH LINE AB

MATCH LINE CC

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

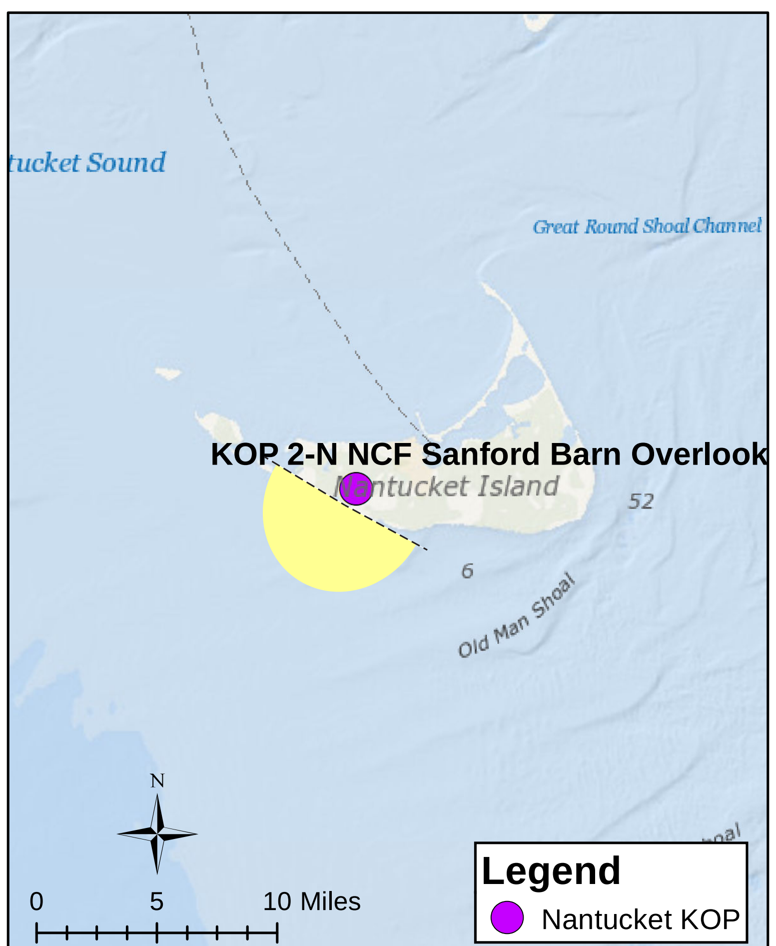


The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

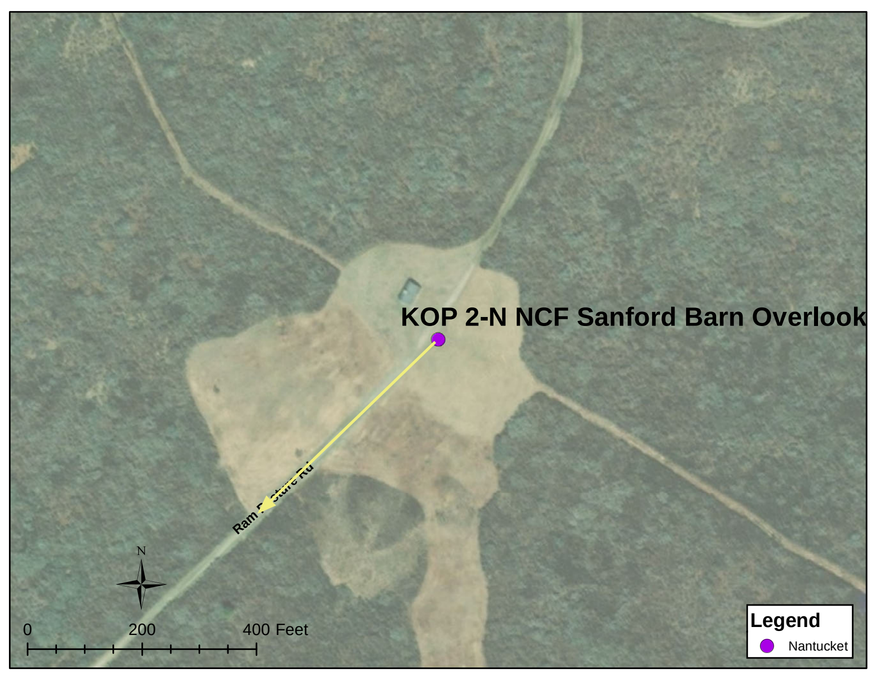
KOP 2-N Sanford Farm Barn - Scenario 2

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 182°
Vertical Field of View: 40°
Nearest WTG: 17 mi / 27 km
Furthest Visible WTG: 62 mi / 100 km
Potential Number of Structures Visible: 379
Potential Number of Structures Not Visible: 219

PHOTOGRAPH AND SITE

Time of photograph: 10:54AM
Date of photograph: 6-26-20
L/SCA: Ocean beach
Viewing direction: South (230°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

ENVIRONMENT

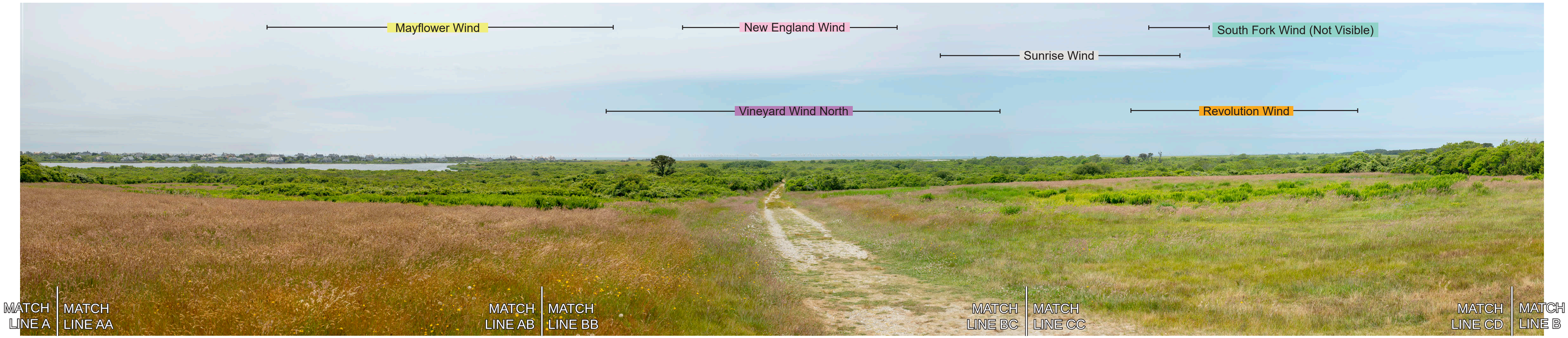
Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

CAMERA

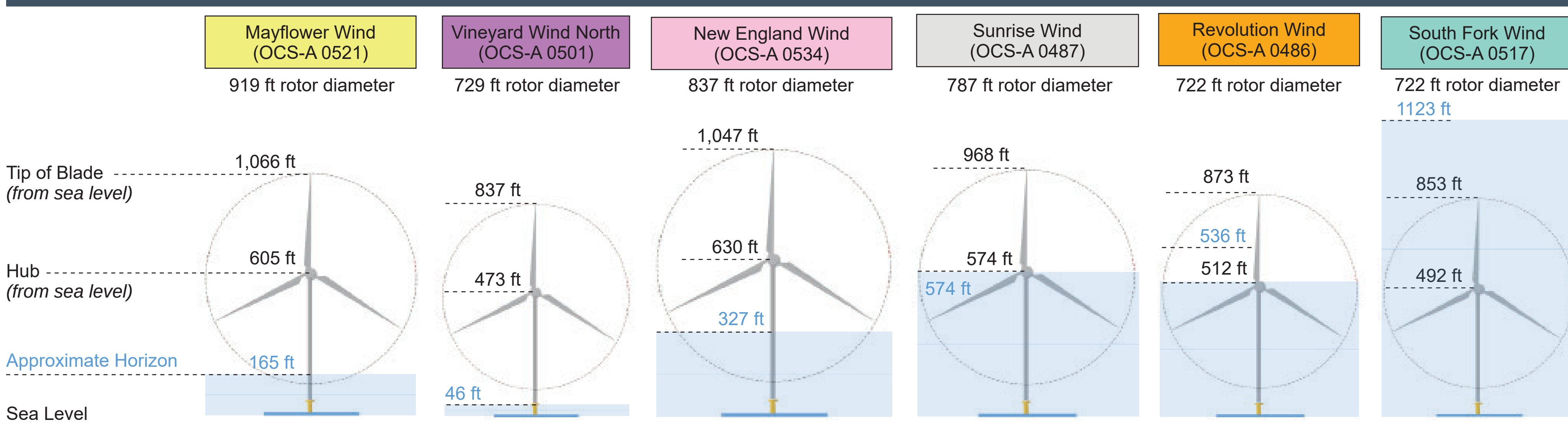
Camera Elevation: 50 ft /15.2 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 2-N Sanford Farm Barn - Scenario 2

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES

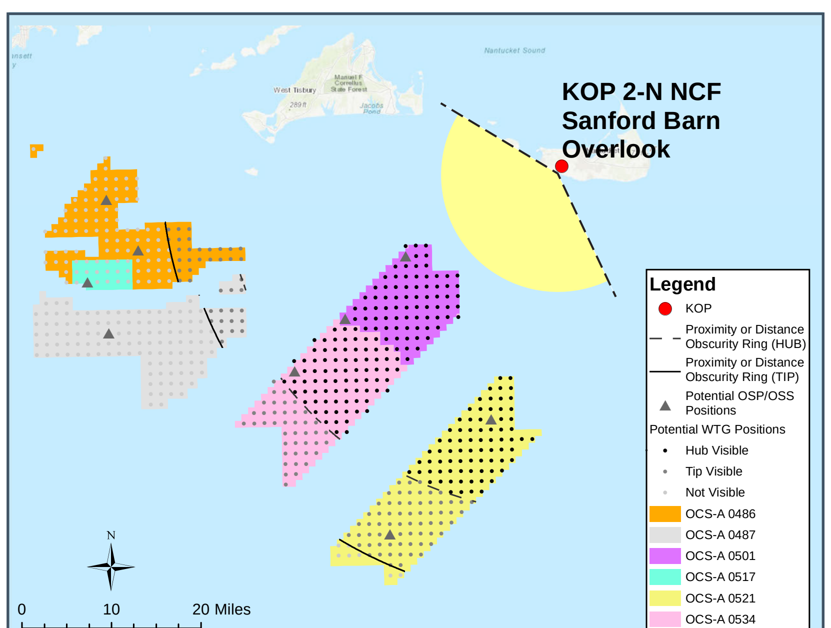


	Mayflower Wind	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	149	77	120	131	103	18
Number of Structures within View of KOP	142	77	120	16	24	0
Distance to Closest Structure	24 mi (39 km)	17 mi (27 km)	31 mi (50 km)	38 mi (61 km)	37 mi (60 km)	50 mi (80 km)
Distance to Furthest Structure	49 mi (79 km)	30 mi (48 km)	47 mi (76 km)	62 mi (100 km)	59 mi (95 km)	56 mi (90 km)

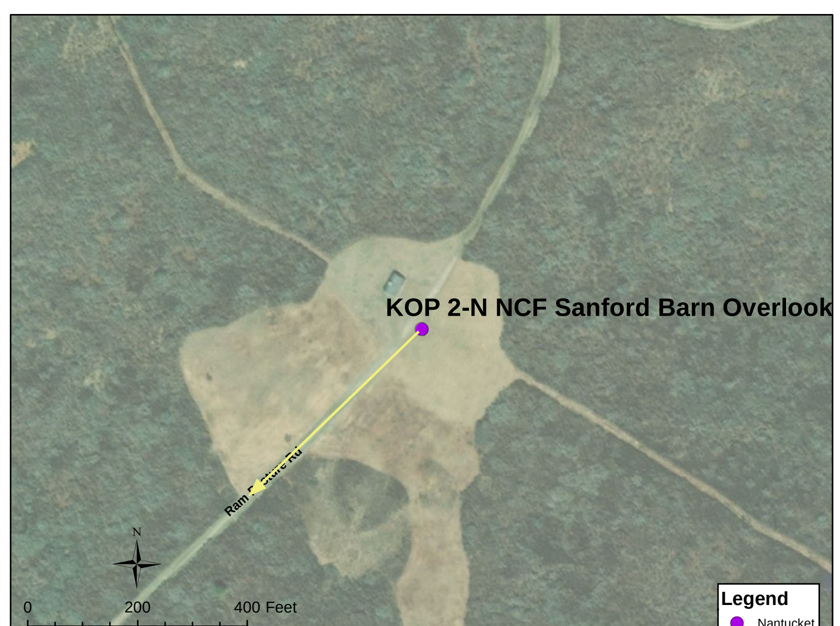
KOP 2-N Sanford Farm Barn - Scenario 2 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 17 mi / 27 km
Furthest Visible WTG: 62 mi / 100 km
Potential Number of Structures Visible: 379
Potential Number of Structures Not Visible: 219

ENVIRONMENT

Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

PHOTOGRAPH AND SITE

Time of photograph: 10:54AM
Date of photograph: 6-26-20
L/SCA: Ocean beach
Viewing direction: South (194°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

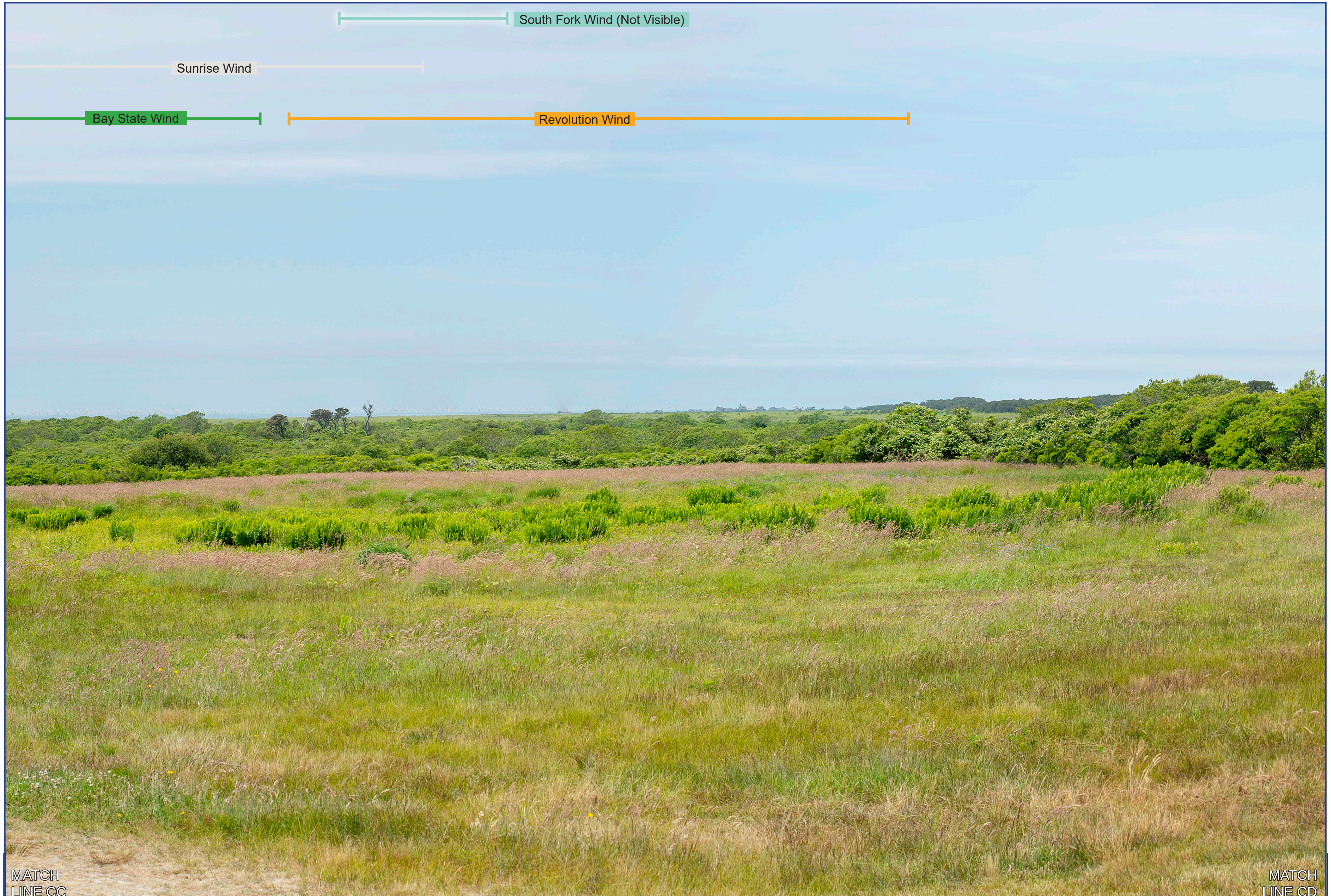
CAMERA

Camera Elevation: 50 ft /15.2 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 2-N Sanford Farm Barn - Scenario 2 (50mm view - 27° vertical / 40° horizontal) 1 of 3

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

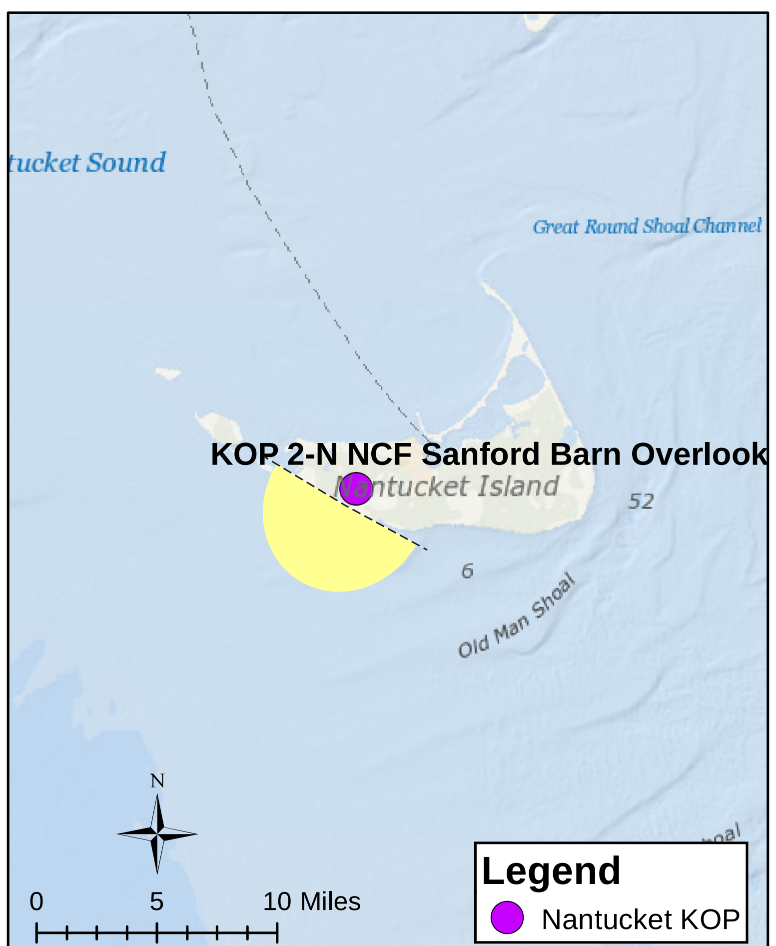


The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

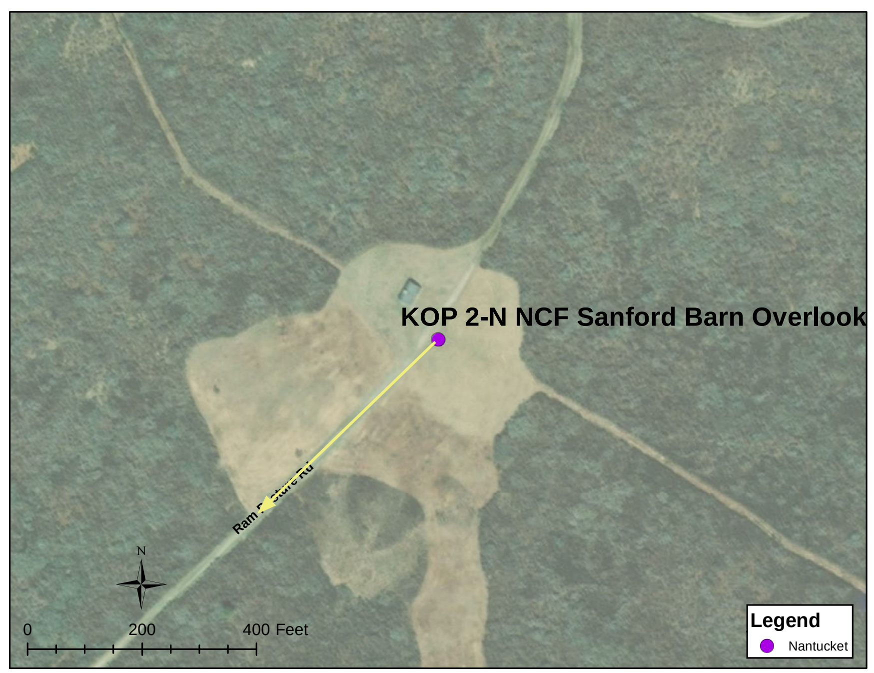
KOP 2-N Sanford Farm Barn - Scenario 3

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 182°
Vertical Field of View: 40°
Nearest WTG: 20 mi / 33 km
Furthest Visible WTG: 49 mi / 79 km
Potential Number of Structures Visible: 392
Potential Number of Structures Not Visible: 73

PHOTOGRAPH AND SITE

Time of photograph: 10:54AM
Date of photograph: 6-26-20
L/SCA: Ocean beach
Viewing direction: South (230°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

ENVIRONMENT

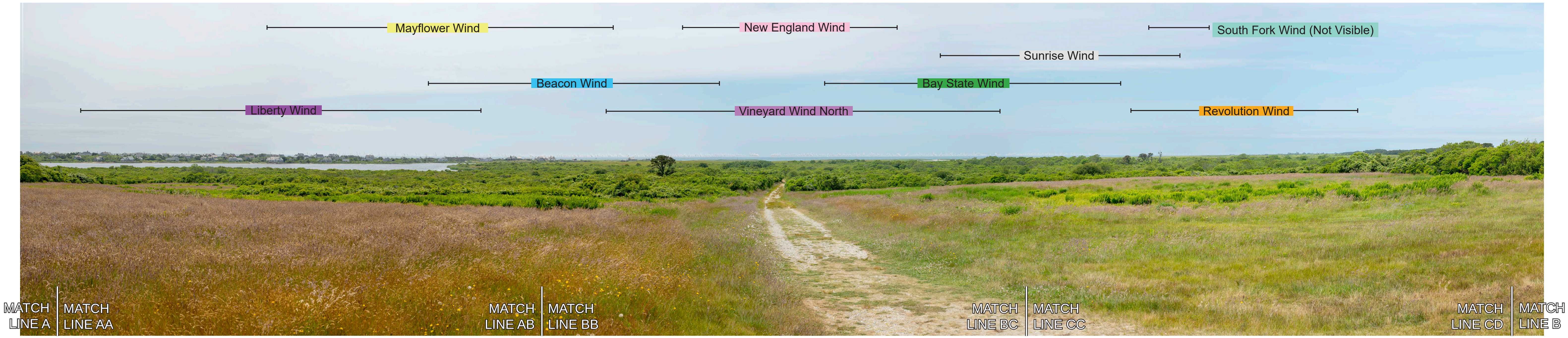
Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

CAMERA

Camera Elevation: 50 ft /15.2 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

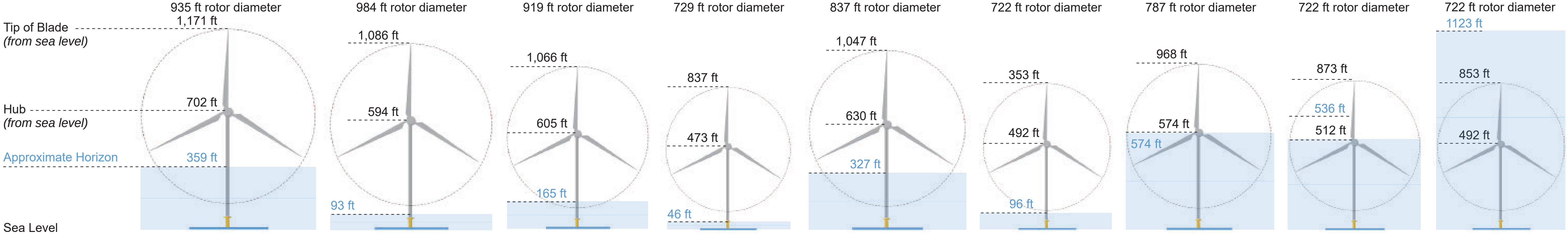
KOP 2-N Sanford Farm Barn - Scenario 3

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES

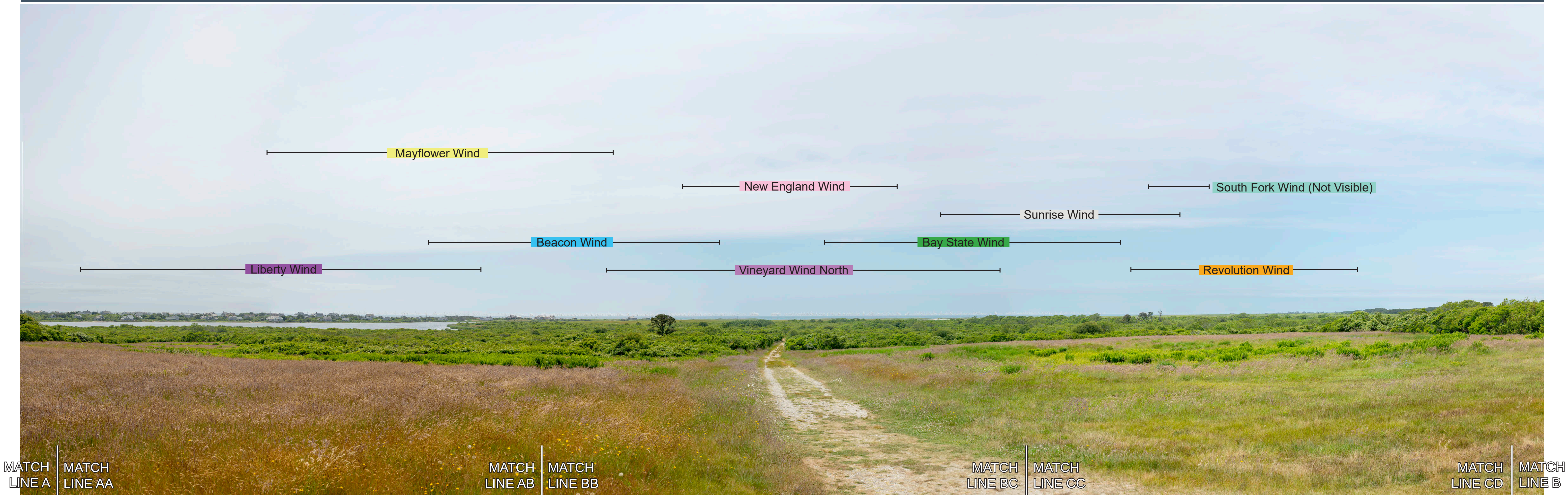
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Mayflower Wind (OCS-A 0521)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
	935 ft rotor diameter	984 ft rotor diameter	919 ft rotor diameter	729 ft rotor diameter	837 ft rotor diameter	722 ft rotor diameter	787 ft rotor diameter	722 ft rotor diameter	722 ft rotor diameter



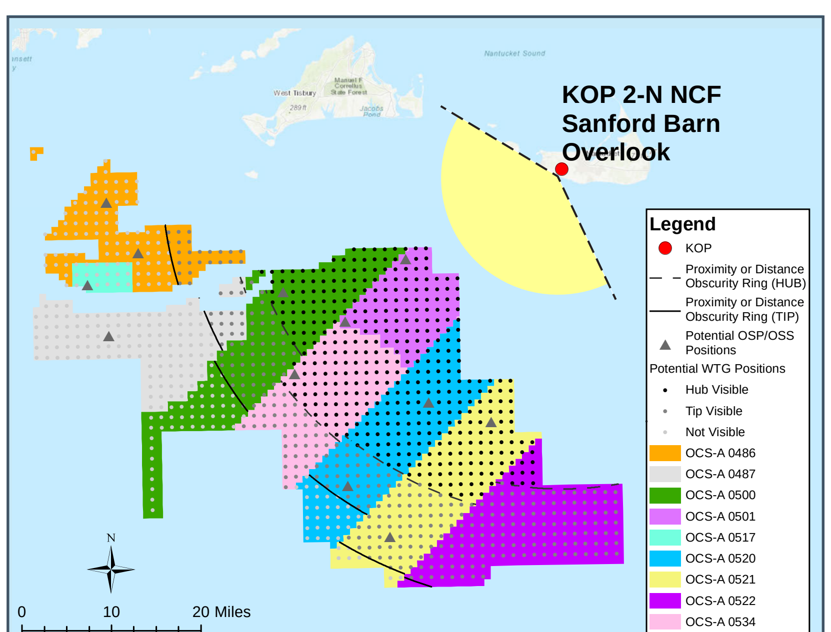
	Liberty Wind	Beacon Wind	Mayflower Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2025	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	149	77	120	169	131	103	18
Number of Structures within View of KOP	139	129	142	77	120	124	16	24	0
Distance to Closest Structure	32 mi (51 km)	20 mi (33 km)	24 mi (39 km)	17 mi (27 km)	31 mi (50 km)	21 mi (33 km)	38 mi (61 km)	37 mi (60 km)	50 mi (80 km)
Distance to Furthest Structure	49 mi (79 km)	44 mi (81 km)	49 mi (79 km)	30 mi (48 km)	47 mi (76 km)	60 mi (97 km)	62 mi (100 km)	59 mi (95 km)	56 mi (90 km)

KOP 2-N Sanford Farm Barn - Scenario 3 (Human Field of View - 124°)

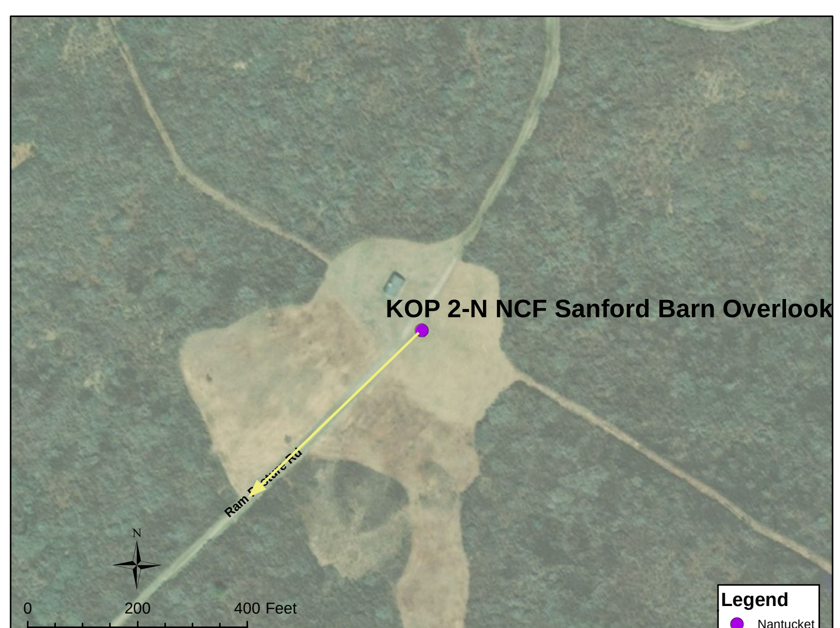
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 20.mi / 33 km

Furthest Visible WTG: 49 mi / 79 km
Potential Number of Structures Visible: 392
Potential Number of Structures Not Visible: 73

ENVIRONMENT

Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

PHOTOGRAPH AND SITE

Time of photograph: 10:54AM
Date of photograph: 6-26-20
L/SCA: Ocean beach

Viewing direction: South (194°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

CAMERA

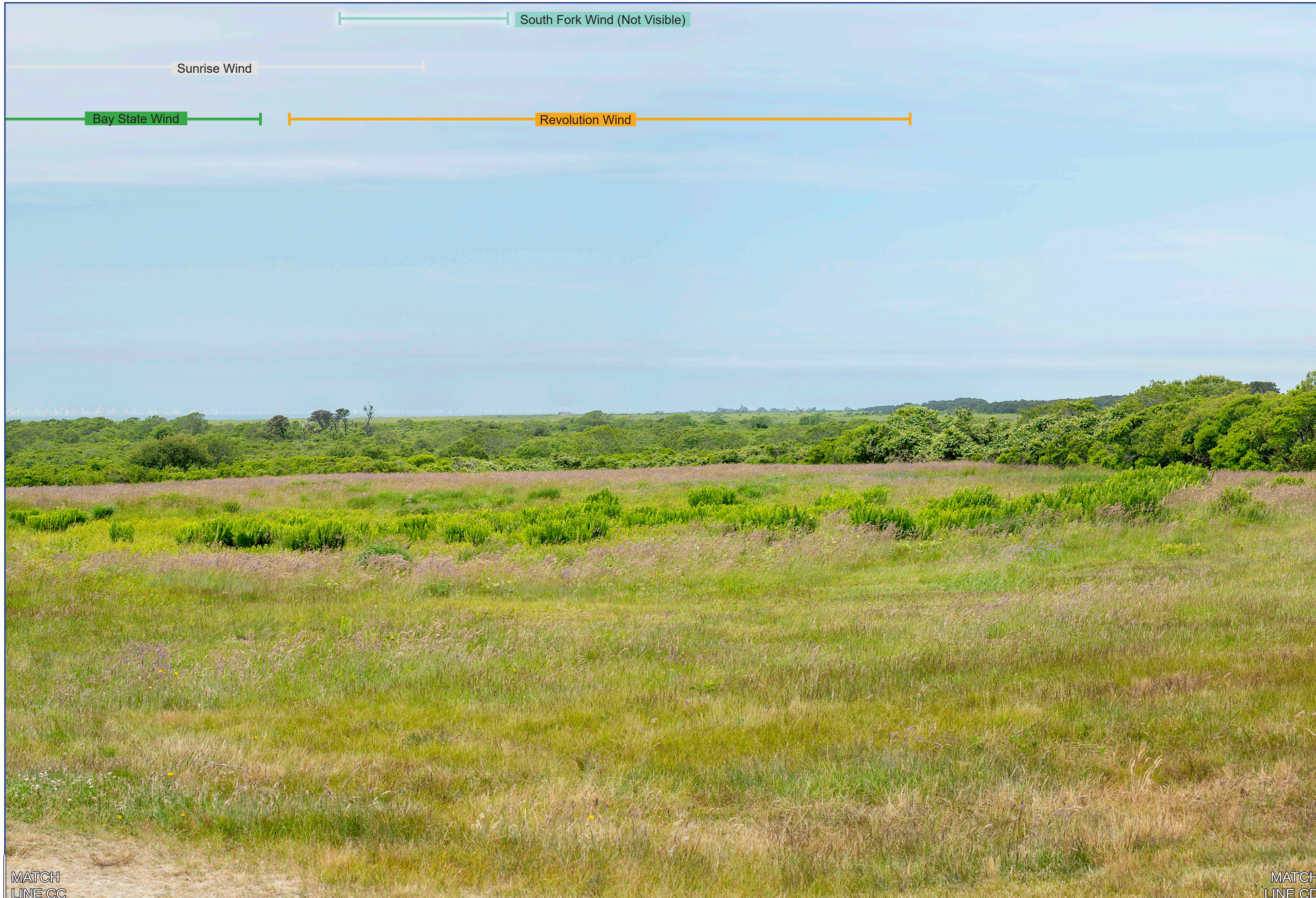
Camera Elevation: 50 ft /15.2 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 2-N Sanford Farm Barn - Scenario 3 (50mm view - 27° vertical / 40° horizontal) 2 of 3

SIMULATED CONDITIONS

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

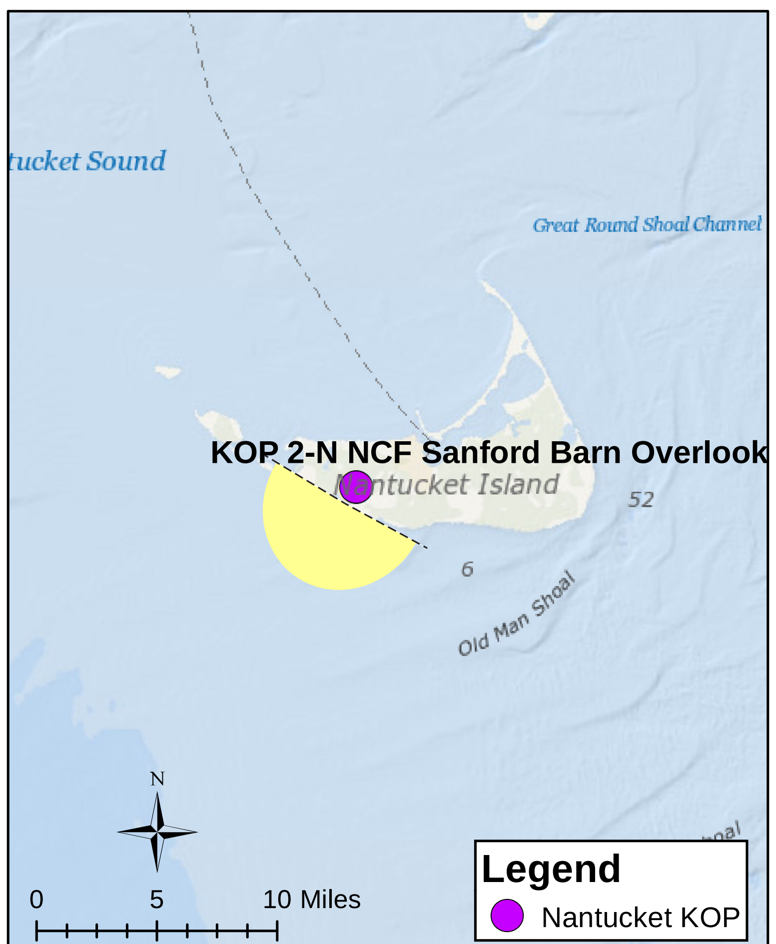


The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

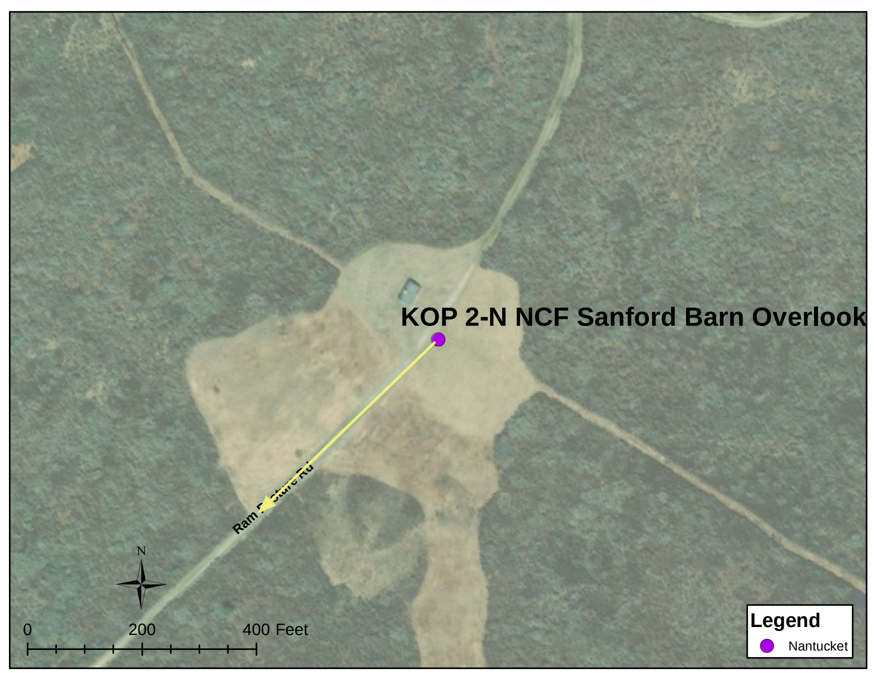
KOP 2-N Sanford Farm Barn - Scenario 4

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 182.3°
Vertical Field of View: 40°
Nearest WTG: 20 mi / 33 km
Furthest Visible WTG: 60 mi / 96 km
Potential Number of Structures isible: 534
Potential Number of Structures Not Visible: 80

PHOTOGRAPH AND SITE

Time of photograph: 10:54 AM
Date of photograph: 6-26-20
L/SCA: Ocean beach
Viewing direction: South (230°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

ENVIRONMENT

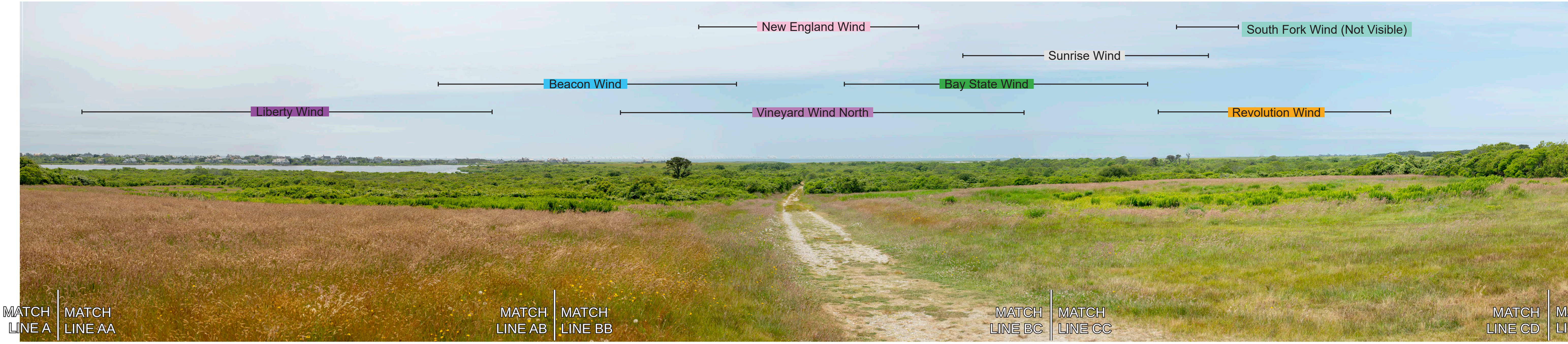
Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

CAMERA

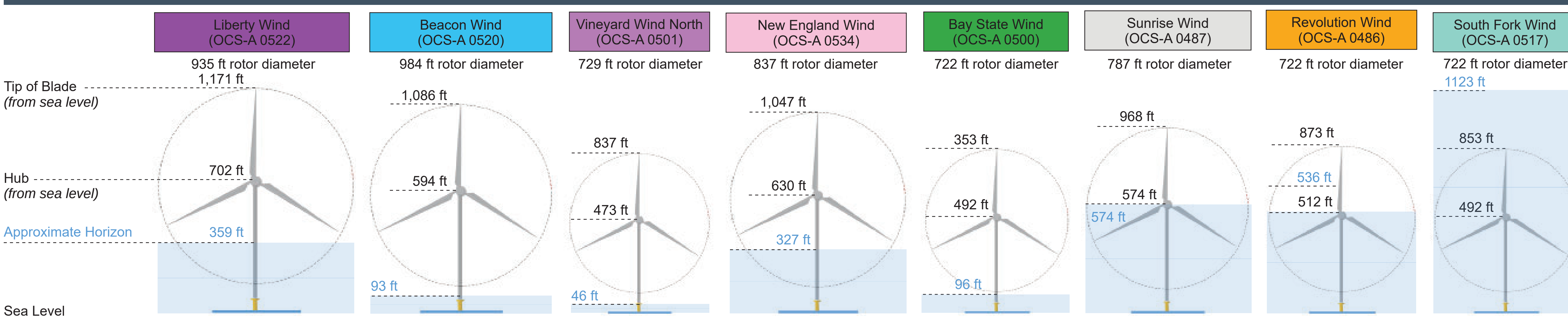
Camera Elevation: 50 ft /15.2 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 2-N Sanford Farm Barn - Scenario 4

SIMULATED CONDITIONS 2



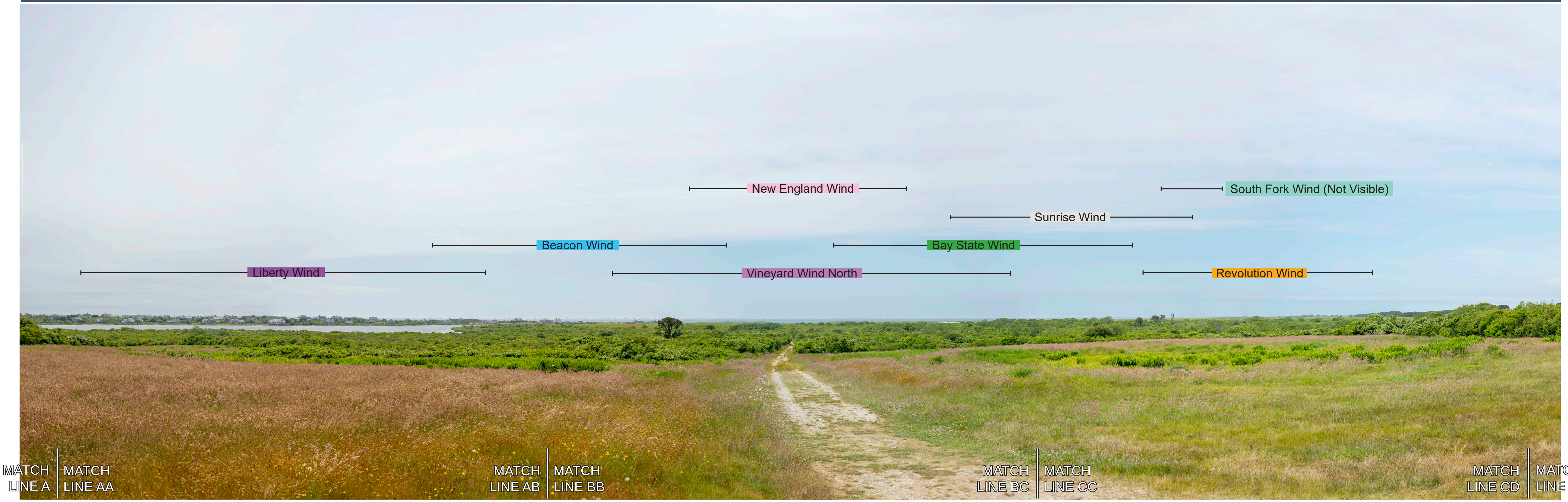
VISIBILTY OF CLOSEST TURBINES



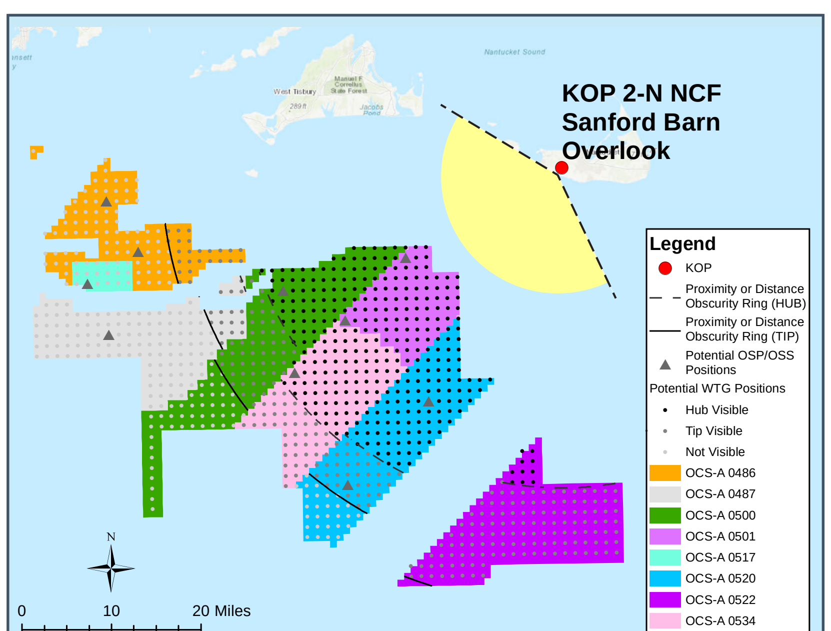
	Liberty Wind	Beacon Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	77	120	169	131	103	18
Number of Structures within View of KOP	139	129	77	120	124	16	24	0
Distance to Closest Structure	32 mi (51 km)	20 mi (33 km)	17 mi (27 km)	31 mi (50 km)	21 mi (33 km)	38 mi (61 km)	37 mi (60 km)	50 mi (80 km)
Distance to Furthest Structure	49 mi (79 km)	44 mi (81 km)	30 mi (48 km)	47 mi (76 km)	60 mi (97 km)	62 mi (100 km)	59 mi (95 km)	56 mi (90 km)

KOP 2-N Sanford Farm Barn - Scenario 4 (Human Field of View - 124°)

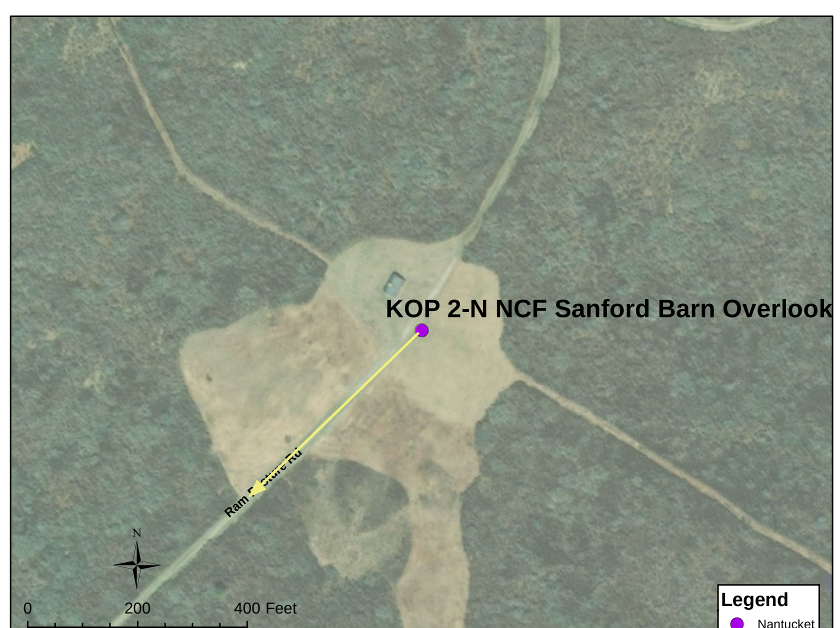
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 182.3°
Vertical Field of View: 40°
Nearest WTG: 20 mi / 33 km
Furthest Visible WTG: 60 mi / 96 km
Potential Number of Structures isible: 534
Potential Number of Structures Not Visible: 80

PHOTOGRAPH AND SITE

Time of photograph: 10:54 AM
Date of photograph: 6-26-20
L/SCA: Ocean beach
Viewing direction: South (194°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

ENVIRONMENT

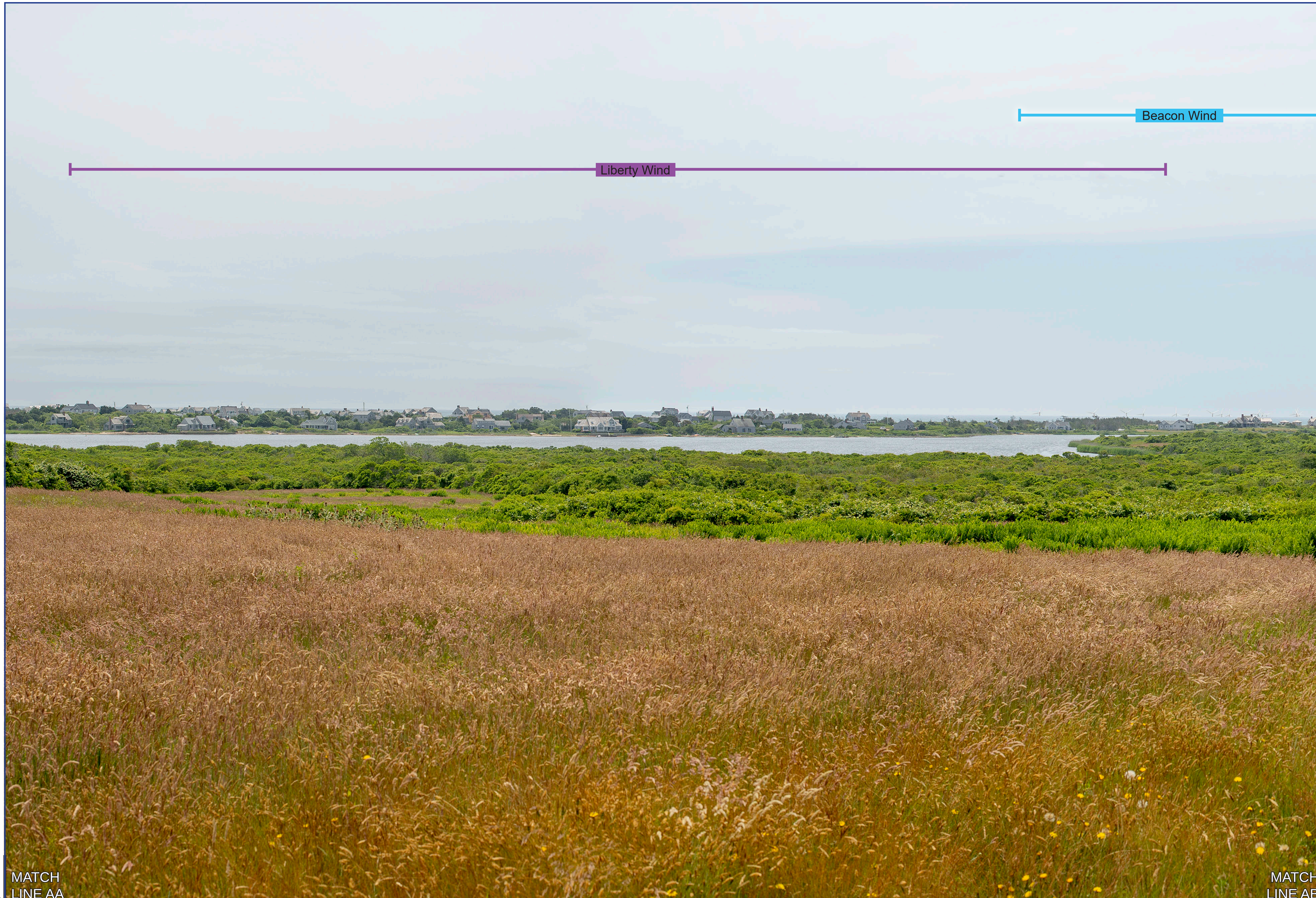
Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

CAMERA

Camera Elevation: 50 ft /15.2 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 2-N Sanford Farm Barn - Scenario 4 (50mm view - 27° vertical / 40° horizontal) 1 of 3

MATCH LINE A



MATCH LINE BB

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

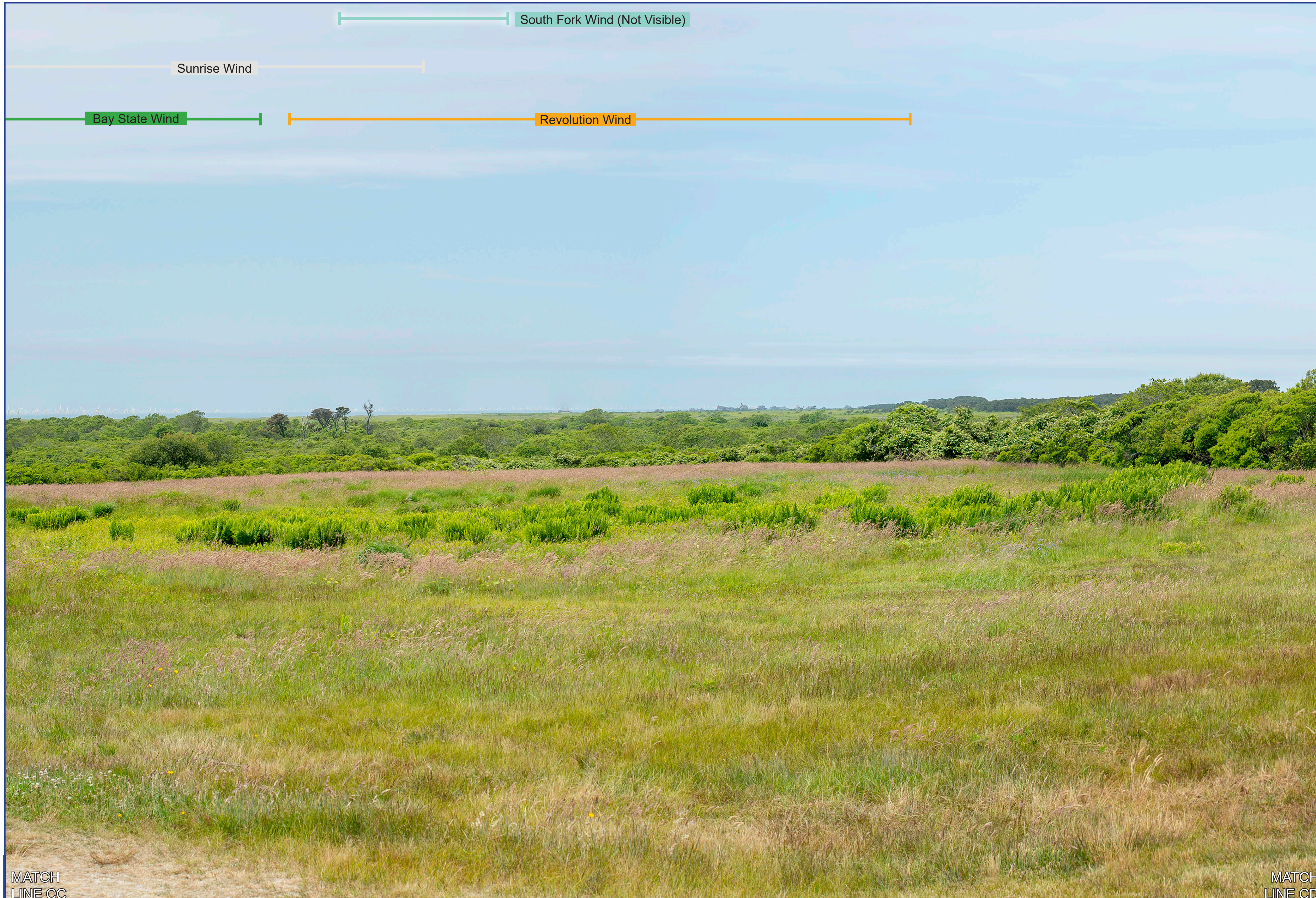
KOP 2-N Sanford Farm Barn - Scenario 4 (50mm view - 27° vertical / 40° horizontal) 2 of 3

SIMULATED CONDITIONS

MATCH LINE AB

MATCH LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .



MATCH LINE BC

MATCH LINE CC

MATCH LINE CD

MATCH LINE B

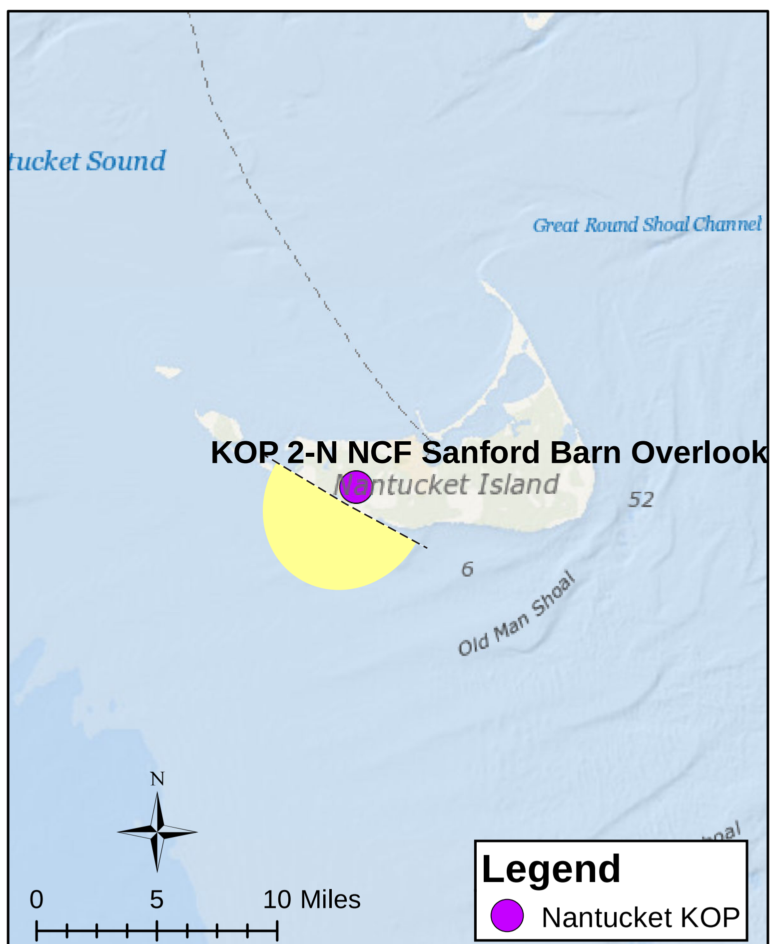
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 2-N Sanford Farm Barn - Scenario 5

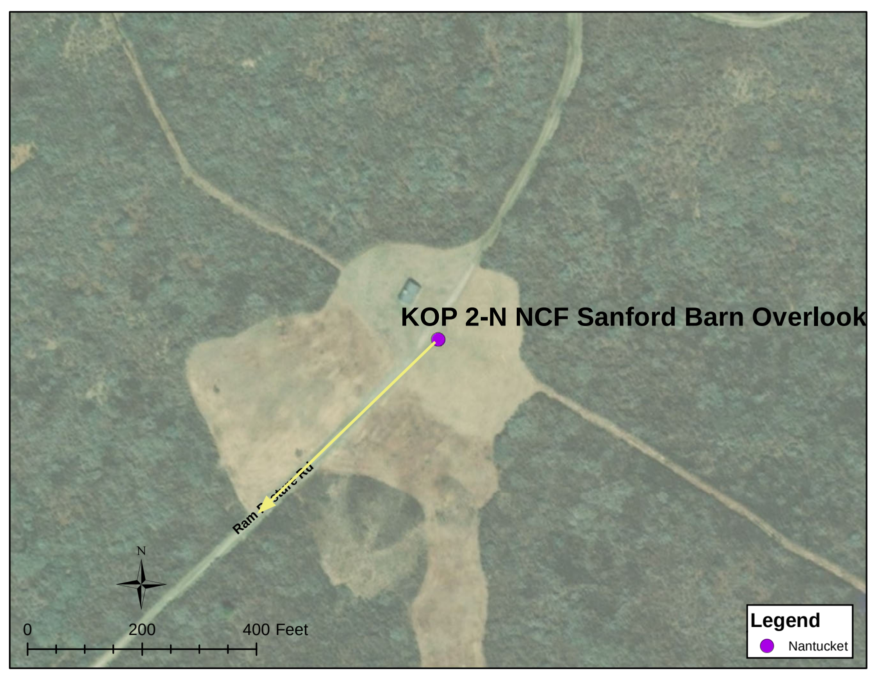
Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 182.3°
Vertical Field of View: 39.6°
Nearest WTG: 17 mi / 27.35 km
Furthest Visible WTG: 62.4 mi / 100.42 km
Potential Number of WTGs Visible: 629
Potential Number of WTGs Not Visible: 285

PHOTOGRAPH AND SITE

Time of photograph: 10:54 AM
Date of photograph: 6-26-20
L/SCA: Ocean beach
Viewing direction: South (194°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

CAMERA

Camera Elevation: 50.5 ft /15.4 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

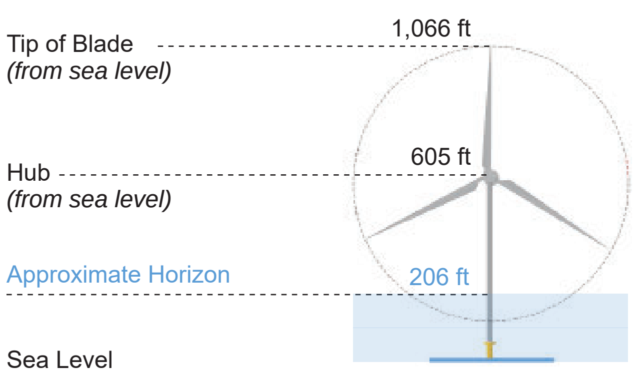
KOP 2-N Sanford Farm Barn - Scenario 5

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

Mayflower Wind
(OCS-A 0521)

919 ft rotor

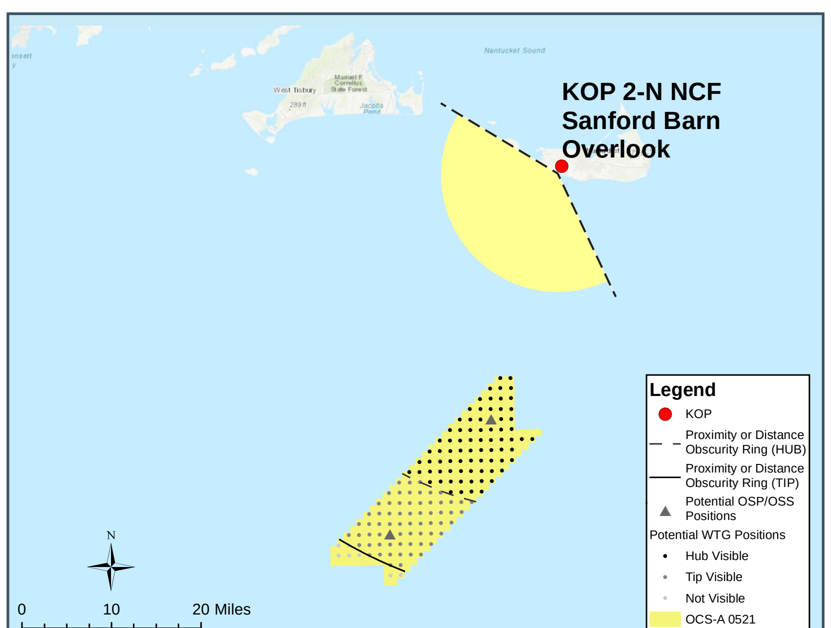


	Mayflower Wind (OCS-A 0521)
Year Forecasted for Development	2025
Number of Structures in Lease Area	149
Number of Structures within View of KOP	142
Distance to Closest Structure	24.4 mi (39.26 km)
Distance to Furthest Structure	50.3 mi (80.95 km)

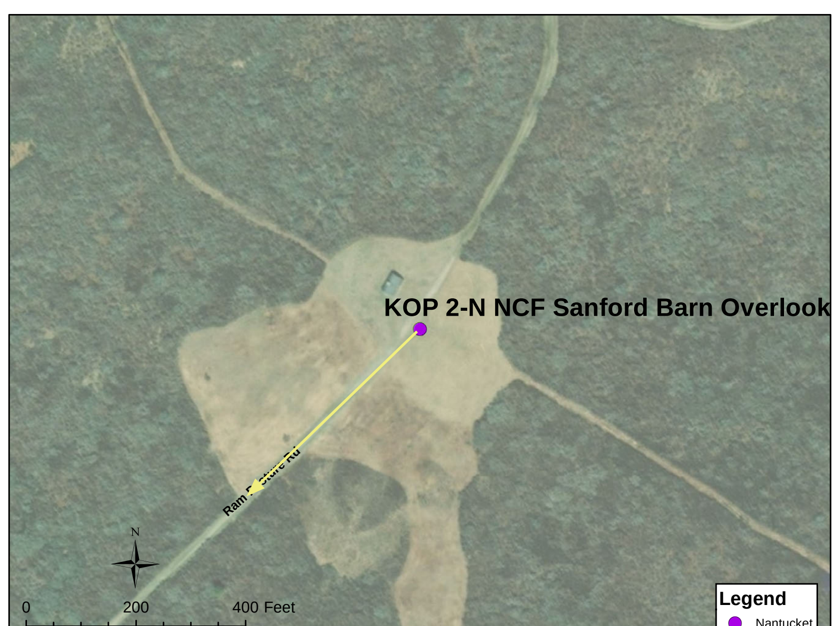
KOP 2-N Sanford Farm Barn - Scenario 5 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 39.6°
Nearest WTG: 17 mi / 27.35 km
Furthest Visible WTG: 62.4 mi / 100.42 km
Potential Number of WTGs Visible: 629
Potential Number of WTGs Not Visible: 285

ENVIRONMENT

Temperature: 68° F
Humidity: 81%
Wind Dir & Speed: S 12 mph
Weather Condition: Hazy

PHOTOGRAPH AND SITE

Time of photograph: 10:54 AM
Date of photograph: 6-26-20
L/SCA: Ocean beach
Viewing direction: South (194°)
Latitude: 41.265608°N
Longitude: 70.150001°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 50.5 ft /15.4 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

MATCH LINE A

MATCH LINE BB

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

SIMULATED CONDITIONS

MATCH
LINE AB

MATCH
LINE CC

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 2-N Sanford Farm Barn - Scenario 5 (50mm view - 27° vertical / 39.6° horizontal) 3 of 3

MATCH LINE BC

MATCH LINE CC

MATCH LINE CD

MATCH LINE B

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

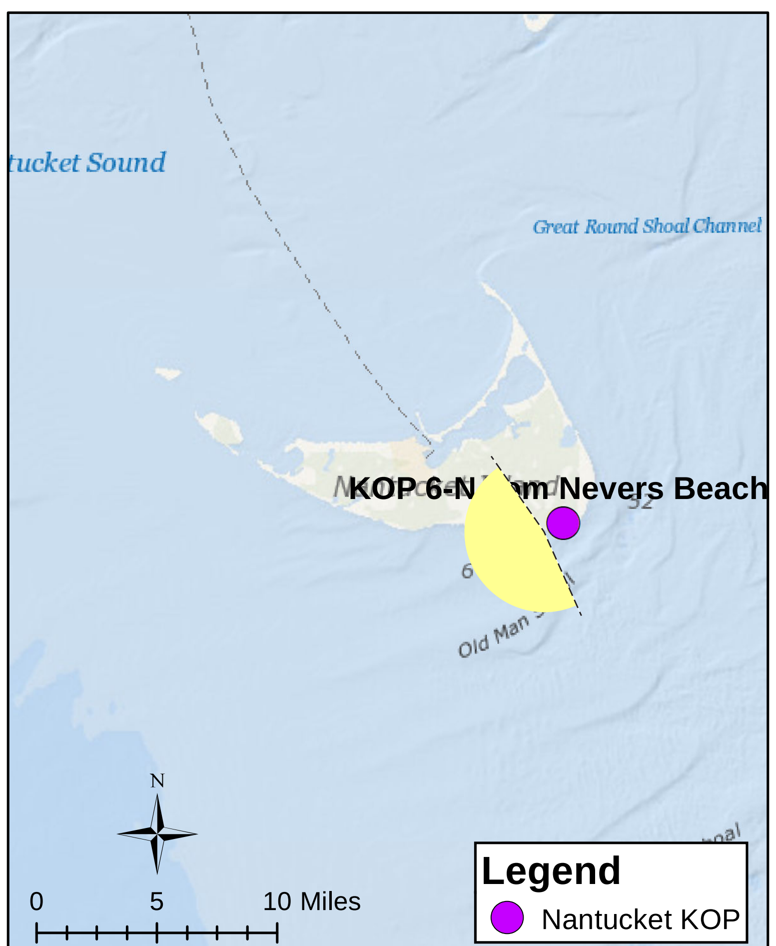
KOP 6-N Tom Nevers Beach - Scenario 1

Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

1

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 169°
Vertical Field of View: 40°
Nearest WTG: 23 mi / 37 km
Furthest Visible WTG: 70 mi / 113 km
Potential Number of Structures Visible: 136
Potential Number of Structures Not Visible: 313

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM
Date of photograph: 6-27-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (242°)
Latitude: 41.244577°N
Longitude: 69.985046°W
Lighting Direction: Sidelit diffused

ENVIRONMENT

Temperature: 68° F
Humidity: 90%
Wind Dir & Speed: S 10 mph
Weather Condition: Partly Cloudy

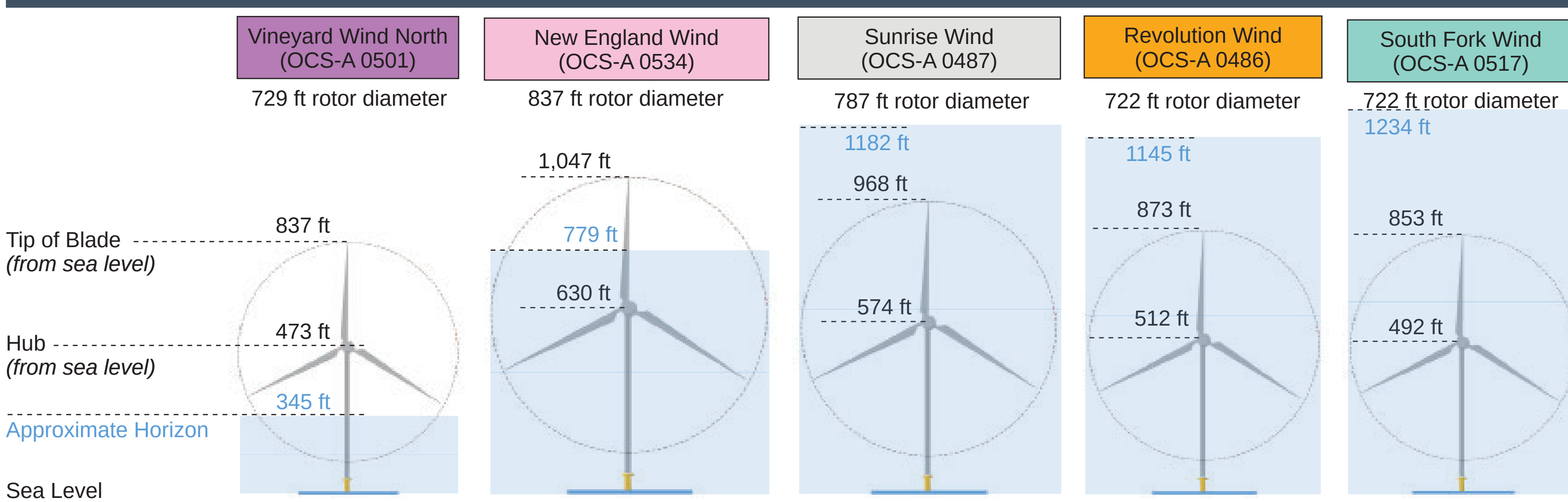
CAMERA

Camera Elevation: 6.5 ft /1.7 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 6-N Tom Nevers Beach - Scenario 1

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

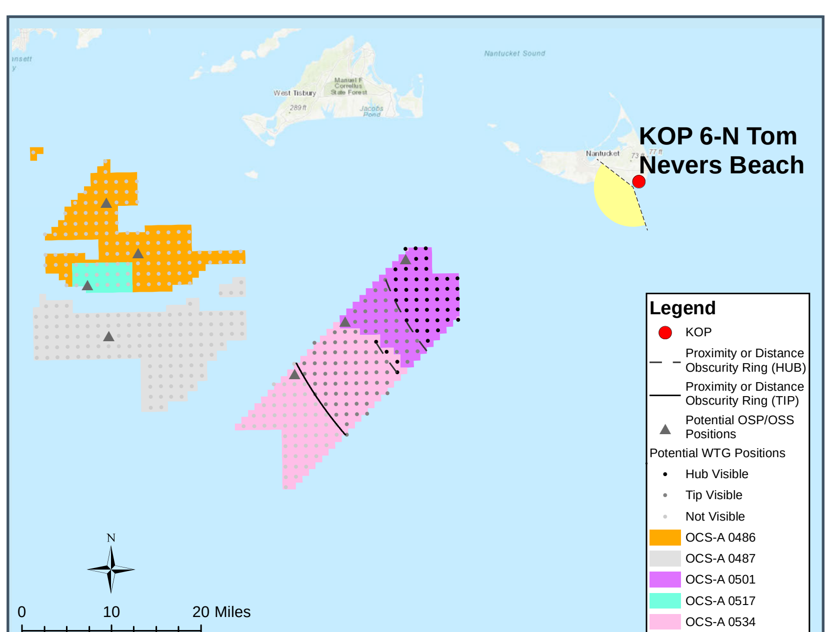


	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	71	65	0	0	0
Distance to Closest Structure	23 mi (37 km)	38 mi (61 km)	46 mi (74 km)	45 mi (73 km)	47 mi (75 km)
Distance to Furthest Structure	36 mi (59 km)	52 mi (84 km)	70 mi (113 km)	109 mi (95 km)	64 mi (103 km)

KOP 6-N Tom Nevers Beach - Scenario 1 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 23 mi / 37 km

Furthest Visible WTG: 70 mi / 113 km

Potential Number of Structures Visible: 136

Potential Number of Structures Not Visible: 313

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM

Date of photograph: 6-27-20

L/SCA: Ocean Beach, Open Ocean, Dunes

Viewing direction: South (242°)

Latitude: 41.244577°N

Longitude: 69.985046°W

Lighting Direction: Sidelit diffused

ENVIRONMENT

Temperature: 68° F

Humidity: 90%

Wind Dir & Speed: S 10 mph

Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 6.5 ft /1.7 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

KOP 6-N Tom Nevers Beach - Scenario 1 (50mm view - 27° vertical / 40° horizontal) 1 of 3

SIMULATED CONDITIONS

MATCH LINE A

MATCH LINE BB

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH LINE AB

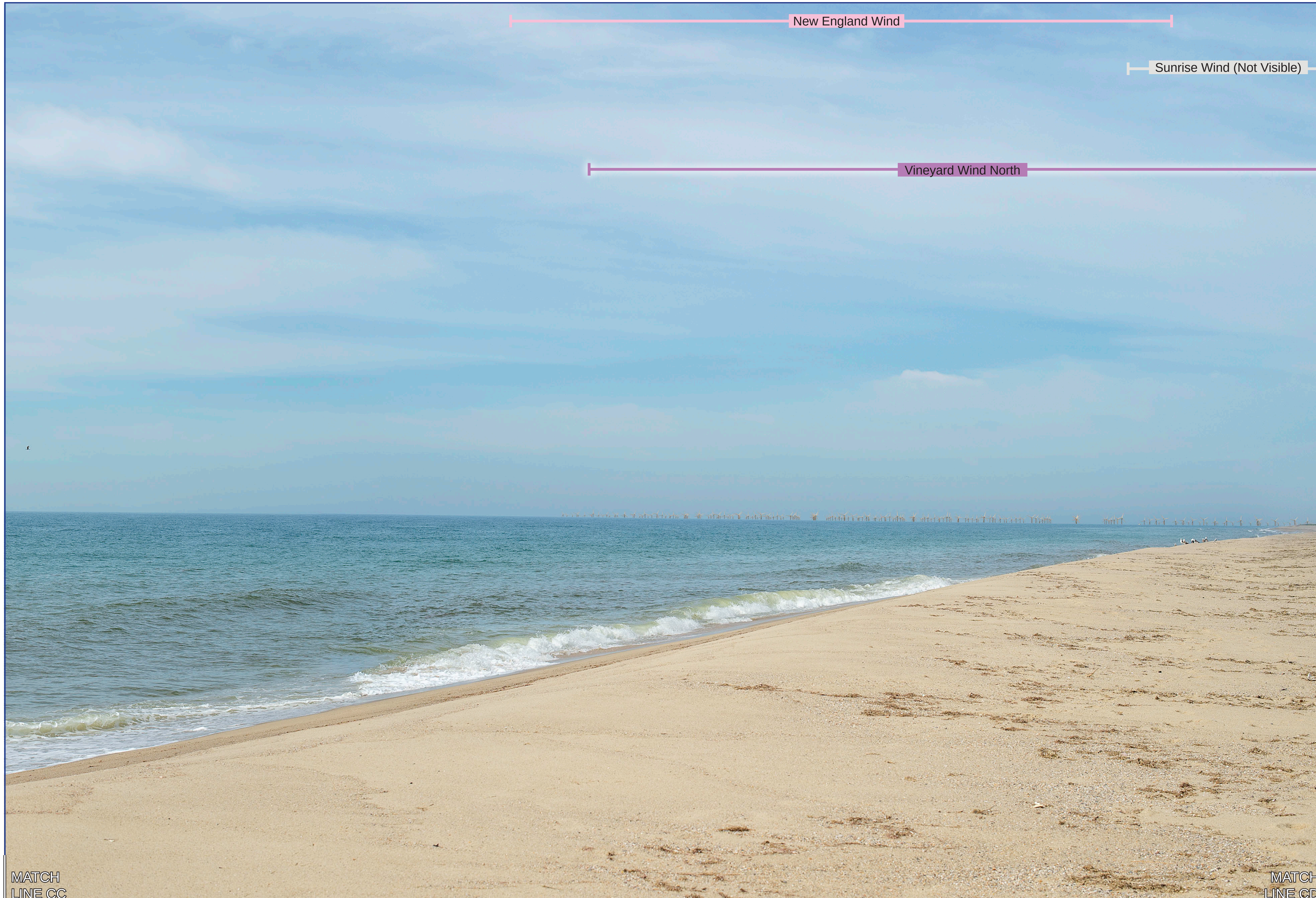
MATCH LINE BB

MATCH LINE BC

MATCH LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH LINE BC

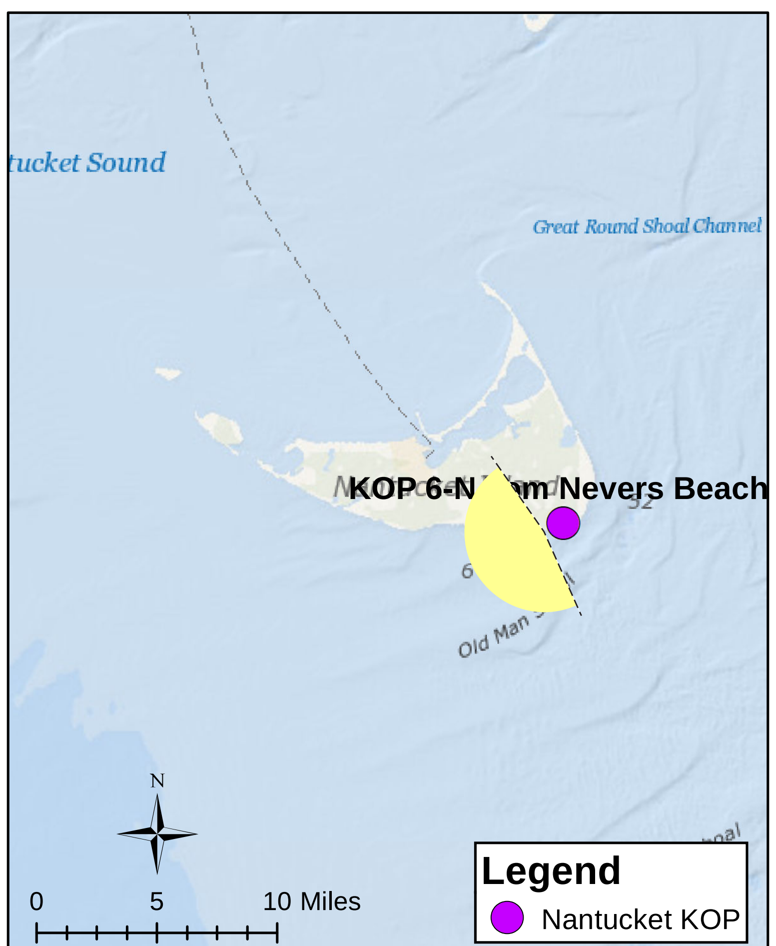


MATCH LINE B

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 169°
Vertical Field of View: 40°
Nearest WTG: 23 mi / 37 km
Furthest Visible WTG: 70 mi / 113 km
Potential Number of Structures Visible: 228
Potential Number of Structures Not Visible: 370

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM
Date of photograph: 6-27-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (242°)
Latitude: 41.244577°N
Longitude: 69.985046°W
Lighting Direction: Sidelit diffused

ENVIRONMENT

Temperature: 68° F
Humidity: 90%
Wind Dir & Speed: S 10 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 6.5 ft /1.7 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

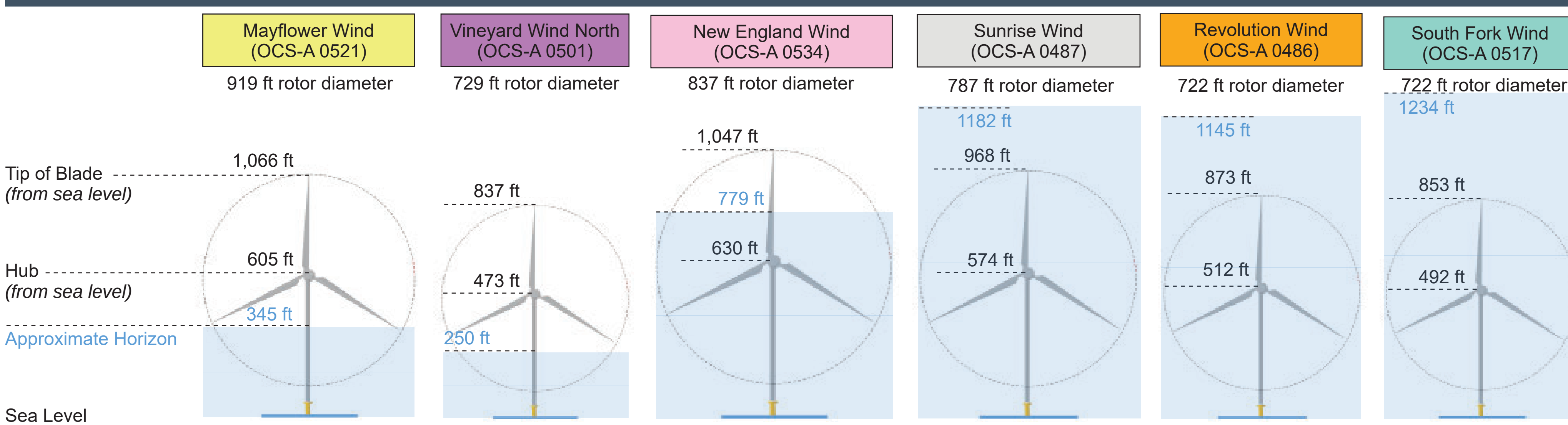
KOP 6-N Tom Nevers Beach - Scenario 2

Nantucket

SIMULATED CONDITIONS

2

VISIBILTY OF CLOSEST TURBINES

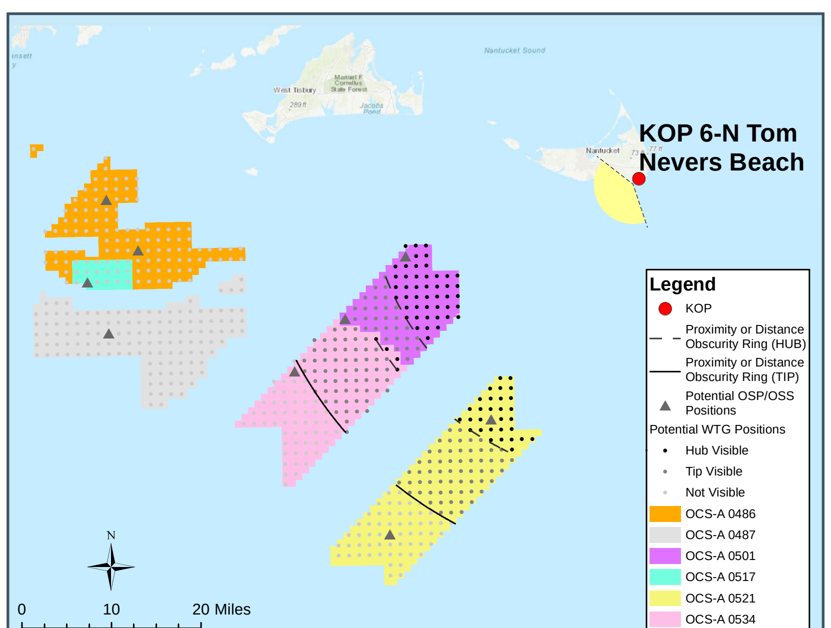


	Mayflower Wind	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	149	77	120	131	103	18
Number of Structures within View of KOP	92	71	65	0	0	0
Distance to Closest Structure	26 mi (43 km)	23 mi (37 km)	38 mi (61 km)	46 mi (74 km)	45 mi (73 km)	47 mi (75 km)
Distance to Furthest Structure	54 mi (87 km)	36 mi (59 km)	52 mi (84 km)	70 mi (113 km)	109 mi (95 km)	64 mi (103 km)

KOP 6-N Tom Nevers Beach - Scenario 2 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 23 mi / 37 km

Furthest Visible WTG: 70 mi / 113 km

Potential Number of Structures Visible: 228

Potential Number of Structures Not Visible: 370

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM

Date of photograph: 6-27-20

L/SCA: Ocean Beach, Open Ocean, Dunes

Viewing direction: South (242°)

Latitude: 41.244577°N

Longitude: 69.985046°W

Lighting Direction: Sidelit diffused

ENVIRONMENT

Temperature: 68° F

Humidity: 90%

Wind Dir & Speed: S 10 mph

Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 6.5 ft /1.7 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

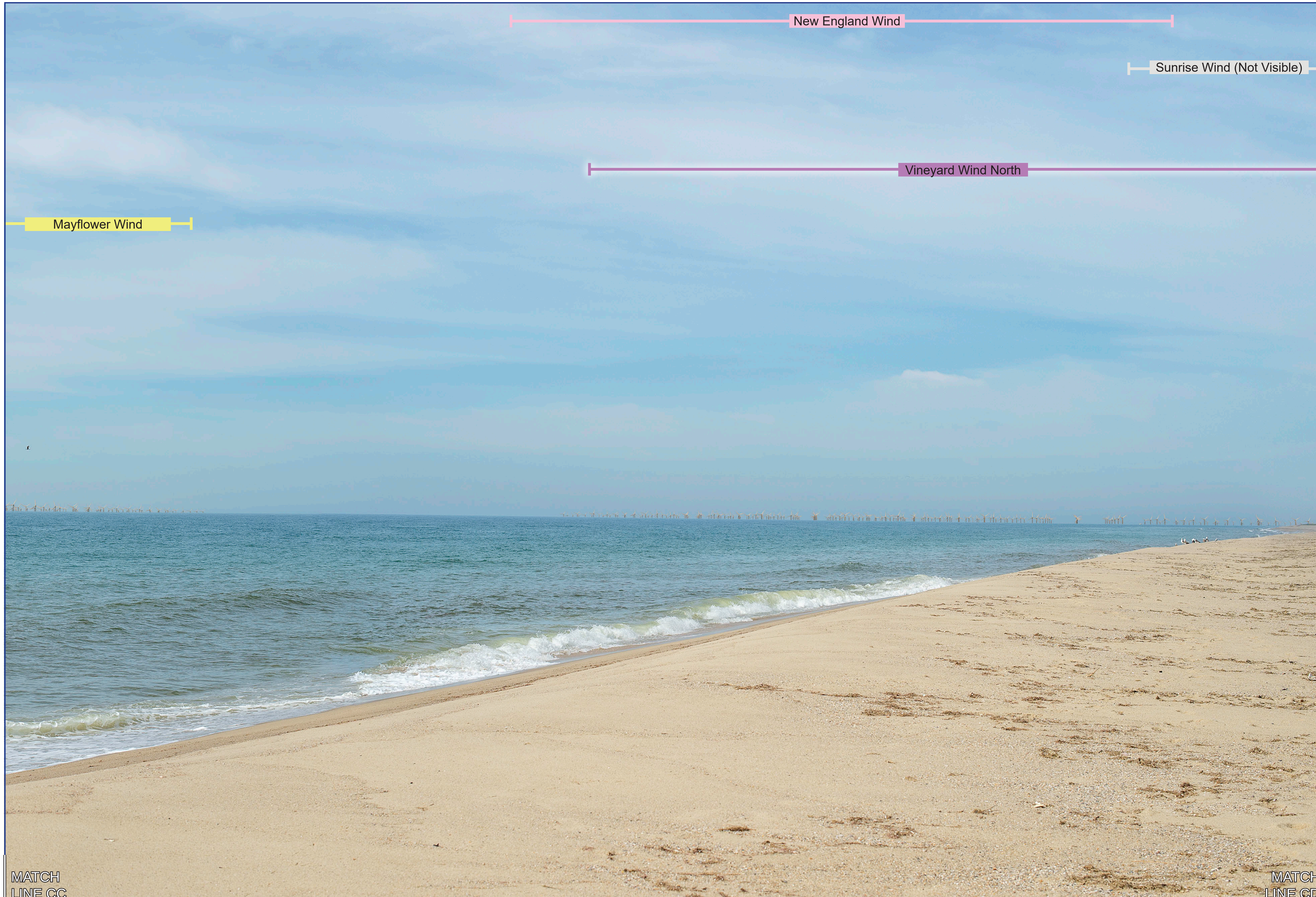
Exposure bias: -0.7 step

MATCH LINE A

MATCH LINE BB

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



MATCH LINE BC

MATCH LINE CC

MATCH LINE CD

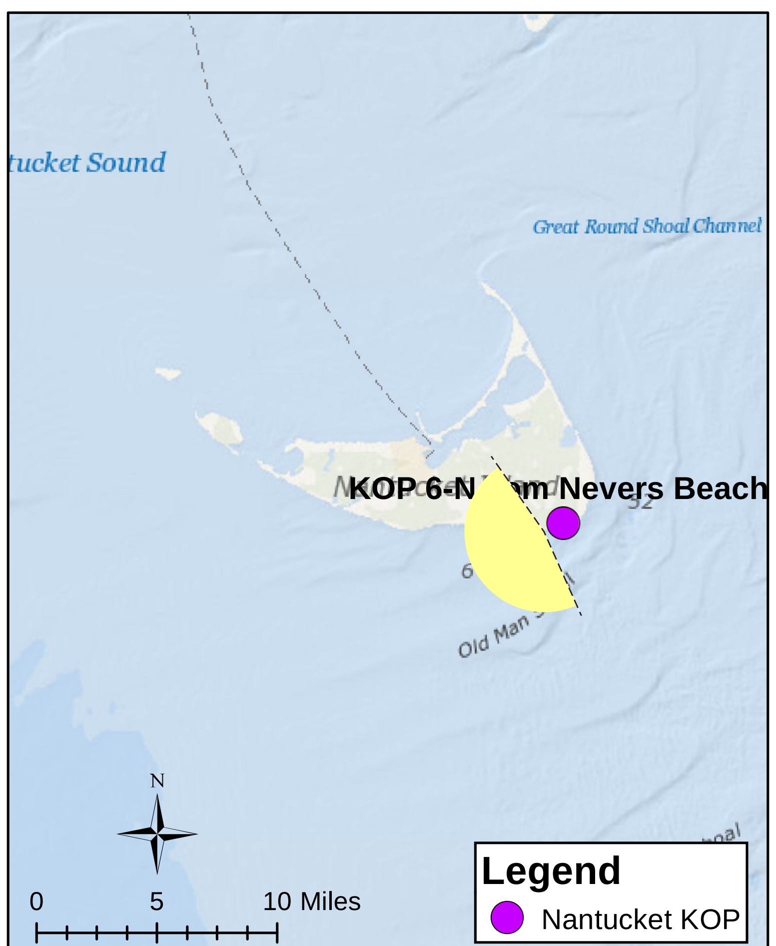
MATCH LINE B

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 6-N Tom Nevers Beach - Scenario 3

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 169°
Vertical Field of View: 40°
Nearest WTG: 23 mi / 37 km
Furthest Visible WTG: 70 mi / 113 km
Potential Number of WTGs Visible: 463
Potential Number of WTGs Not Visible: 600

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM
Date of photograph: 6-27-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (242°)
Latitude: 41.244577°N
Longitude: 69.985046°W
Lighting Direction: Sidelit diffused

ENVIRONMENT

Temperature: 68° F
Humidity: 90%
Wind Dir & Speed: S 10 mph
Weather Condition: Partly Cloudy

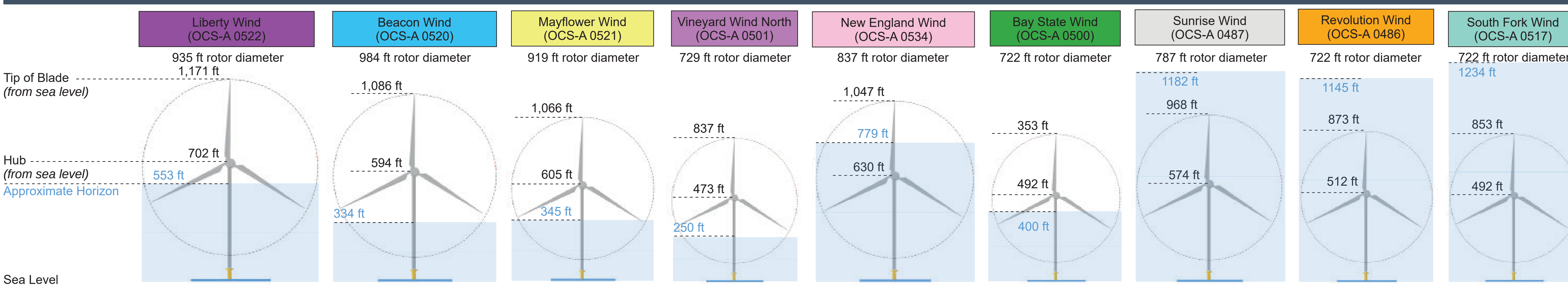
CAMERA

Camera Elevation: 6.5 ft /1.7 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 6-N Tom Nevers Beach - Scenario 3

SIMULATED CONDITIONS

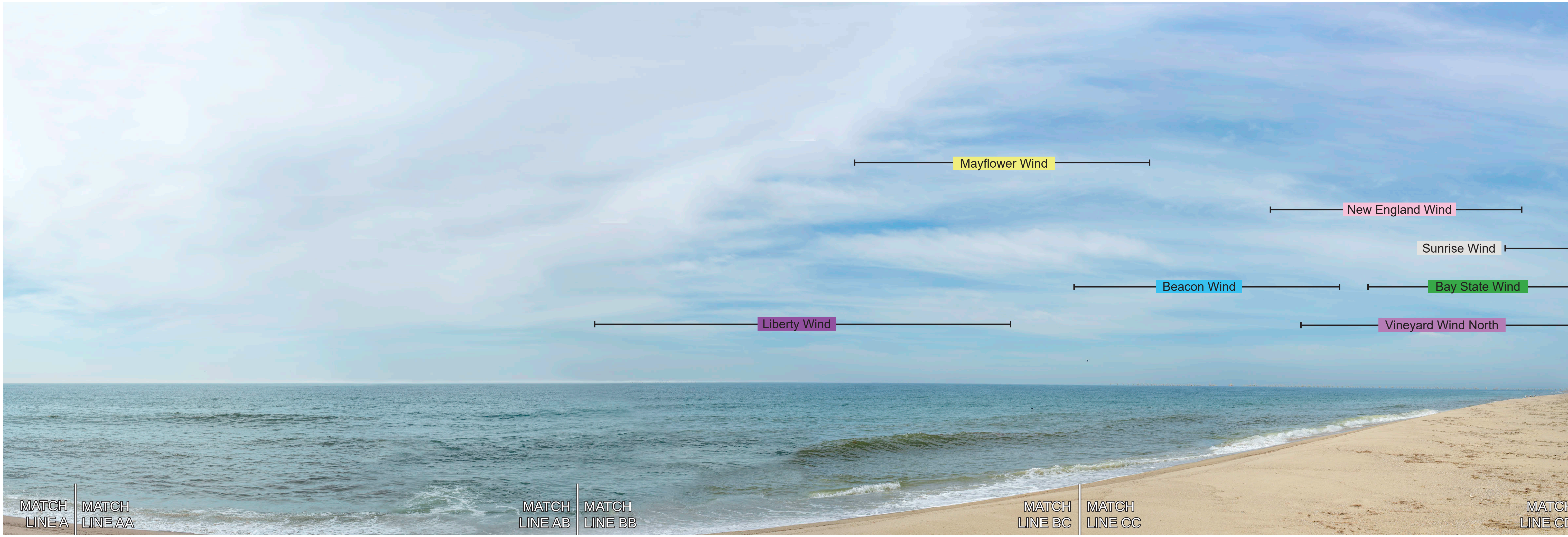
VISIBILTY OF CLOSEST TURBINES



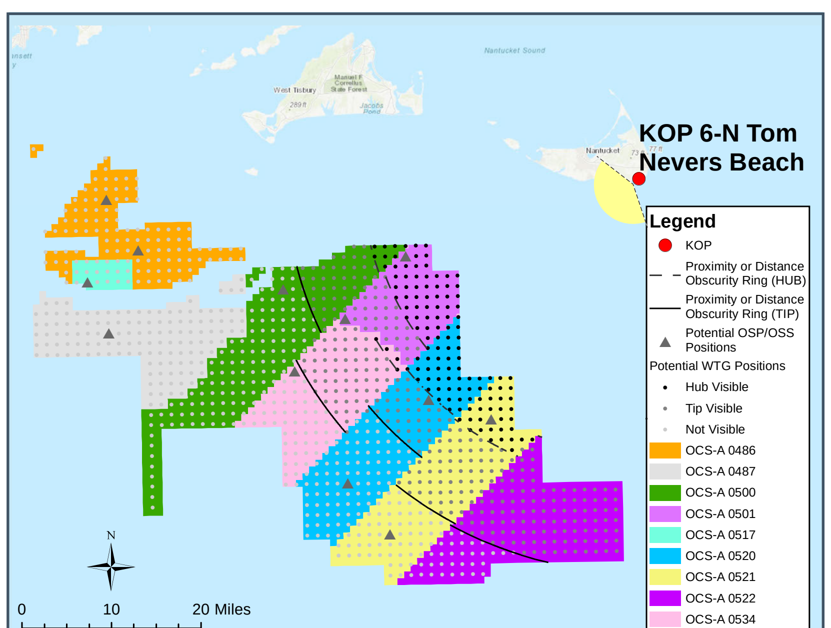
	Liberty Wind	Beacon Wind	Mayflower Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2025	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	149	77	120	169	131	103	18
Number of Structures within View of KOP	107	74	92	71	65	48	0	0	0
Distance to Closest Structure	33 mi (52 km)	26 mi (42.08 km)	26 mi (43 km)	23 mi (37 km)	38 mi (61 km)	28 mi (45 km)	46 mi (74 km)	45 mi (73 km)	47 mi (75 km)
Distance to Furthest Structure	51 mi (83 km)	55 mi (88 km)	54 mi (87 km)	36 mi (59 km)	52 mi (84 km)	66 mi (106 km)	70 mi (113 km)	109 mi (95 km)	64 mi (103 km)

KOP 6-N Tom Nevers Beach - Scenario 3 (Human Field of View - 124°)

SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 23 mi / 37 km
Furthest Visible WTG: 70 mi / 113 km
Potential Number of WTGs Visible: 463
Potential Number of WTGs Not Visible: 600

ENVIRONMENT

Temperature: 68° F
Humidity: 90%
Wind Dir & Speed: S 10 mph
Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM
Date of photograph: 6-27-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (242°)
Latitude: 41.244577°N
Longitude: 69.985046°W
Lighting Direction: Sidelit diffused

CAMERA

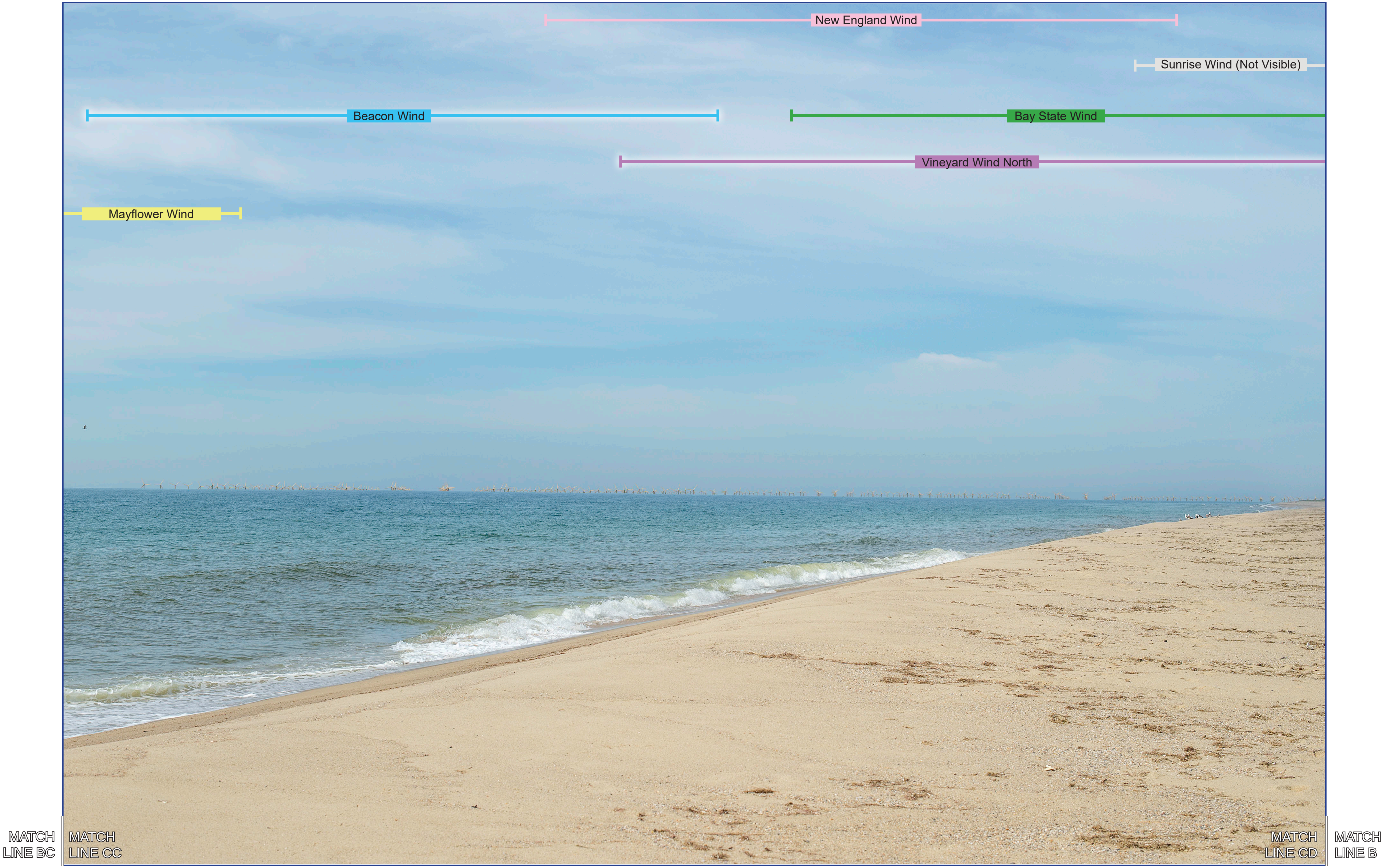
Camera Elevation: 6.5 ft /1.7 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 6-N Tom Nevers Beach - Scenario 3 (50mm view - 27° vertical / 40° horizontal) 3 of 3

SIMULATED CONDITIONS



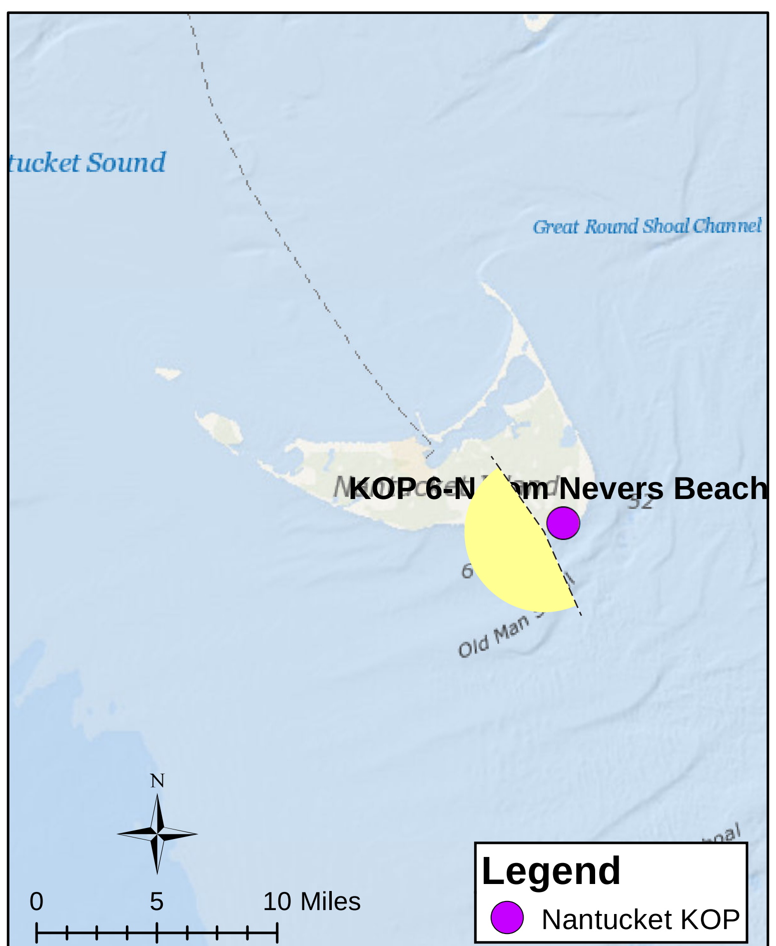
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 6-N Tom Nevers Beach - Scenario 4

Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 169°
Vertical Field of View: 40°
Nearest WTG: 23 mi / 37 km
Furthest Visible WTG: 70 mi / 113 km
Potential Number of Structures Visible: 365
Potential Number of Structures Not Visible: 549

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM
Date of photograph: 6-27-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (242°)
Latitude: 41.244577°N
Longitude: 69.985046°W
Lighting Direction: Sidelit diffused

ENVIRONMENT

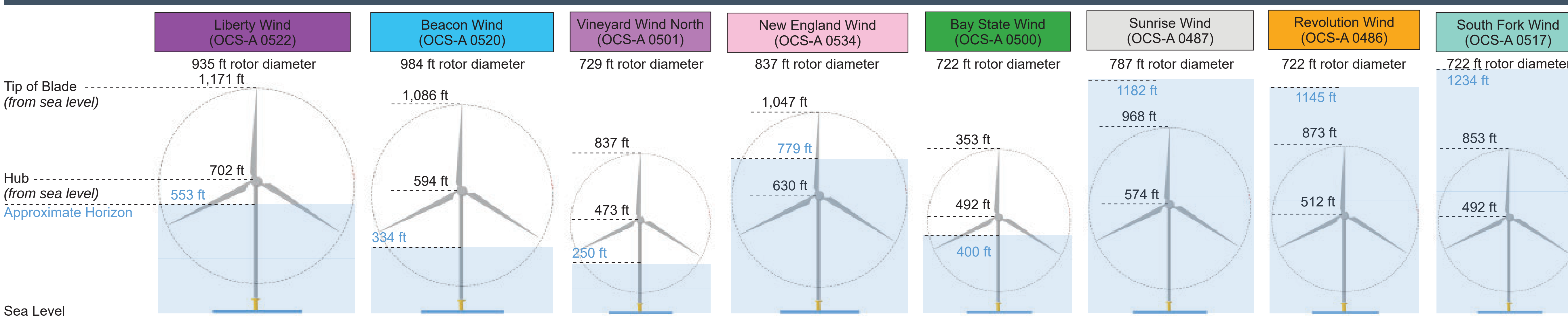
Temperature: 68° F
Humidity: 90%
Wind Dir & Speed: S 10 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 6.5 ft /1.7 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

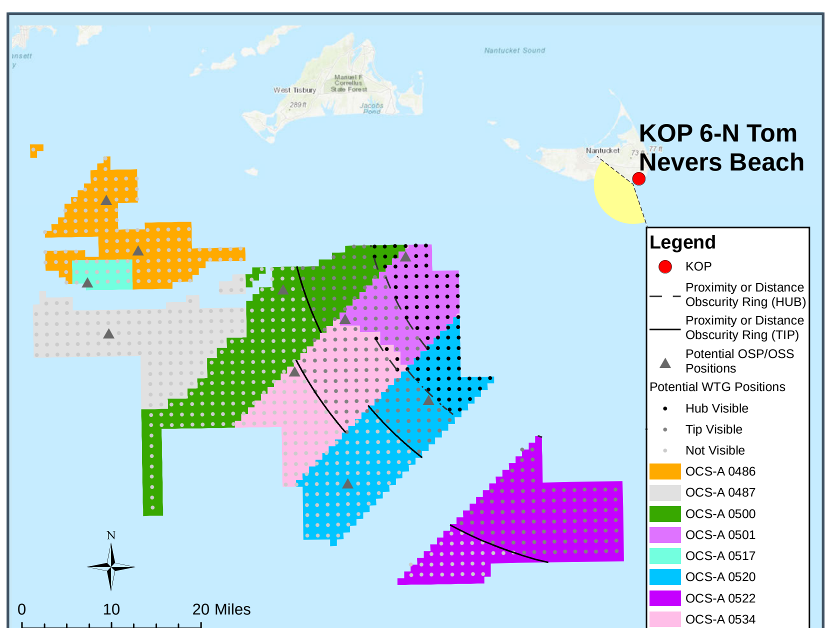


	Liberty Wind	Beacon Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	77	120	169	131	103	18
Number of Structures within View of KOP	107	74	71	65	48	0	0	0
Distance to Closest Structure	33 mi (52 km)	26 mi (42.08 km)	23 mi (37 km)	38 mi (61 km)	28 mi (45 km)	46 mi (74 km)	45 mi (73 km)	46.77 mi (75.26 km)
Distance to Furthest Structure	51 mi (83 km)	55 mi (88 km)	36 mi (59 km)	52 mi (84 km)	66 mi (106 km)	70 mi (113 km)	109 mi (95 km)	63.9 mi (102.83 km)

KOP 6-N Tom Nevers Beach - Scenario 4 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 23 mi / 37 km

Furthest Visible WTG: 70 mi / 113 km

Potential Number of WTGs Visible: 371

Potential Number of WTGs Not Visible: 543

ENVIRONMENT

Temperature: 68° F

Humidity: 90%

Wind Dir & Speed: S 10 mph

Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM

Date of photograph: 6-27-20

L/SCA: Ocean Beach, Open Ocean, Dunes

Viewing direction: South (242°)

Latitude: 41.244577°N

Longitude: 69.985046°W

Lighting Direction: Sidelit diffused

CAMERA

Camera Elevation: 6.5 ft /1.7 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

MATCH
LINE A

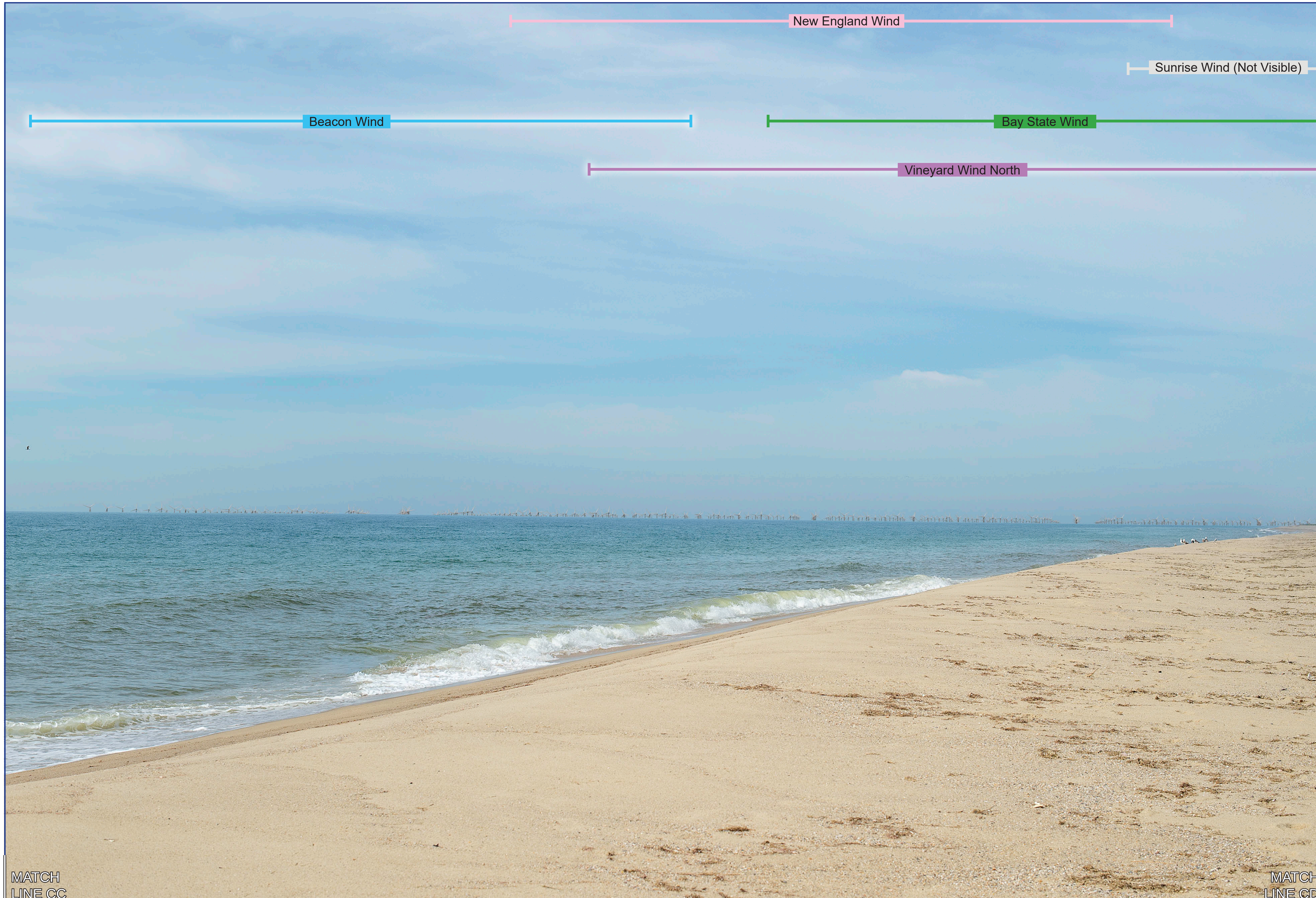
MATCH
LINE BB

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH LINE AB

MATCH LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

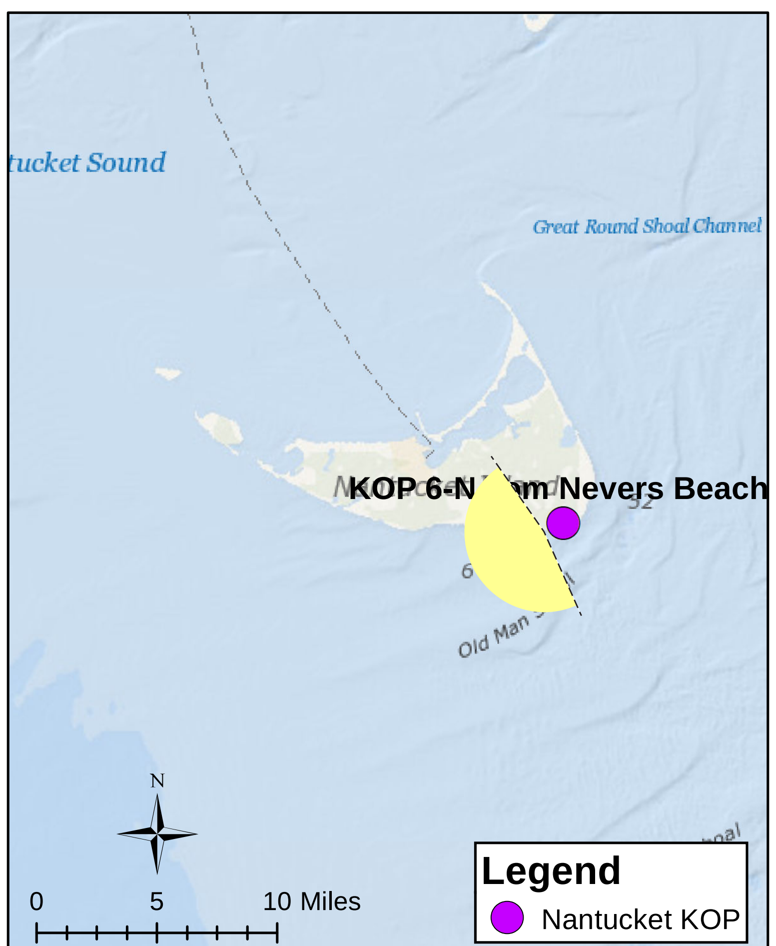


The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 6-N Tom Nevers Beach - Scenario 5

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 169°
Vertical Field of View: 40°
Nearest WTG: 26 mi / 43 km
Furthest Visible WTG: 54 mi / 87 km
Potential Number of Structures Visible: 92
Potential Number of Structures Not Visible: 57

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM
Date of photograph: 6-27-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (242°)
Latitude: 41.244577°N
Longitude: 69.985046°W
Lighting Direction: Sidelit diffused

ENVIRONMENT

Temperature: 68° F
Humidity: 90%
Wind Dir & Speed: S 10 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 6.5 ft /1.7 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 6-N Tom Nevers Beach - Scenario 5

Nantucket

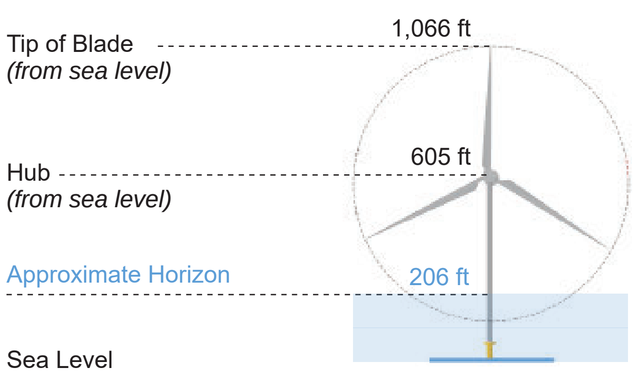
SIMULATED CONDITIONS

2

VISIBILTY OF CLOSEST TURBINES

Mayflower Wind (OCS-A 0521)

919 ft rotor diameter

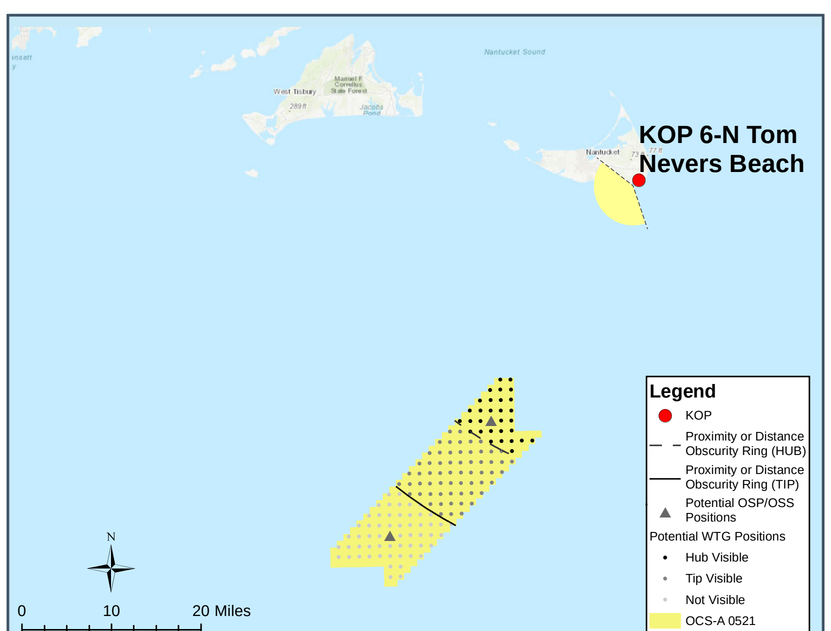


Year Forecasted for Development	2025
Number of Structures in Lease Area	149
Number of Structures within View of KOP	92
Distance to Closest Structure	26 mi (43 km)
Distance to Furthest Structure	54 mi (87 km)

KOP 6-N Tom Nevers Beach - Scenario 5 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 26 mi / 43 km
Furthest Visible WTG: 54 mi / 87 km
Potential Number of WTGs Visible: 92
Potential Number of WTGs Not Visible: 57

ENVIRONMENT

Temperature: 68° F
Humidity: 90%
Wind Dir & Speed: S 10 mph
Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 8:44AM
Date of photograph: 6-27-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (242°)
Latitude: 41.244577°N
Longitude: 69.985046°W
Lighting Direction: Sidelit diffused

CAMERA

Camera Elevation: 6.5 ft /1.7 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 6-N Tom Nevers Beach - Scenario 5 (50mm view - 27° vertical / 40° horizontal) 2 of 3

SIMULATED CONDITIONS

MATCH
LINE AB

MATCH
LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH
LINE BC

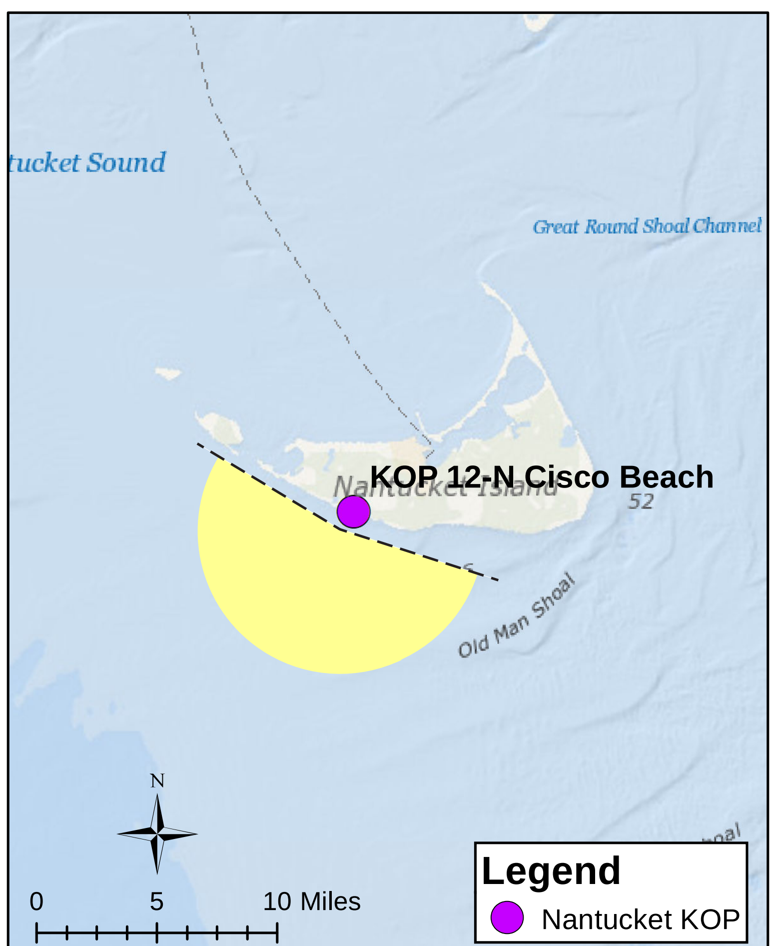
MATCH
LINE B

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach - Scenario 1

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193.2°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

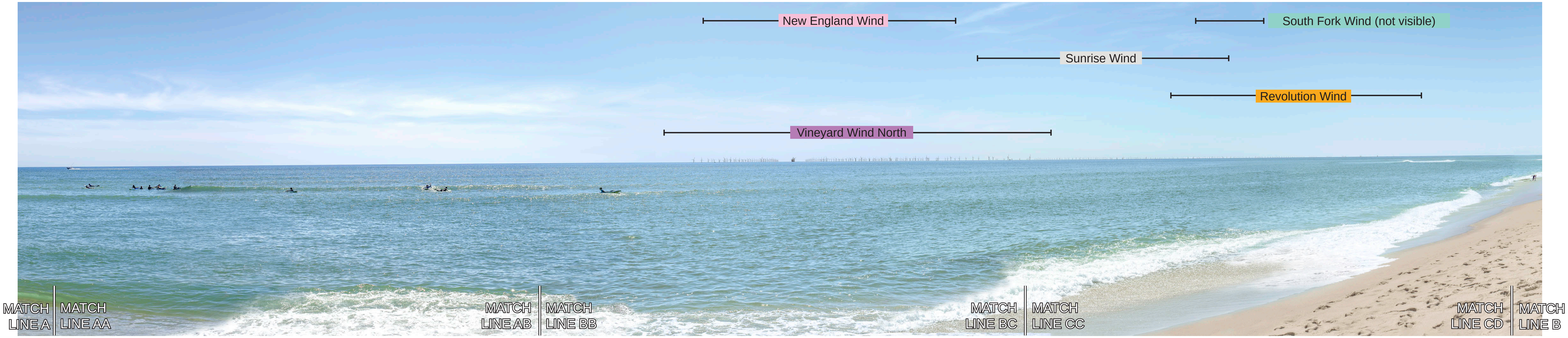
Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

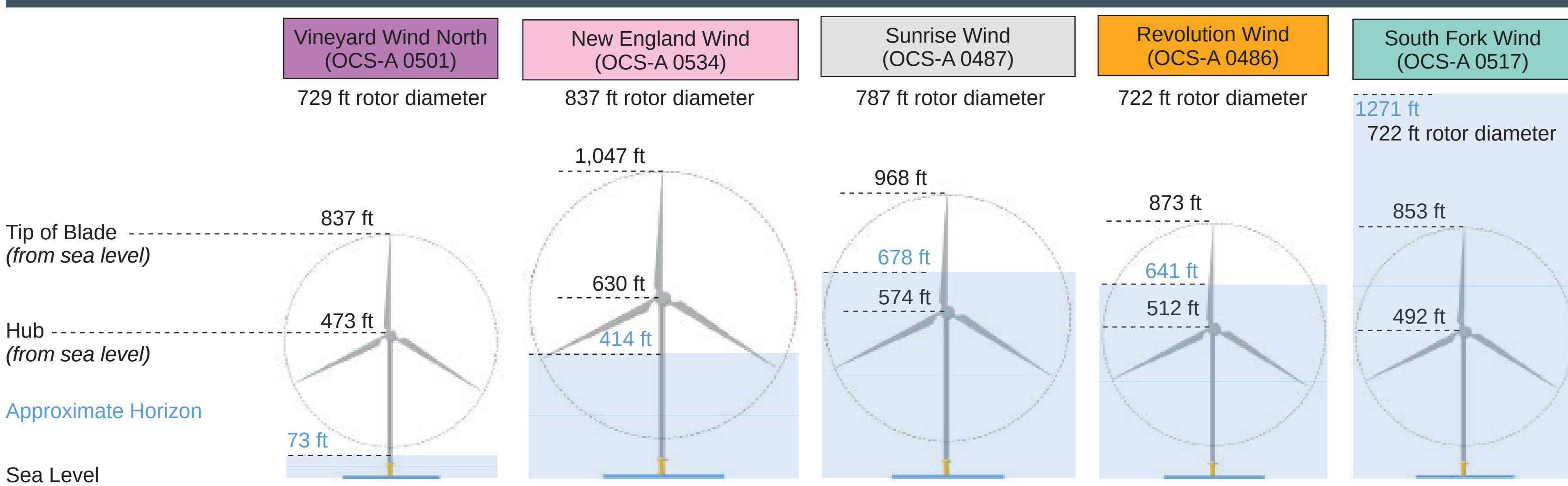
Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach - Scenario 1

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES

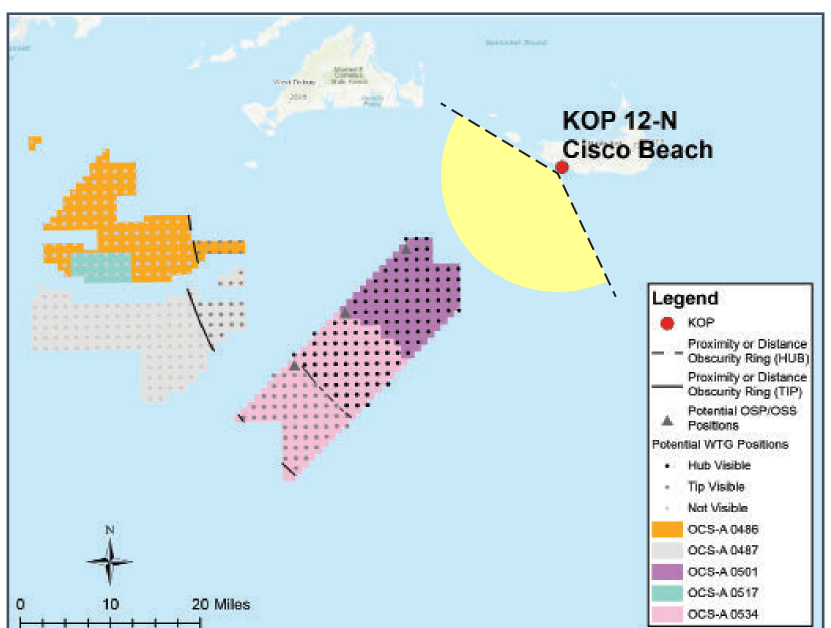


	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	77	118	22	10	0
Distance to Closest Structure	16 mi (26 km)	31 mi (49 km)	38 mi (61 km)	38 mi (61 km)	49 mi (79.46 km)
Distance to Furthest Structure	29 mi (47 km)	48 mi (78 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

KOP 12-N Cisco Beach - Scenario 1 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP

PROJECT VIEW

- Horizontal Field of View: 124°
- Vertical Field of View: 40°
- Nearest WTG: 16 mi / 26 km
- Furthest Visible WTG: 46 mi / 74 km
- Potential Number of Structures Visible: 577
- Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

- Time of photograph: 1:25PM
- Date of photograph: 8-20-20
- L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
- Viewing direction: South (226°)
- Latitude: 41.252490°N
- Longitude: 70.154080°W
- Lighting Direction: Backlit diffused

ENVIRONMENT

- Temperature: 61° F
- Humidity: 90%
- Wind Dir & Speed: N 6 mph
- Weather Condition: Partly Cloudy

CAMERA

- Camera Elevation: 23.0 ft / 7.0 m
- Nikon D4
- Nikon 50mm
- ISO: 100
- Fstop: f/7.1
- Shutter: 1/1250 sec
- Exposure bias: -0.7 step

KOP 12-N Cisco Beach - Scenario 1 (50mm view - 27° vertical / 40° horizontal) 1 of 3

SIMULATED CONDITIONS

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

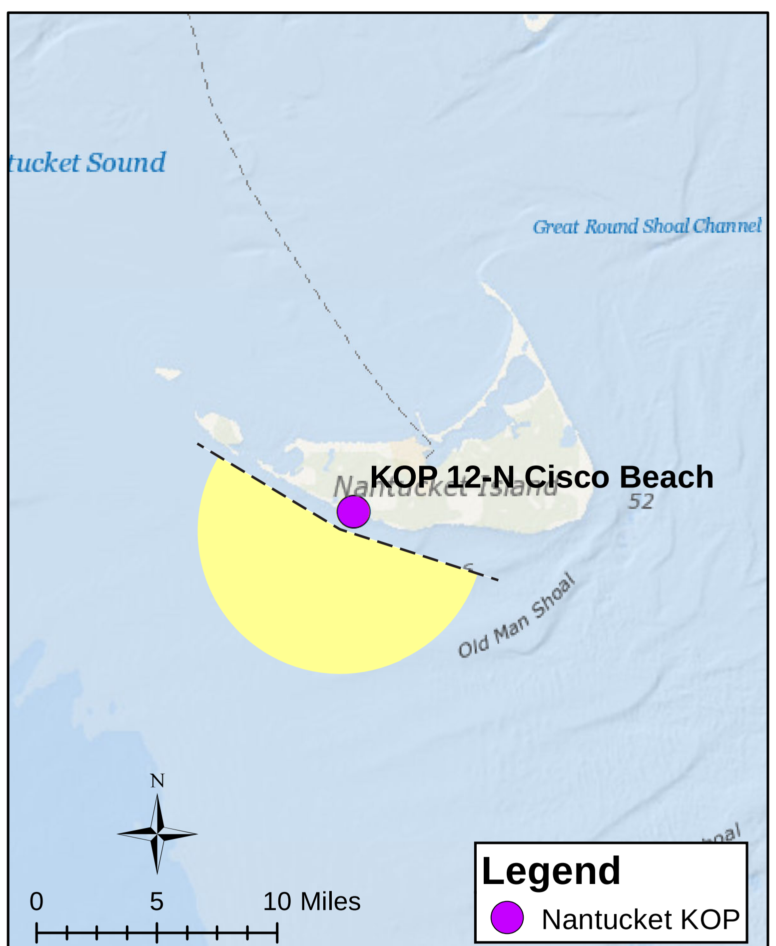
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach - Scenario 2

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

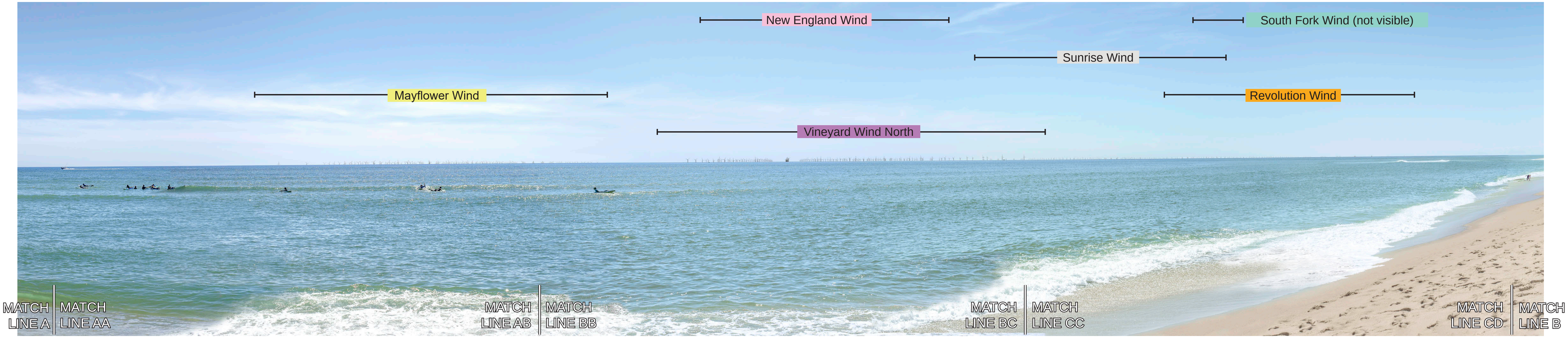
Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

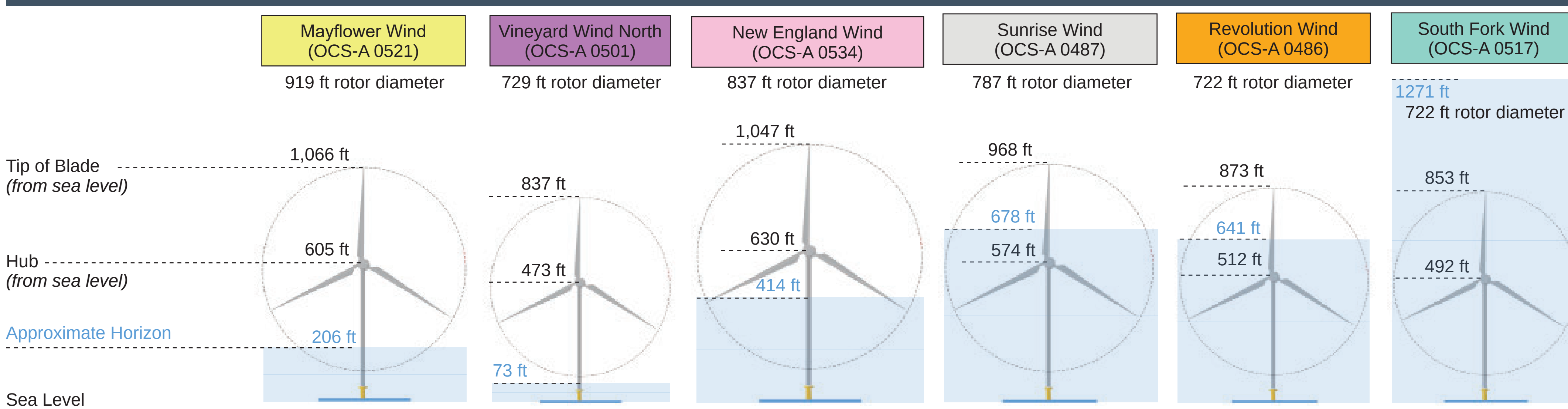
Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach - Scenario 2

SIMULATED CONDITIONS



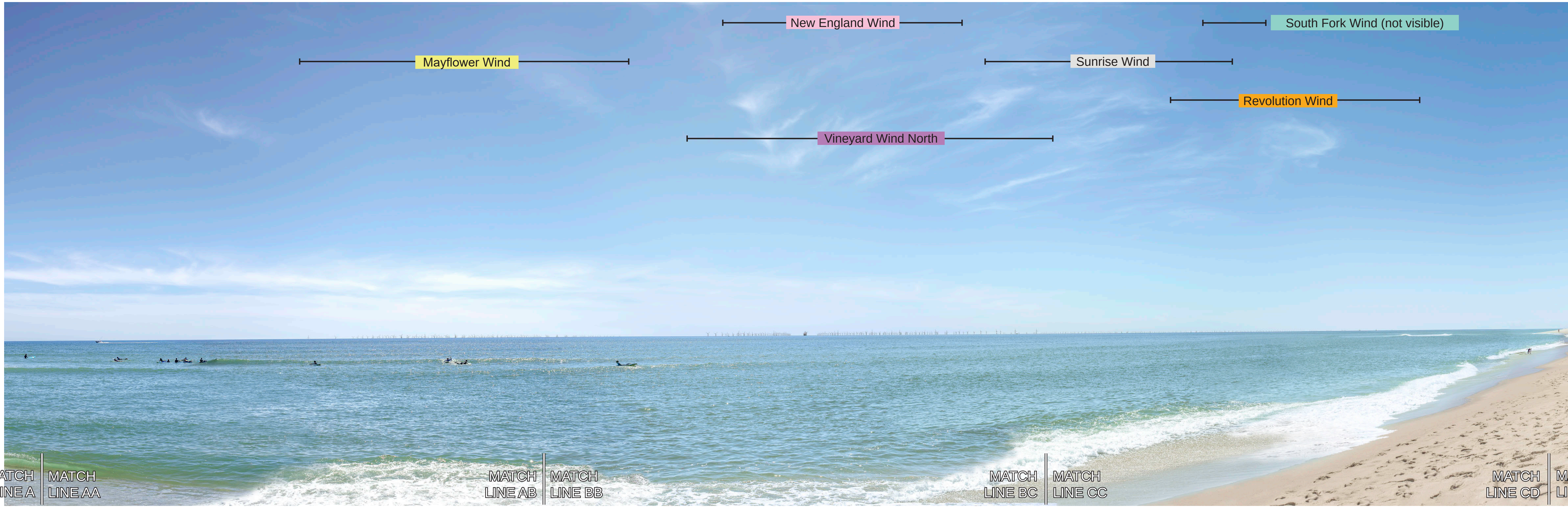
VISIBILTY OF CLOSEST TURBINES



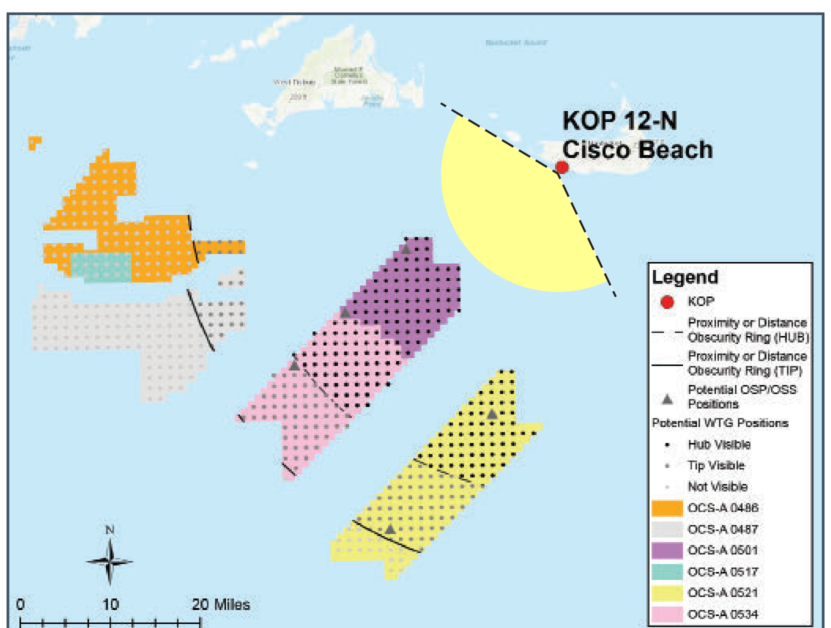
	Mayflower Wind	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	149	77	120	131	103	18
Number of Structures within View of KOP	130	77	118	22	10	0
Distance to Closest Structure	23 mi (38 km)	16 mi (26 km)	31 mi (50 km)	38 mi (60.52 km)	38 mi (60.57 km)	49 mi (79 km)
Distance to Furthest Structure	49 mi (80 km)	29 mi (47 km)	48 mi (78 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

KOP 12-N Cisco Beach - Scenario 2 (Human Field of View - 124°)

SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16.2 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

MATCH LINE A

MATCH LINE BB

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach - Scenario 2 (50mm view - 27° vertical / 40° horizontal) 2 of 3

SIMULATED CONDITIONS

MATCH LINE AB

MATCH LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH LINE BC
MATCH LINE CC
MATCH LINE CD
MATCH LINE B

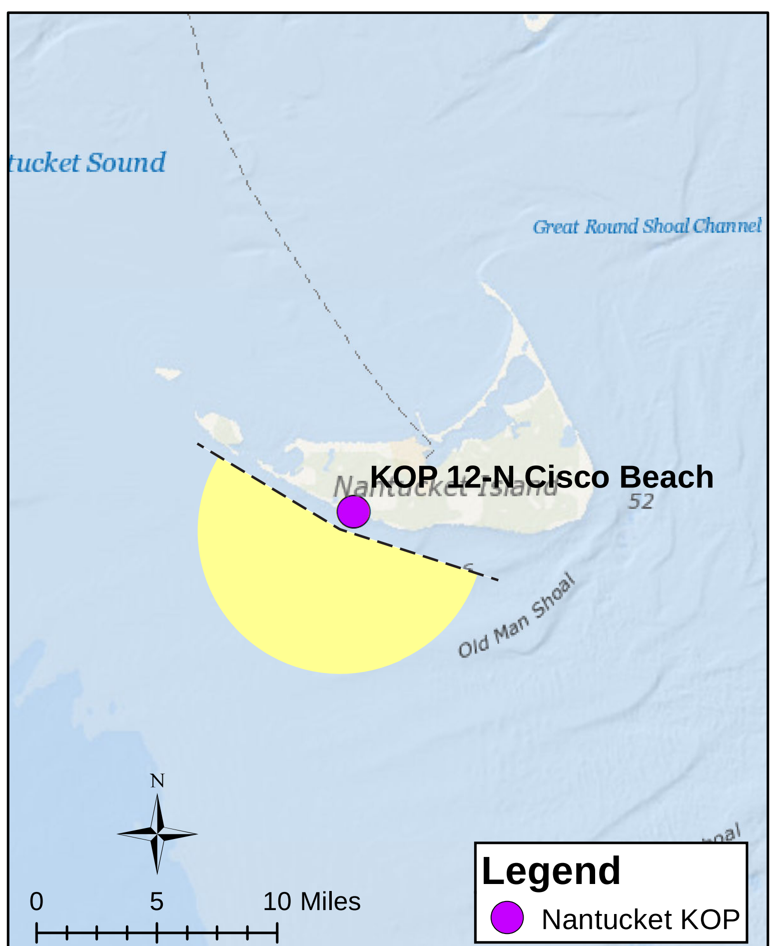
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 12-N Cisco Beach - Scenario 3

Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km

Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential

Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

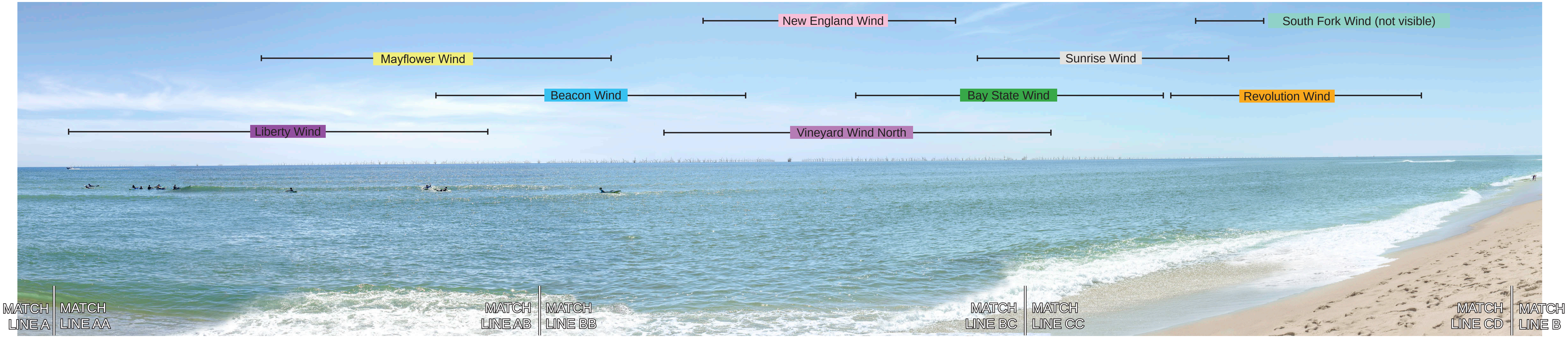
Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

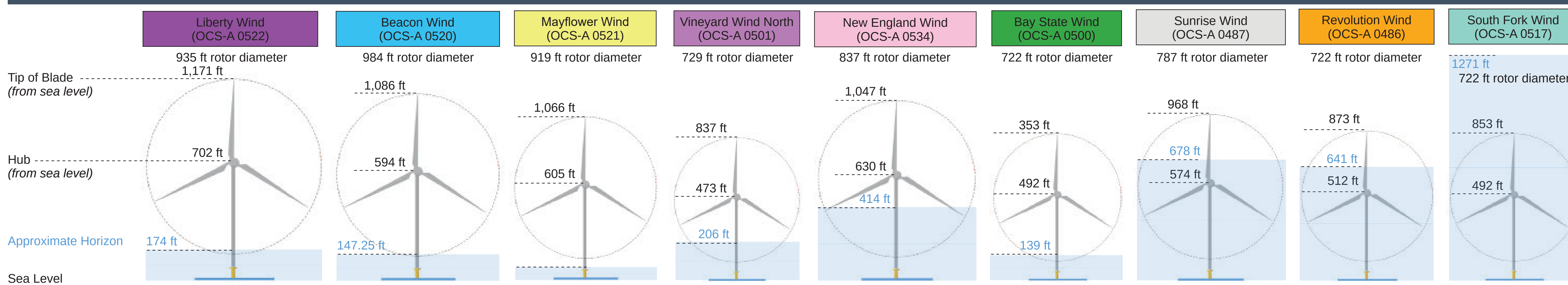
Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach - Scenario 3

SIMULATED CONDITIONS



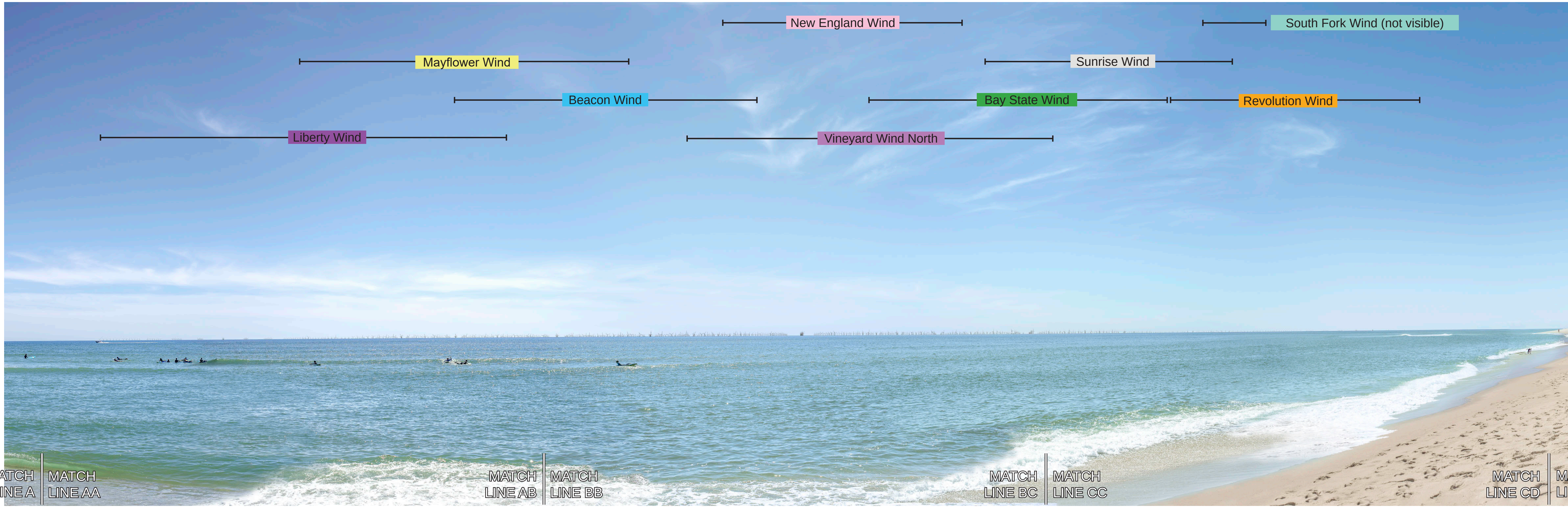
VISIBILTY OF CLOSEST TURBINES



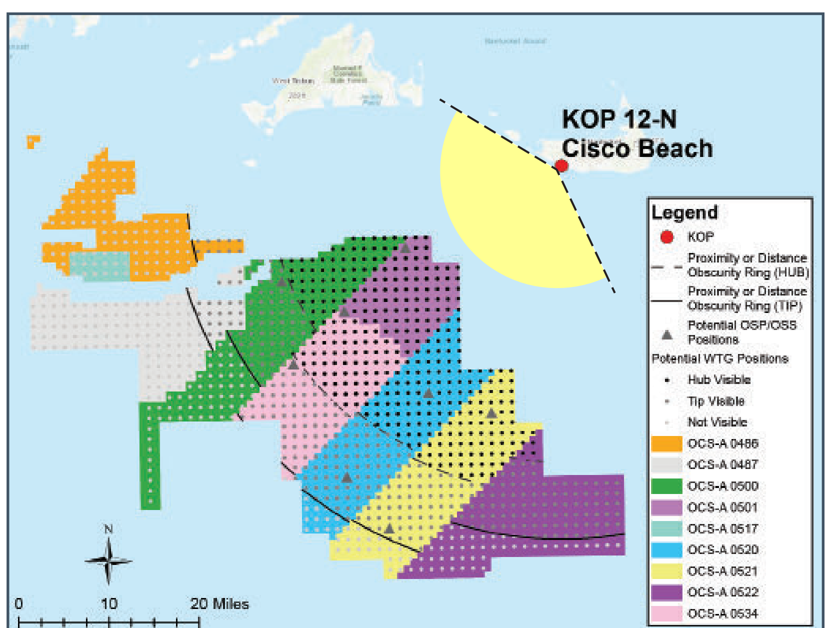
	Liberty Wind	Beacon Wind	Mayflower Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2025	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	149	77	120	169	131	103	18
Number of Structures within View of KOP	94	145	130	77	118	111	22	10	0
Distance to Closest Structure	22 mi (35 km)	21 mi (33 km)	23 mi (38 km)	16 mi (26 km)	31 mi (49.32 km)	20 mi (32 km)	38 mi (61 km)	38 mi (61 km)	49 mi (79 km)
Distance to Furthest Structure	48 mi (77 km)	49 mi (80 km)	49 mi (80 km)	29 mi (47 km)	48 mi (78 km)	59 mi (95 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

KOP 12-N Cisco Beach - Scenario 3 (Human Field of View - 124°)

SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 16 mi / 26 km

Furthest Visible WTG: 46 mi / 74 km

Potential Number of Structures Visible: 577

Potential Number of Structures Not Visible: 337

ENVIRONMENT

Temperature: 61° F

Humidity: 90%

Wind Dir & Speed: N 6 mph

Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM

Date of photograph: 8-20-20

L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential

Viewing direction: South (226°)

Latitude: 41.252490°N

Longitude: 70.154080°W

Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 23.0 ft / 7.0 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

KOP 12-N Cisco Beach - Scenario 3 (50mm view - 27° vertical / 40° horizontal) 1 of 3

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

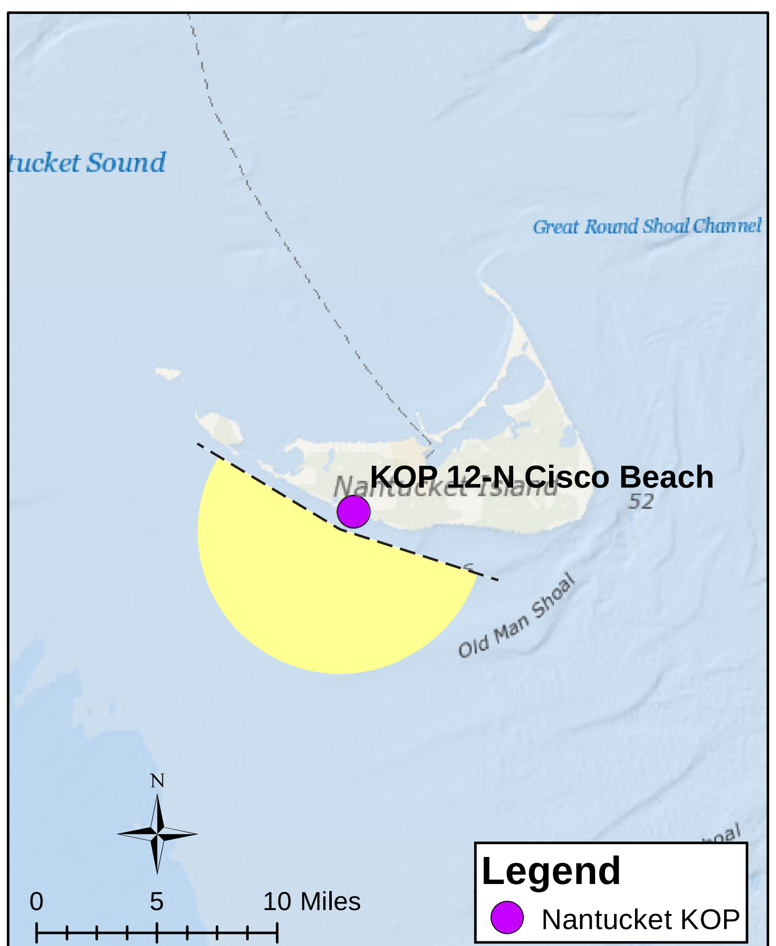
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach - Scenario 4

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16.2 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

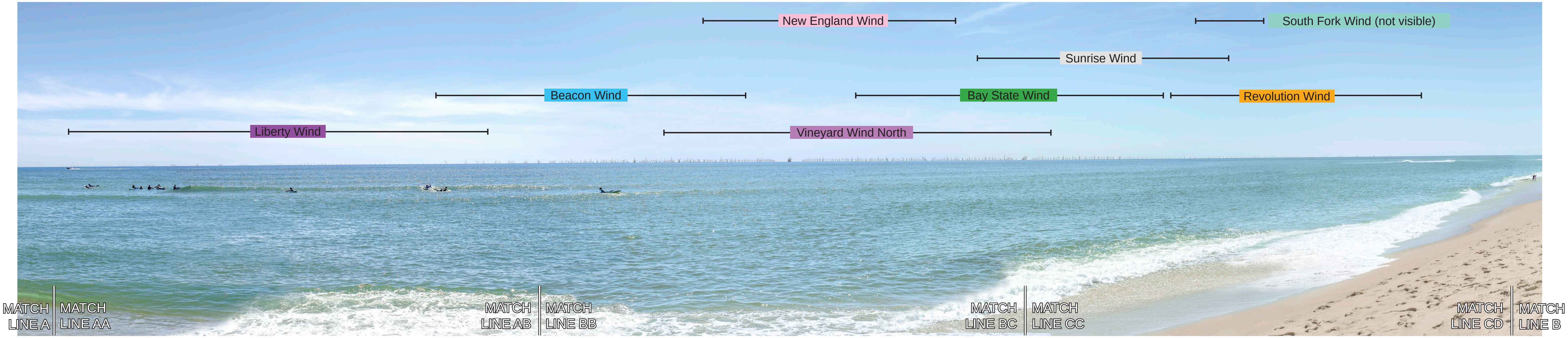
ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

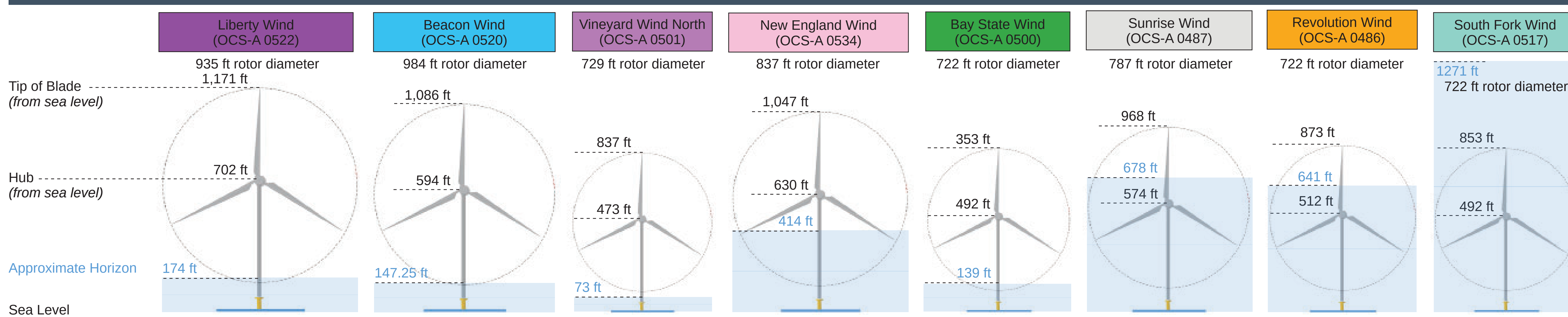
CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES

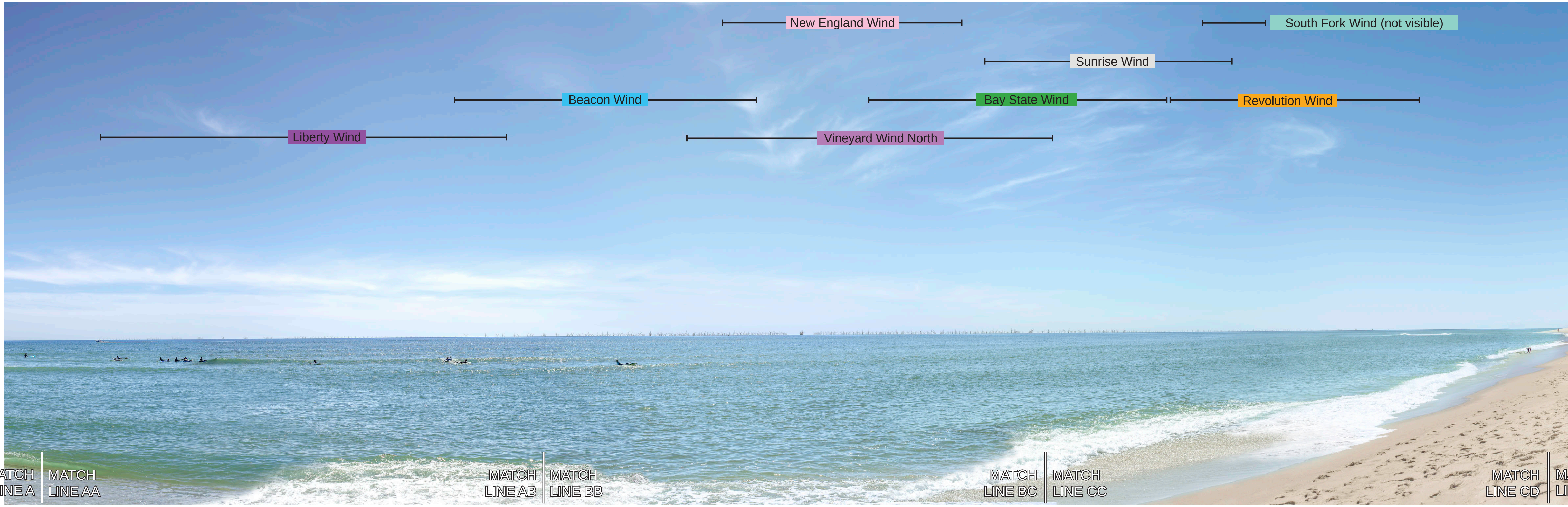


	Liberty Wind	Beacon Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	77	120	169	131	103	18
Number of Structures within View of KOP	94	145	77	118	111	22	10	0
Distance to Closest Structure	22 mi (35 km)	21 mi (33 km)	16 mi (26 km)	31 mi (49 km)	20 mi (32 km)	38 mi (61 km)	38 mi (61 km)	49 mi (79 km)
Distance to Furthest Structure	48 mi (77 km)	49 mi (80 km)	29 mi (47 km)	48 mi (78 km)	59 mi (95 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

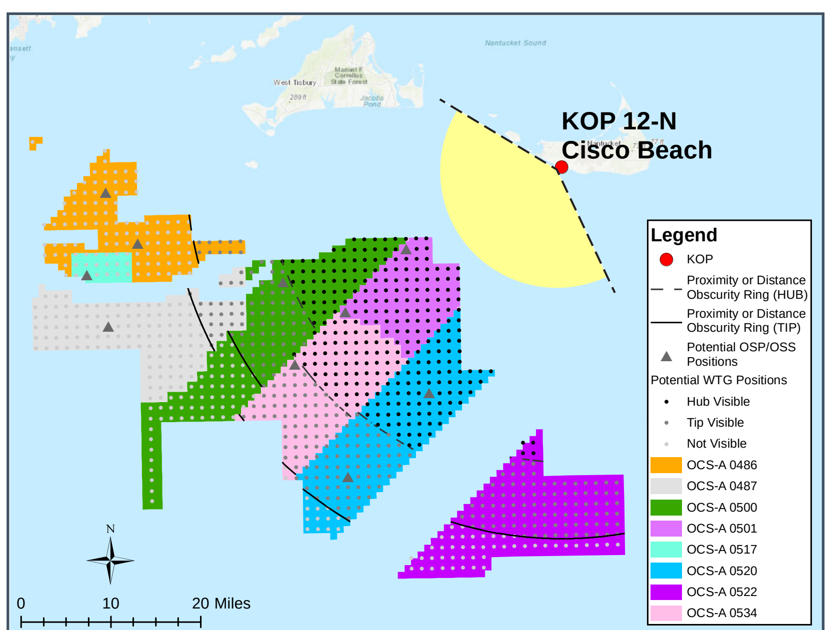
KOP 12-N Cisco Beach - Scenario 4 (Human Field of View - 124°)

Nantucket

SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach - Scenario 4 (50mm crop - 27° vertical / 40° horizontal) 1 of 3

SIMULATED CONDITIONS

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

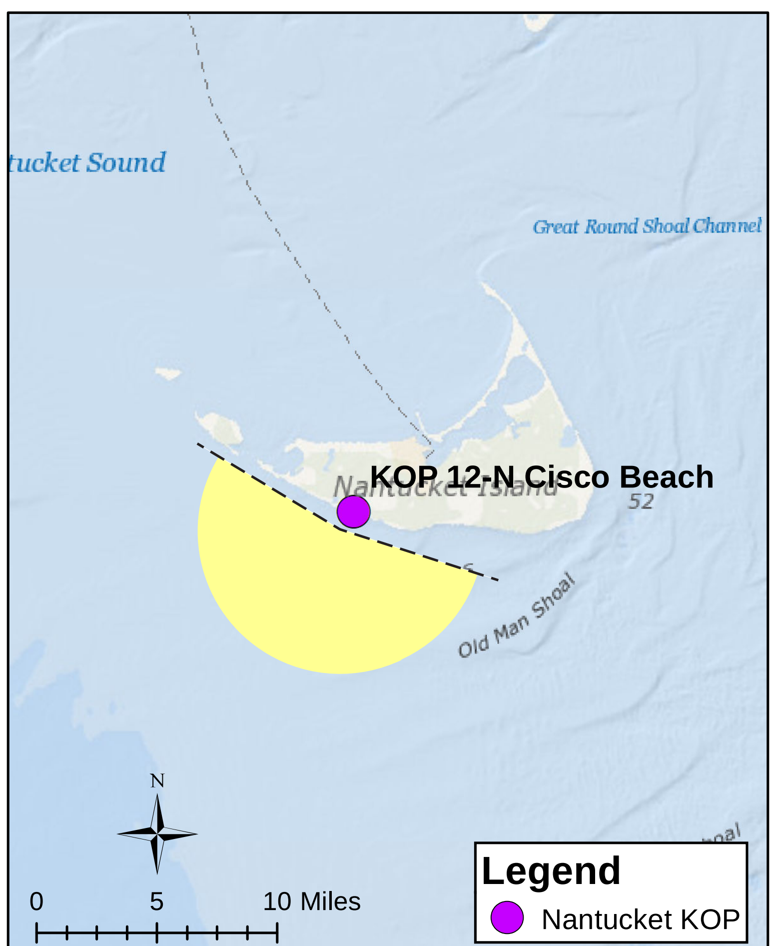
The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach - Scenario 5

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

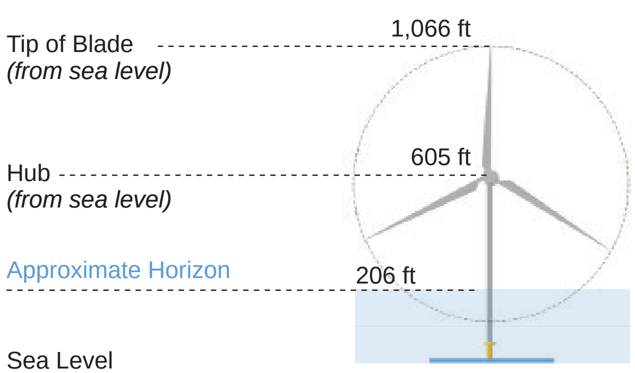
KOP 12-N Cisco Beach - Scenario 5

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

Mayflower Wind (OCS-A 0521)

919 ft rotor diameter

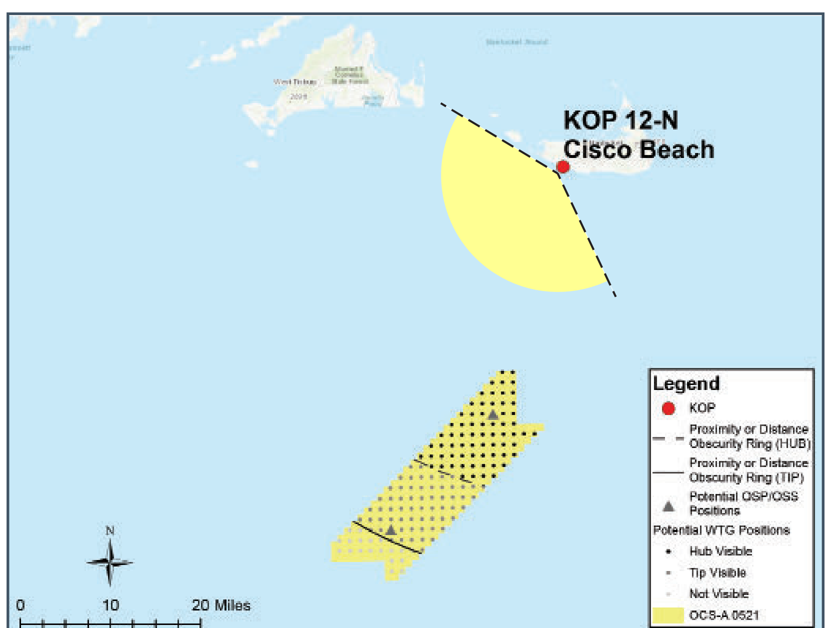


	Mayflower Wind (OCS-A 0521)
Year Forecasted for Development	2025
Number of Structures in Lease Area	149
Number of Structures within View of KOP	130
Distance to Closest Structure	23 mi (38 km)
Distance to Furthest Structure	49 mi (80 km)

KOP 12-N Cisco Beach - Scenario 5 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 16 mi / 26 km

Furthest Visible WTG: 46 mi / 74 km

Potential Number of Structures Visible: 577

Potential Number of Structures Not Visible: 337

ENVIRONMENT

Temperature: 61° F

Humidity: 90%

Wind Dir & Speed: N 6 mph

Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM

Date of photograph: 8-20-20

L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential

Viewing direction: South (226°)

Latitude: 41.252490°N

Longitude: 70.154080°W

Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 23.0 ft / 7.0 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

SIMULATED CONDITIONS

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 12-N Cisco Beach - Scenario 5 (50mm view - 27° vertical / 40° horizontal) 2 of 3

SIMULATED CONDITIONS

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach - Scenario 5 (50mm view - 27° vertical / 40° horizontal) 3 of 3

SIMULATED CONDITIONS

MATCH LINE BC

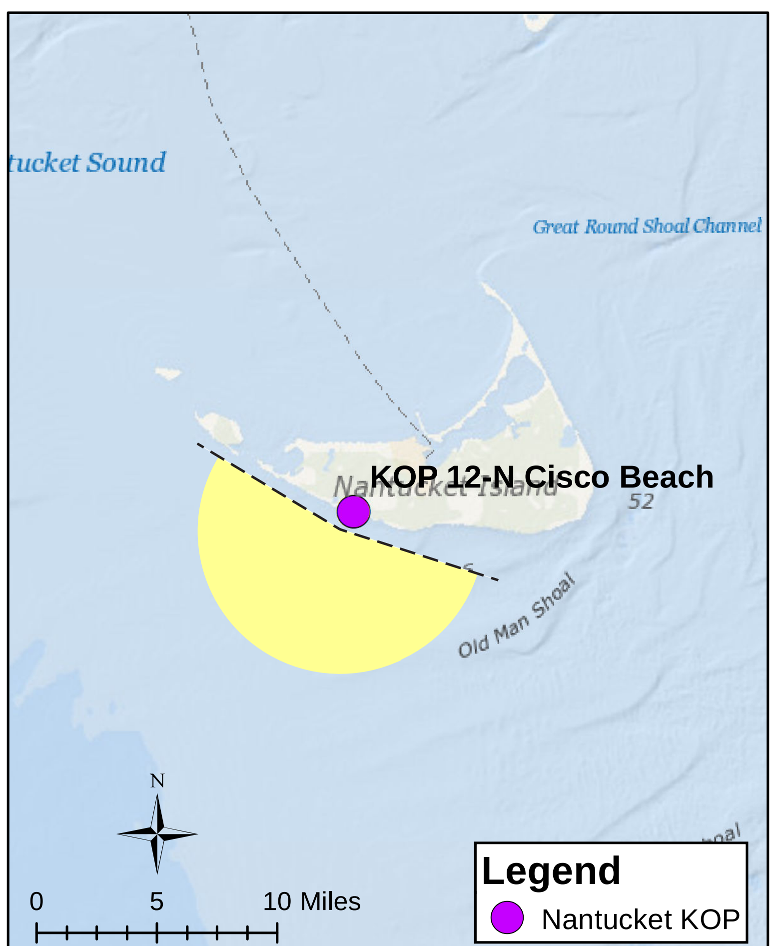
MATCH LINE B

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach Night - Scenario 1

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 9:00PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

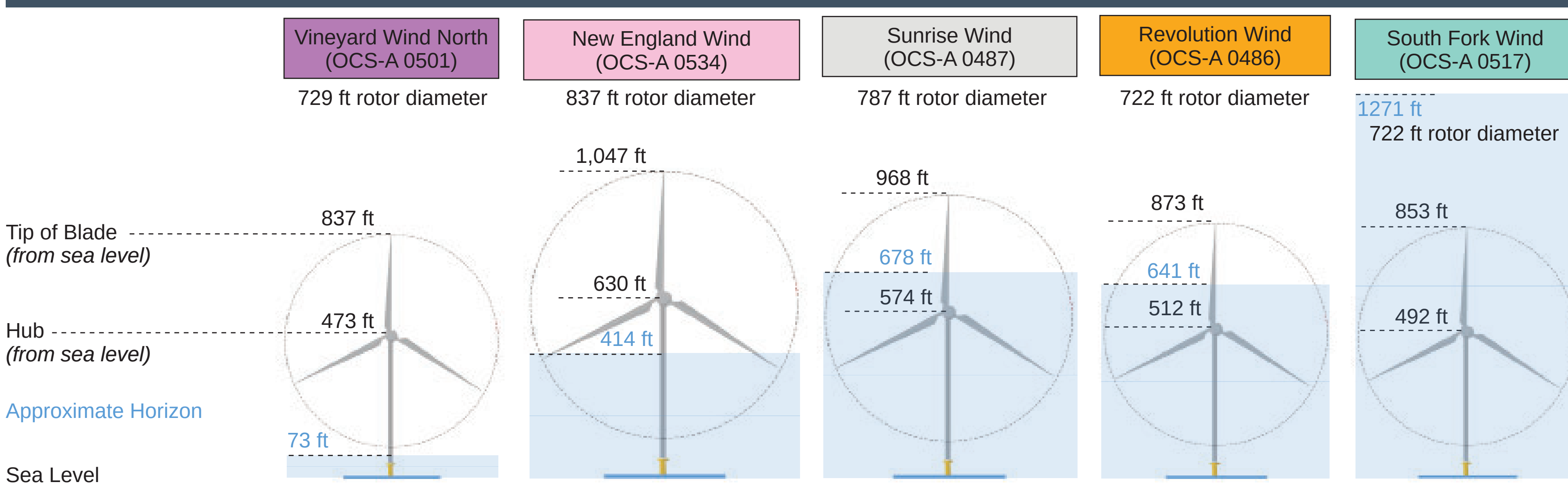
CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach Night - Scenario 1

SIMULATED CONDITIONS

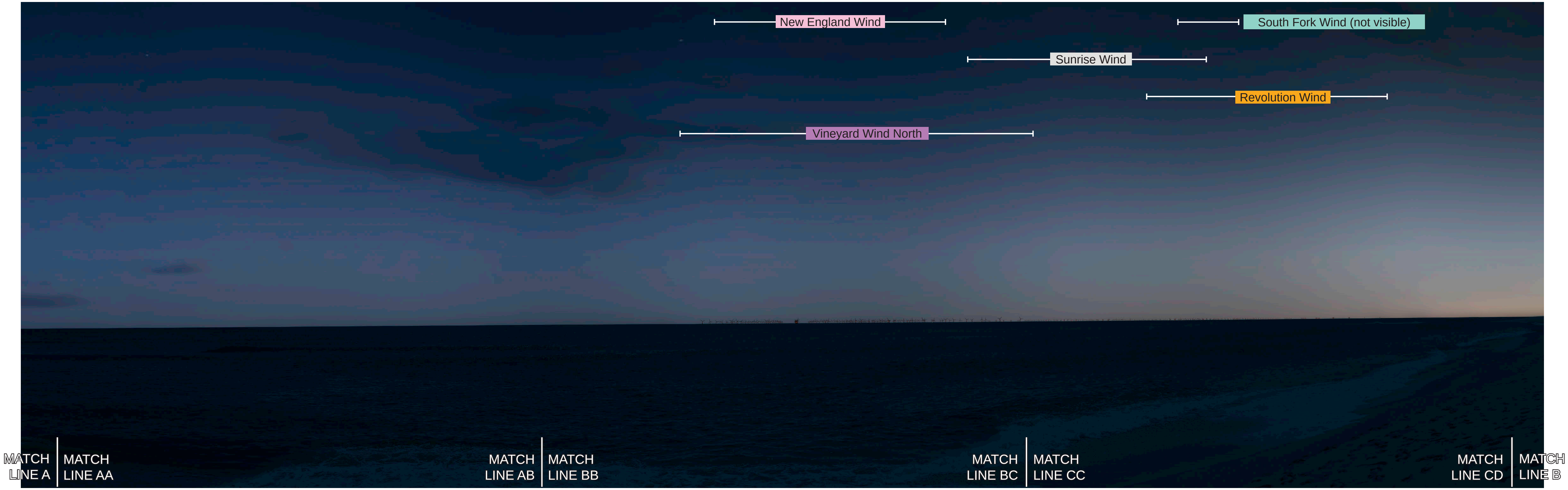
VISIBILTY OF CLOSEST TURBINES



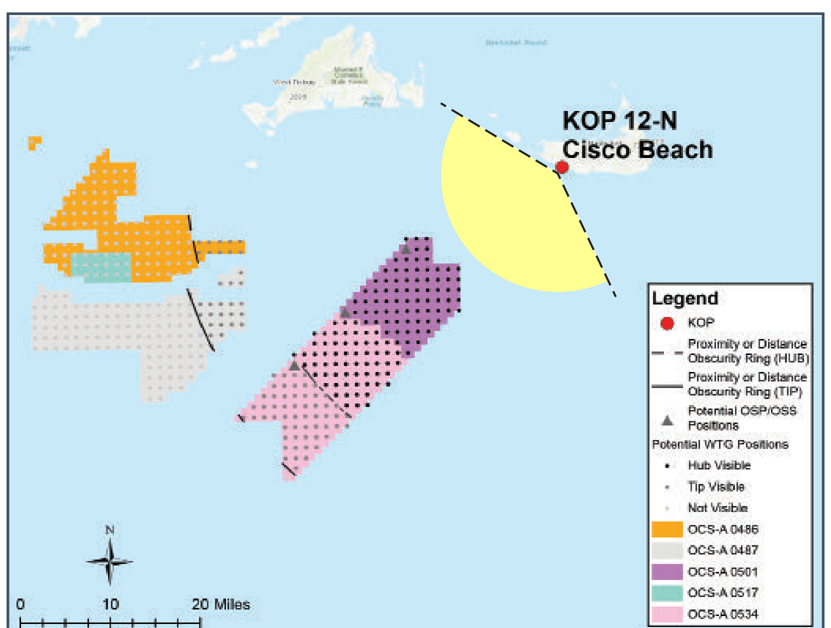
	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	77	118	22	10	0
Distance to Closest Structure	16 mi (26 km)	31 mi (49 km)	38 mi (61 km)	38 mi (61 km)	49 mi (79 km)
Distance to Furthest Structure	29 mi (47 km)	48 mi (78 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

KOP 12-N Cisco Beach Night - Scenario 1 (Human Field of View - 124°)

SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km

Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

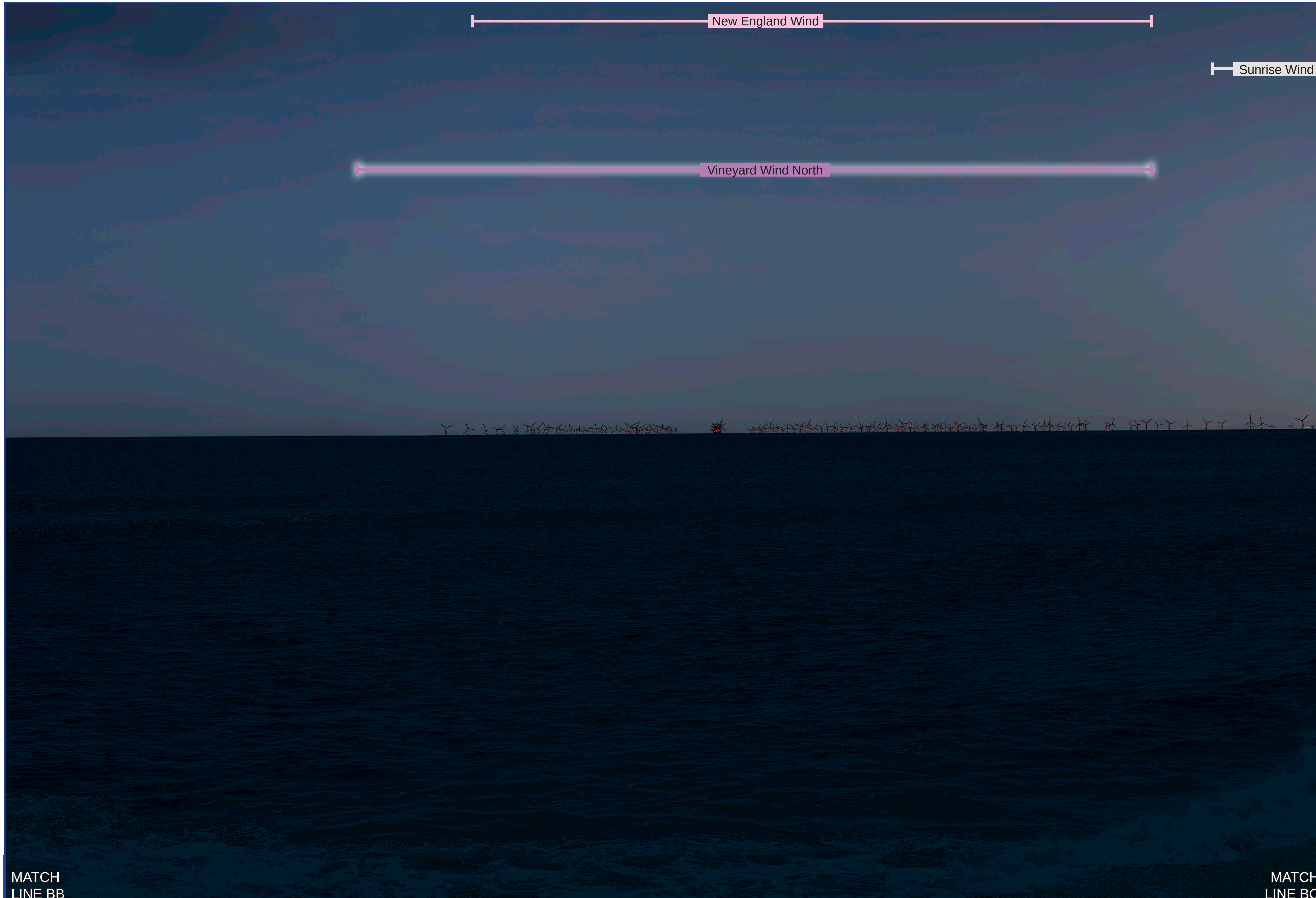
Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential

Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .



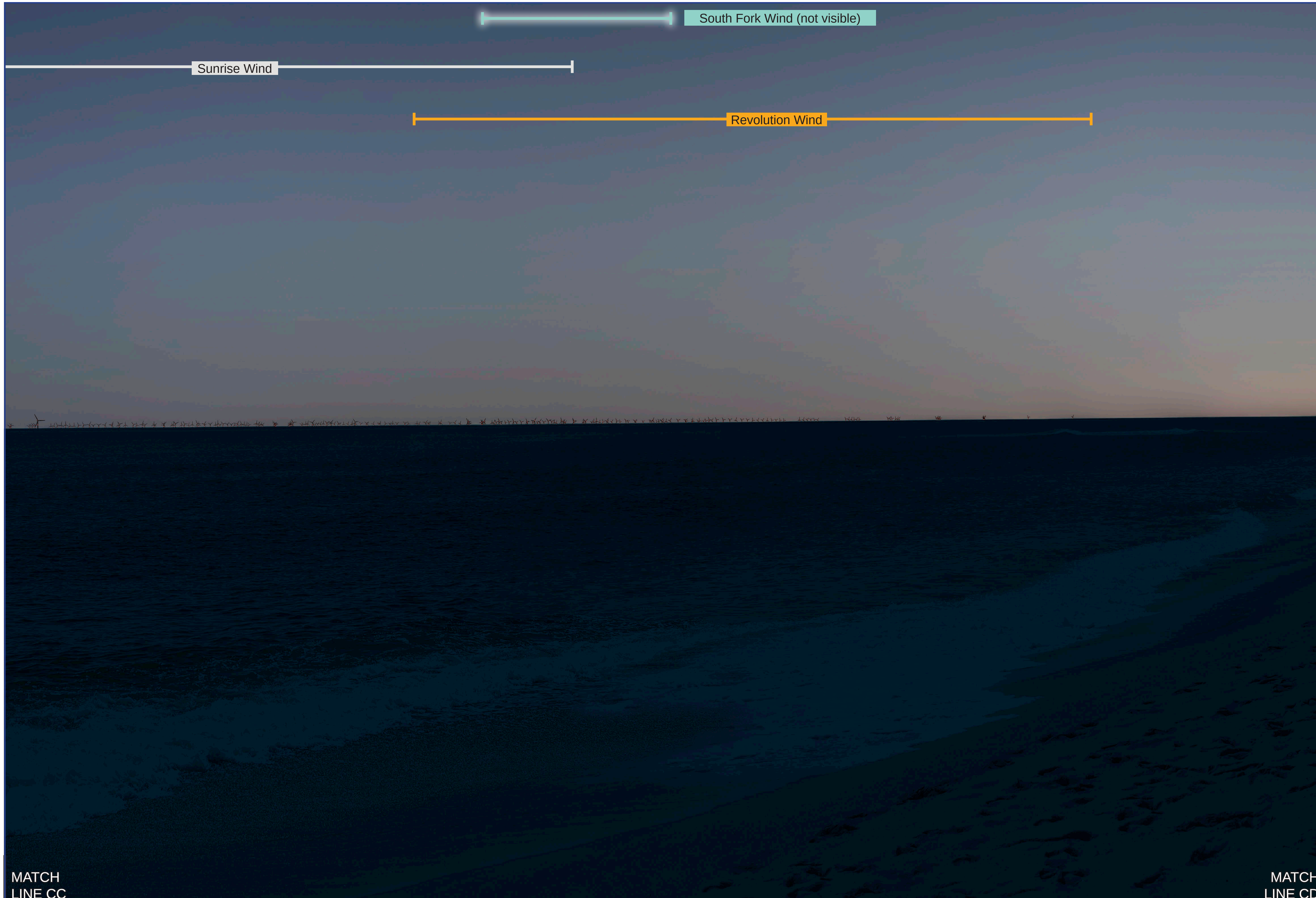
MATCH
LINE AB

MATCH
LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach Night - Scenario 1 (50mm view - 27° vertical / 40° horizontal) 3 of 3

SIMULATED CONDITIONS



MATCH LINE BC

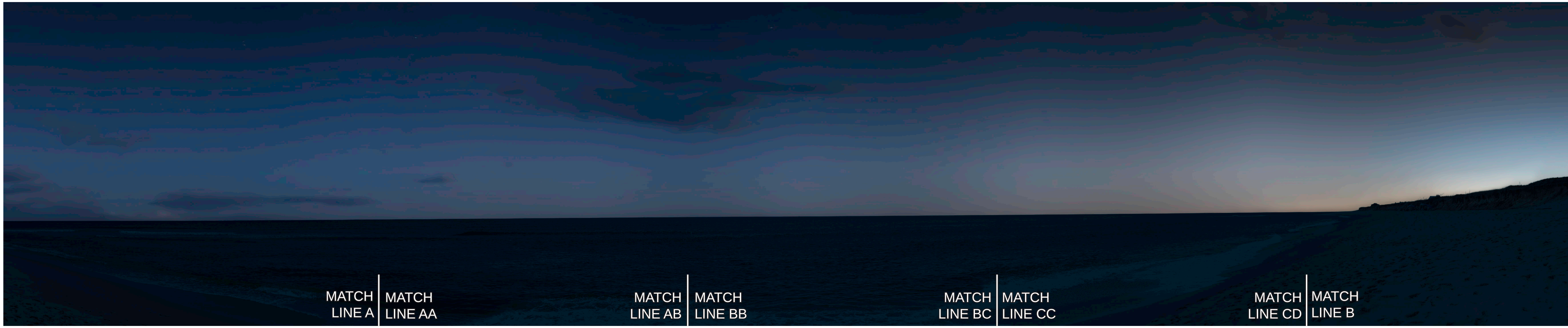
MATCH LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

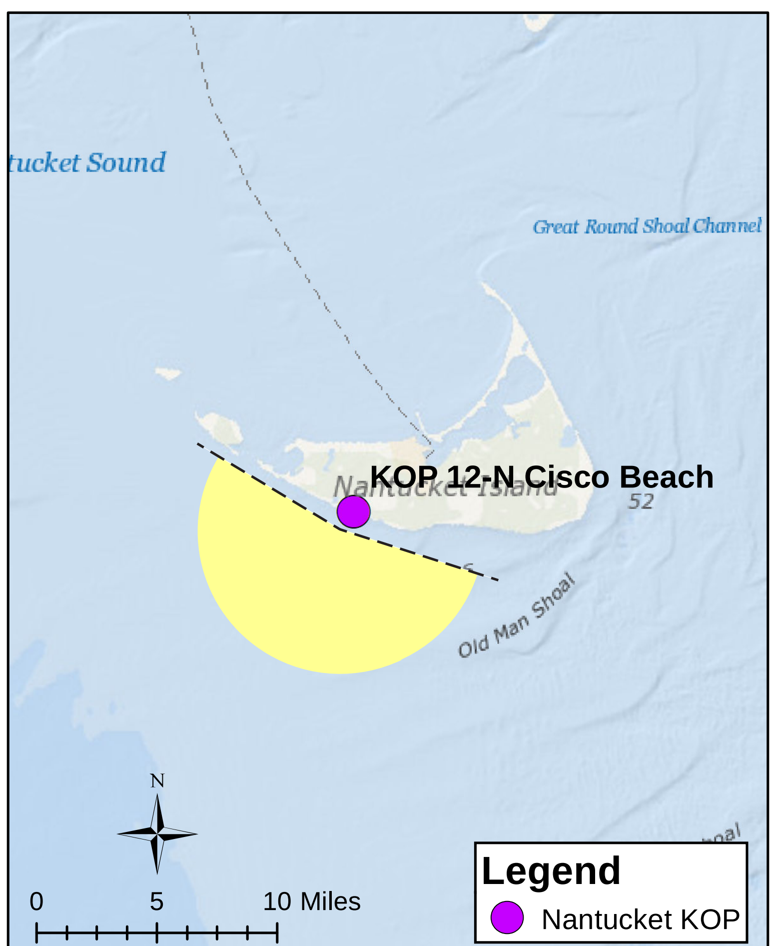
KOP 12-N Cisco Beach Night - Scenario 1

Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS



REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 9:00PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

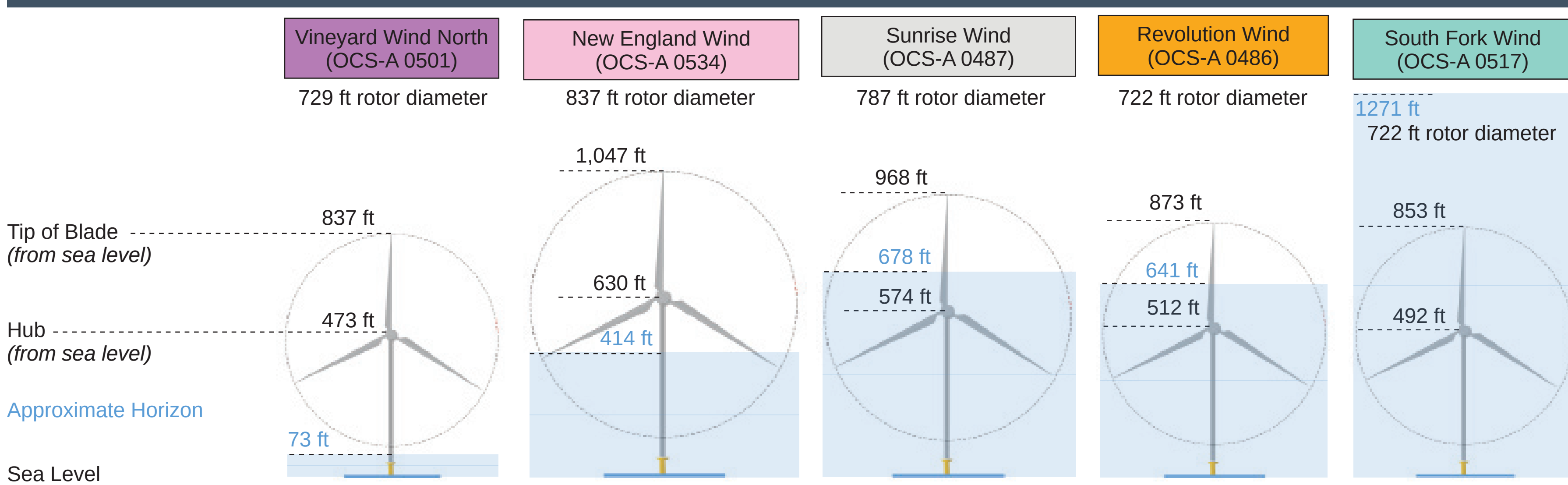
CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach Night - Scenario 1

SIMULATED CONDITIONS

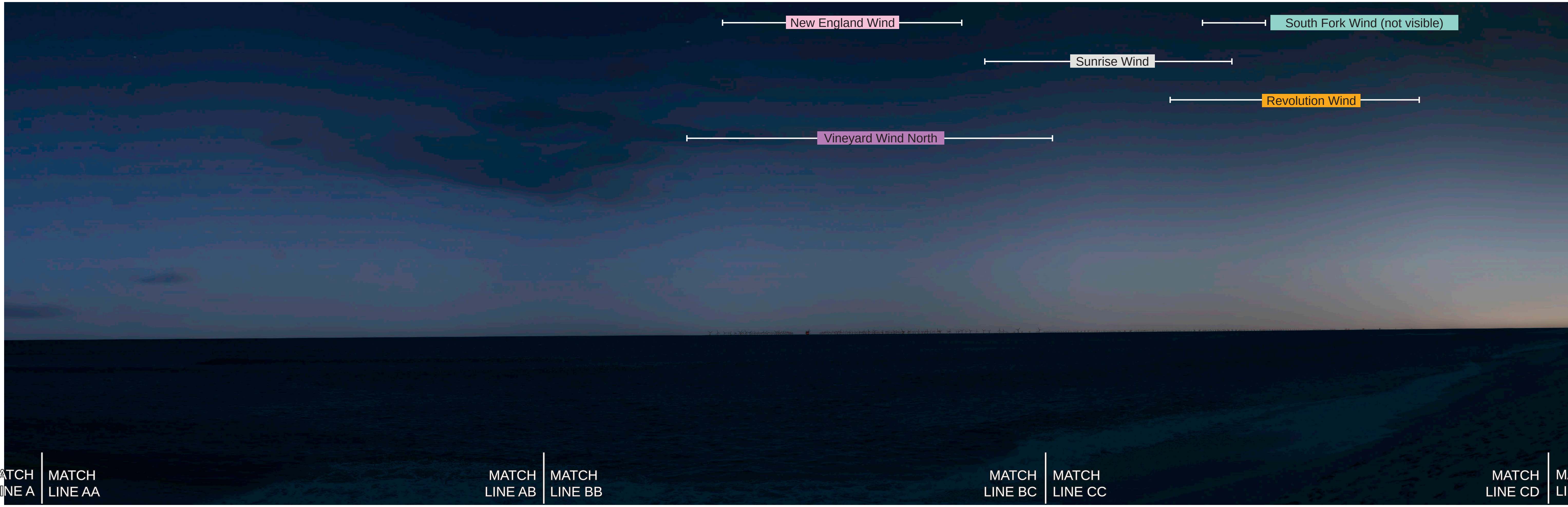
VISIBILTY OF CLOSEST TURBINES



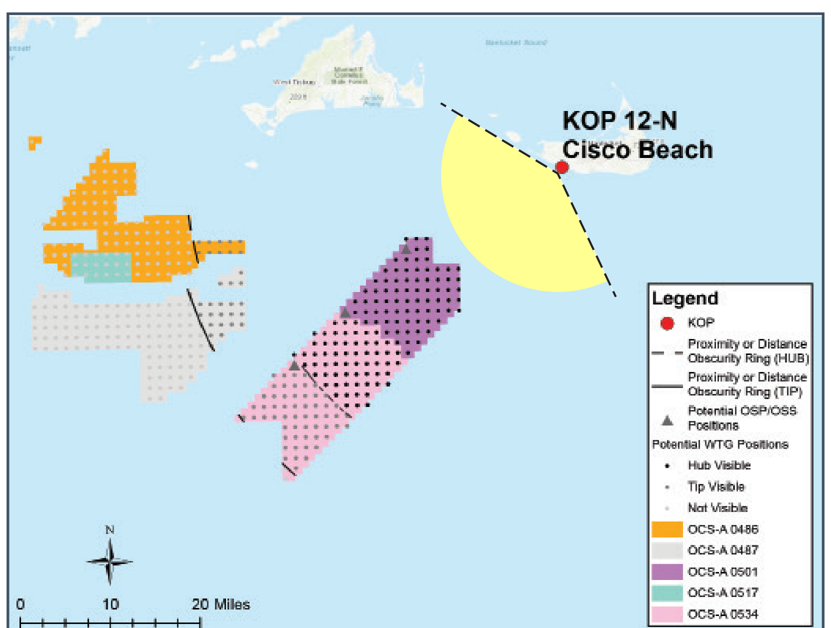
	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	77	118	22	10	0
Distance to Closest Structure	16 mi (26 km)	31 mi (49 km)	38 mi (61 km)	38 mi (61 km)	49 mi (79 km)
Distance to Furthest Structure	29 mi (47 km)	48 mi (78 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

KOP 12-N Cisco Beach Night - Scenario 1 (Human Field of View - 124°)

SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 16 mi / 26 km

Furthest Visible WTG: 46 mi / 74 km

Potential Number of Structures Visible: 577

Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM

Date of photograph: 8-20-20

L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential

Viewing direction: South (226°)

Latitude: 41.252490°N

Longitude: 70.154080°W

Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F

Humidity: 90%

Wind Dir & Speed: N 6 mph

Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 23.0 ft / 7.0 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

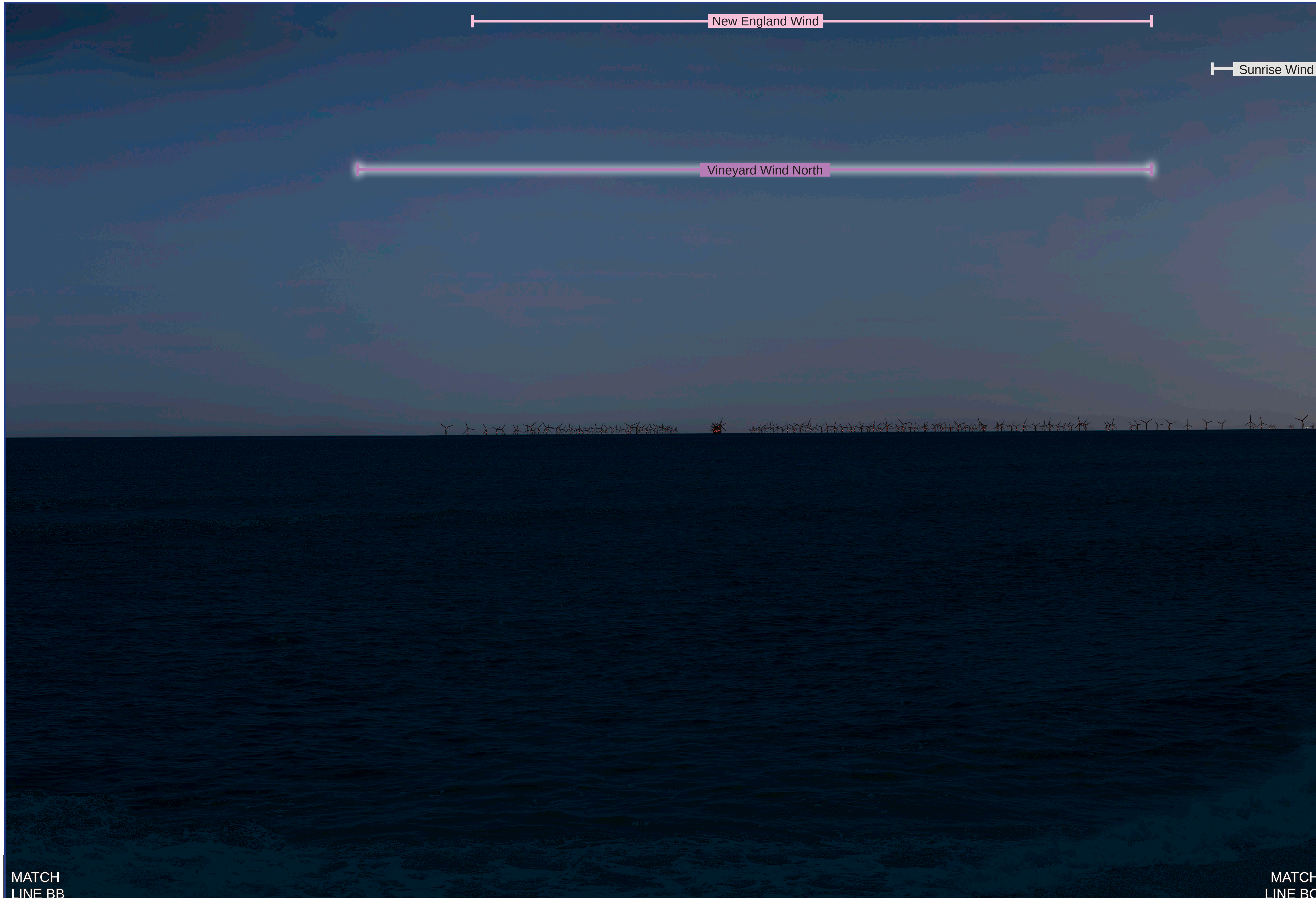
Shutter: 1/1250 sec

Exposure bias: -0.7 step

MATCH
LINE A

MATCH
LINE BB

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .



MATCH
LINE AB

MATCH
LINE CC

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

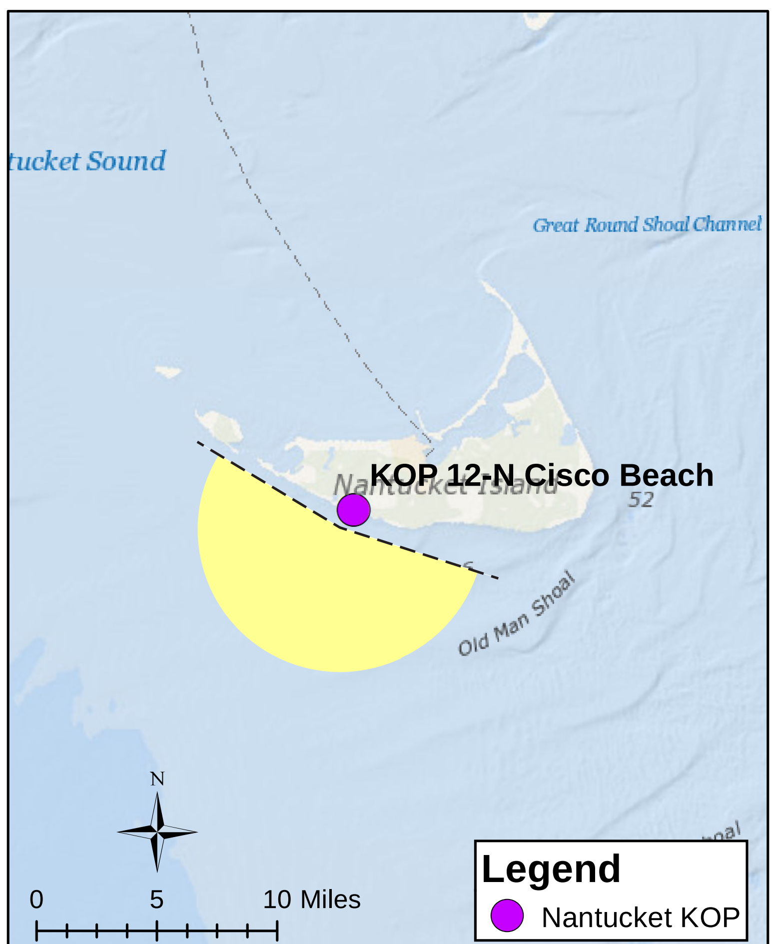
KOP 12-N Cisco Beach Night - Scenario 2

Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

1

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 9:00 PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

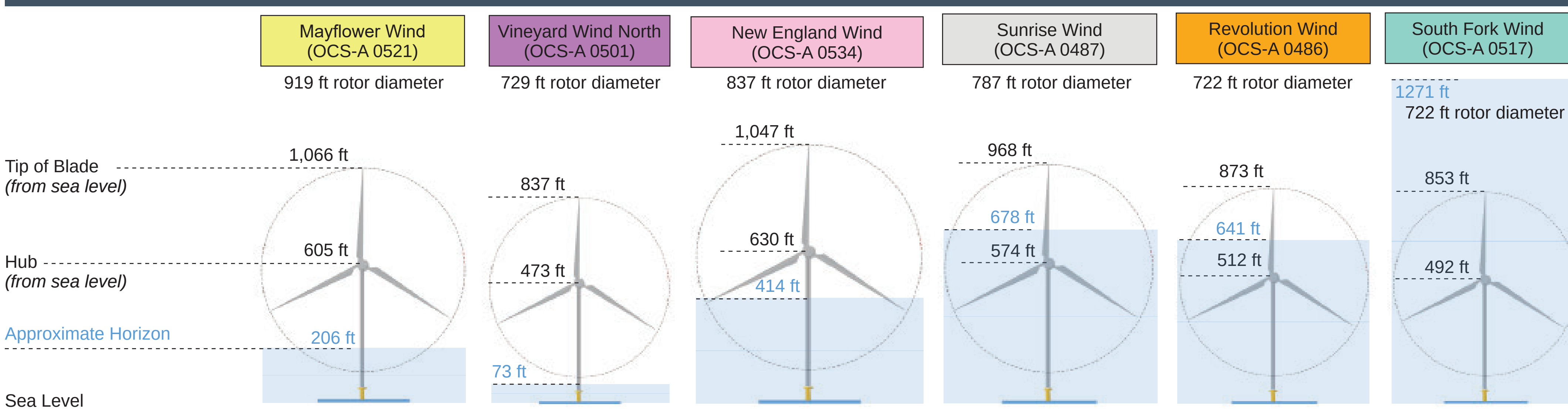
CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach Night - Scenario 2

SIMULATED CONDITIONS

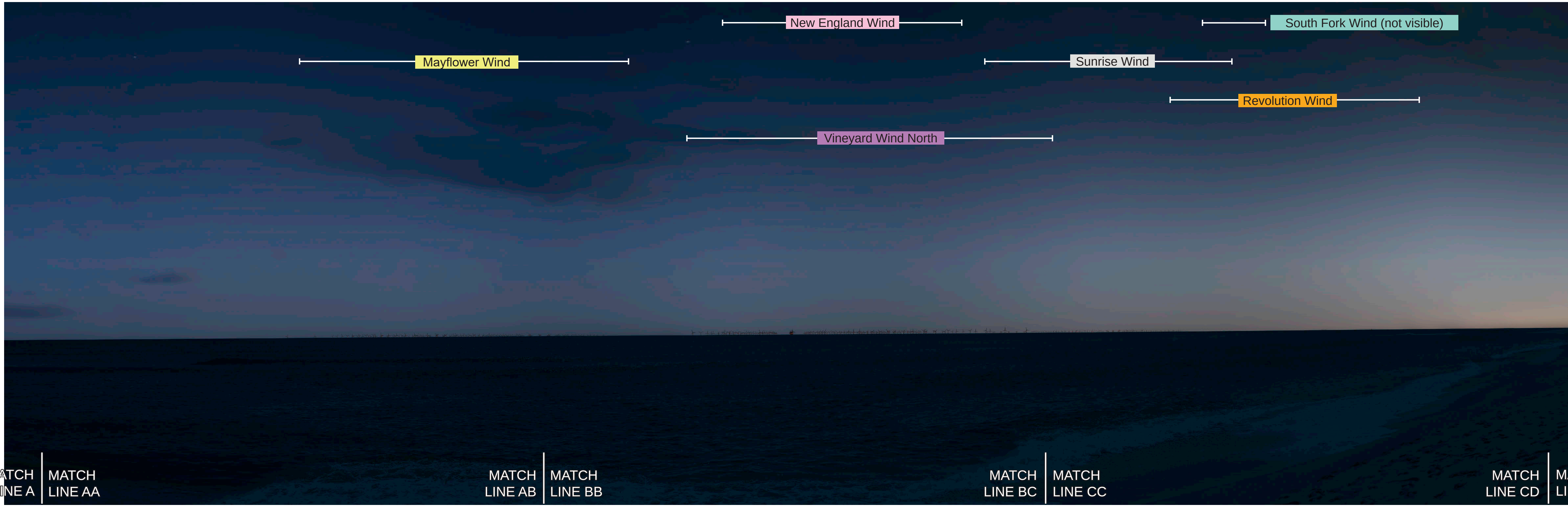
VISIBILTY OF CLOSEST TURBINES



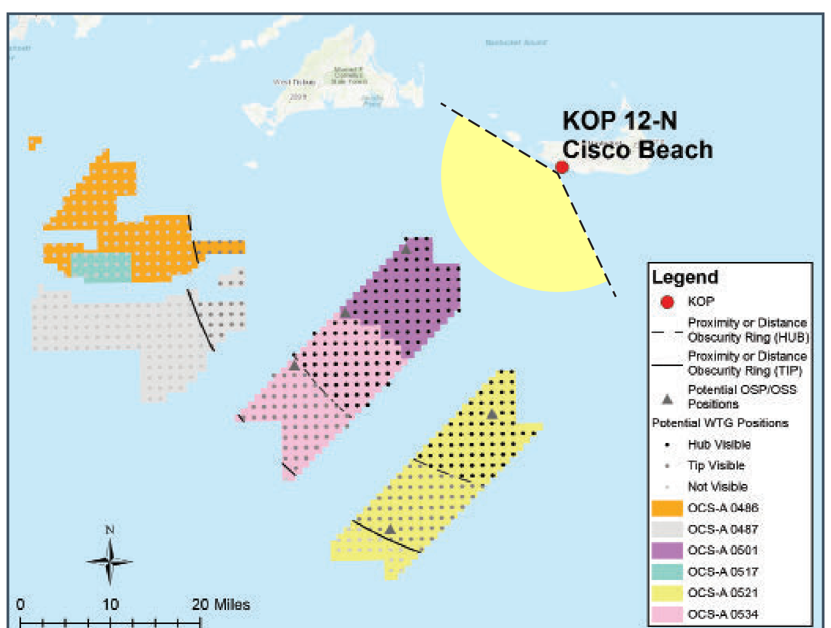
	Mayflower Wind	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	149	77	120	131	103	18
Number of Structures within View of KOP	130	77	118	22	10	0
Distance to Closest Structure	23 mi (38 km)	16 mi (26 km)	31 mi (49 km)	38 mi (61 km)	38 mi (61 km)	49 mi (79 km)
Distance to Furthest Structure	49 mi (80 km)	29 mi (47 km)	49 mi (78 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

KOP 12-N Cisco Beach Night - Scenario 2 (Human Field of View - 124°)

SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

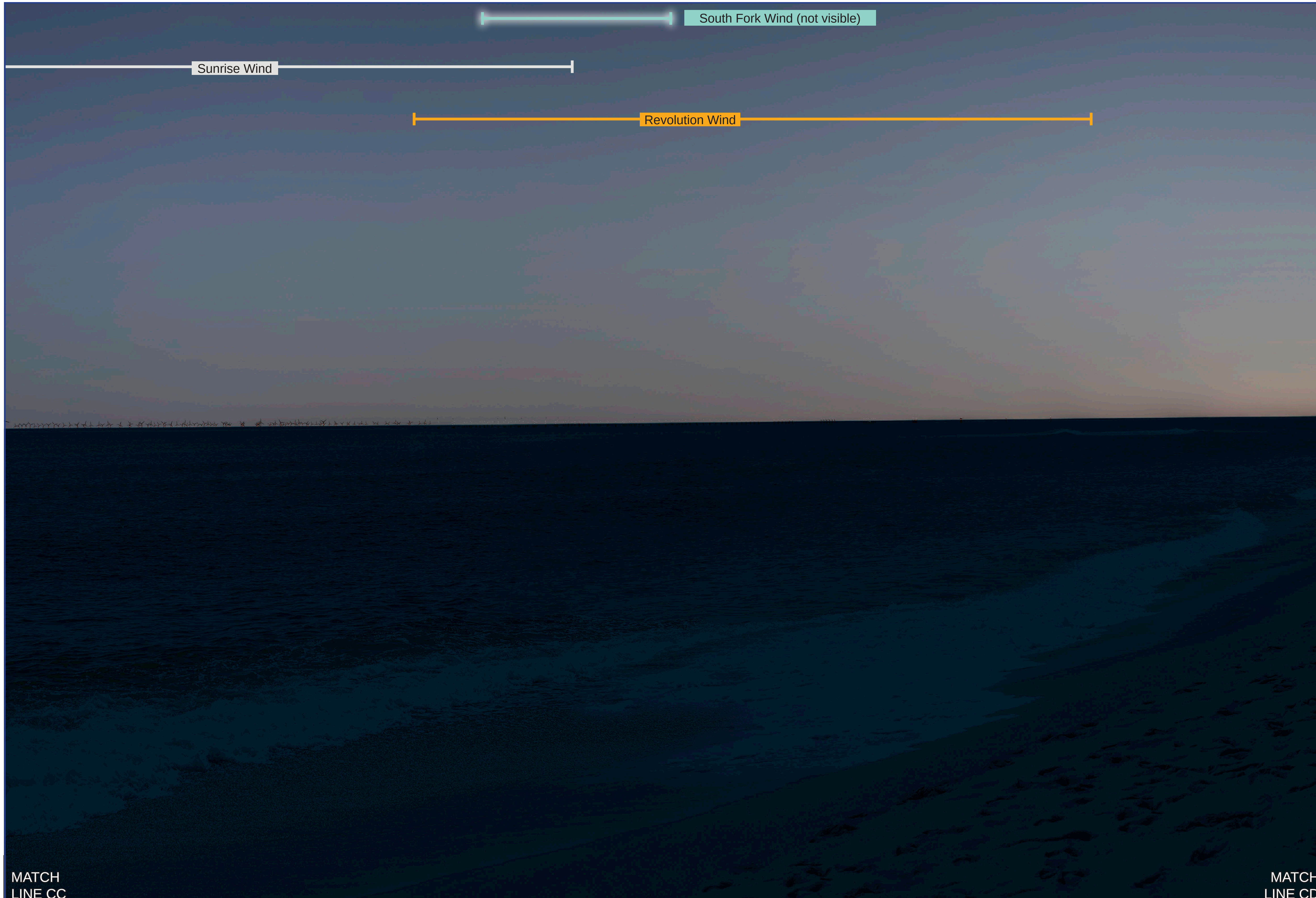
The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 12-N Cisco Beach Night - Scenario 2 (50mm view - 27° vertical / 40° horizontal) 2 of 3

MATCH
LINE AB

MATCH
LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .



MATCH LINE BC

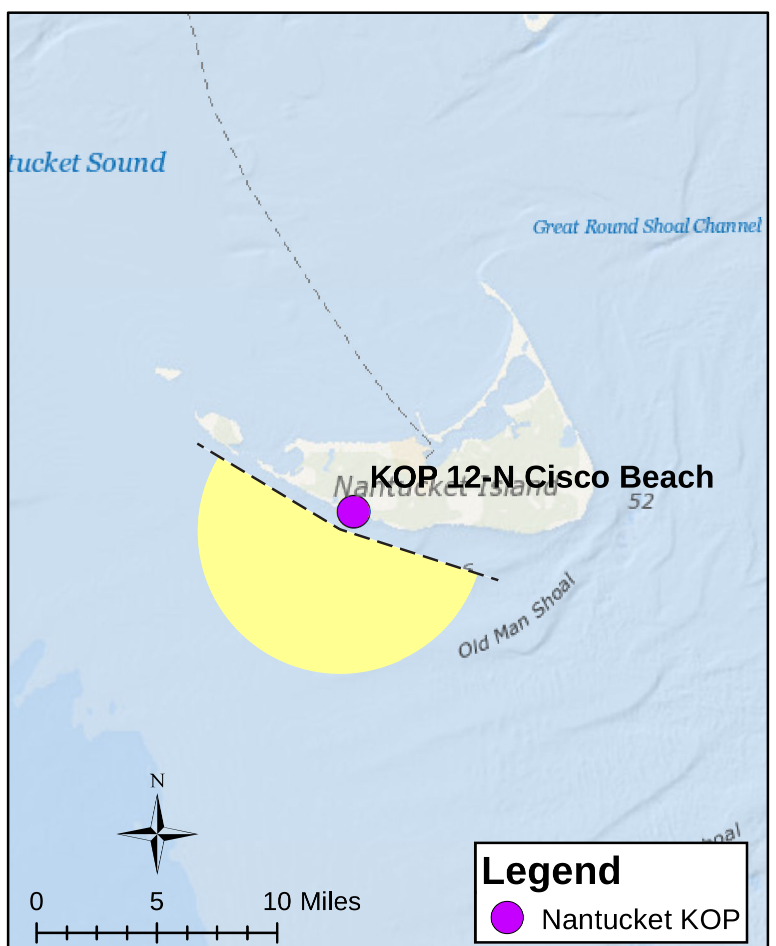
MATCH LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 12-N Cisco Beach Night - Scenario 3

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 9:00 PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

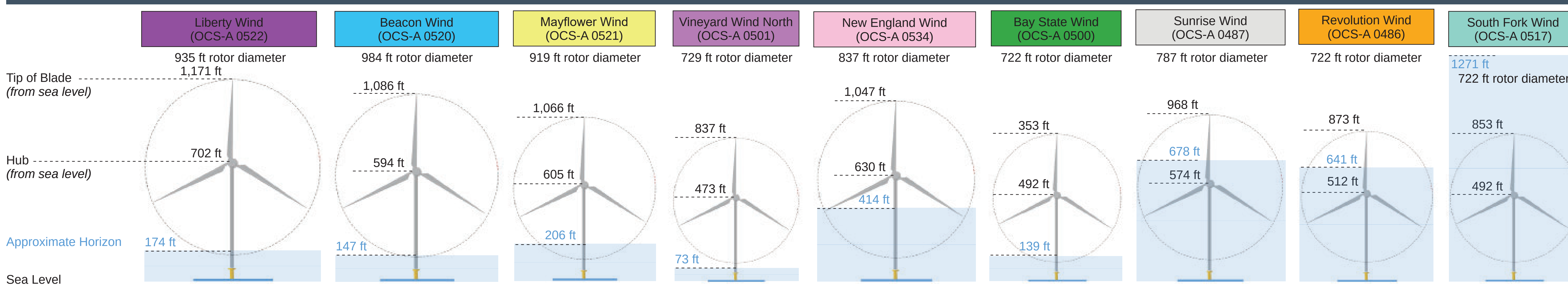
CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach Night - Scenario 3

SIMULATED CONDITIONS

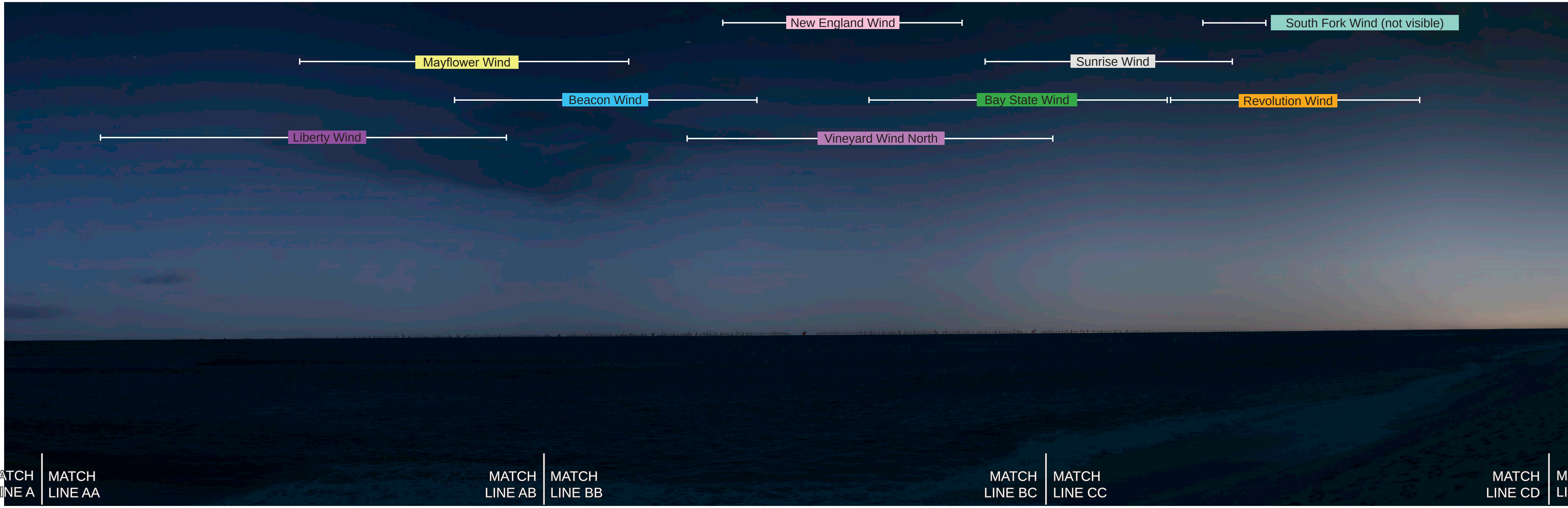
VISIBILTY OF CLOSEST TURBINES



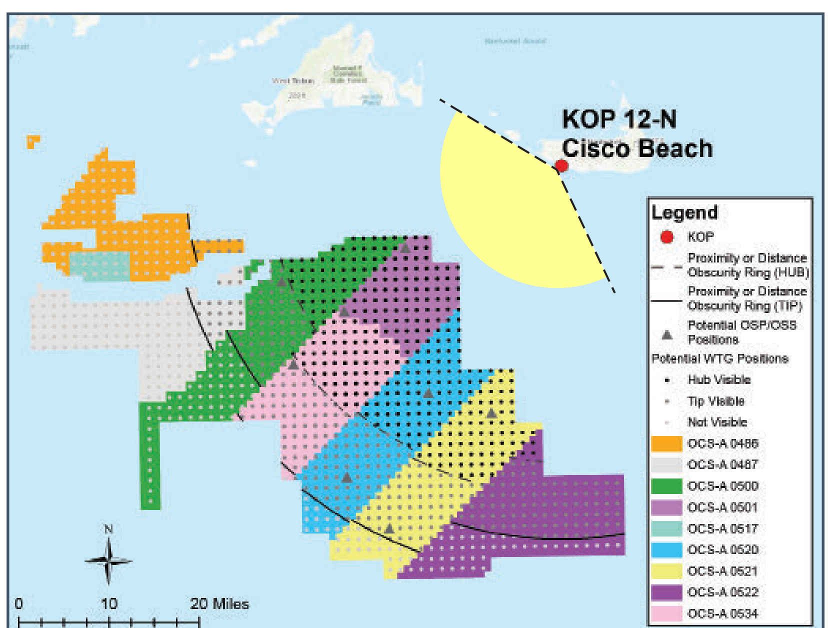
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Mayflower Wind (OCS-A 0521)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2025-2030	2025-2030	2025	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	149	77	120	169	131	103	18
Number of Structures within View of KOP	94	145	130	77	118	111	22	10	0
Distance to Closest Structure	22 mi (35 km)	21 mi (33 km)	23 mi (38 km)	16 mi (26 km)	31 mi (49 km)	20 mi (32 km)	38 mi (61 km)	38 mi (61 km)	49 mi (79 km)
Distance to Furthest Structure	48 mi (77 km)	49 mi (80 km)	49 mi (80 km)	29 mi (47 km)	48 mi (78 km)	59 mi (95 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

KOP 12-N Cisco Beach Night - Scenario 3 (Human Field of View - 124°)

SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS

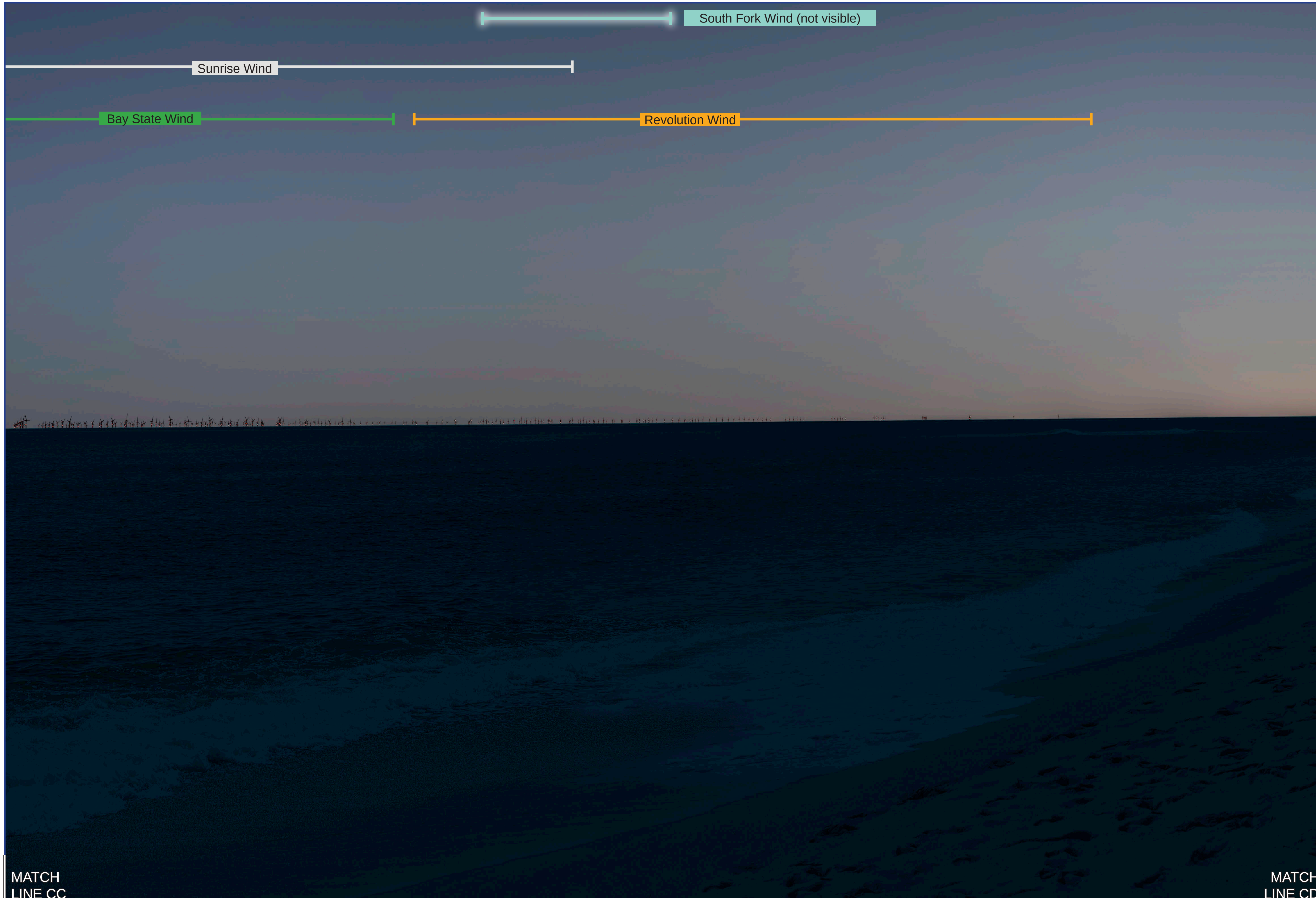
MATCH LINE A

MATCH LINE BB

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

SIMULATED CONDITIONS



MATCH
LINE BC

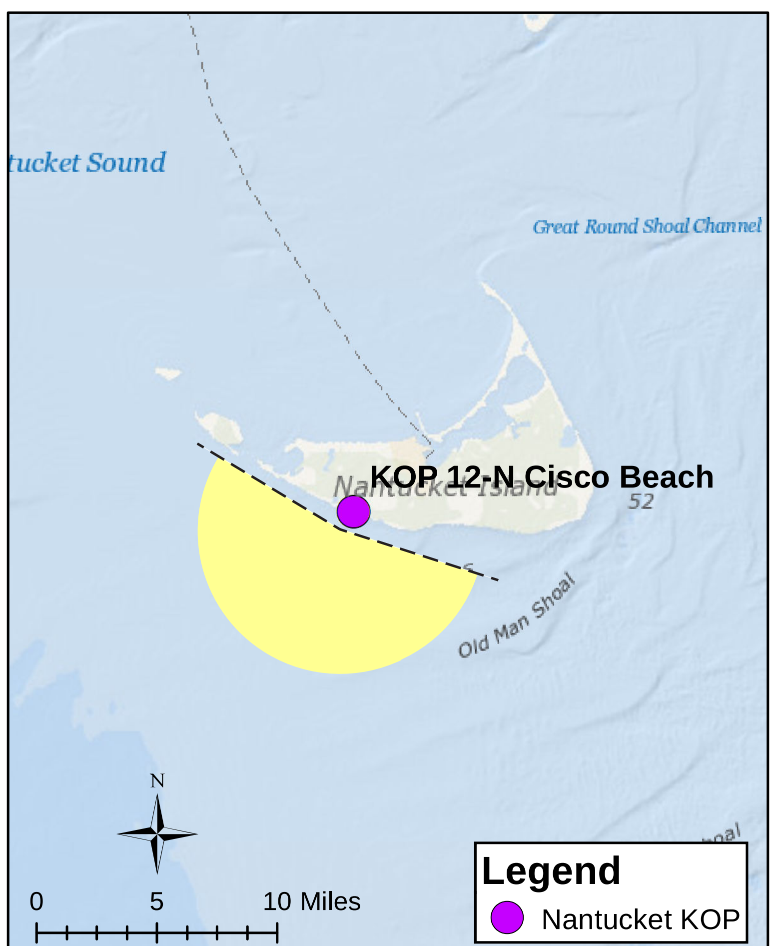
MATCH
LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 12-N Cisco Beach Night - Scenario 4

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16.2 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 9:00PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

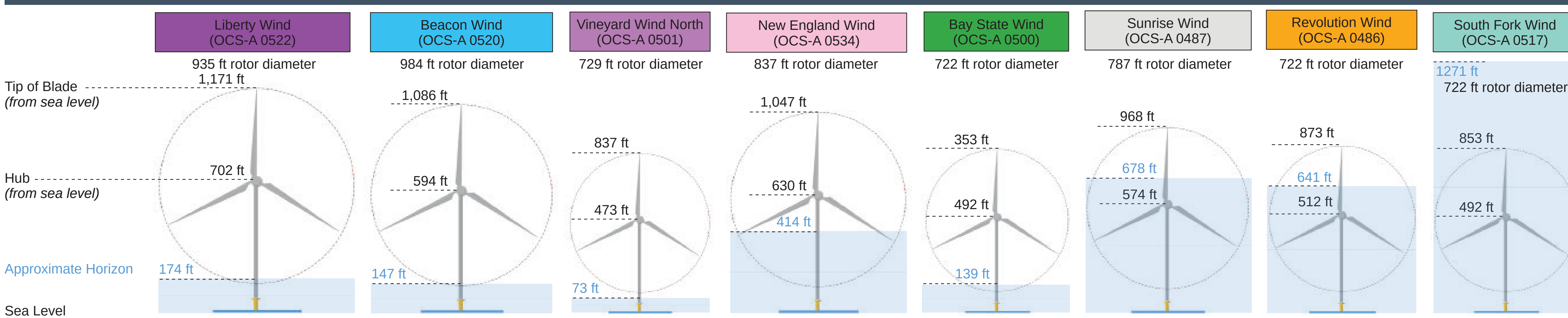
KOP 12-N Cisco Beach Night - Scenario 4

Nantucket

SIMULATED CONDITIONS

2

VISIBILTY OF CLOSEST TURBINES



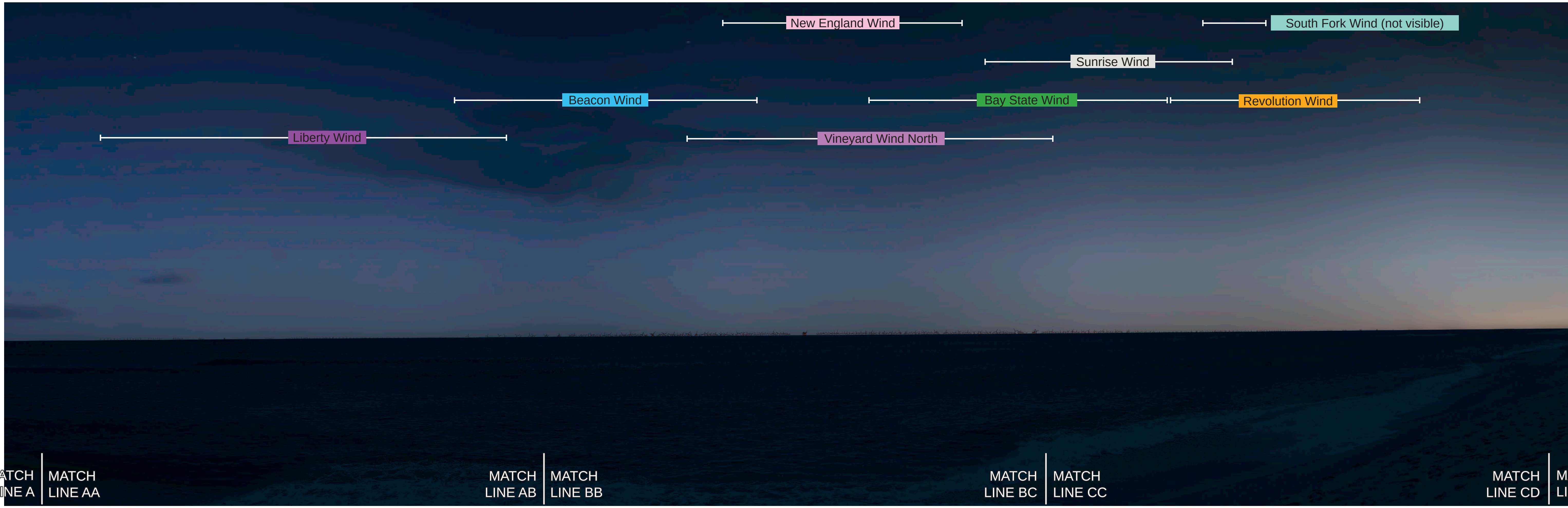
	Liberty Wind	Beacon Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	77	120	169	131	103	18
Number of Structures within View of KOP	94	145	77	118	111	22	10	0
Distance to Closest Structure	22 mi (35 km)	21 mi (33 km)	16 mi (26 km)	31 mi (49 km)	20 mi (32km)	38 mi (61 km)	38 mi (61 km)	49 mi (79 km)
Distance to Furthest Structure	48 mi (77 km)	49 mi (80 km)	29 mi (47 km)	48 mi (78 km)	59 mi (95 km)	62 mi (100 km)	59 mi (95 km)	56 mi (89 km)

KOP 12-N Cisco Beach Night - Scenario 4 (Human Field of View - 124°)

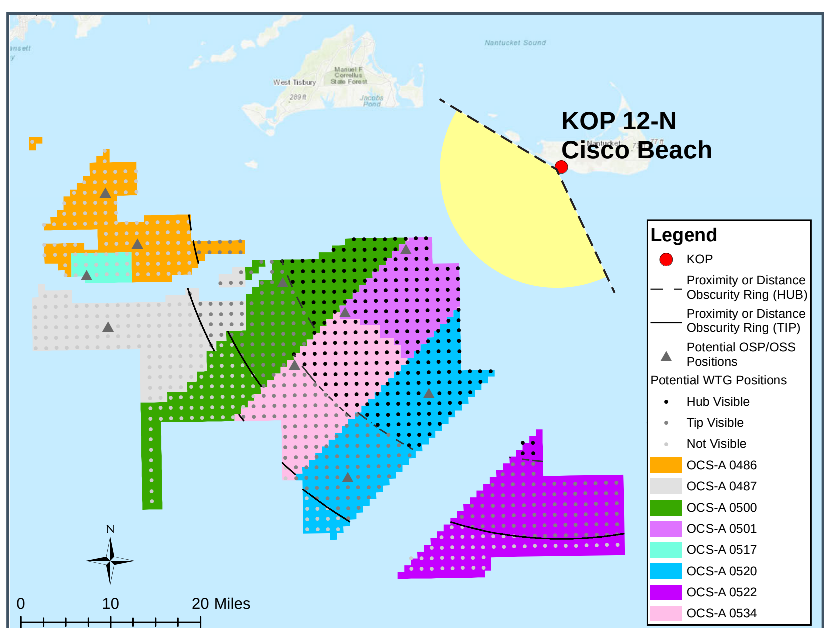
Nantucket

SIMULATED CONDITIONS

3



REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

PHOTOGRAPH AND SITE

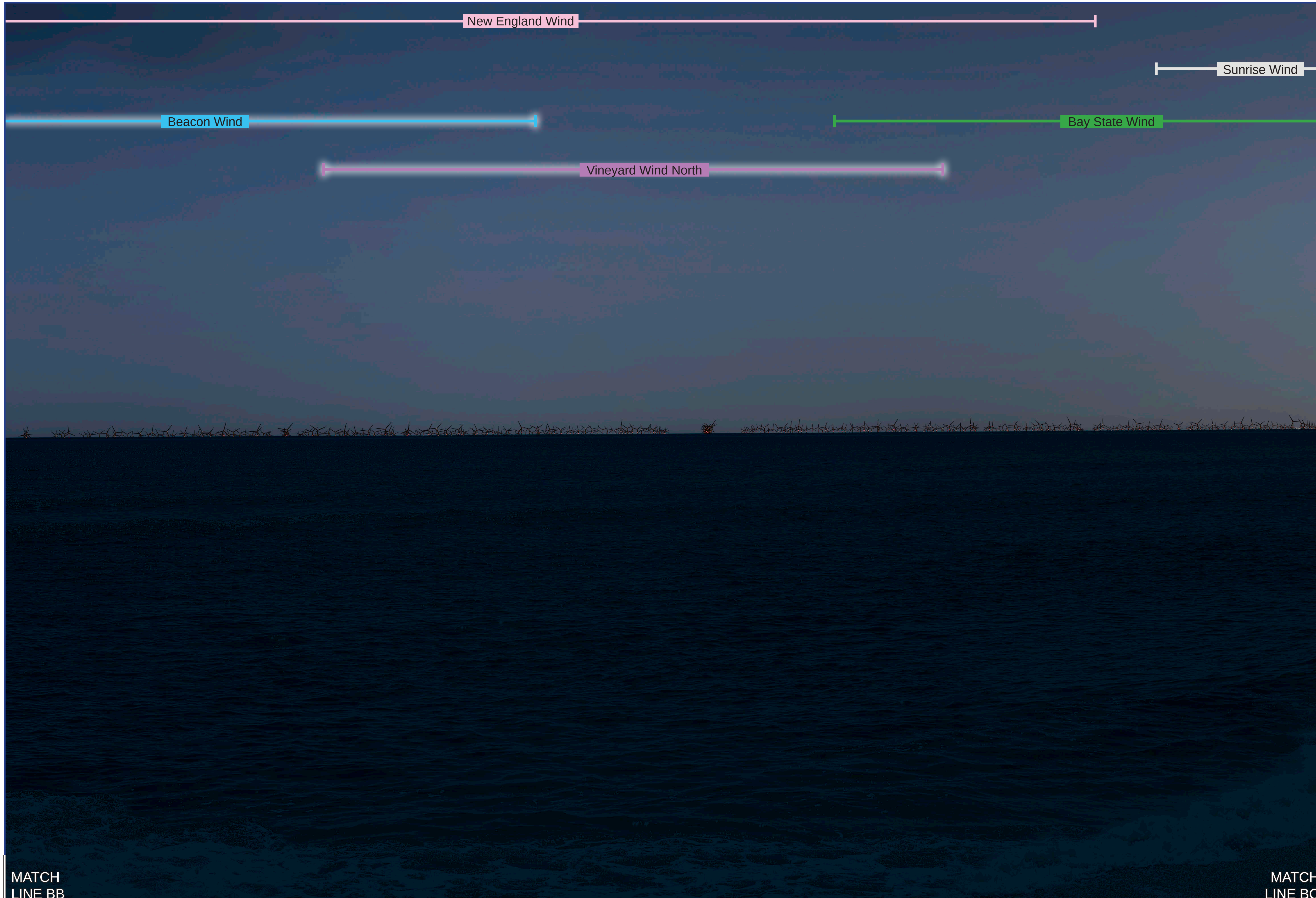
Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 12-N Cisco Beach Night - Scenario 4 (50mm crop - 27° vertical / 40° horizontal) 1 of 3

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .



The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

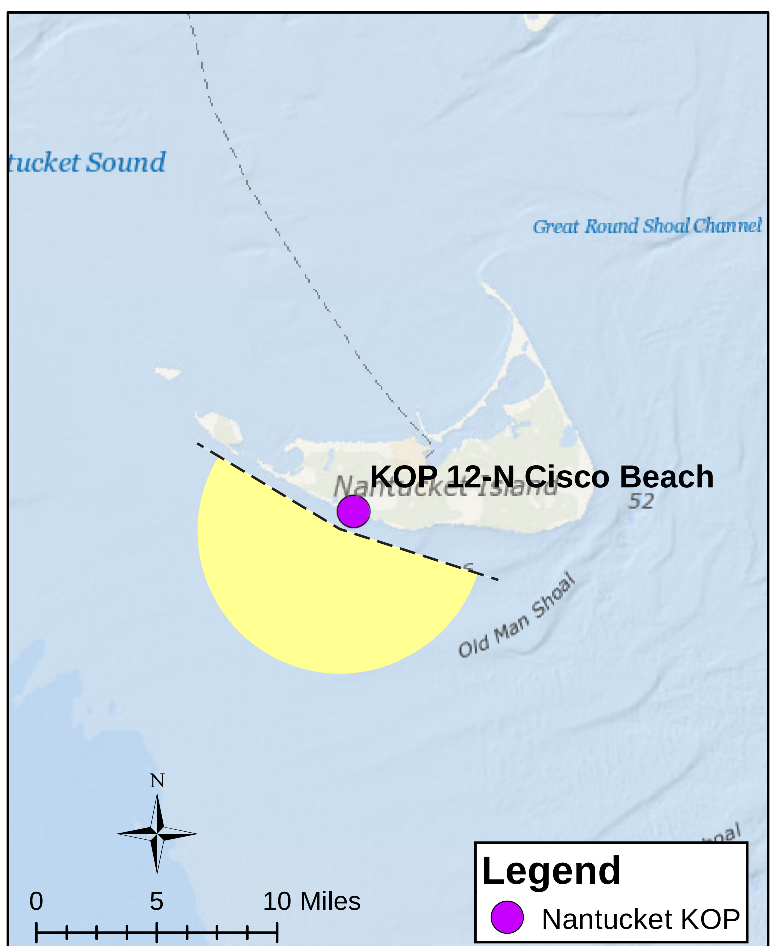
KOP 12-N Cisco Beach Night - Scenario 5

Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

1

REGIONAL MAP



SITE MAP

MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 9:00PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

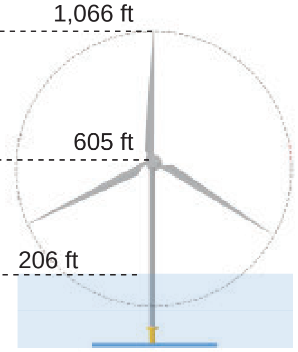
KOP 12-N Cisco Beach Night - Scenario 5

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

Mayflower Wind (OCS-A 0521)

919 ft rotor diameter

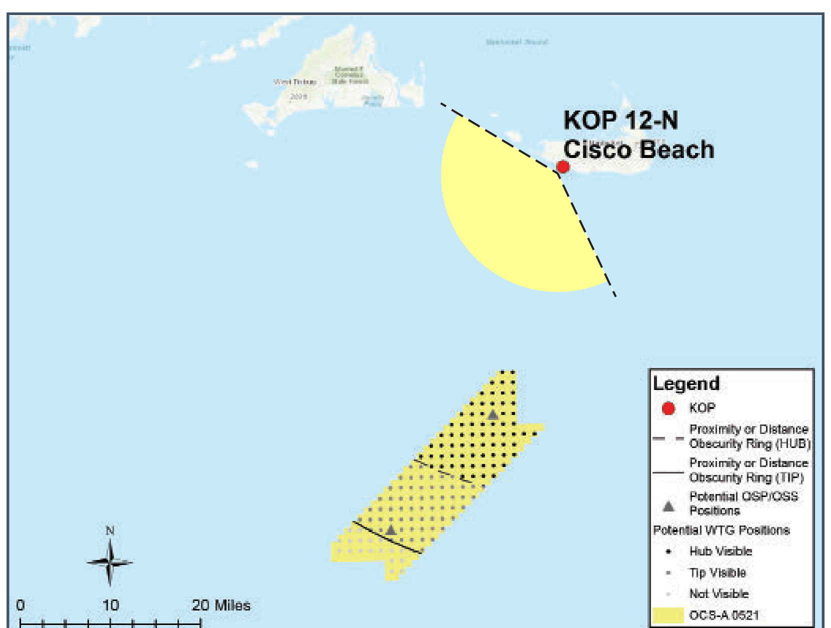


	Mayflower Wind (OCS-A 0521)
Year Forecasted for Development	2025
Number of Structures in Lease Area	149
Number of Structures within View of KOP	130
Distance to Closest Structure	23 mi (38 km)
Distance to Furthest Structure	49 mi (80 km)

KOP 12-N Cisco Beach Night - Scenario 5 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP

PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 26 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 577
Potential Number of Structures Not Visible: 337

PHOTOGRAPH AND SITE

Time of photograph: 1:25PM
Date of photograph: 8-20-20
L/SCA: Open Ocean, Ocean Beach, Dunes, Salt Ponds/Tidal Marsh, Residential
Viewing direction: South (226°)
Latitude: 41.252490°N
Longitude: 70.154080°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 61° F
Humidity: 90%
Wind Dir & Speed: N 6 mph
Weather Condition: Partly Cloudy

CAMERA

Camera Elevation: 23.0 ft / 7.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

MATCH
LINE A

MATCH
LINE BB

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH
LINE AB

MATCH
LINE CC

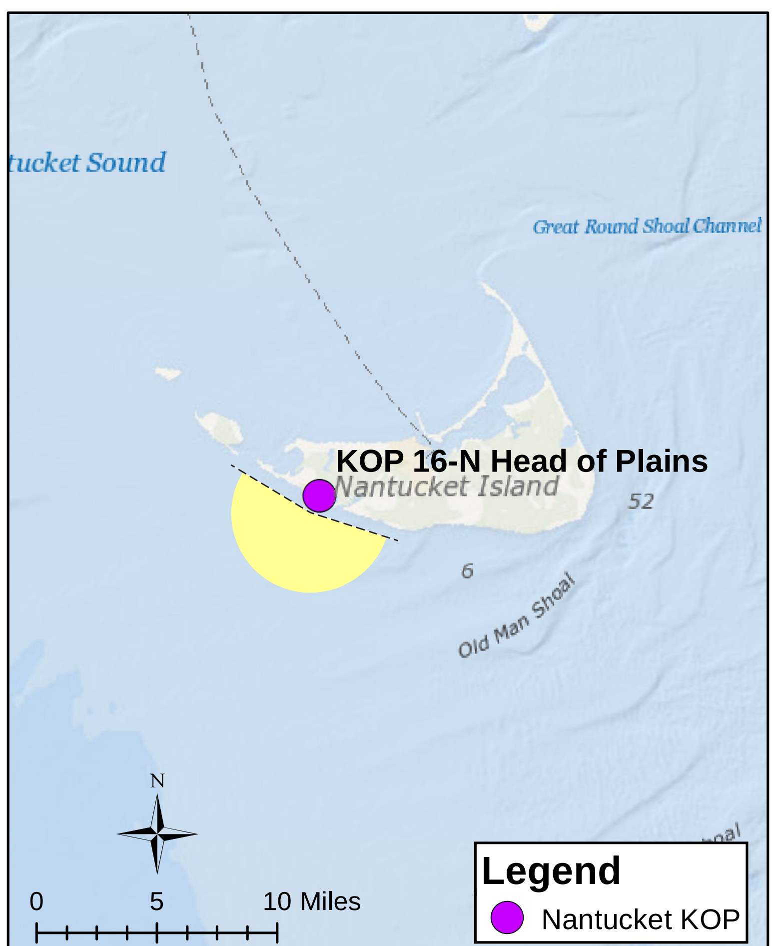
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

SIMULATED CONDITIONS

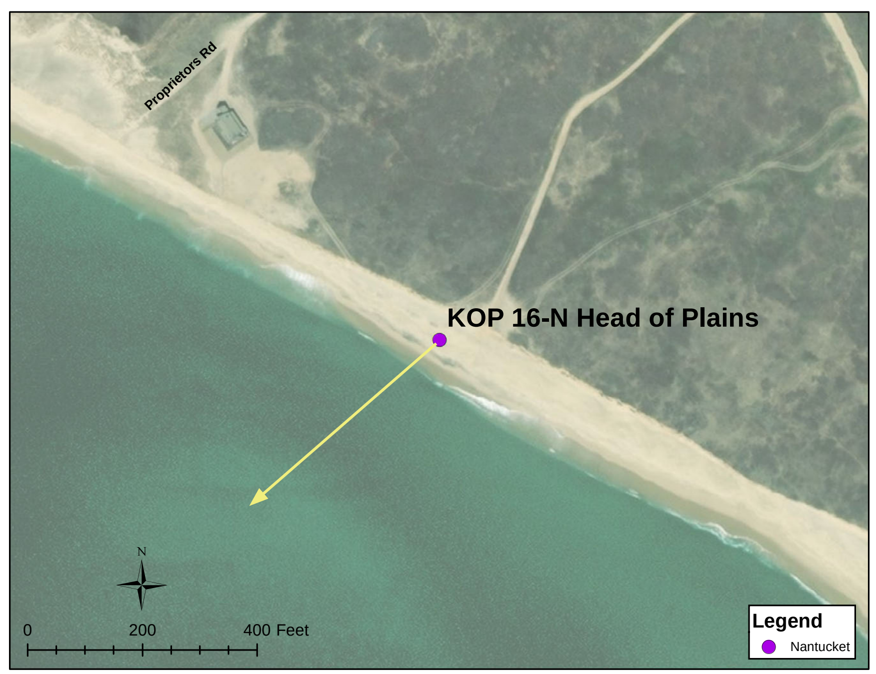
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi /25 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of WTGs Visible: 244
Potential Number of WTGs Not Visible: 205

PHOTOGRAPH AND SITE

Time of photograph: 3:54 PM
Date of photograph: 10-7-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (229°)
Latitude: 41.341724°N
Longitude: 70.179524°W
Lighting Direction: Sidelit

ENVIRONMENT

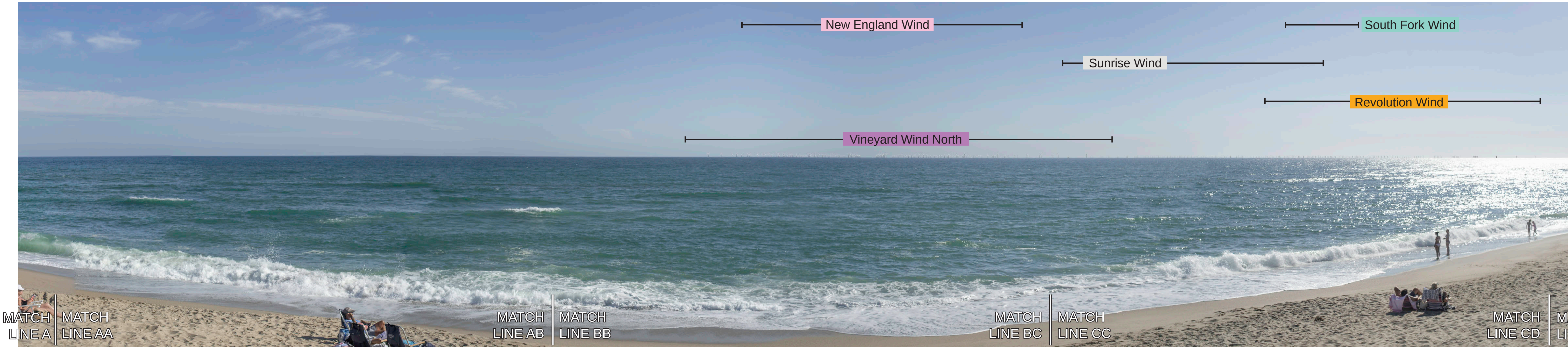
Temperature: 66° F
Humidity: 81%
Wind Dir & Speed: SW 21 mph
Weather Condition: Clear

CAMERA

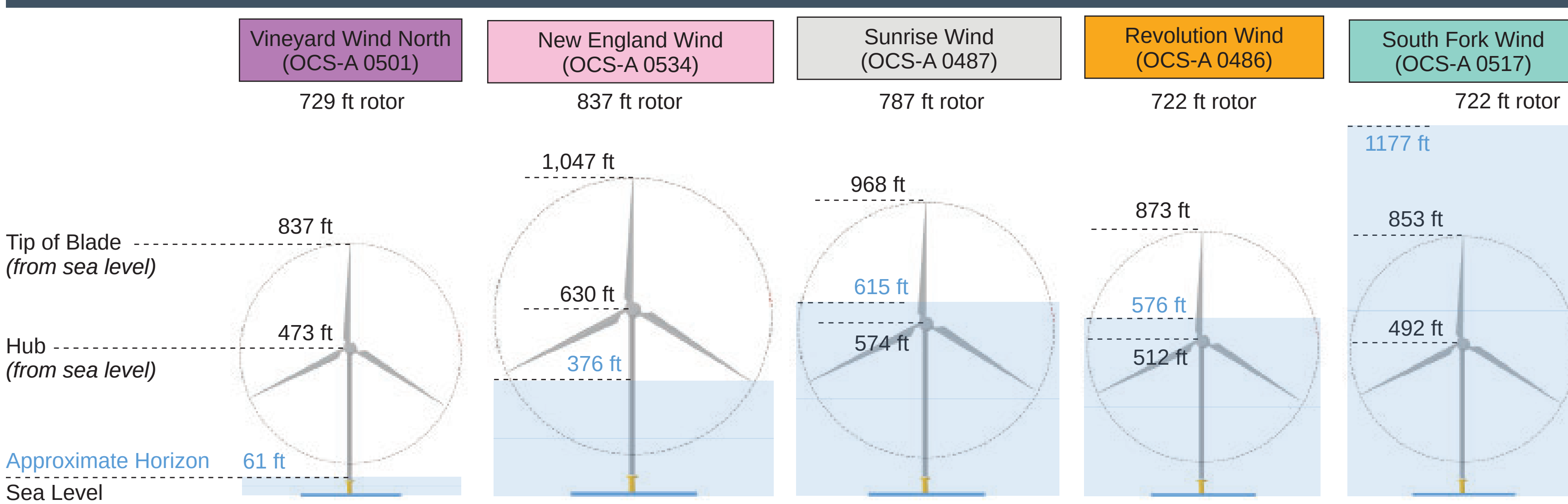
Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-N Head of Plains - Scenario 1

SIMULATED CONDITIONS



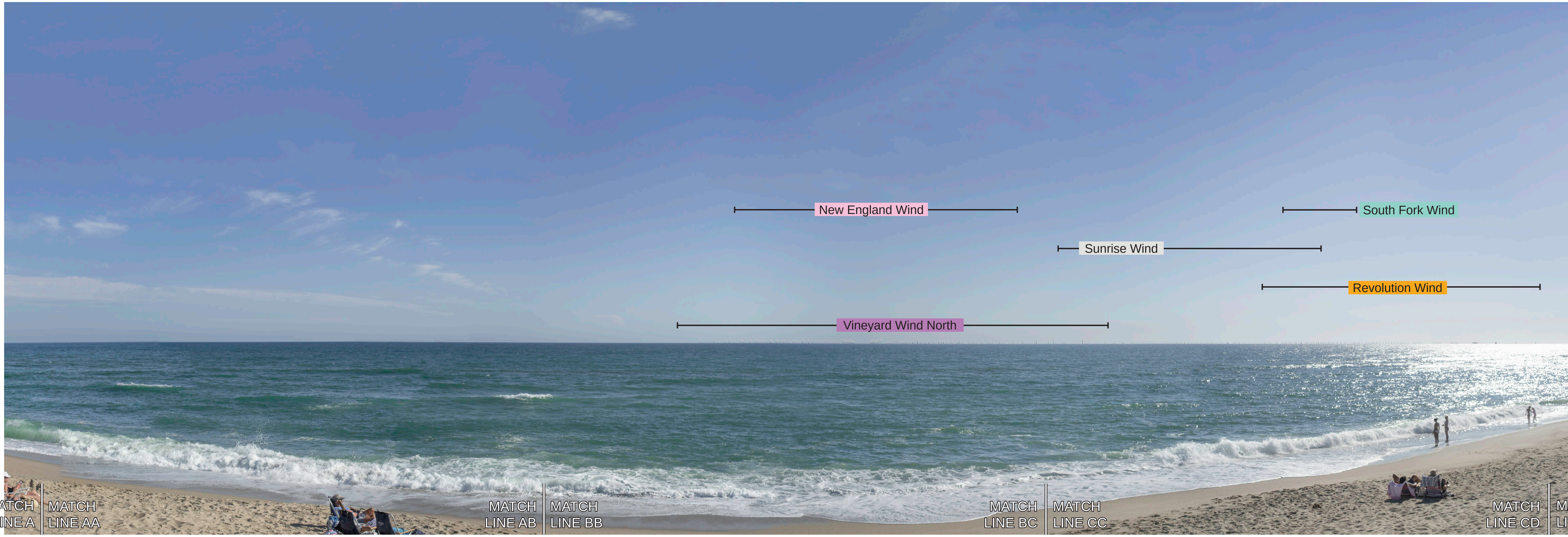
VISIBILTY OF CLOSEST TURBINES



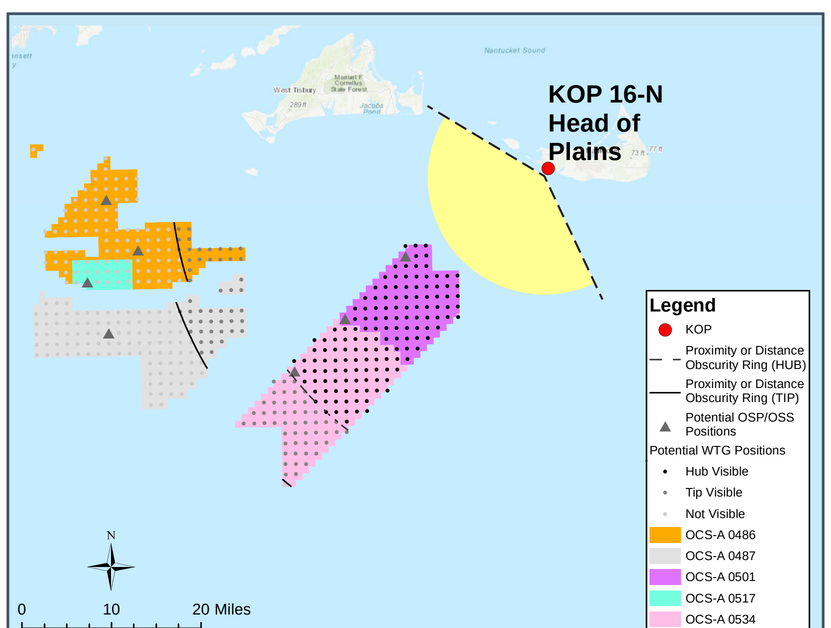
	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	77	119	29	19	0
Distance to Closest Structure	16 mi (25 km)	30 mi (48 km)	37 mi (59 km)	36 mi (57 km)	48 mi (77.45 km)
Distance to Furthest Structure	28 mi (46 km)	46 mi (74 km)	61 mi (98 km)	58 mi (93 km)	54 mi (87 km)

KOP 16-N Head of Plains - Scenario 1 (Human Field of View - 124°)

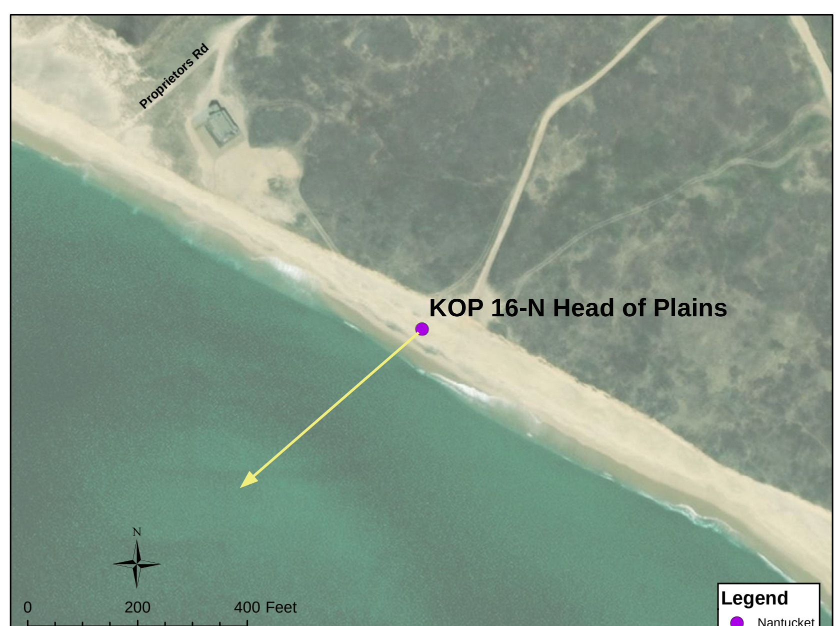
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 16 mi /25 km

Furthest Visible WTG: 46 mi / 74 km

Potential Number of WTGs Visible: 244

Potential Number of WTGs Not Visible: 205

ENVIRONMENT

Temperature: 66° F

Humidity: 81%

Wind Dir & Speed: SW 21 mph

Weather Condition: Clear

PHOTOGRAPH AND SITE

Time of photograph: 3:54PM

Date of photograph: 10-7-20

L/SCA: Ocean Beach, Open Ocean, Dunes

Viewing direction: South (229°)

Latitude: 41.341724°N

Longitude: 70.179524°W

Lighting Direction: Sidelit

CAMERA

Camera Elevation: 20.5 ft / 6.3 m

Nikon D4

Nikon 50mm

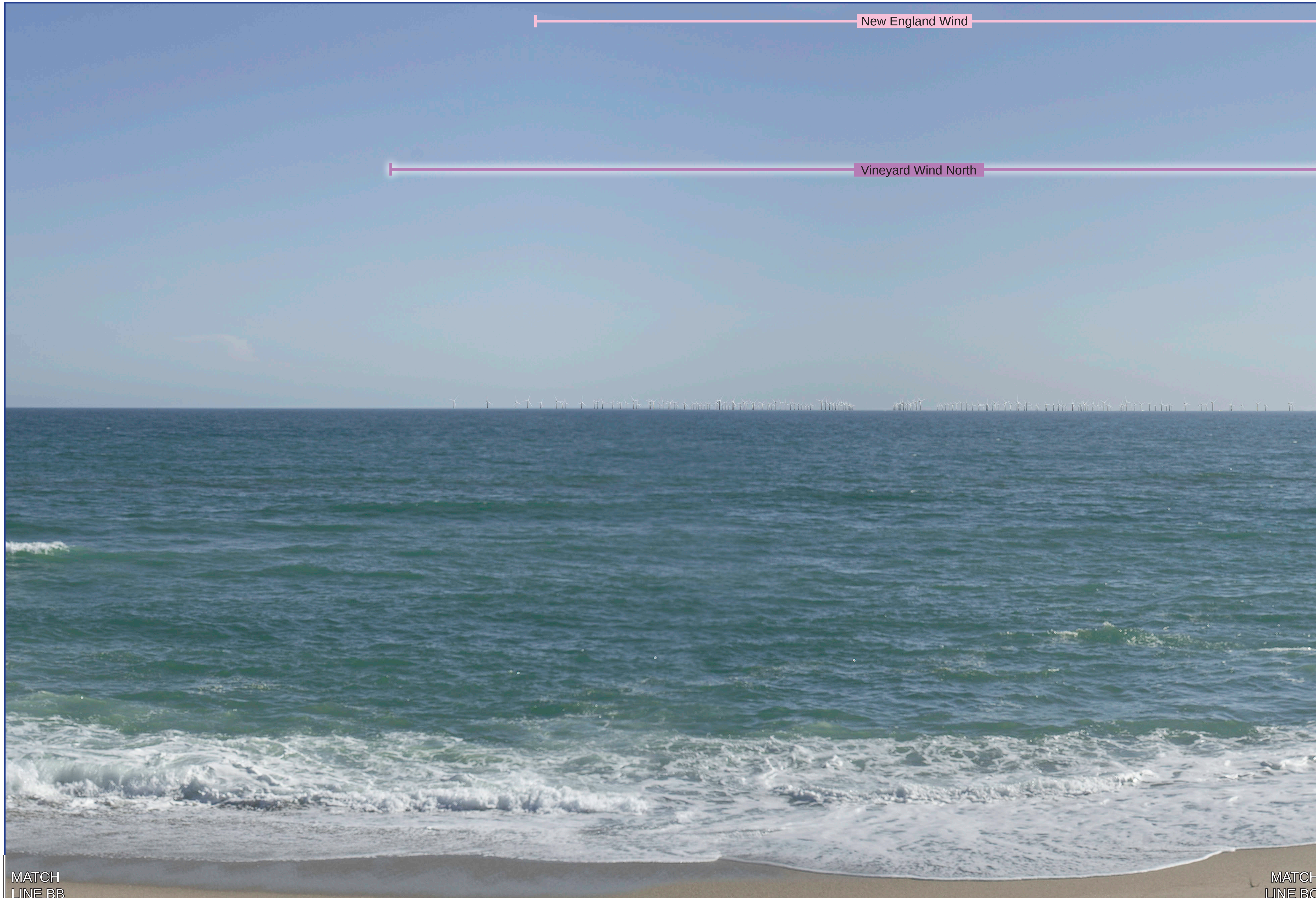
ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 16-N Head of Plains - Scenario 1 (50mm view - 27° vertical / 40° horizontal) 3 of 3

SIMULATED CONDITIONS

MATCH LINE BC

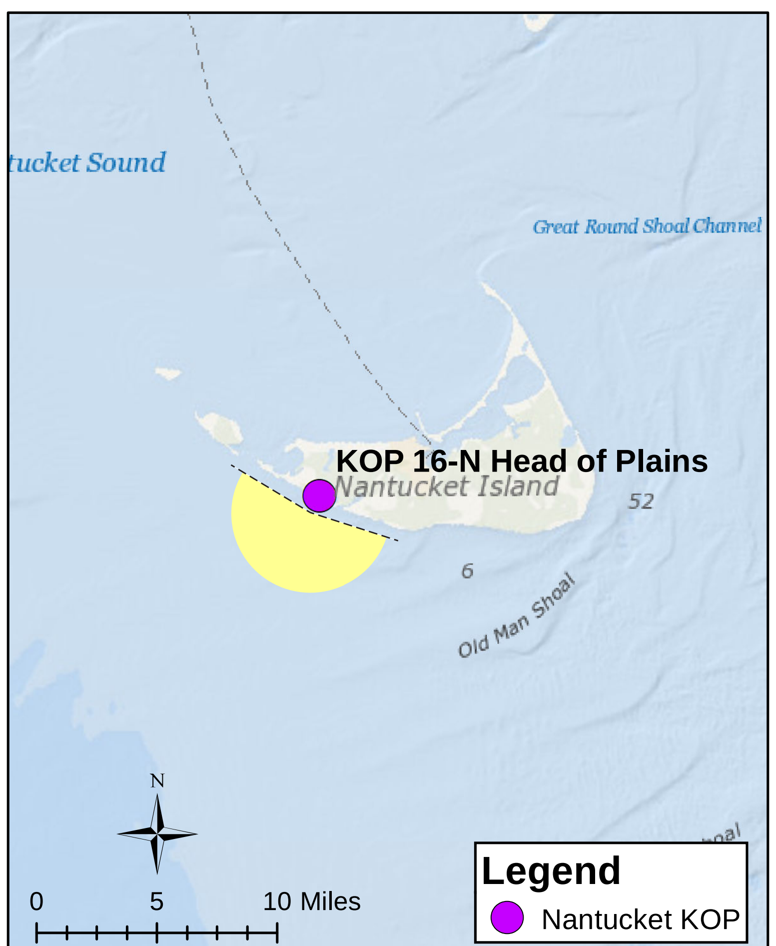
MATCH LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

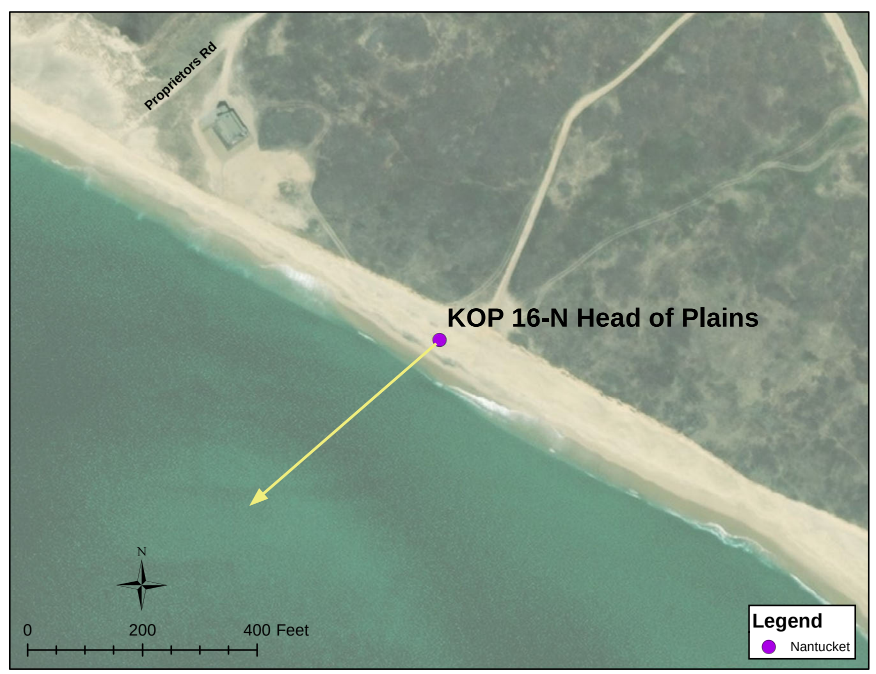
KOP 16-N Head of Plains - Scenario 2

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 25 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of WTGs Visible: 376
Potential Number of WTGs Not Visible: 222

PHOTOGRAPH AND SITE

Time of photograph: 3:54PM
Date of photograph: 10-7-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (229°)
Latitude: 41.341724°N
Longitude: 70.179524°W
Lighting Direction: Sidelit

ENVIRONMENT

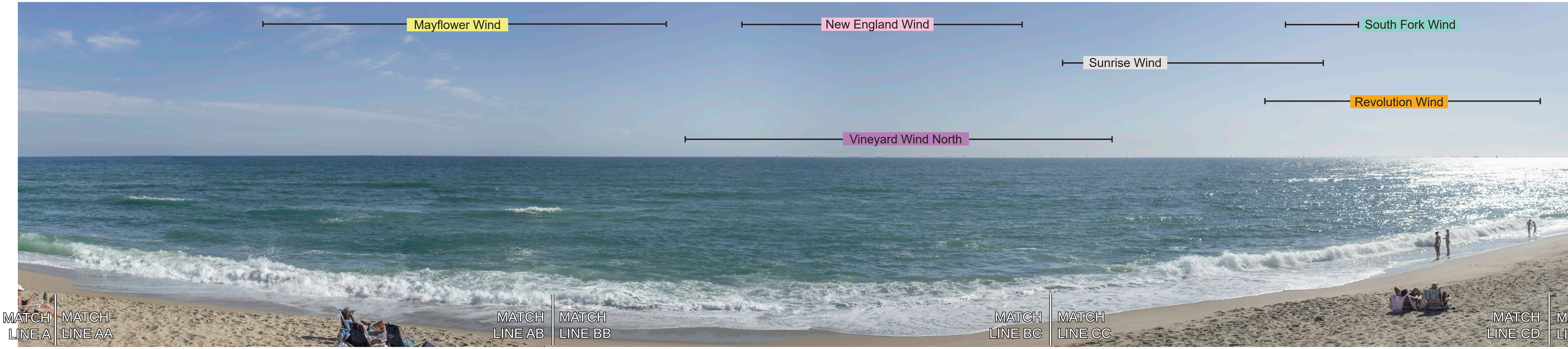
Temperature: 66° F
Humidity: 81%
Wind Dir & Speed: SW 21 mph
Weather Condition: Clear

CAMERA

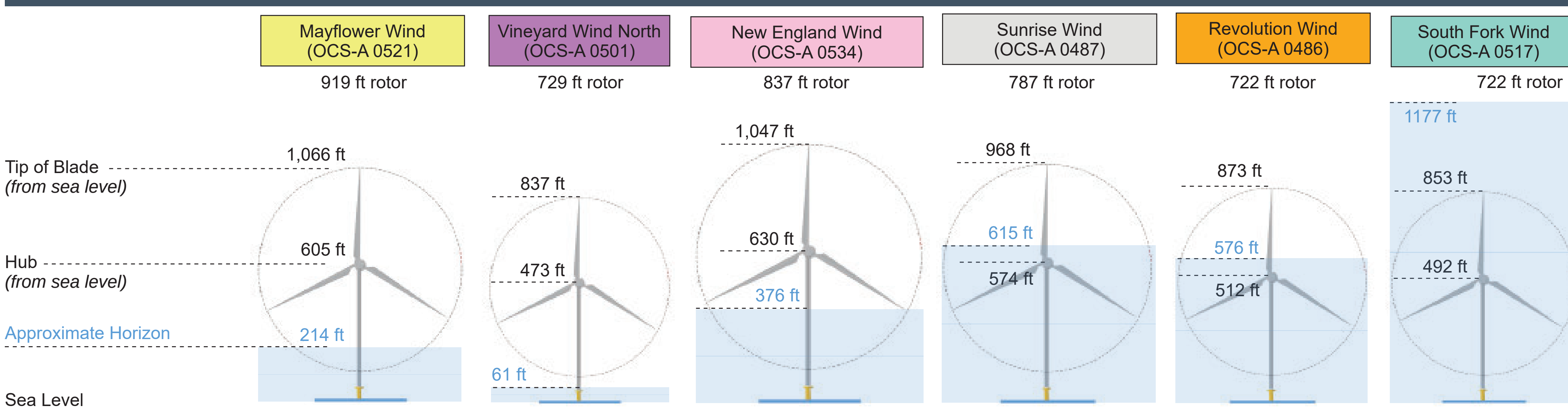
Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-N Head of Plains - Scenario 2

SIMULATED CONDITIONS



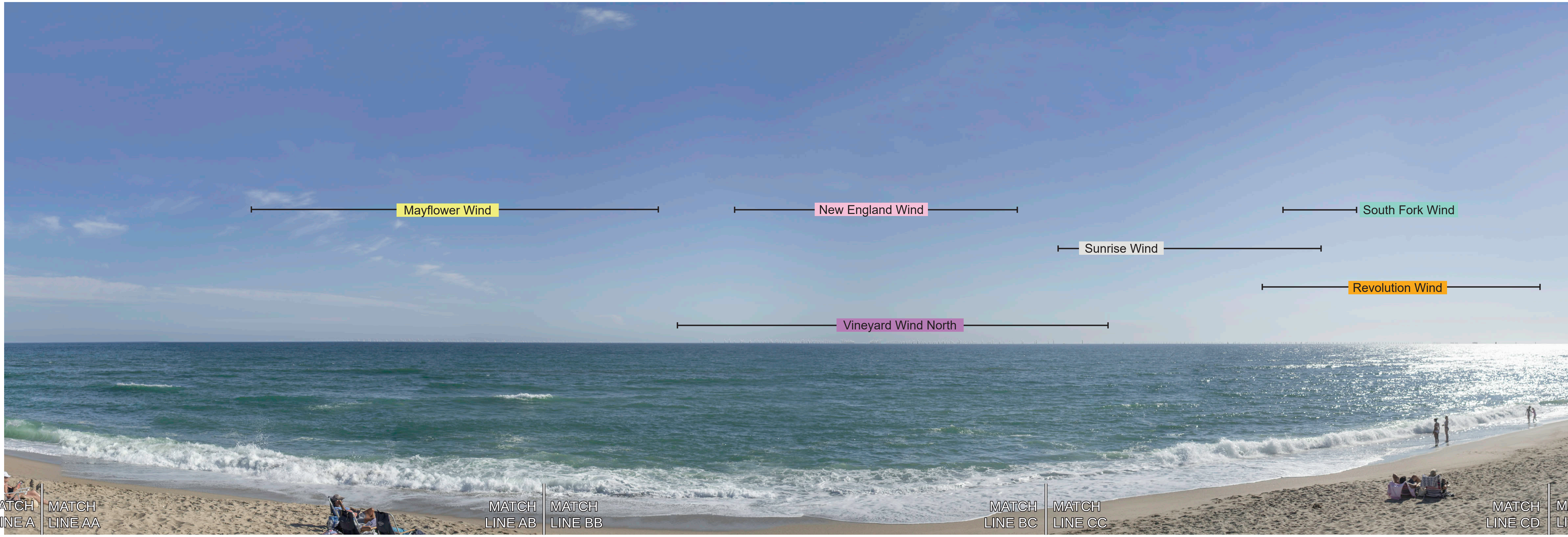
VISIBILTY OF CLOSEST TURBINES



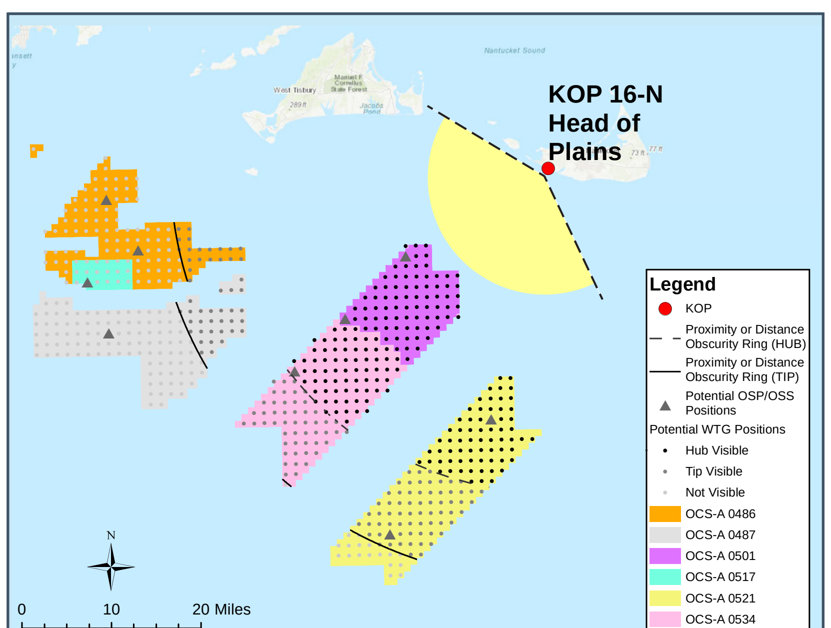
	Mayflower Wind	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	149	77	120	131	103	18
Number of Structures within View of KOP	132	77	119	29	19	0
Distance to Closest Structure	24 mi (38.67 km)	16 mi (25 km)	30 mi (48 km)	37 mi (59 km)	36 mi (57 km)	48 mi (77.45 km)
Distance to Furthest Structure	49 mi (79 km)	28 mi (46 km)	46 mi (74 km)	61 mi (98 km)	58 mi (93 km)	54 mi (87 km)

KOP 16-N Head of Plains - Scenario 2 (Human Field of View - 124°)

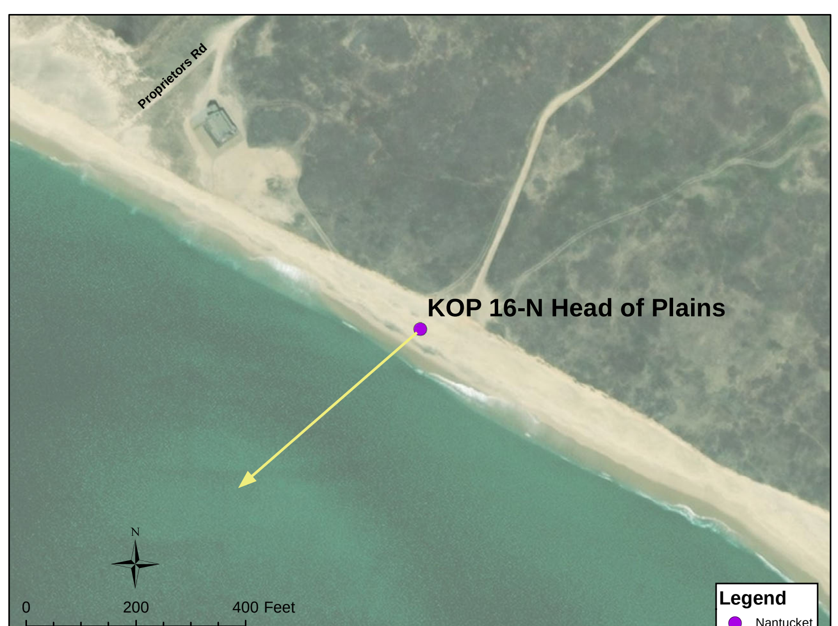
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 16 mi /25 km

Furthest Visible WTG: 46 mi / 74 km

Potential Number of WTGs Visible: 376

Potential Number of WTGs Not Visible: 222

ENVIRONMENT

Temperature: 66° F

Humidity: 81%

Wind Dir & Speed: SW 21 mph

Weather Condition: Clear

PHOTOGRAPH AND SITE

Time of photograph: 3:54PM

Date of photograph: 10-7-20

L/SCA: Ocean Beach, Open Ocean, Dunes

Viewing direction: South (229°)

Latitude: 41.341724°N

Longitude: 70.179524°W

Lighting Direction: Sidelit

CAMERA

Camera Elevation: 20.5 ft / 6.3 m

Nikon D4

Nikon 50mm

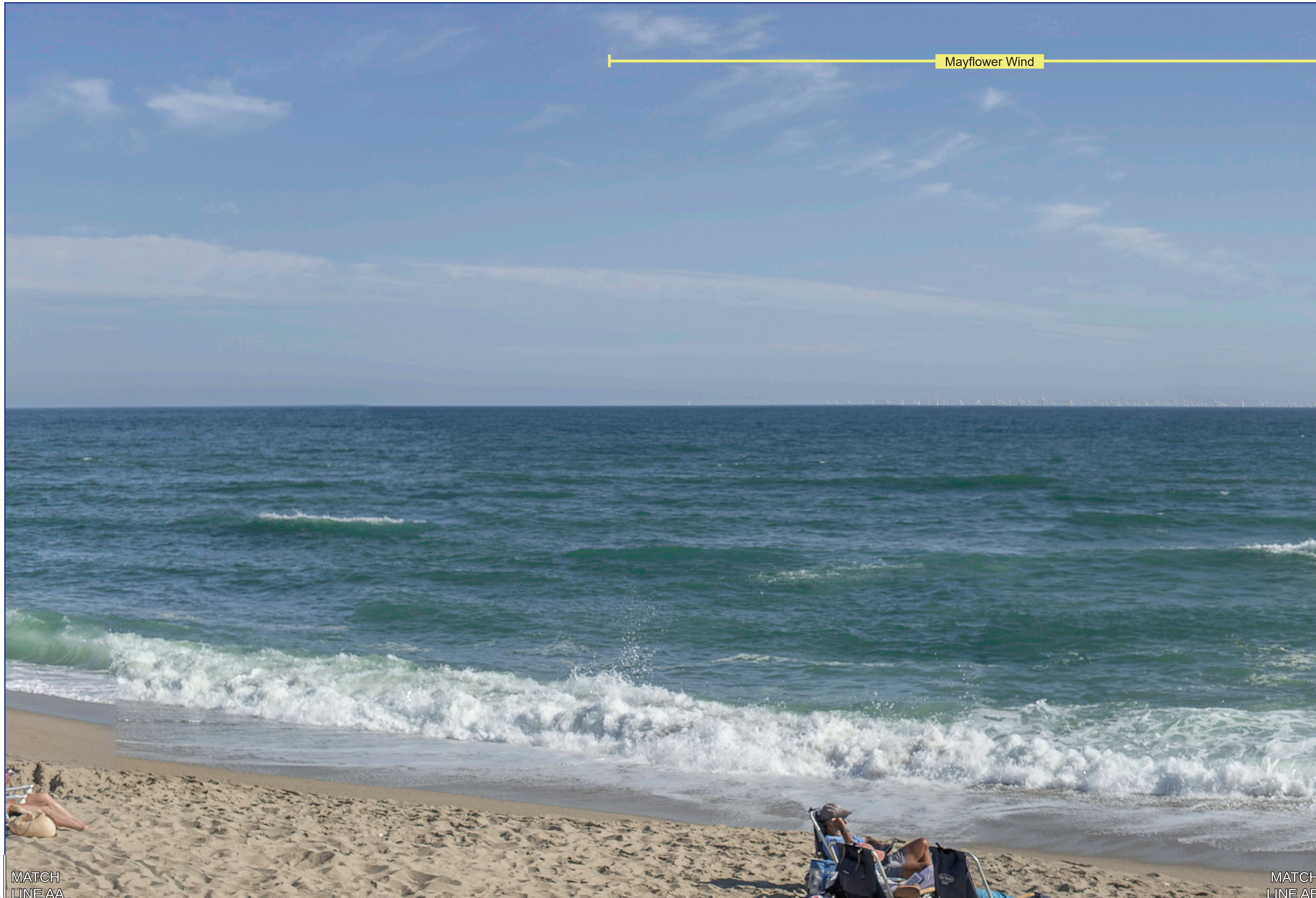
ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

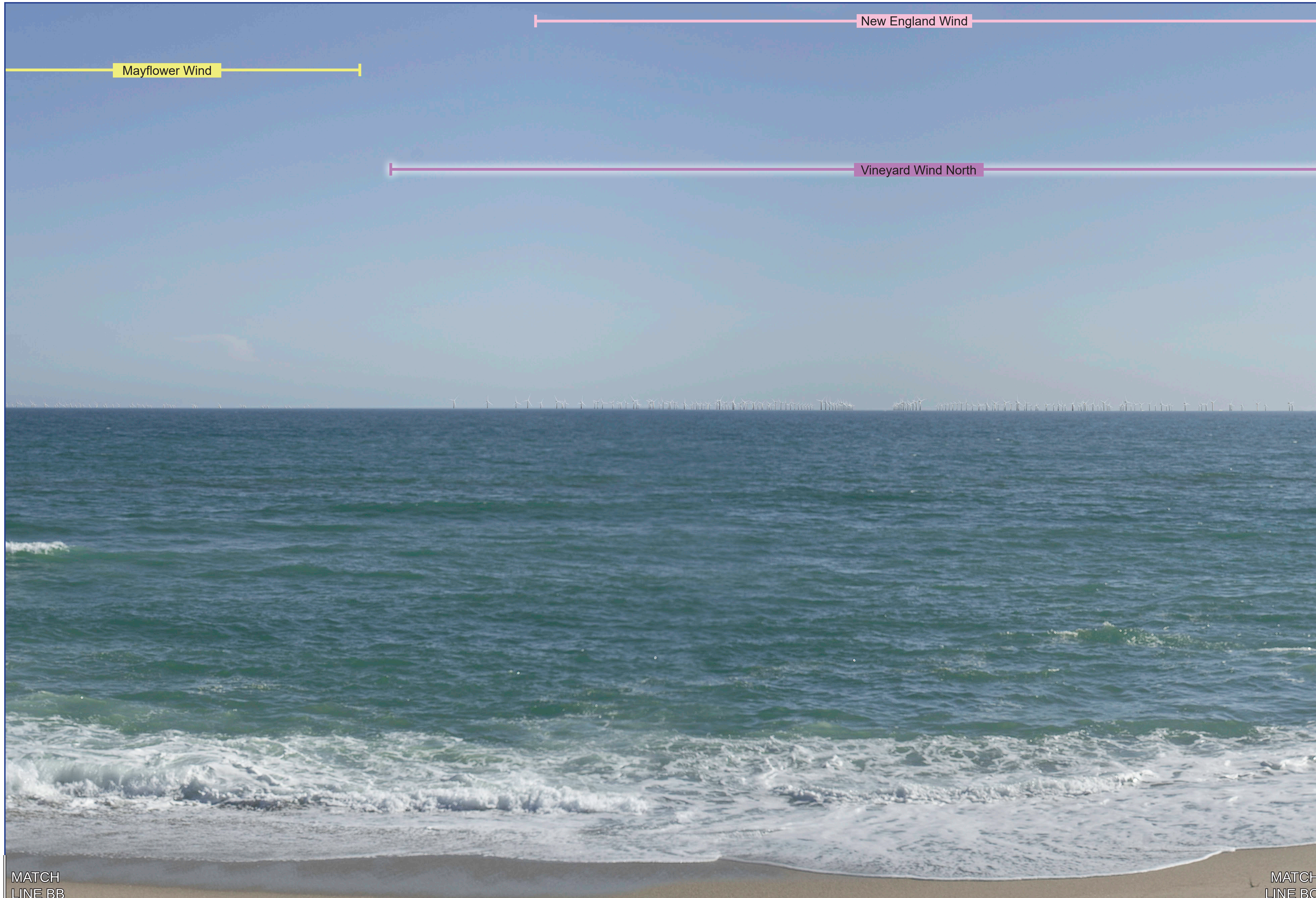
Exposure bias: -0.7 step

MATCH LINE A

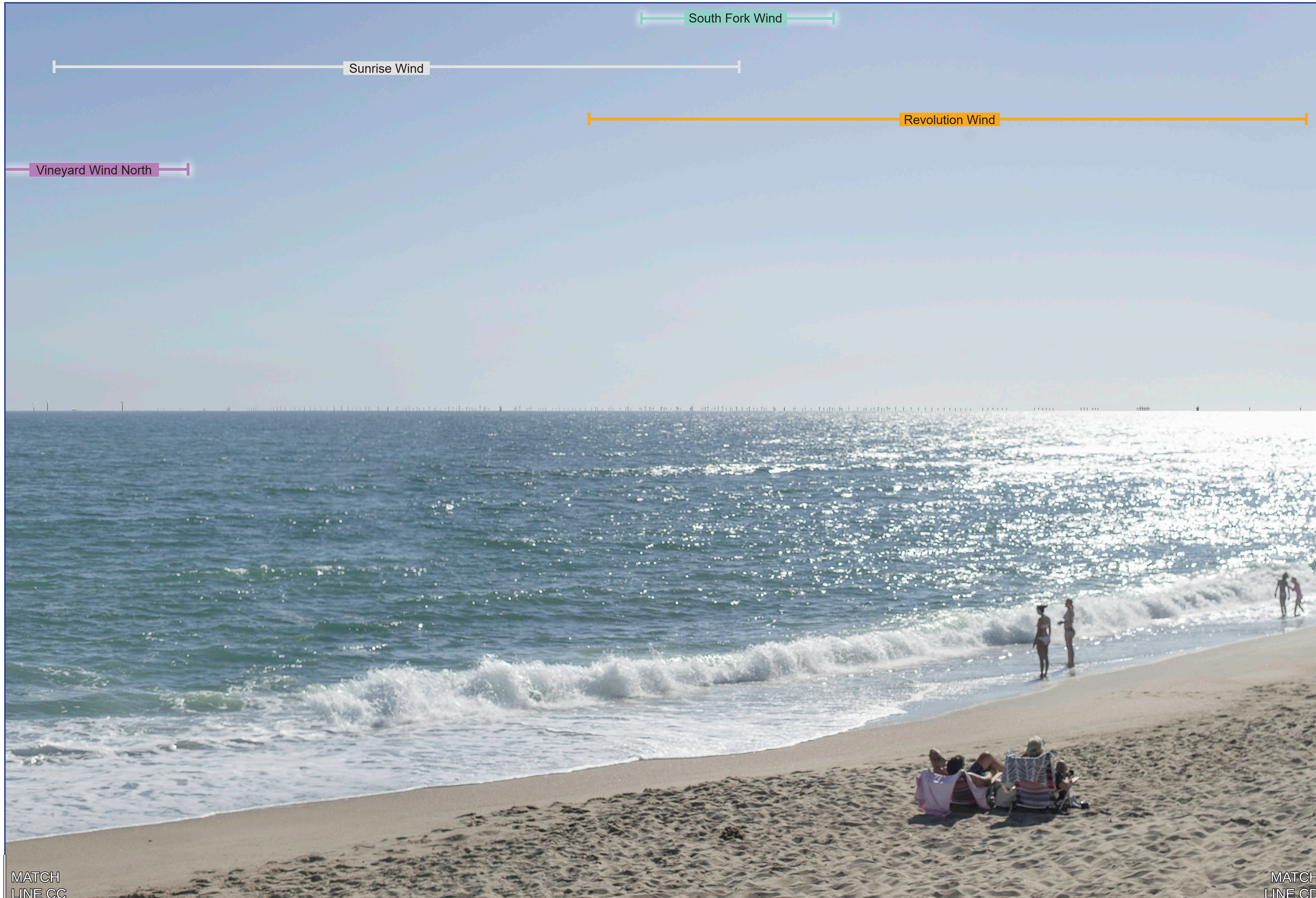


MATCH LINE BB

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



MATCH LINE BC

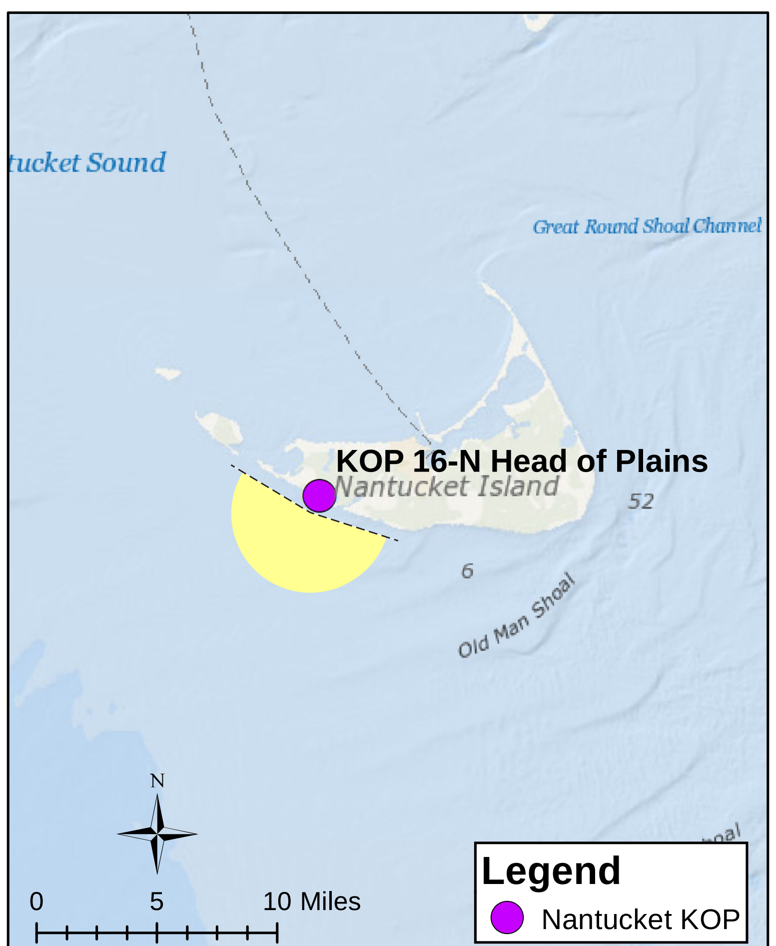
MATCH LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

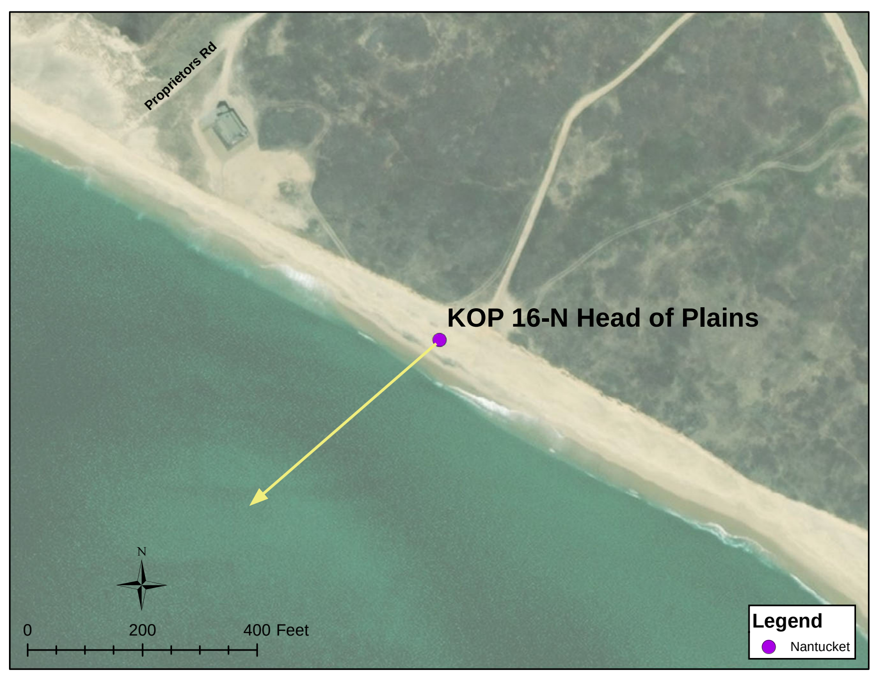
KOP 16-N Head of Plains - Scenario 3

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 25 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of WTGs Visible: 746
Potential Number of WTGs Not Visible: 317

PHOTOGRAPH AND SITE

Time of photograph: 3:54PM
Date of photograph: 10-7-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (229°)
Latitude: 41.341724°N
Longitude: 70.179524°W
Lighting Direction: Sidelit

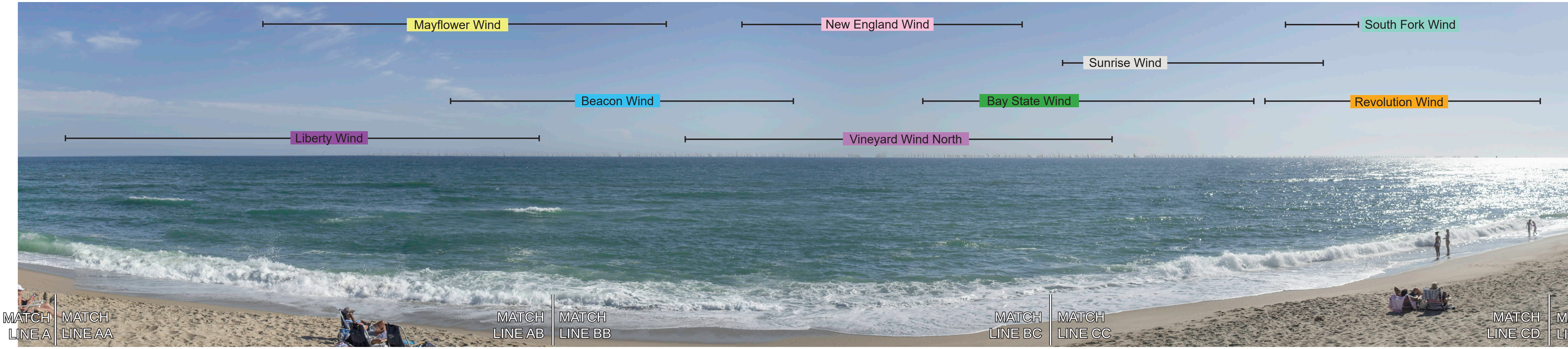
ENVIRONMENT

Temperature: 66° F
Humidity: 81%
Wind Dir & Speed: SW 21 mph
Weather Condition: Clear

CAMERA

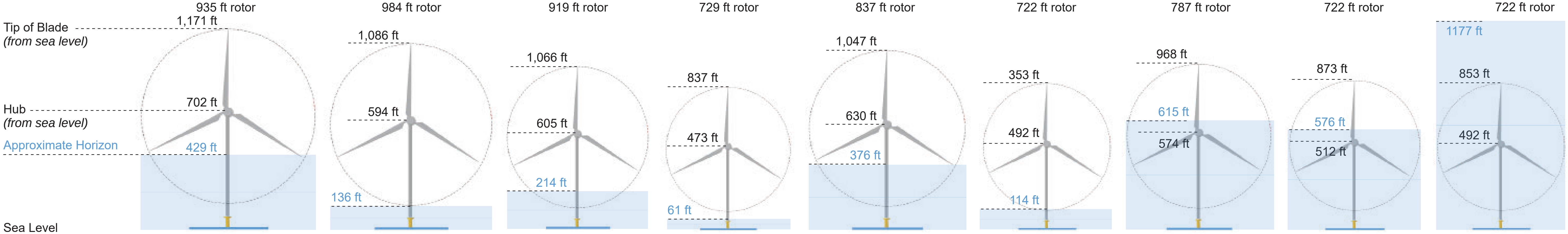
Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES

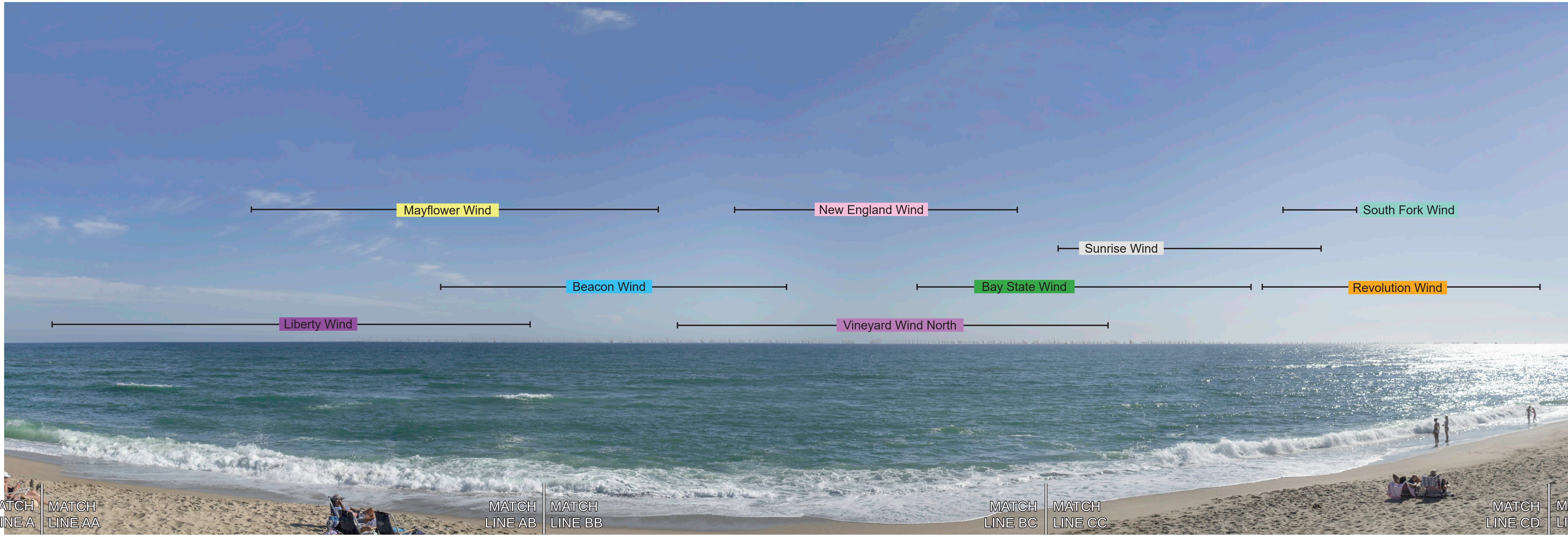
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Mayflower Wind (OCS-A 0521)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
	935 ft rotor	984 ft rotor	919 ft rotor	729 ft rotor	837 ft rotor	722 ft rotor	787 ft rotor	722 ft rotor	722 ft rotor



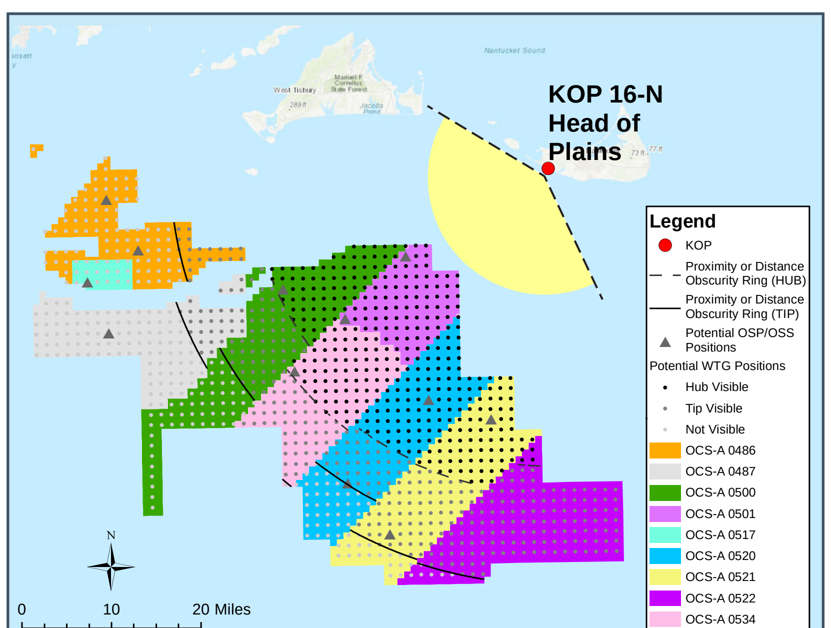
	Liberty Wind	Beacon Wind	Mayflower Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2025	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	149	77	120	169	131	103	18
Number of Structures within View of KOP	132	120	132	77	119	118	29	19	0
Distance to Closest Structure	31 mi (51 km)	20 mi (32.81 km)	24 mi (38.67 km)	16 mi (25 km)	30 mi (48 km)	19 mi (31 km)	37 mi (59 km)	36 mi (57 km)	48 mi (77.45 km)
Distance to Furthest Structure	48 mi (77 km)	49 mi (79 km)	49 mi (79 km)	28 mi (46 km)	46 mi (74 km)	58 mi (94 km)	61 mi (98 km)	58 mi (93 km)	54 mi (87 km)

KOP 16-N Head of Plains - Scenario 3 (Human Field of View - 124°)

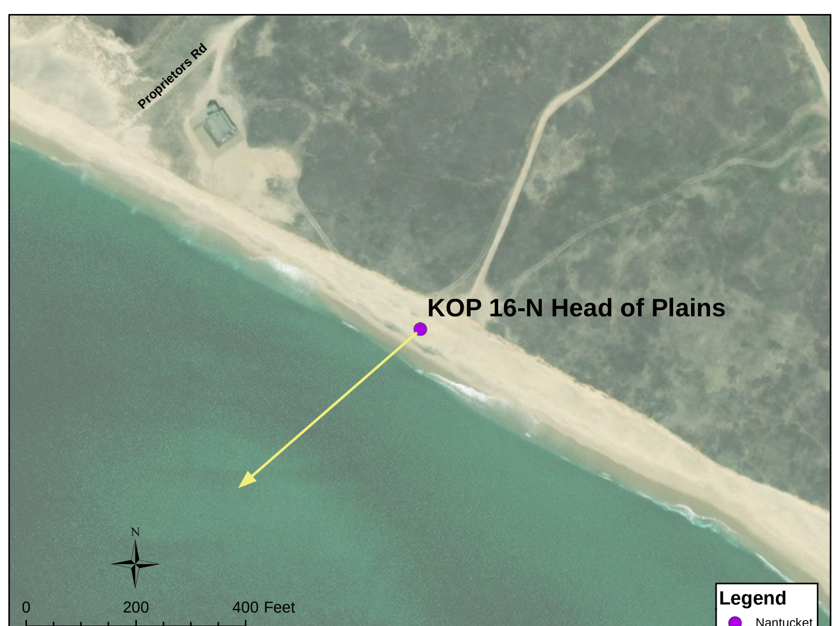
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16 mi /25 km

Furthest Visible WTG: 46 mi / 74 km
Potential Number of WTGs Visible: 746
Potential Number of WTGs Not Visible: 317

ENVIRONMENT

Temperature: 66° F
Humidity: 81%
Wind Dir & Speed: SW 21 mph
Weather Condition: Clear

PHOTOGRAPH AND SITE

Time of photograph: 3:54PM
Date of photograph: 10-7-20
L/SCA: Ocean Beach, Open Ocean, Dunes

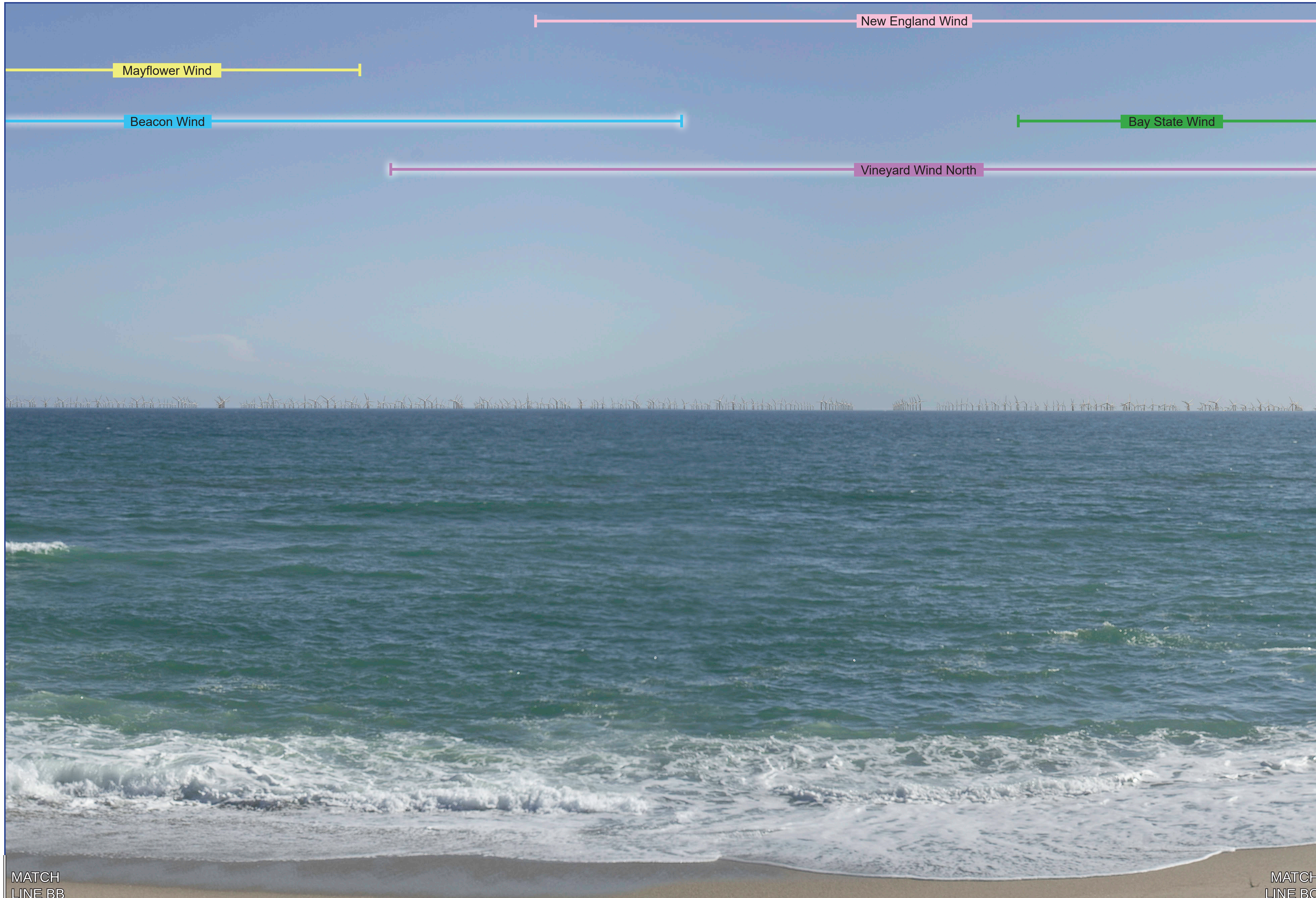
Viewing direction: South (229°)
Latitude: 41.341724°N
Longitude: 70.179524°W
Lighting Direction: Sidelit

CAMERA

Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH LINE AB



MATCH LINE CC

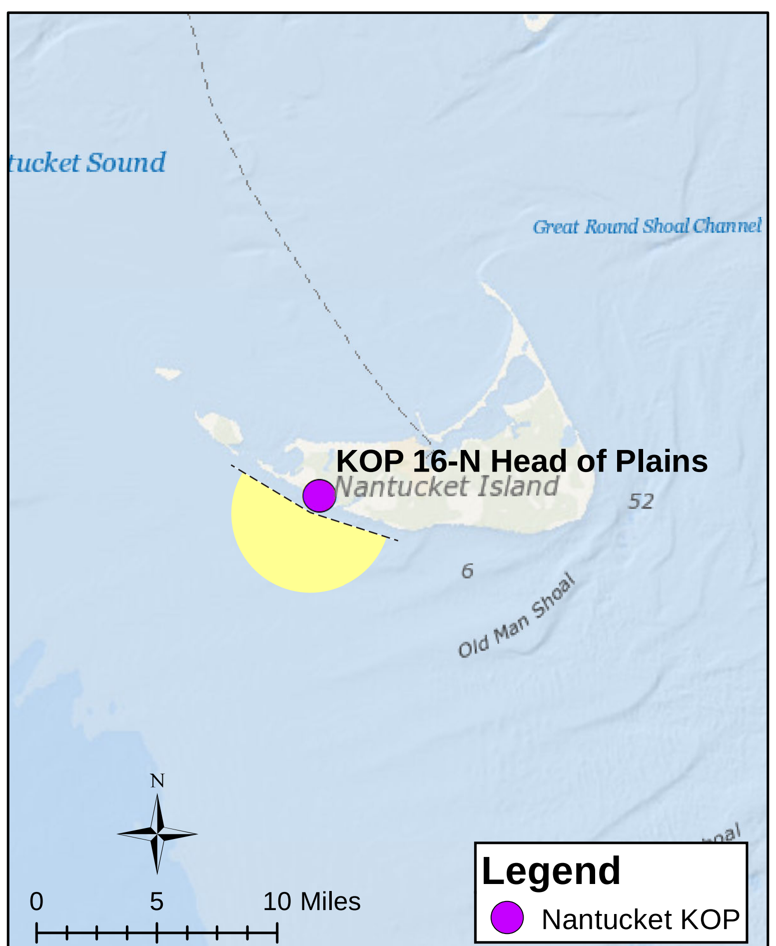
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

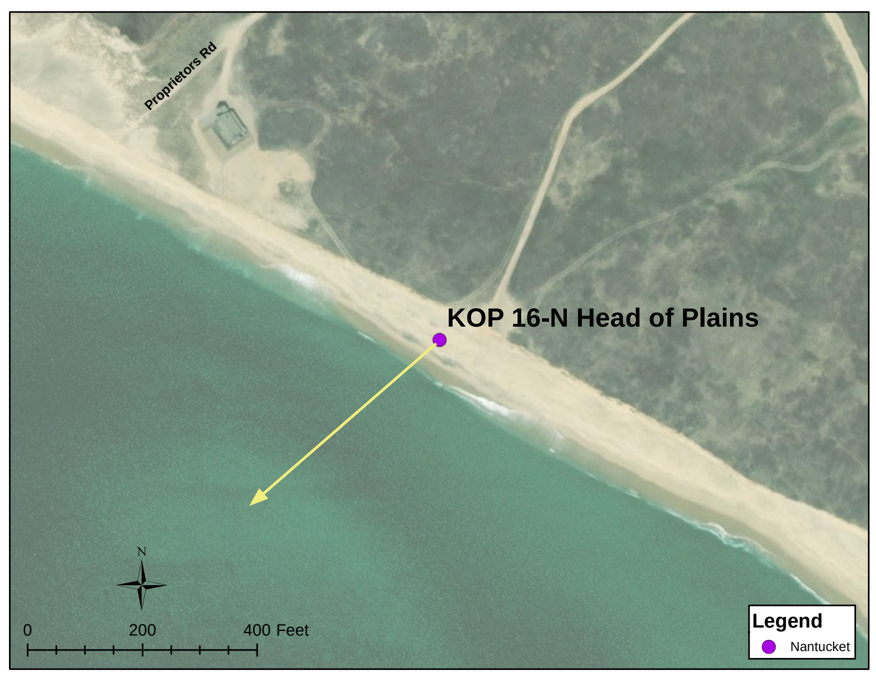
KOP 16-N Head of Plains - Scenario 4

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 25 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of WTGs Visible: 614
Potential Number of WTGs Not Visible: 300

PHOTOGRAPH AND SITE

Time of photograph: 3:54PM
Date of photograph: 10-7-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (229°)
Latitude: 41.341724°N
Longitude: 70.179524°W
Lighting Direction: Sidelit

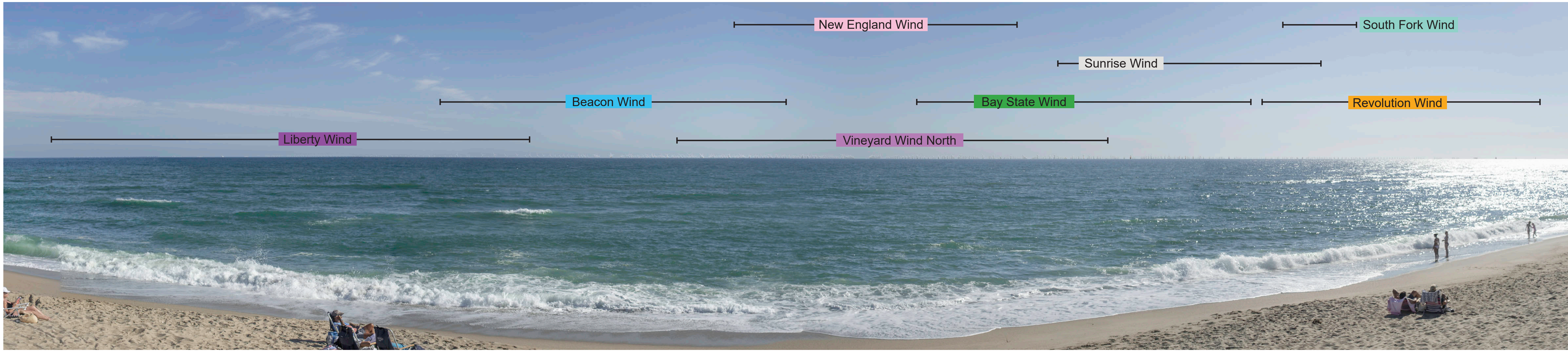
ENVIRONMENT

Temperature: 66° F
Humidity: 81%
Wind Dir & Speed: SW 21 mph
Weather Condition: Clear

CAMERA

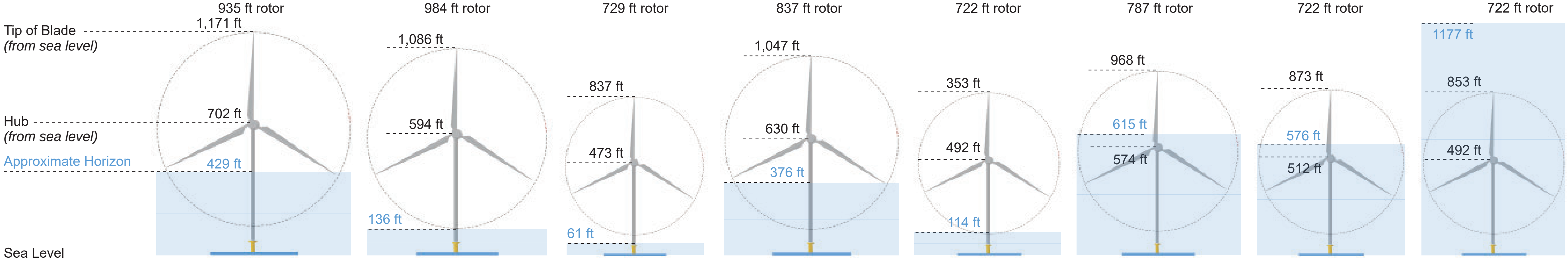
Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES

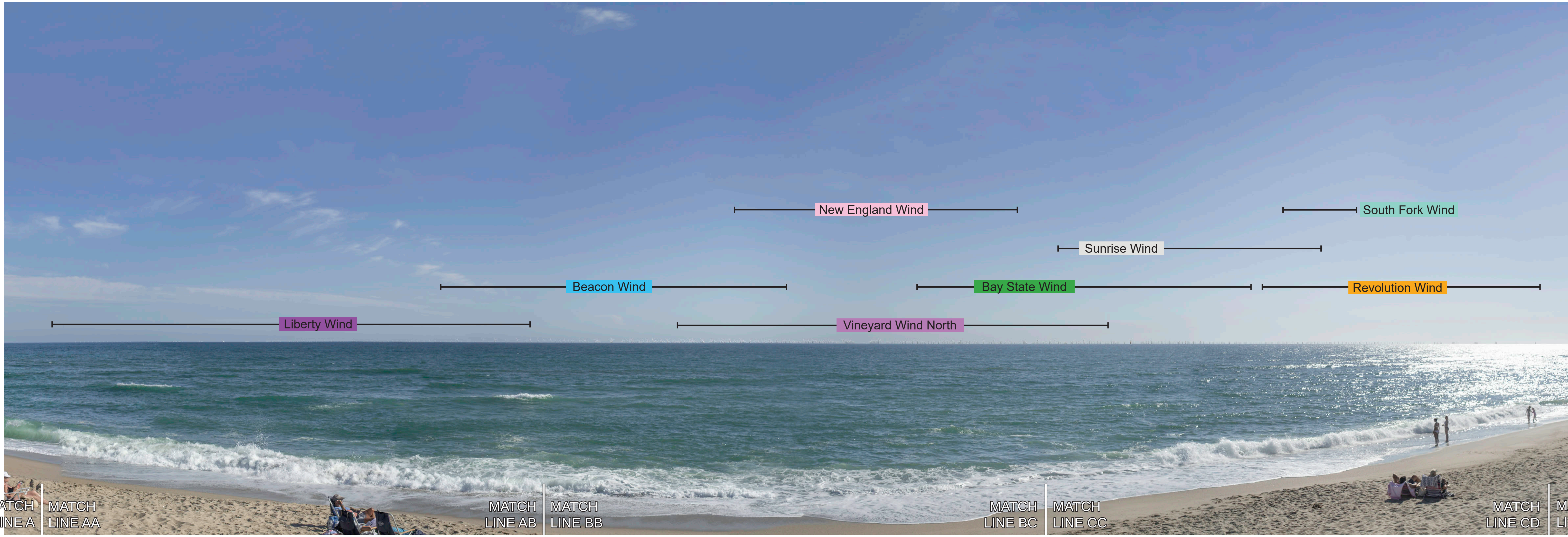
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
	935 ft rotor	984 ft rotor	729 ft rotor	837 ft rotor	722 ft rotor	787 ft rotor	722 ft rotor	722 ft rotor



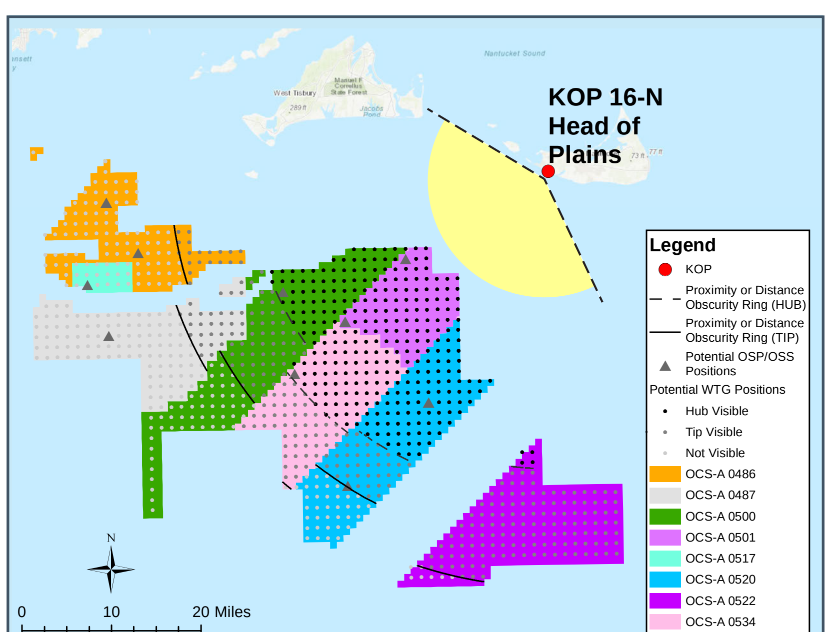
	Liberty Wind	Beacon Wind	Vineyard Wind North	New England Wind	Bay State Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025-2030	2025-2030	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	77	120	169	131	103	18
Number of Structures within View of KOP	132	120	77	119	118	29	19	0
Distance to Closest Structure	31 mi (51 km)	20 mi (32.81 km)	16 mi (25 km)	30 mi (48 km)	19 mi (31 km)	37 mi (59 km)	36 mi (57 km)	48 mi (77.45 km)
Distance to Furthest Structure	48 mi (77 km)	49 mi (79 km)	28 mi (46 km)	46 mi (74 km)	58 mi (94 km)	61 mi (98 km)	58 mi (93 km)	54 mi (87 km)

KOP 16-N Head of Plains - Scenario 4 (Human Field of View - 124°)

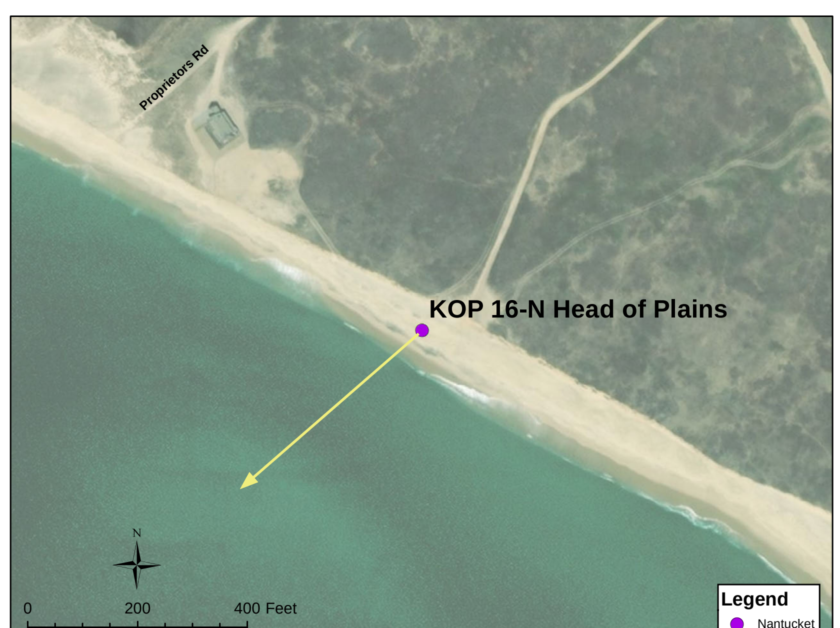
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 16 mi / 25 km

Furthest Visible WTG: 46 mi / 74 km
Potential Number of WTGs Visible: 614
Potential Number of WTGs Not Visible: 300

ENVIRONMENT

Temperature: 66° F
Humidity: 81%
Wind Dir & Speed: SW 21 mph
Weather Condition: Clear

PHOTOGRAPH AND SITE

Time of photograph: 3:54PM
Date of photograph: 10-7-20
L/SCA: Ocean Beach, Open Ocean, Dunes

Viewing direction: South (229°)
Latitude: 41.341724°N
Longitude: 70.179524°W
Lighting Direction: Sidelit

CAMERA

Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-N Head of Plains - Scenario 4 (50mm view - 27° vertical / 40° horizontal) 1 of 3

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH LINE BC

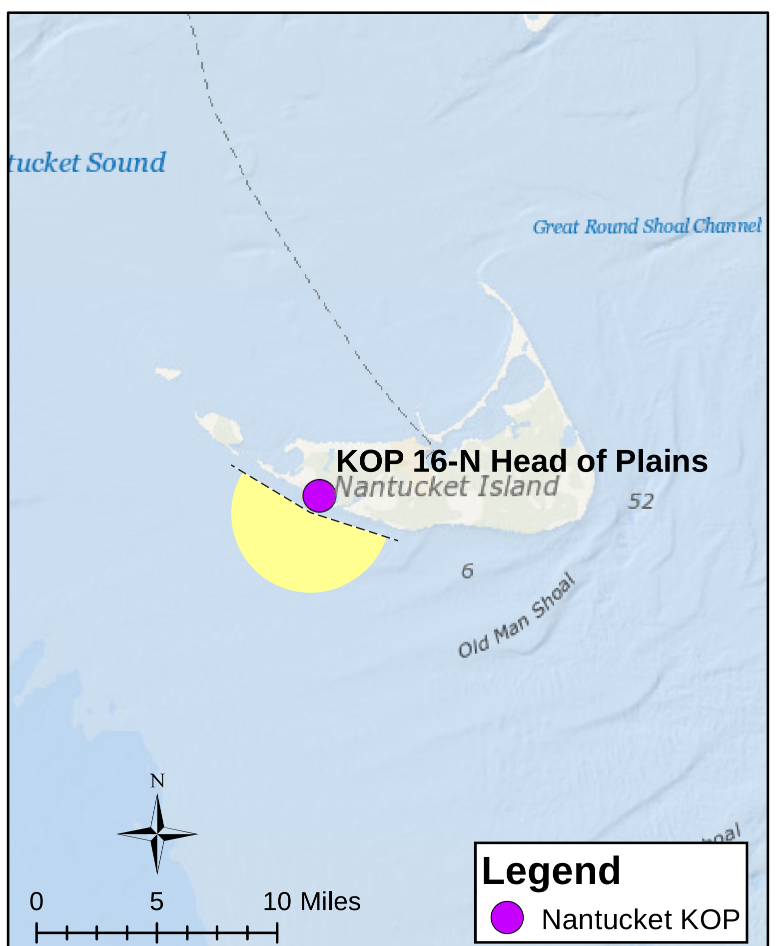
MATCH LINE B

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

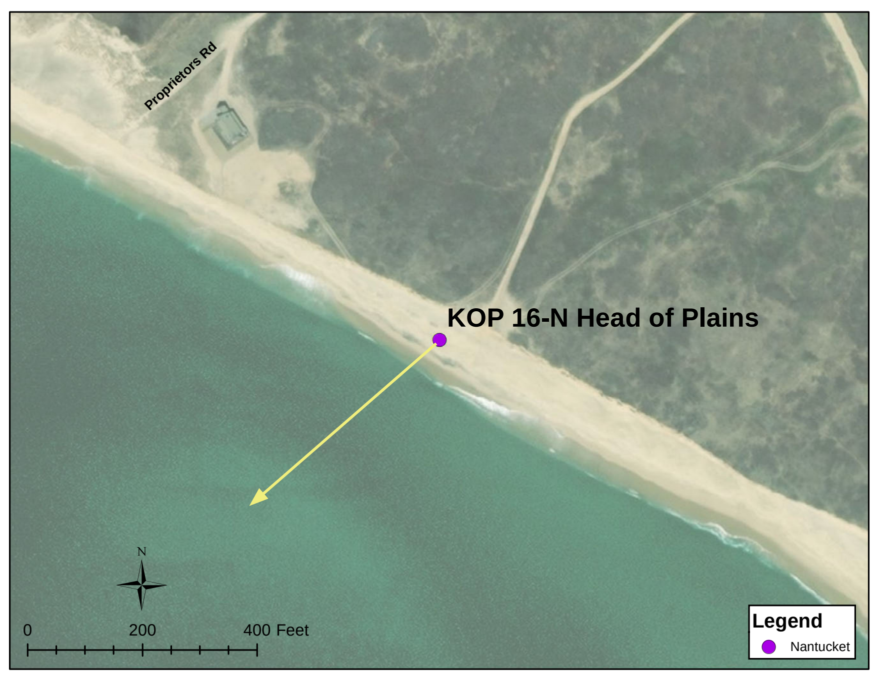
KOP 16-N Head of Plains - Scenario 5

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 24 mi / 38 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of WTGs Visible: 132
Potential Number of WTGs Not Visible: 17

PHOTOGRAPH AND SITE

Time of photograph: 3:54 PM
Date of photograph: 10-7-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (229°)
Latitude: 41.341724°N
Longitude: 70.179524°W
Lighting Direction: Sidelit

ENVIRONMENT

Temperature: 66° F
Humidity: 81%
Wind Dir & Speed: SW 21 mph
Weather Condition: Clear

CAMERA

Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-N Head of Plains - Scenario 5

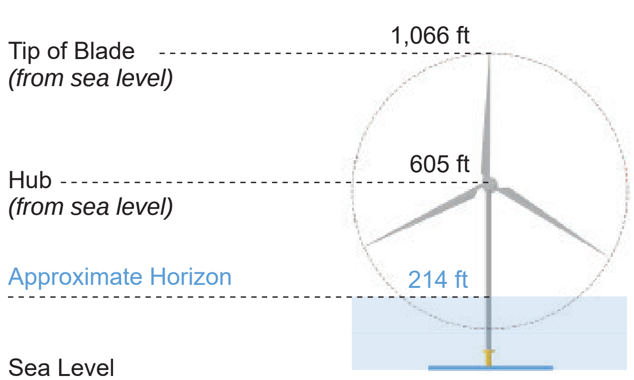
Nantucket

SIMULATED CONDITIONS 2

VISIBILTY OF CLOSEST TURBINES

Mayflower Wind (OCS-A 0521)

919 ft rotor

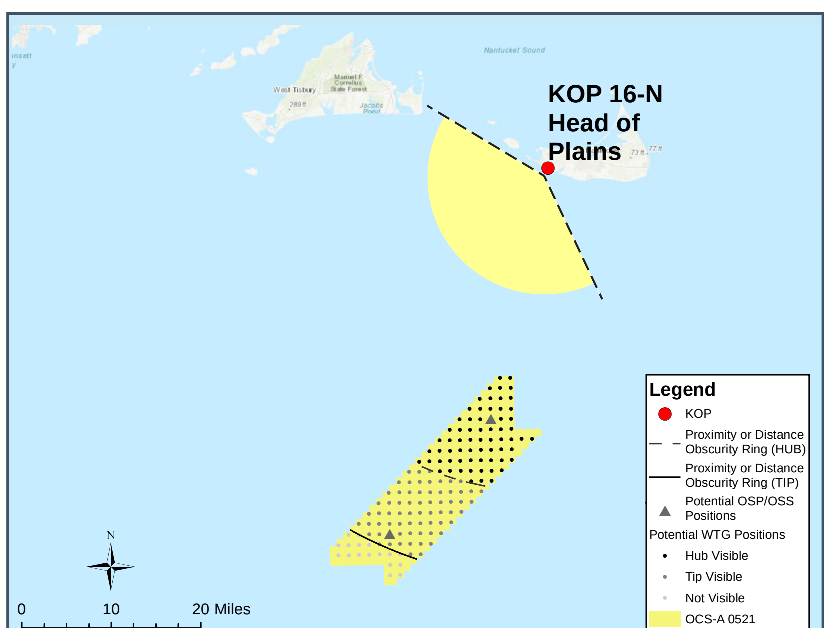


	Mayflower Wind (OCS-A 0521)
Year Forecasted for Development	2025
Number of Structures in Lease Area	149
Number of Structures within View of KOP	132
Distance to Closest Structure	24 mi (38.67 km)
Distance to Furthest Structure	49 mi (79 km)

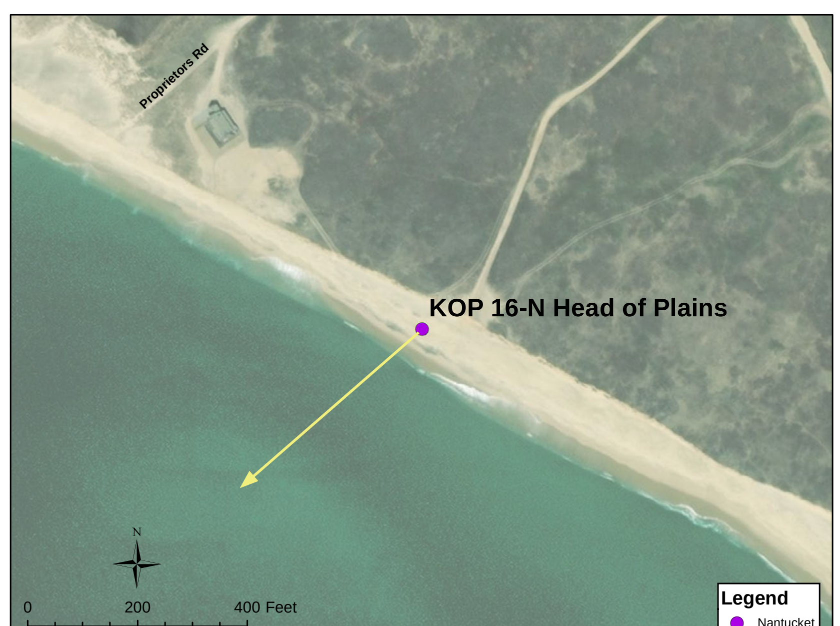
KOP 16-N Head of Plains - Scenario 5 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 24 mi / 39 km
Furthest Visible WTG: 49 mi / 79 km
Potential Number of WTGs Visible: 132
Potential Number of WTGs Not Visible: 17

ENVIRONMENT

Temperature: 66° F
Humidity: 81%
Wind Dir & Speed: SW 21 mph
Weather Condition: Clear

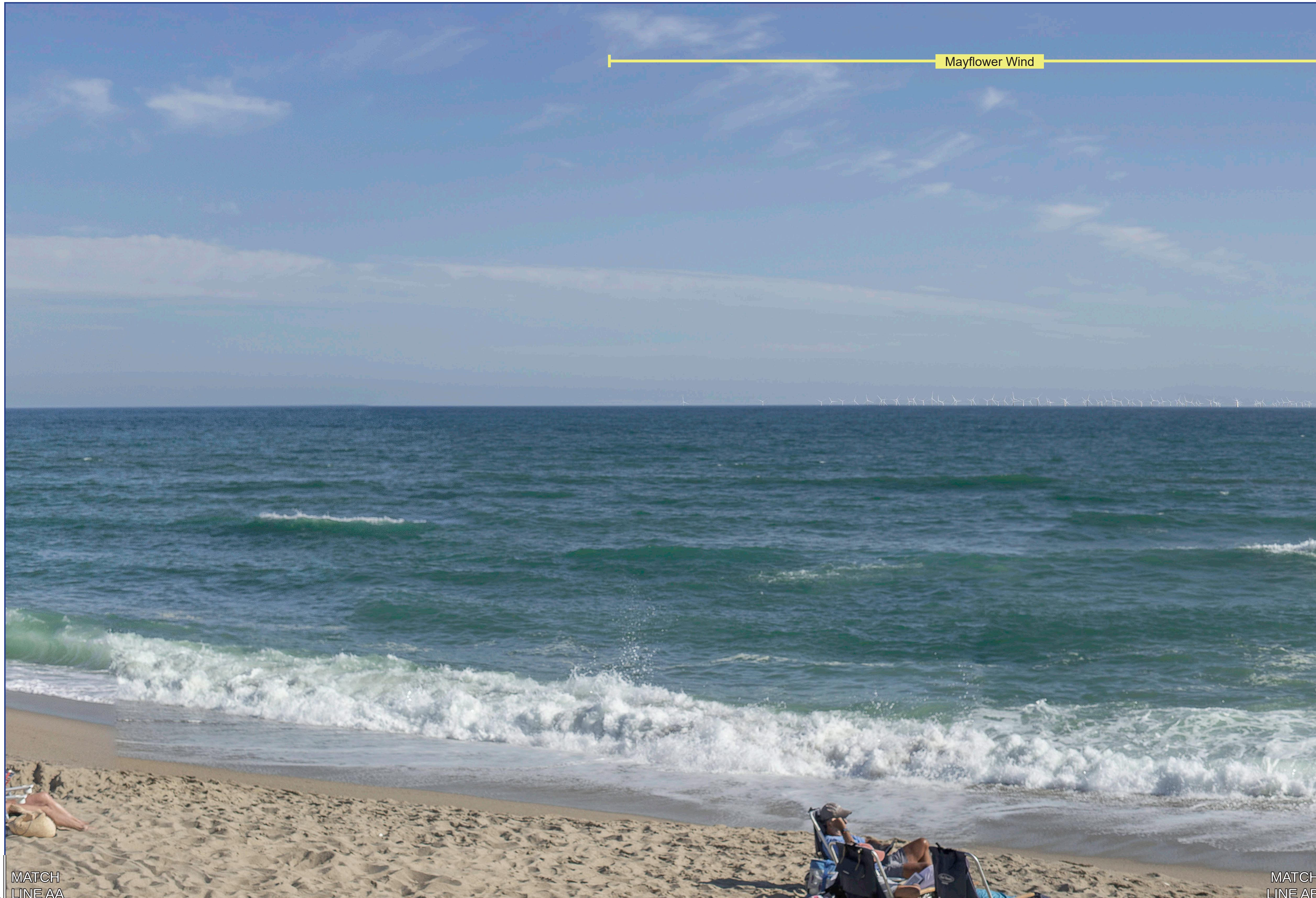
PHOTOGRAPH AND SITE

Time of photograph: 3:54PM
Date of photograph: 10-7-20
L/SCA: Ocean Beach, Open Ocean, Dunes
Viewing direction: South (229°)
Latitude: 41.341724°N
Longitude: 70.179524°W
Lighting Direction: Sidelit

CAMERA

Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS



MATCH LINE A

MATCH LINE AA

MATCH LINE AB

MATCH LINE BB

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 16-N Head of Plains - Scenario 5 (50mm view - 27° vertical / 40° horizontal) 2 of 3

SIMULATED CONDITIONS

MATCH
LINE AB

MATCH
LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 16-N Head of Plains - Scenario 5 (50mm view - 27° vertical / 40° horizontal) 3 of 3

SIMULATED CONDITIONS

MATCH
LINE BC

MATCH
LINE B

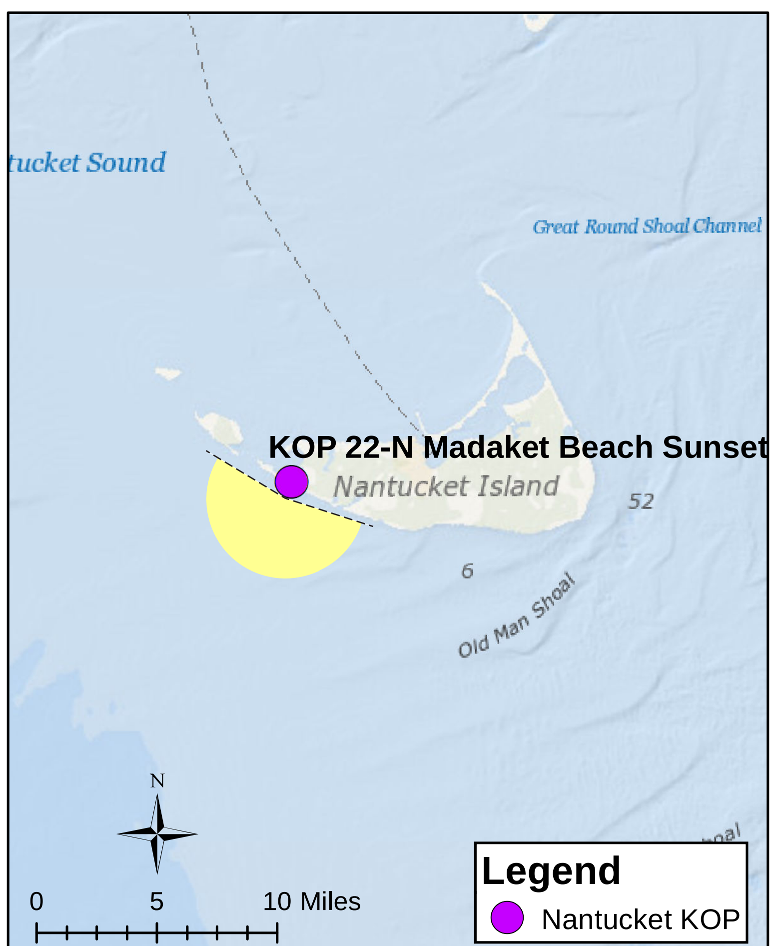
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 22-N Madaket Beach at Sunset - Scenario 1

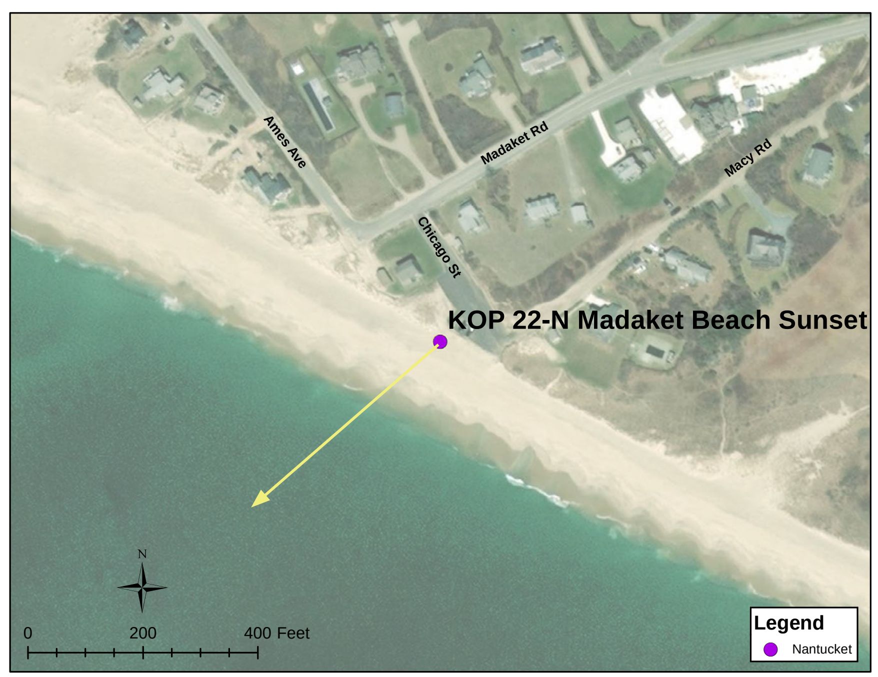
Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 25 km

Furthest Visible WTG: 45 mi / 72 km
Potential Number of Structures Visible: 249
Potential Number of Structures Not Visible: 200

PHOTOGRAPH AND SITE

Time of photograph: 6:11PM
Date of photograph: 7-29-20
L/SCA: Ocean beach

Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

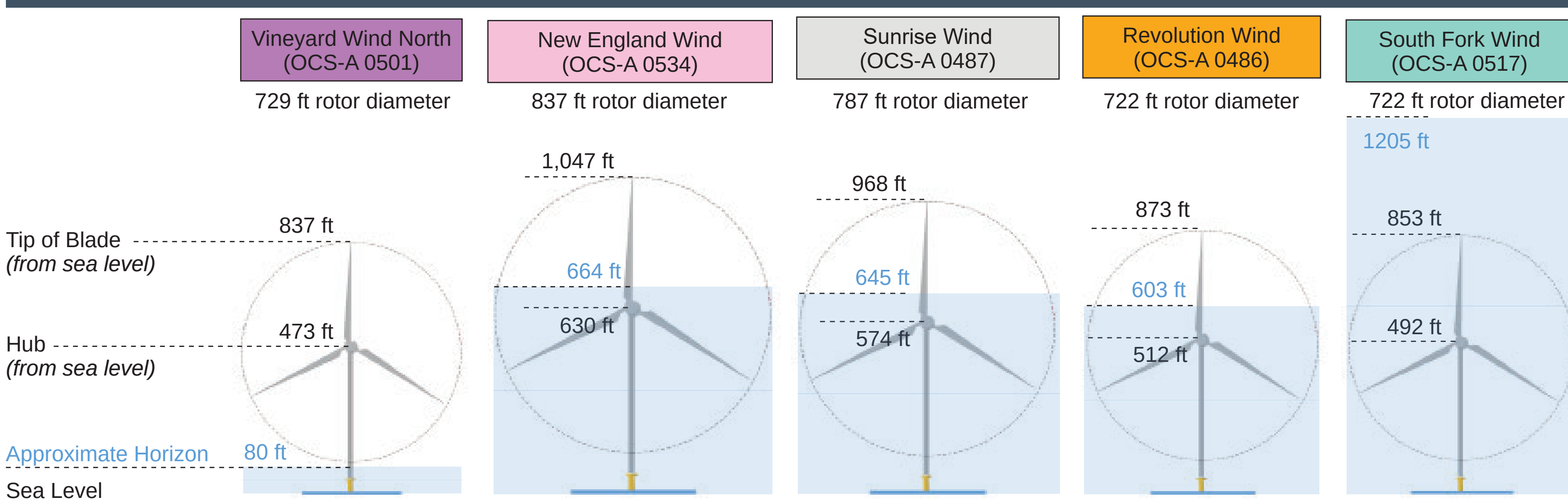
CAMERA

Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 22-N Madaket Beach at Sunset - Scenario 1

SIMULATED CONDITIONS

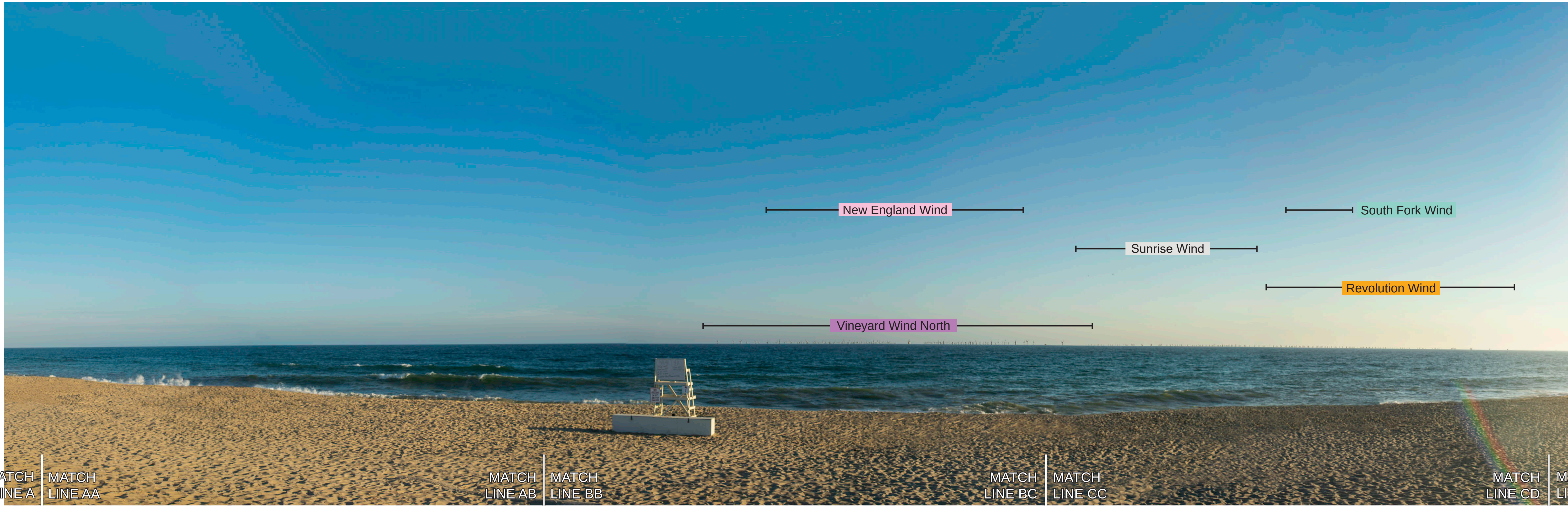
VISIBILTY OF CLOSEST TURBINES



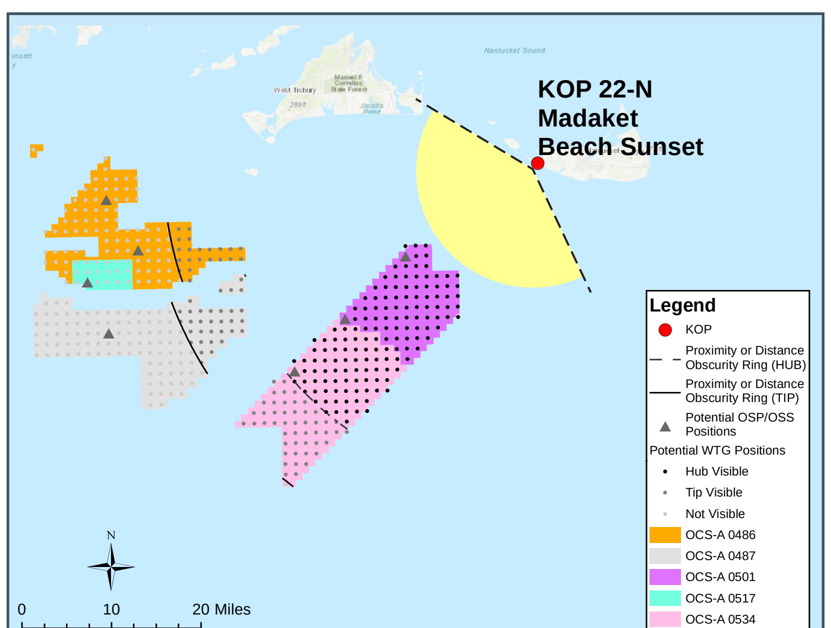
	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	77	119	32	21	0
Distance to Closest Structure	15 mi (25 km)	36 mi (58 km)	36 mi (57 km)	35 mi (56 km)	47 mi (76 km)
Distance to Furthest Structure	28 mi (45 km)	45 mi (72 km)	43.73 mi (70 km)	42 mi (67 km)	53 mi (85 km)

KOP 22-N Madaket Beach at Sunset - Scenario 1 (Human Field of View - 124°)

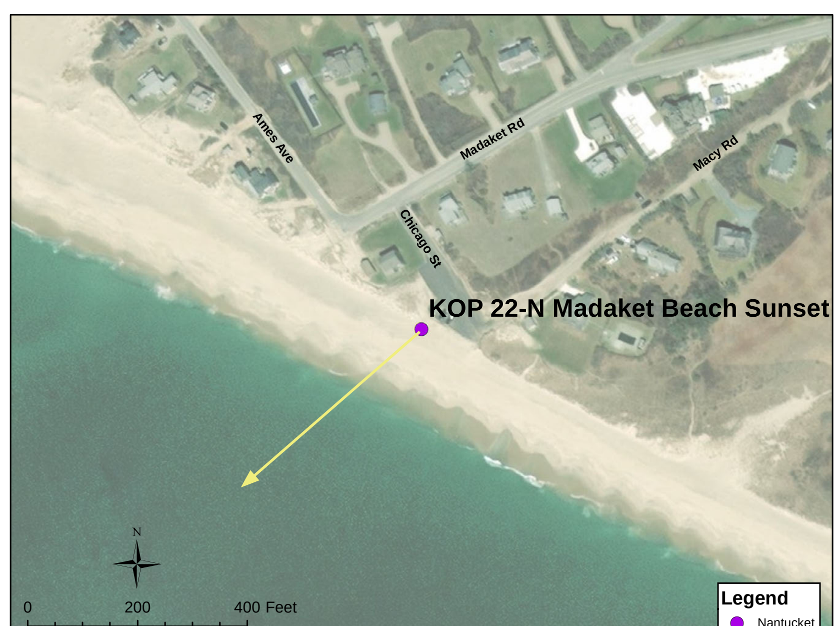
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 25 km
Furthest Visible WTG: 45 mi / 72 km
Potential Number of Structures Visible: 249
Potential Number of Structures Not Visible: 200

PHOTOGRAPH AND SITE

Time of photograph: 6:11PM
Date of photograph: 7-29-20
L/SCA: Ocean beach
Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

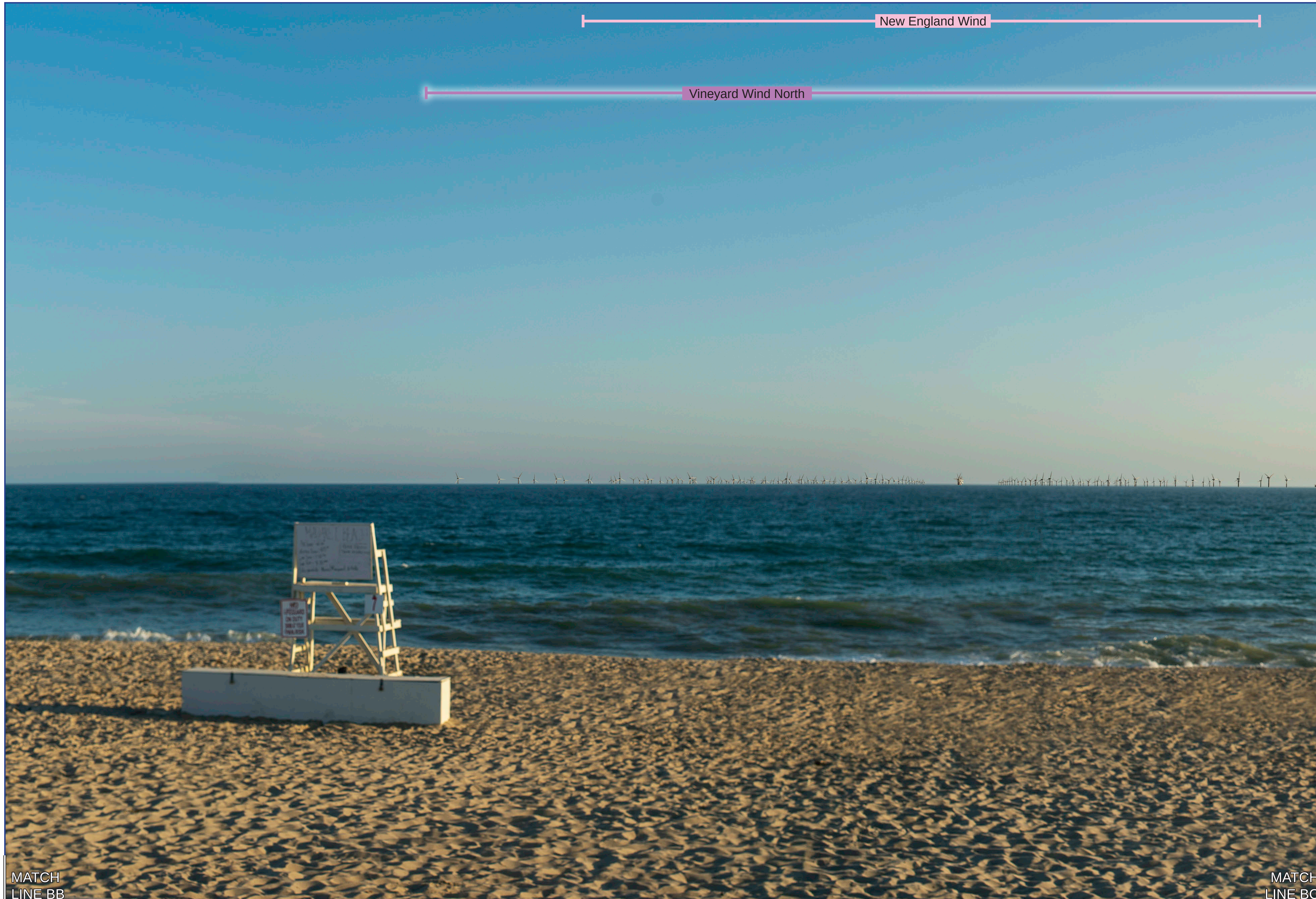
CAMERA

Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 22-N Madaket Beach at Sunset - Scenario 1 (50mm view - 27° vertical / 40° horizontal) 2 of 3

SIMULATED CONDITIONS



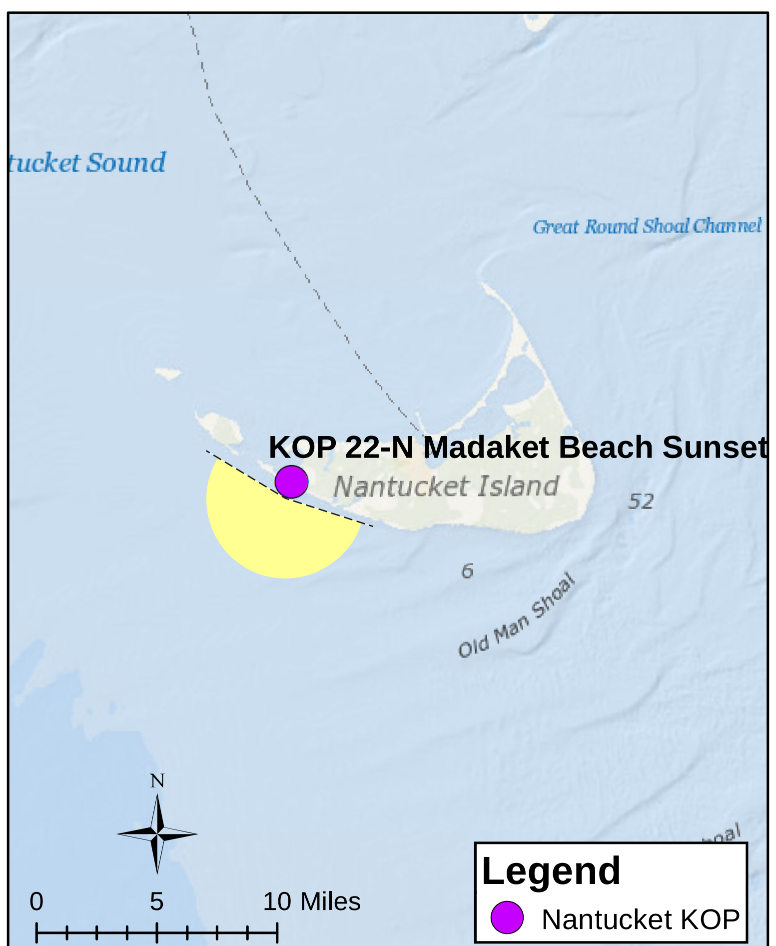
The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

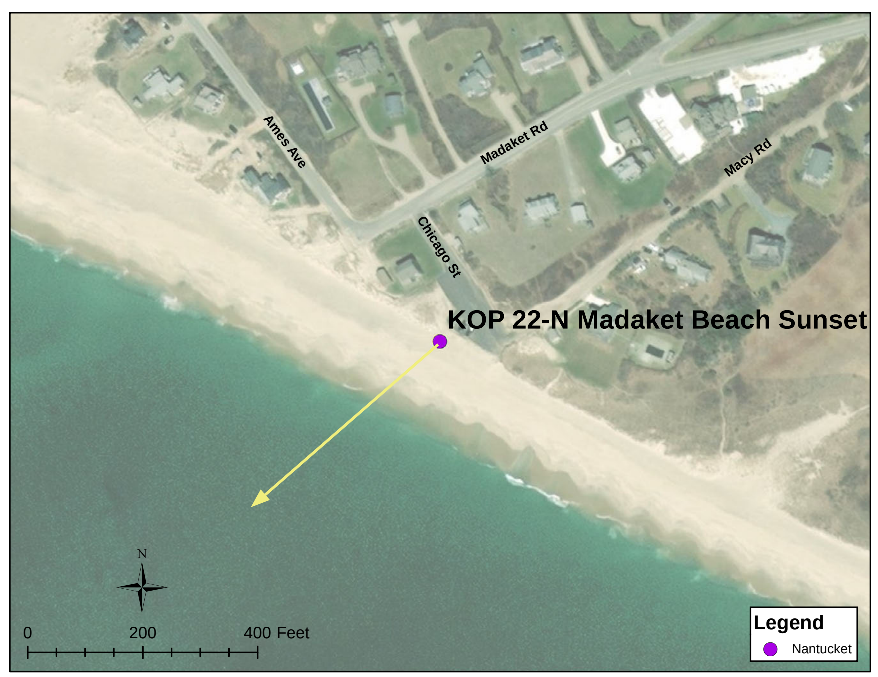
KOP 22-N Madaket Beach at Sunset - Scenario 2

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 25 km
Furthest Visible WTG: 46 mi / 73 km
Potential Number of Structures Visible: 378
Potential Number of Structures Not Visible: 220

PHOTOGRAPH AND SITE

Time of photograph: 6:11 PM
Date of photograph: 7-29-20
L/SCA: Ocean beach
Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

ENVIRONMENT

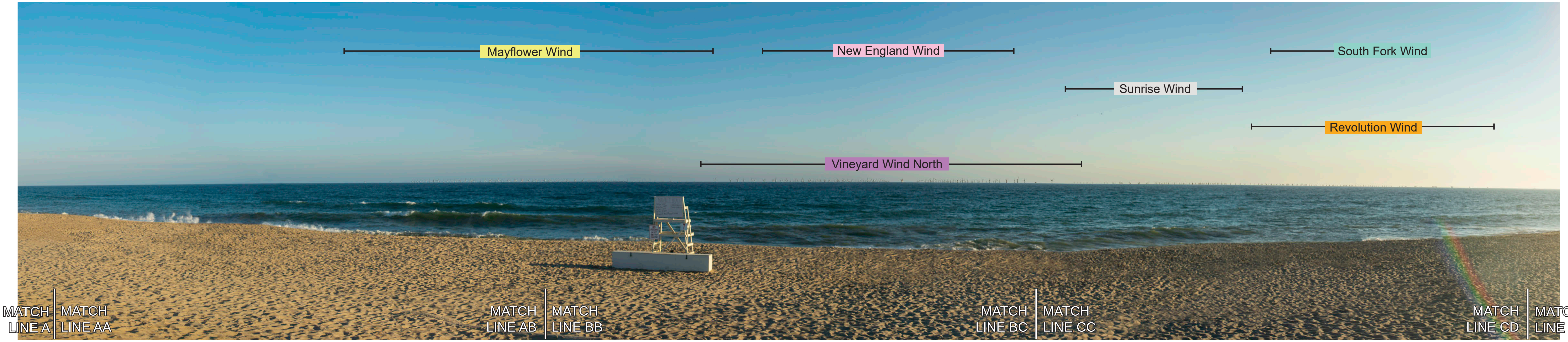
Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

CAMERA

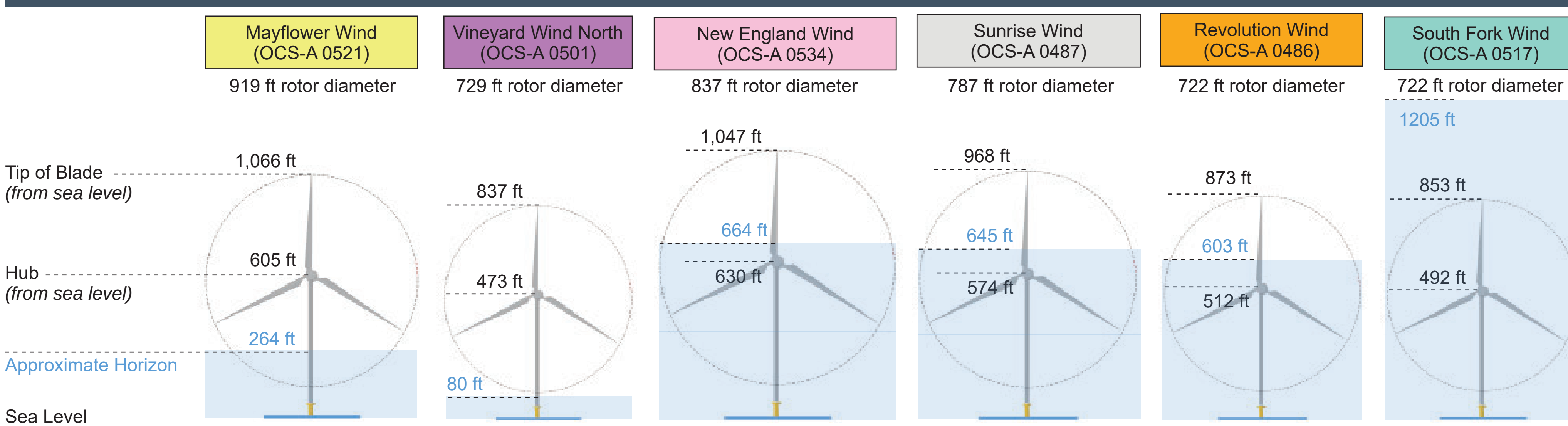
Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 22-N Madaket Beach at Sunset - Scenario 2

SIMULATED CONDITIONS



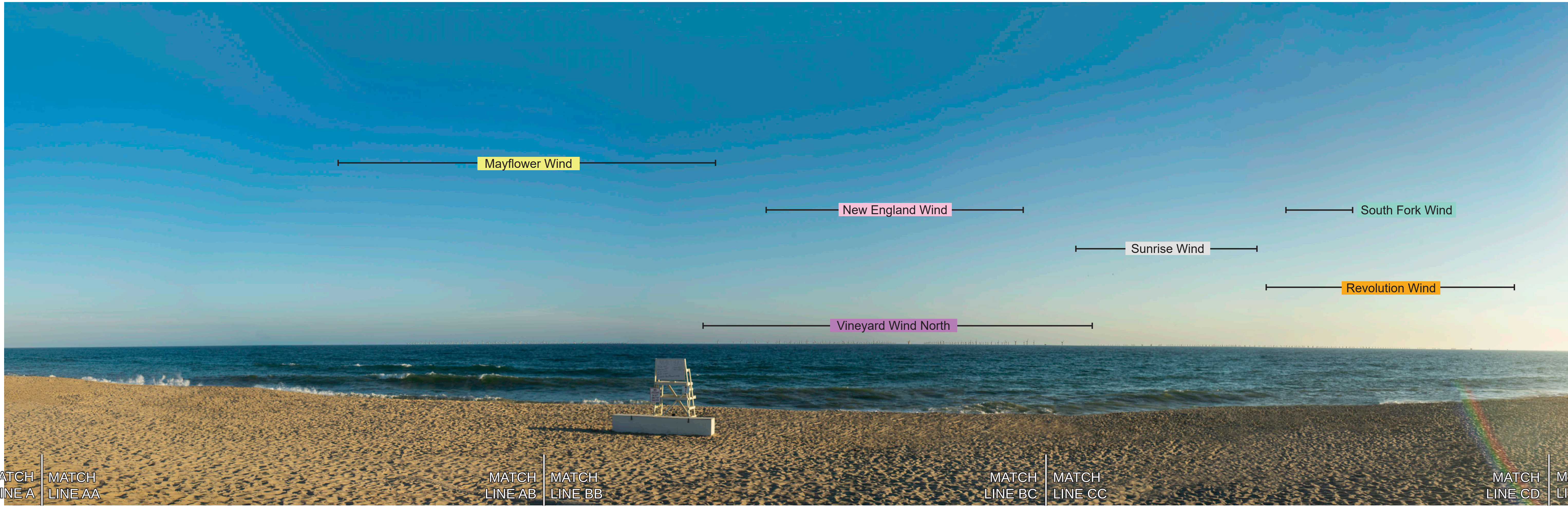
VISIBILTY OF CLOSEST TURBINES



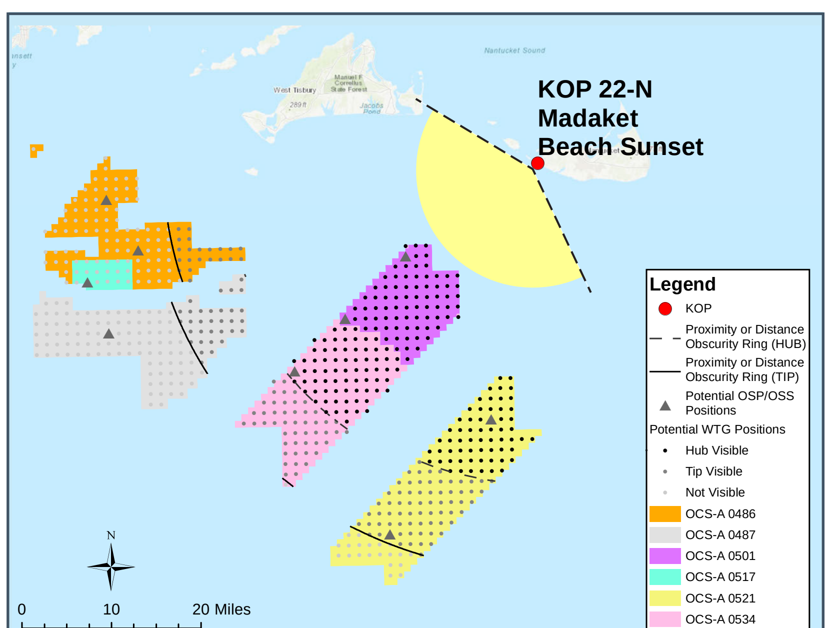
	Mayflower Wind (OCS-A 0521)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2025	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	149	77	120	131	103	18
Number of Structures within View of KOP	129	77	119	32	21	0
Distance to Closest Structure	24 mi (39 km)	15 mi (25 km)	36 mi (58 km)	36 mi (57 km)	35 mi (56 km)	47 mi (76 km)
Distance to Furthest Structure	46 mi (73 km)	28 mi (45 km)	45 mi (72 km)	43.73 mi (70 km)	42 mi (67 km)	53 mi (85 km)

KOP 22-N Madaket Beach at Sunset - Scenario 2 (Human Field of View - 124°)

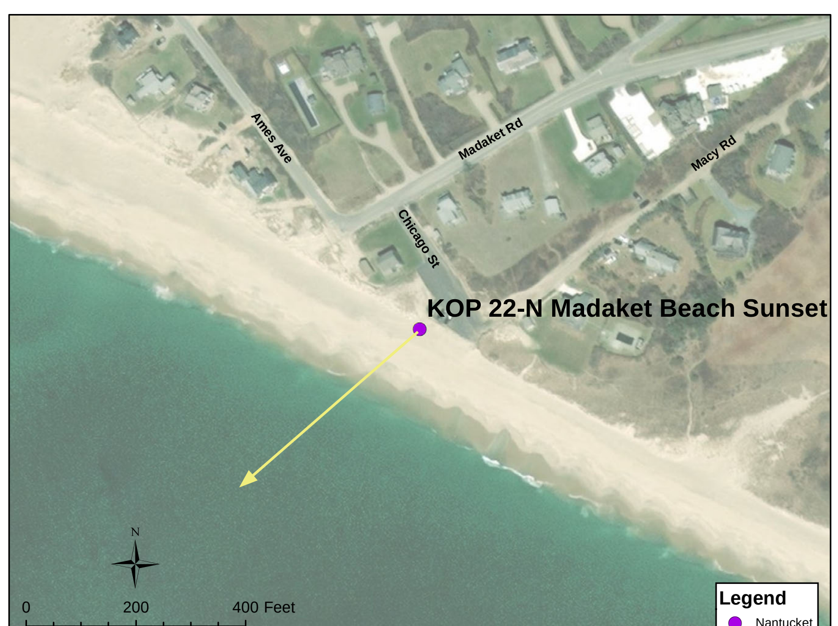
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 25 km
Furthest Visible WTG: 46 mi / 73 km
Potential Number of Structures Visible: 378
Potential Number of Structures Not Visible: 220

ENVIRONMENT

Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

PHOTOGRAPH AND SITE

Time of photograph: 6:11PM
Date of photograph: 7-29-20
L/SCA: Ocean beach
Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 22-N Madaket Beach at Sunset - Scenario 2 (50mm view - 27° vertical / 40° horizontal) 3 of 3

SIMULATED CONDITIONS

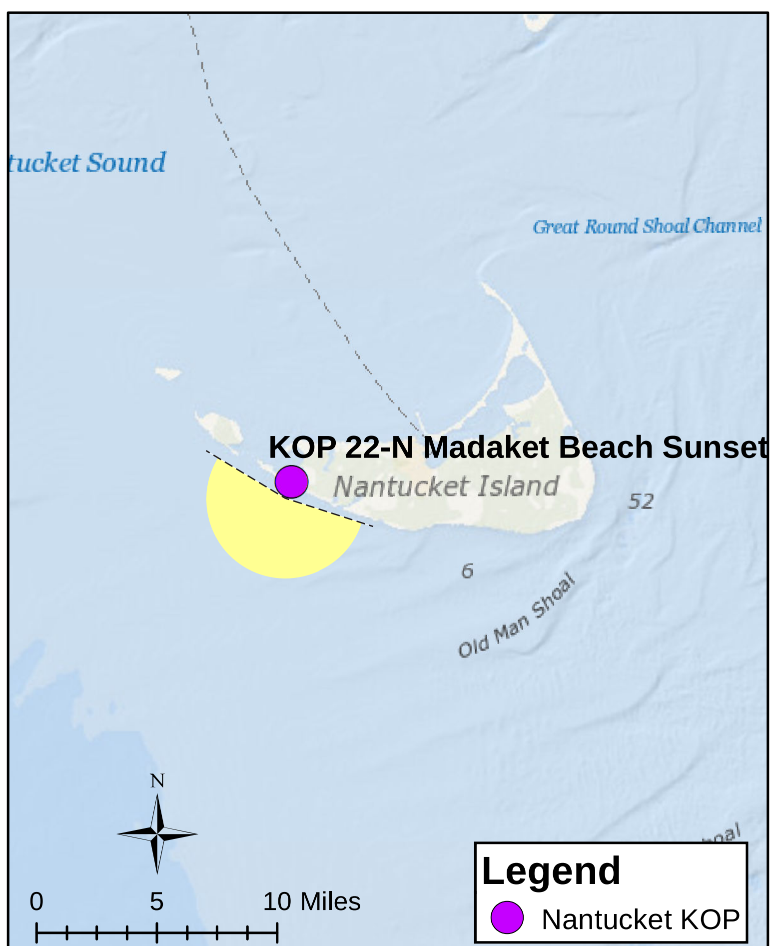
The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 22-N Madaket Beach at Sunset - Scenario 3

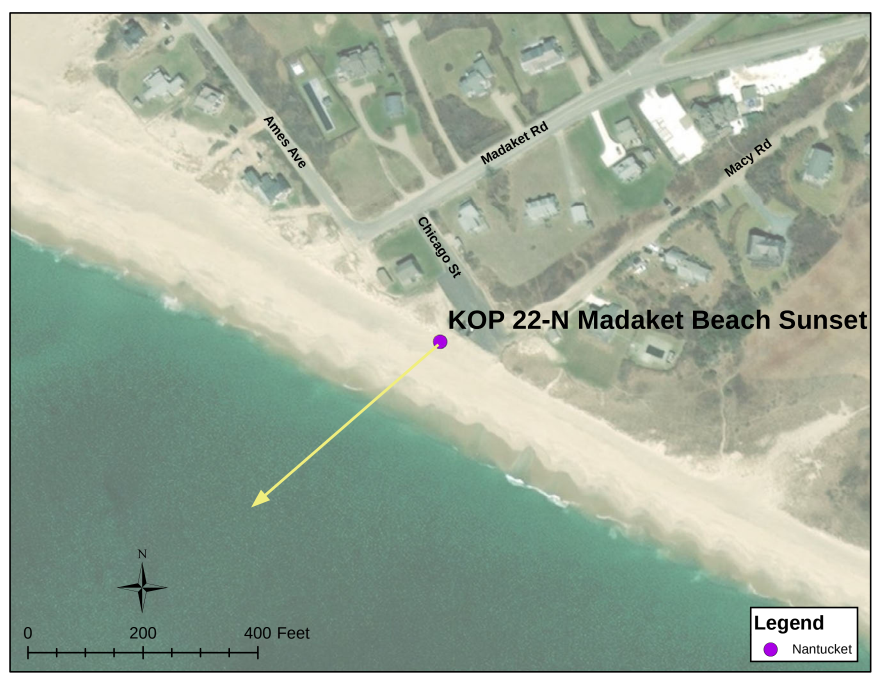
Nantucket

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 25 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 743
Potential Number of Structures Not Visible: 320

PHOTOGRAPH AND SITE

Time of photograph: 6:11 PM
Date of photograph: 7-29-20
L/SCA: Ocean beach
Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

ENVIRONMENT

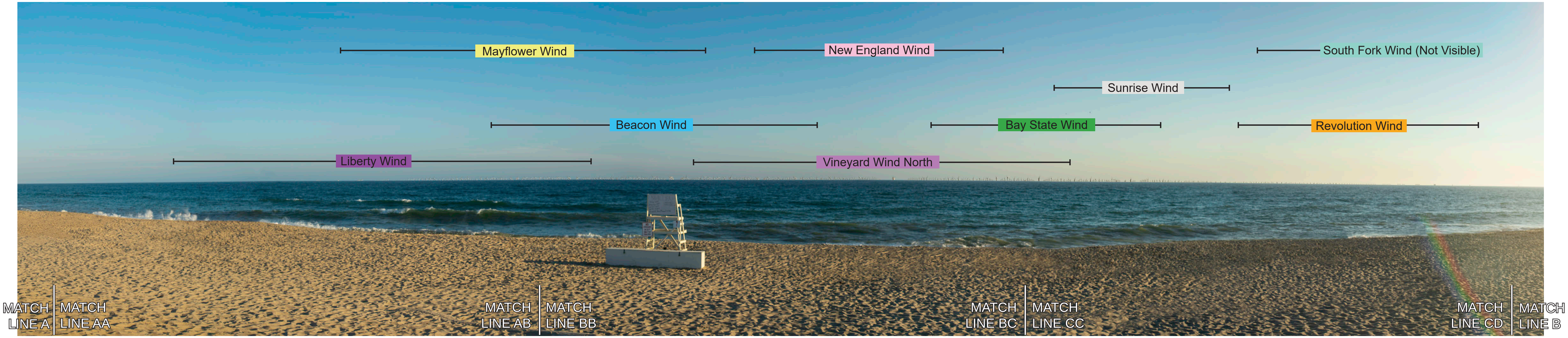
Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

CAMERA

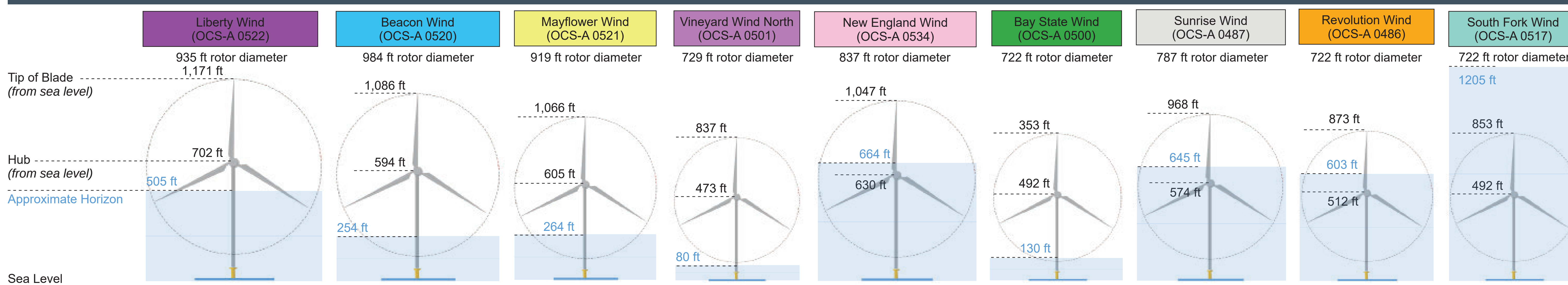
Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 22-N Madaket Beach at Sunset - Scenario 3

SIMULATED CONDITIONS



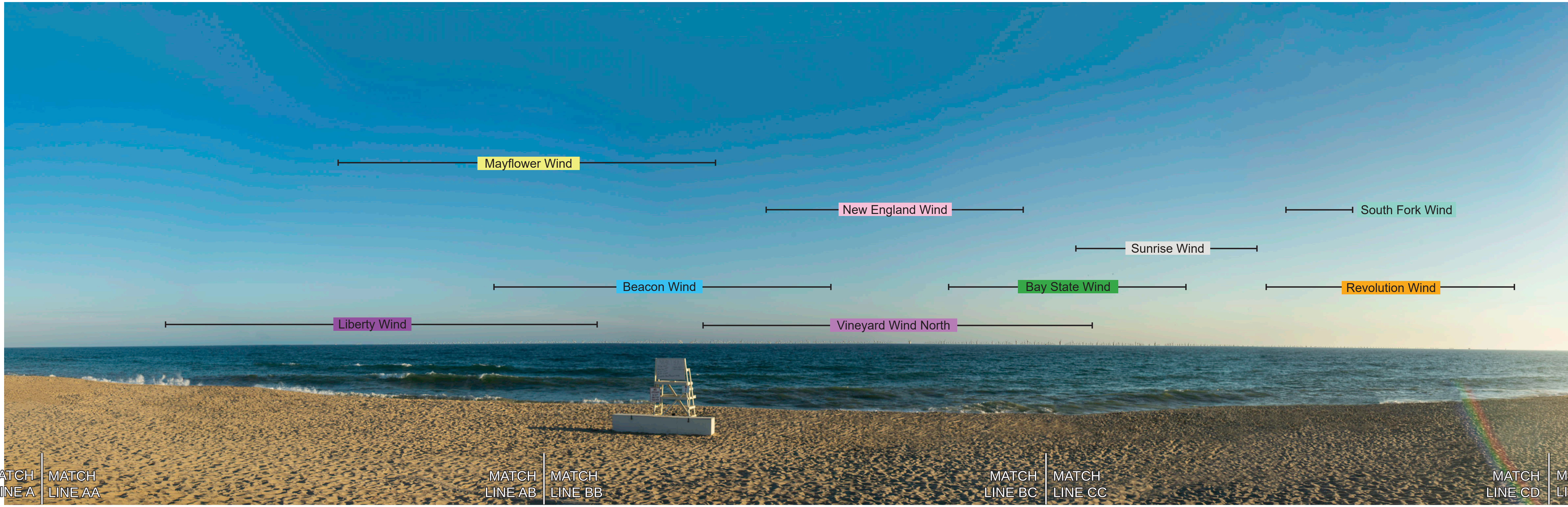
VISIBILTY OF CLOSEST TURBINES



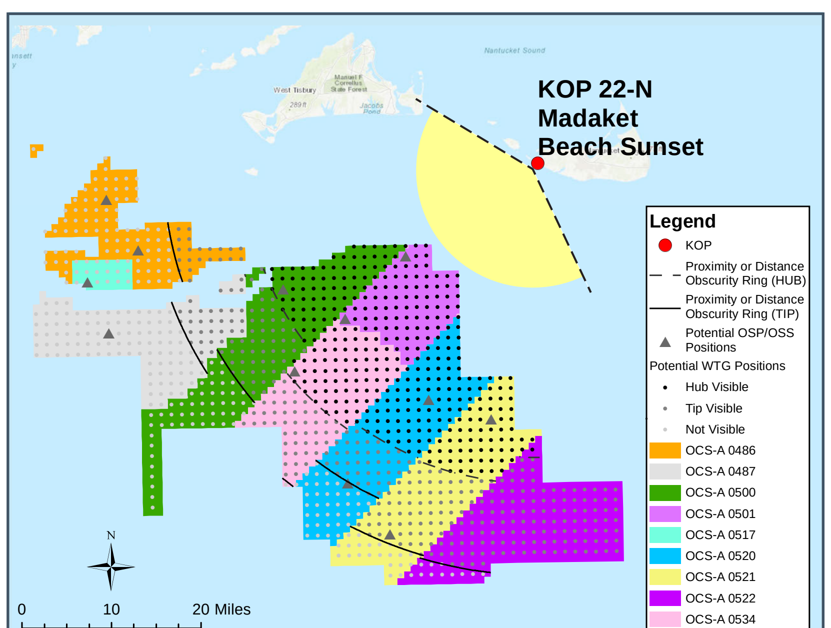
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Mayflower Wind (OCS-A 0521)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2025-2030	2025-2030	2025	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	149	77	120	169	131	103	18
Number of Structures within View of KOP	127	119	129	77	119	119	32	21	0
Distance to Closest Structure	32 mi (52 km)	24 mi (39 km)	24 mi (39 km)	15 mi (25 km)	36 mi (58 km)	18 mi (30 km)	36 mi (57 km)	35 mi (56 km)	47 mi (76 km)
Distance to Furthest Structure	46 mi (78 km)	42 mi (67 km)	46 mi (73 km)	28 mi (45 km)	45 mi (72 km)	41 mi (67 km)	43.73 mi (70 km)	42 mi (67 km)	53 mi (85 km)

KOP 22-N Madaket Beach at Sunset - Scenario 3 (Human Field of View - 124°)

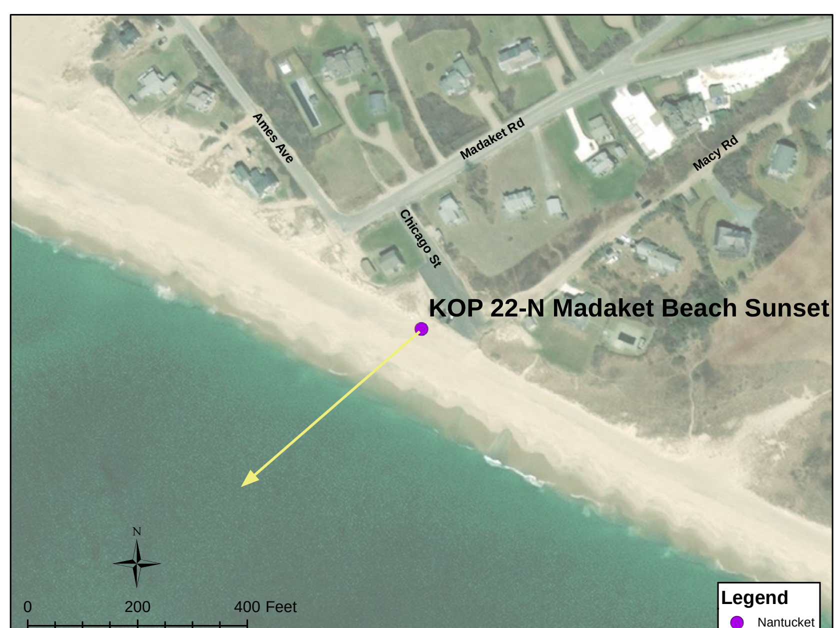
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 25 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 743
Potential Number of Structures Not Visible: 320

ENVIRONMENT

Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

PHOTOGRAPH AND SITE

Time of photograph: 6:11PM
Date of photograph: 7-29-20
L/SCA: Ocean beach
Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

MATCH LINE AB

MATCH LINE CC

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 22-N Madaket Beach at Sunset - Scenario 3 (50mm view - 27° vertical / 40° horizontal) 3 of 3

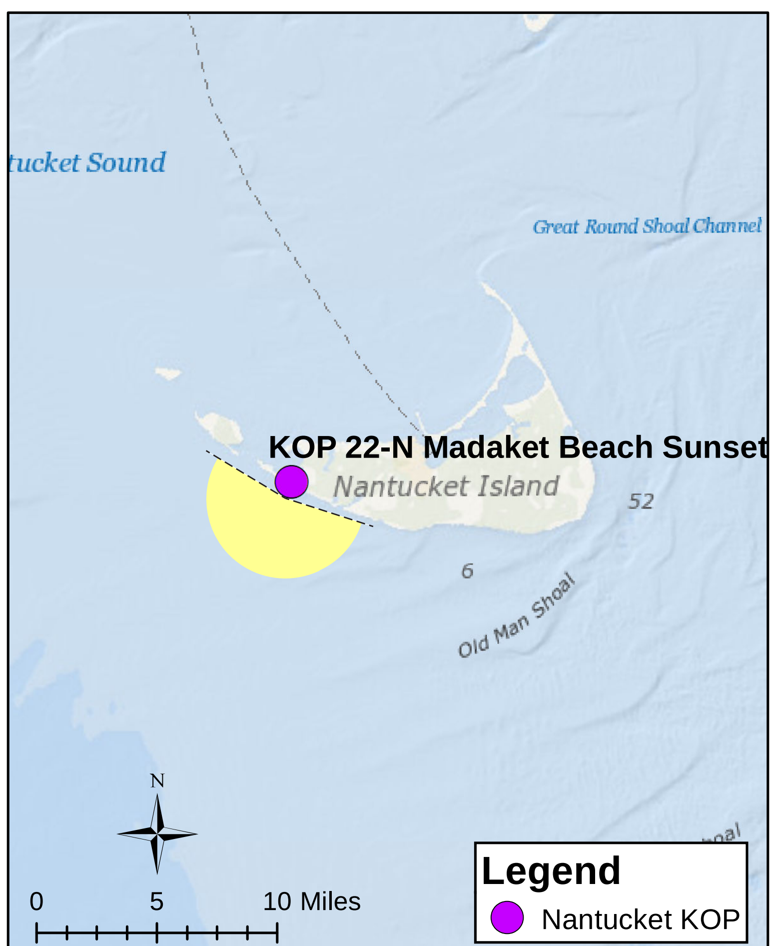
SIMULATED CONDITIONS

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

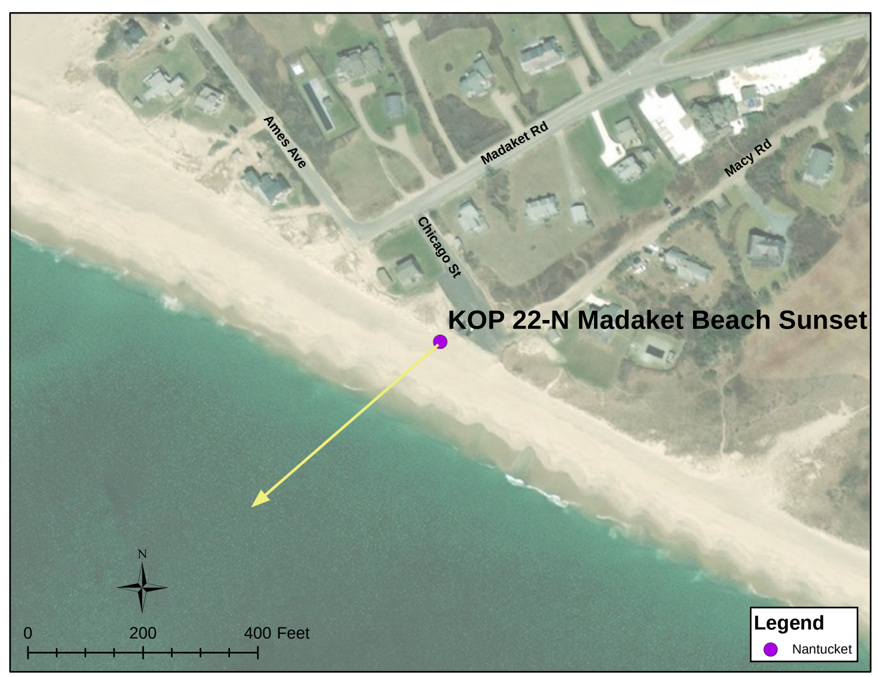
KOP 22-N Madaket Beach at Sunset - Scenario 4

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 25 km
Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 614
Potential Number of Structures Not Visible: 300

PHOTOGRAPH AND SITE

Time of photograph: 6:11PM
Date of photograph: 7-29-20
L/SCA: Ocean beach
Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

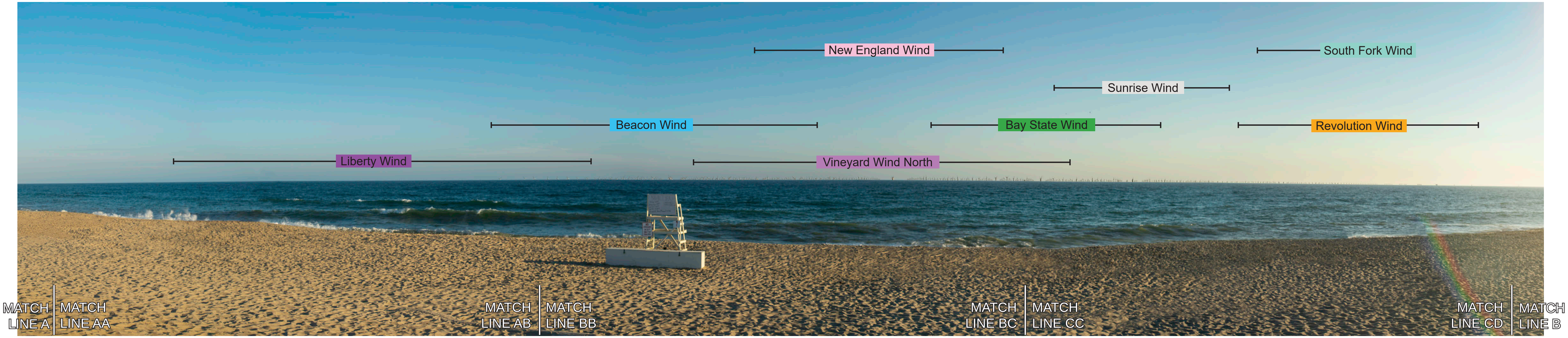
ENVIRONMENT

Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

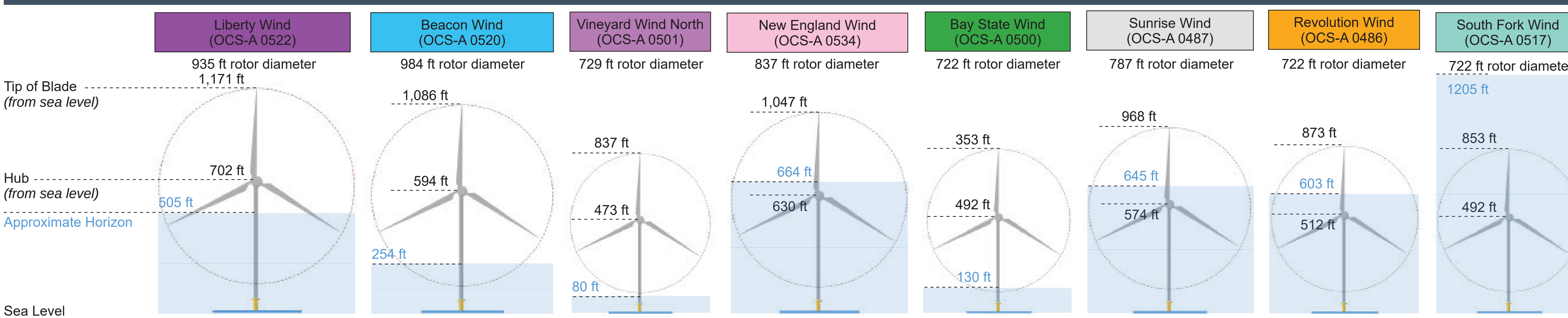
CAMERA

Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS



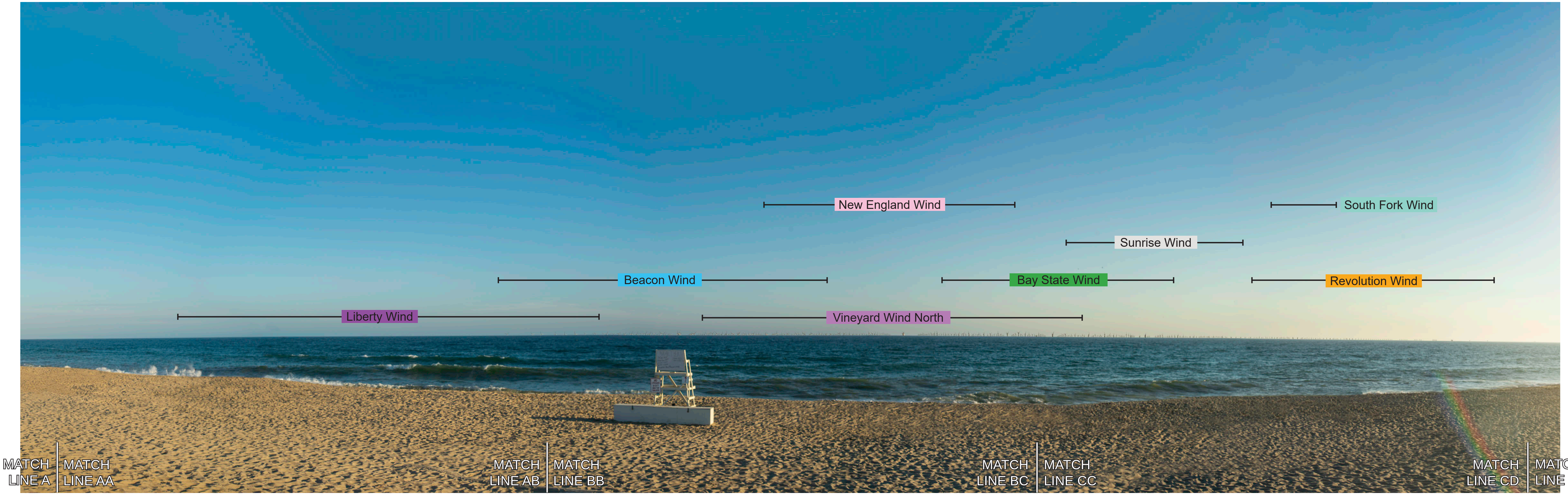
VISIBILTY OF CLOSEST TURBINES



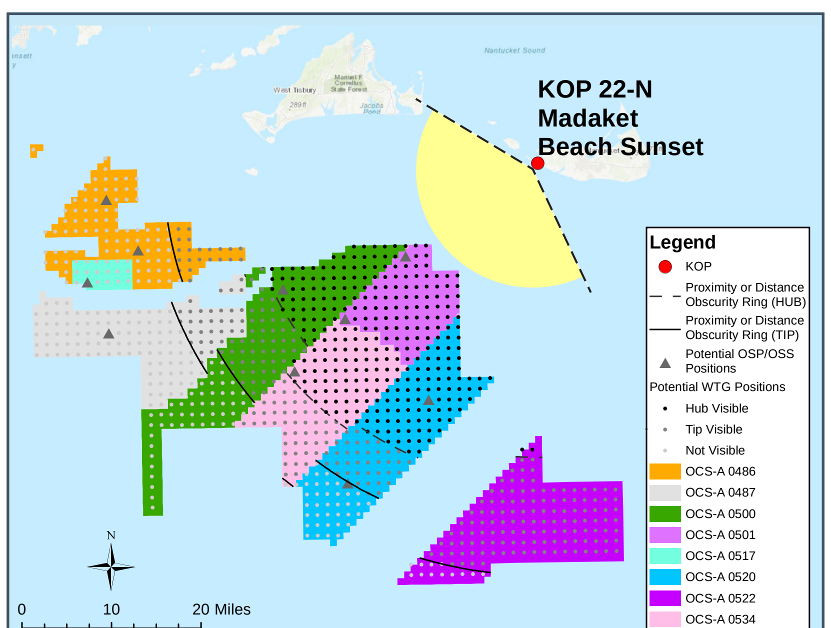
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2025-2030	2025-2030	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	77	120	169	131	103	18
Number of Structures within View of KOP	127	119	77	119	119	32	21	0
Distance to Closest Structure	32 mi (52 km)	24 mi (39 km)	15 mi (25 km)	36 mi (58 km)	18 mi (30 km)	36 mi (57 km)	35 mi (56 km)	47 mi (76 km)
Distance to Furthest Structure	46 mi (78 km)	42 mi (67 km)	28 mi (45 km)	45 mi (72 km)	41 mi (67 km)	43.73 mi (70 km)	42 mi (67 km)	53 mi (85 km)

KOP 22-N Madaket Beach at Sunset - Scenario 4 (Human Field of View - 124°)

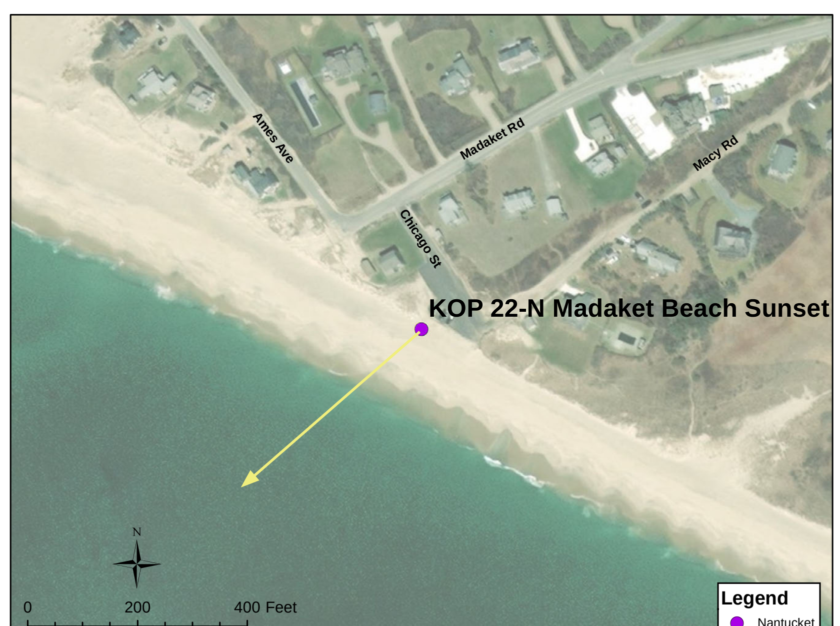
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 25 km

Furthest Visible WTG: 46 mi / 74 km
Potential Number of Structures Visible: 614
Potential Number of Structures Not Visible: 300

ENVIRONMENT

Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

PHOTOGRAPH AND SITE

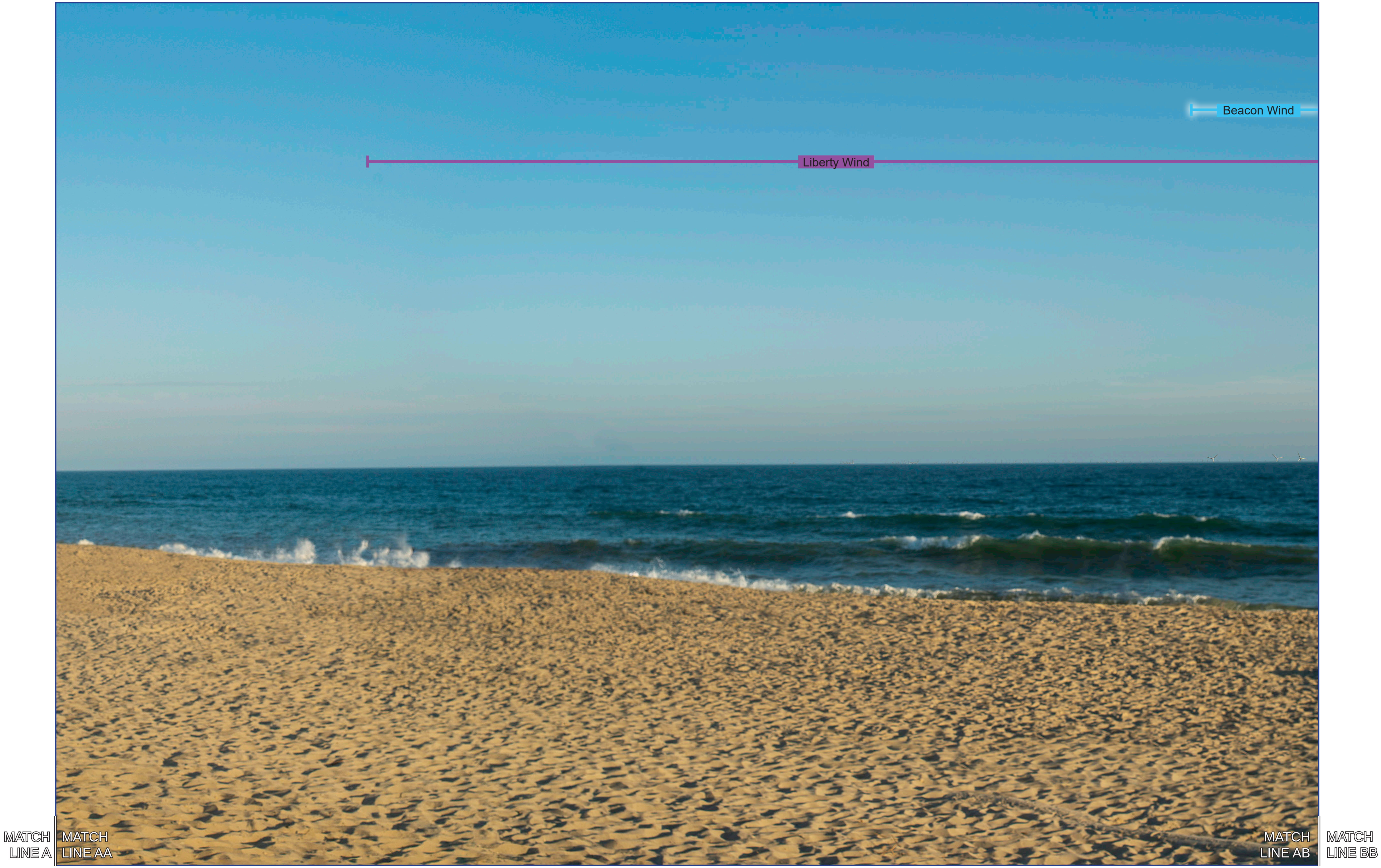
Time of photograph: 6:11PM
Date of photograph: 7-29-20
L/SCA: Ocean beach

Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 22-N Madaket Beach at Sunset - Scenario 4 (50mm view - 27° vertical / 39.6° horizontal) 1 of 3



The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

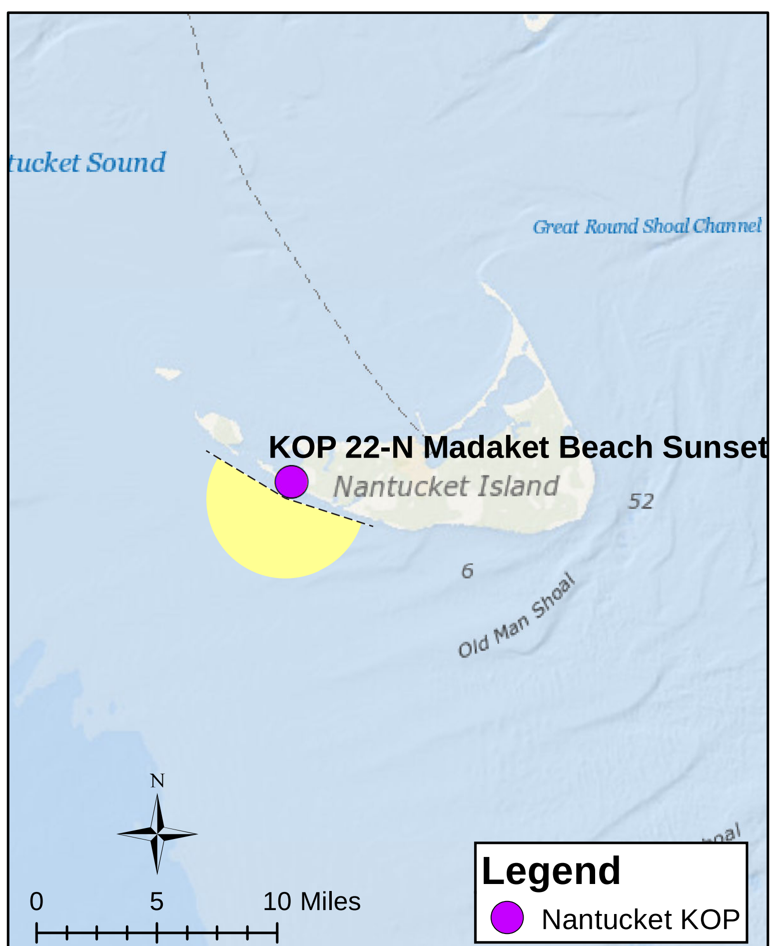
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

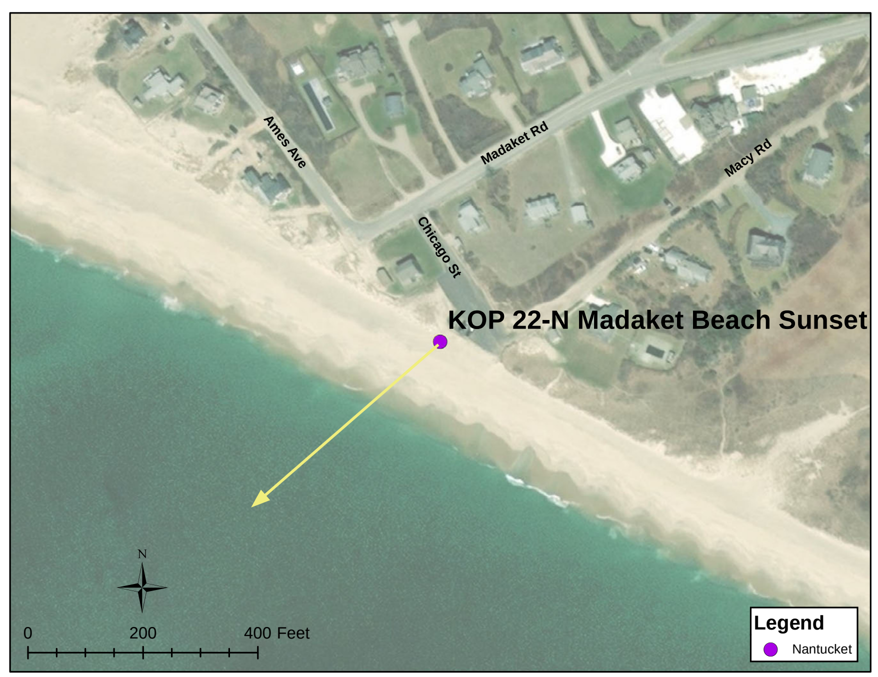
KOP 22-N Madaket Beach at Sunset - Scenario 5

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 24 mi / 39 km
Furthest Visible WTG: 46 mi / 73 km
Potential Number of StructuresVisible: 129
Potential Number of Structures Not Visible: 20

PHOTOGRAPH AND SITE

Time of photograph: 6:11PM
Date of photograph: 7-29-20
L/SCA: Ocean beach
Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

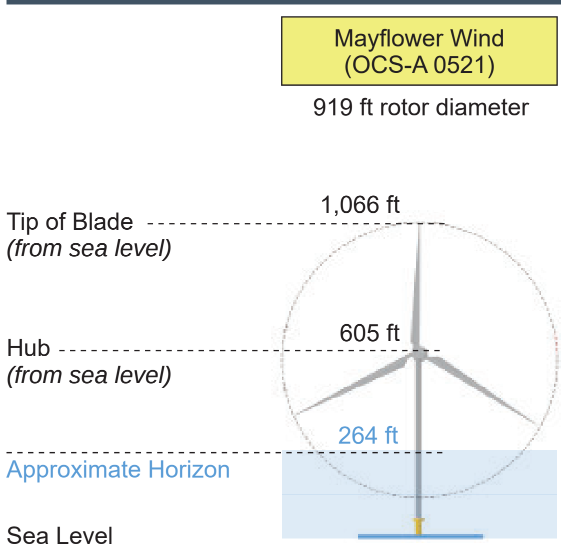
CAMERA

Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 22-N Madaket Beach at Sunset - Scenario 5

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

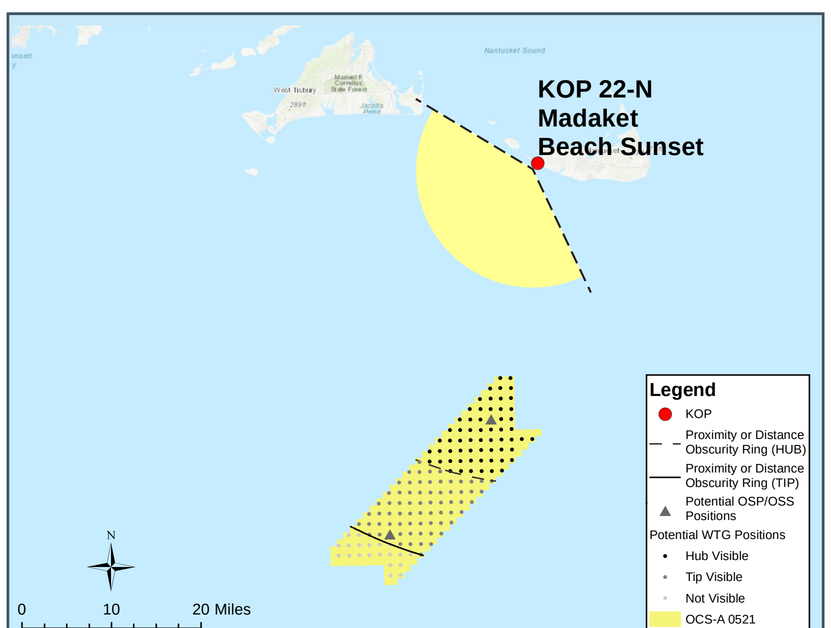


Year Forecasted for Development	2025
Number of Structures in Lease Area	149
Number of Structures within View of KOP	129
Distance to Closest Structure	24 mi (39 km)
Distance to Furthest Structure	46 mi (73 km)

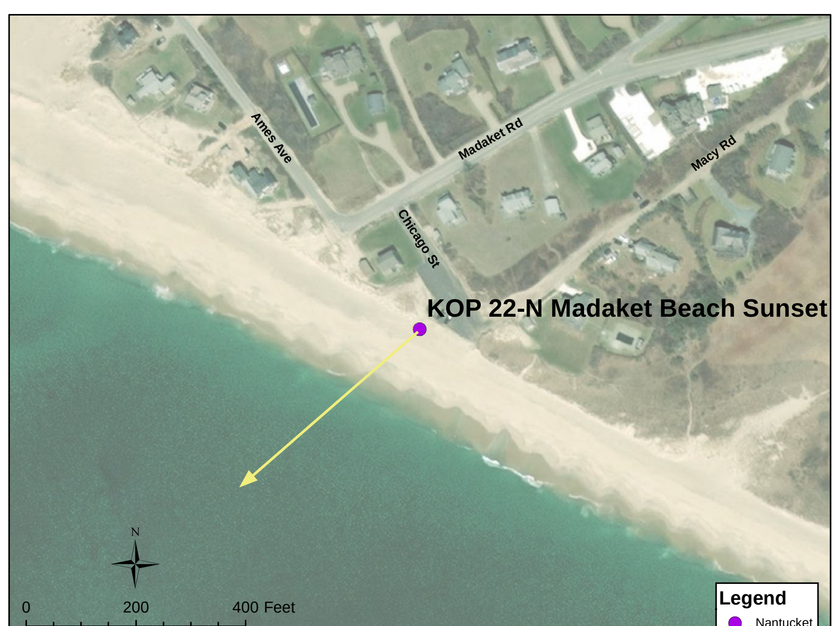
KOP 22-N Madaket Beach at Sunset - Scenario 5 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 127°
Vertical Field of View: 40°
Nearest WTG: 24 mi / 39 km
Furthest Visible WTG: 46 mi / 73 km
Potential Number of Structures Visible: 129
Potential Number of Structures Not Visible: 20

ENVIRONMENT

Temperature: 74° F
Humidity: 79%
Wind Dir & Speed: WNW 3 mph
Weather Condition: Clear

PHOTOGRAPH AND SITE

Time of photograph: 6:11PM
Date of photograph: 7-29-20
L/SCA: Ocean beach
Viewing direction: South (228°)
Latitude: 41.270282°N
Longitude: 70.201719°W
Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 13.5 ft / 4.1 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

MATCH
LINE AB

MATCH
LINE CC

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

MATCH
LINE BC

MATCH
LINE B

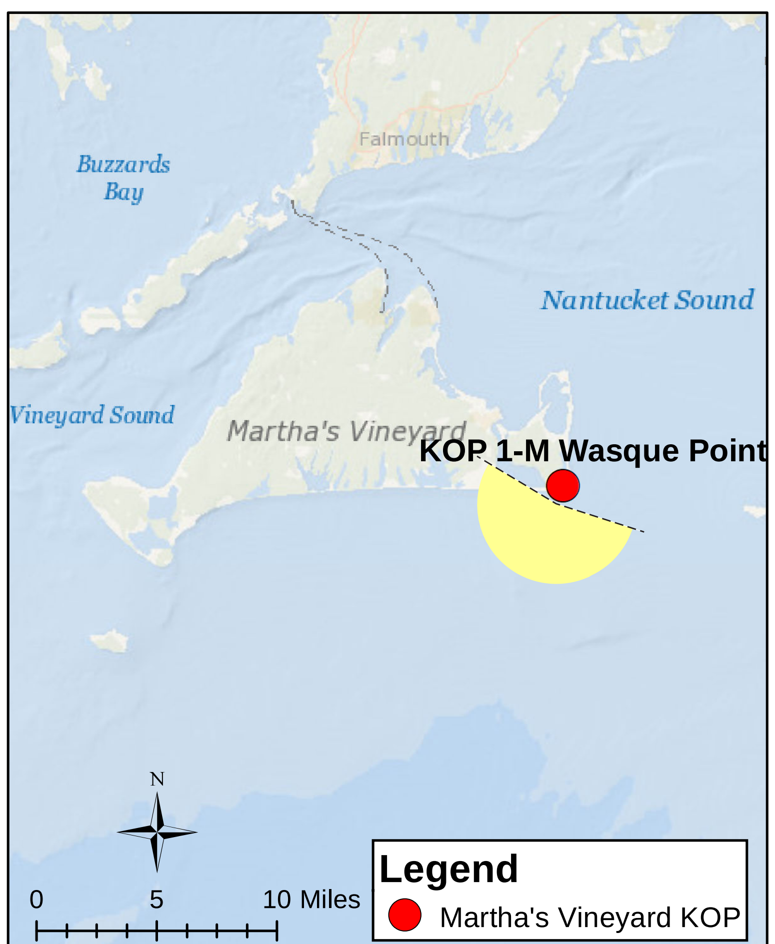
The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 1-MV Wasque Point - Scenario 1

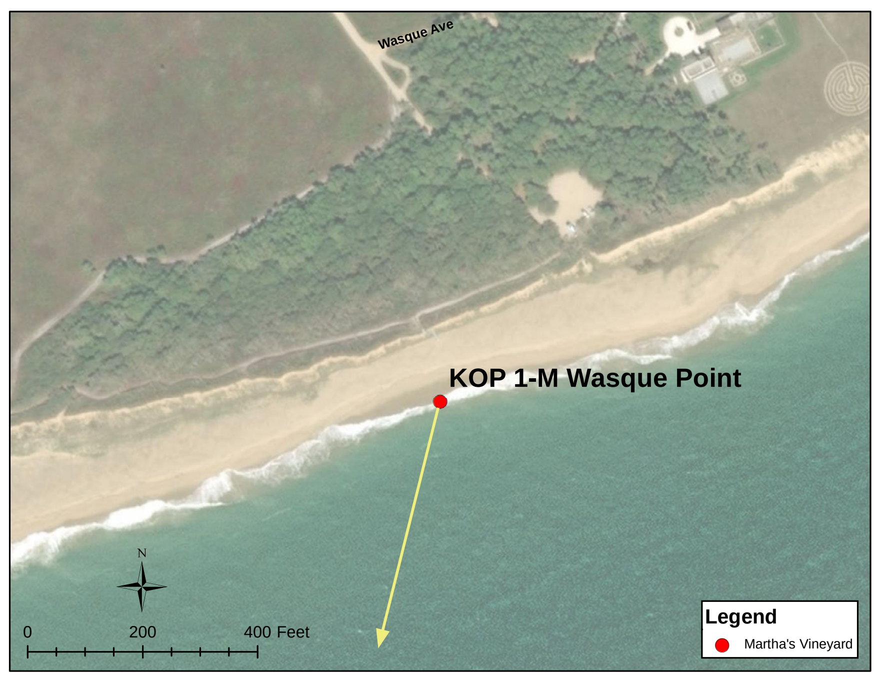
Martha's Vineyard

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 24 km
Furthest Visible WTG: 43 mi / 69 km
Potential Number of Structures Visible: 352
Potential Number of Structures Not Visible: 95

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM
Date of photograph: 6-25-20
L/SCA: Ocean Beach, Costal Scrub, Rural/Residential
Viewing direction: South (194°)
Latitude: 41.351077°N
Longitude: 70.454821°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 77° F
Humidity: 58%
Wind Dir & Speed: SSW 14mph
Weather Condition: Cloudy

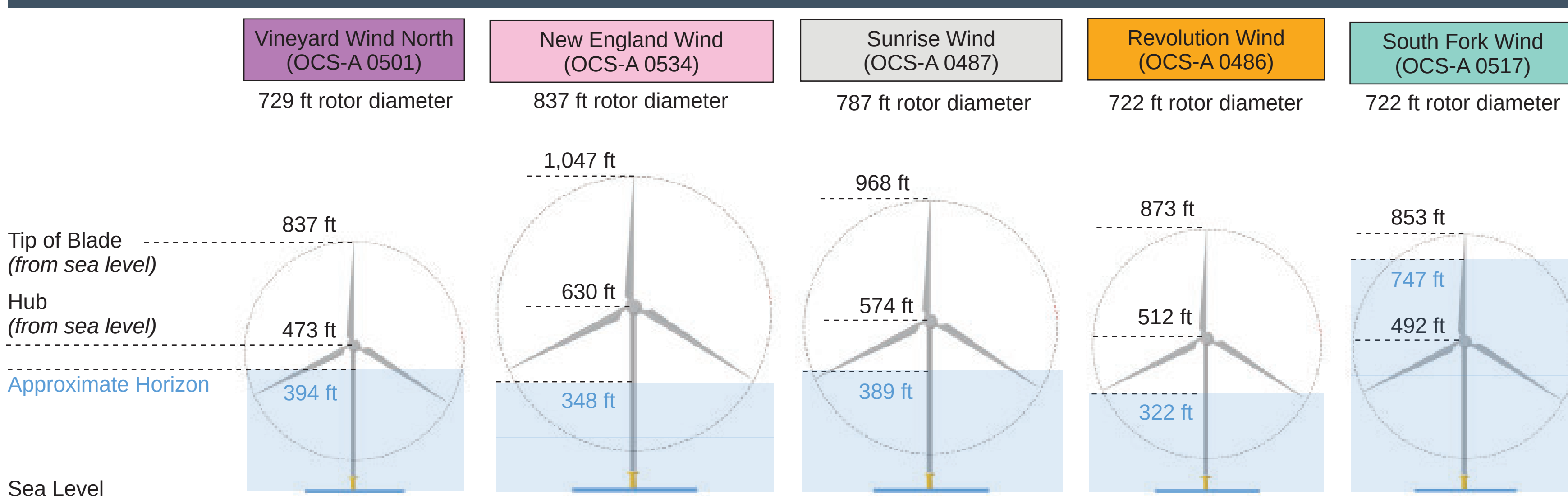
CAMERA

Camera Elevation: 6.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 1-MV Wasque Point - Scenario 1

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

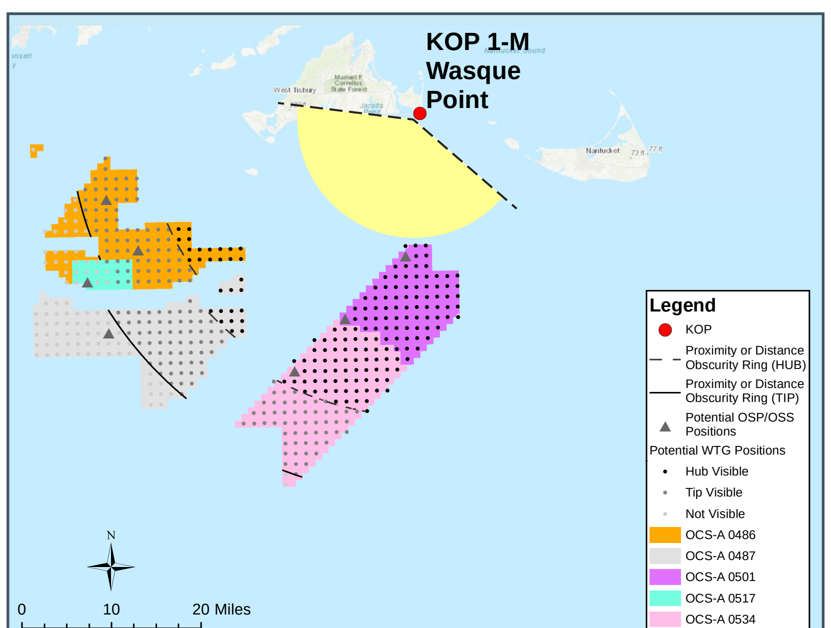


	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	77	118	74	83	0
Distance to Closest Structure	15 mi (24 km)	26 mi (42 km)	27 mi (44 km)	25 mi (40 km)	37 mi (59 km)
Distance to Furthest Structure	27 mi (44 km)	43 mi (69 km)	41 mi (66 km)	39 mi (63 km)	43 mi (69 km)

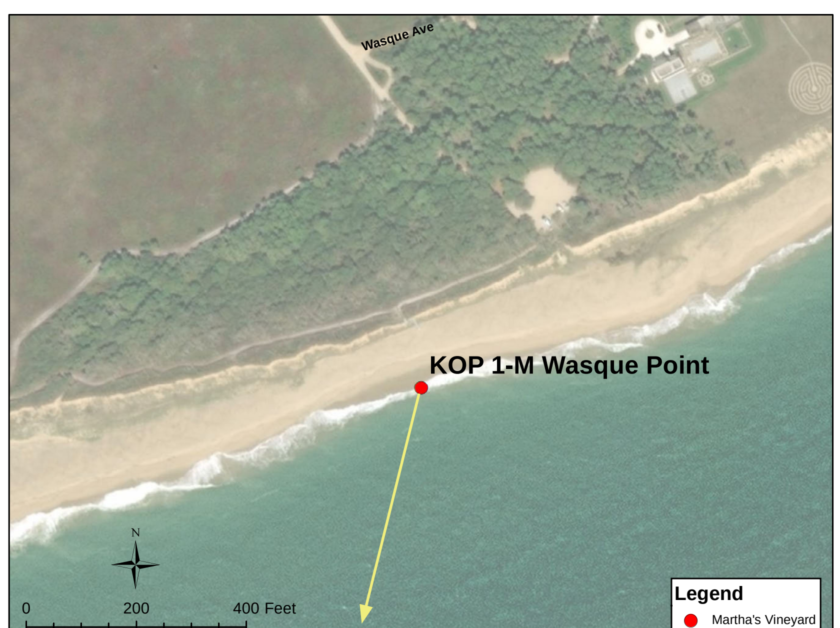
KOP 1-MV Wasque Point - Scenario 1 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 15 mi / 24 km

Furthest Visible WTG: 43 mi / 69 km

Potential Number of Structures Visible: 352

Potential Number of Structures Not Visible: 95

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM

Date of photograph: 6-25-20

L/SCA: Ocean Beach, Costal Scrub, Rural/Residential

Viewing direction: South (194°)

Latitude: 41.351077°N

Longitude: 70.454821°W

Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 77° F

Humidity: 58%

Wind Dir & Speed: SSW 14mph

Weather Condition: Cloudy

CAMERA

Camera Elevation: 6.5 ft / 6.3 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

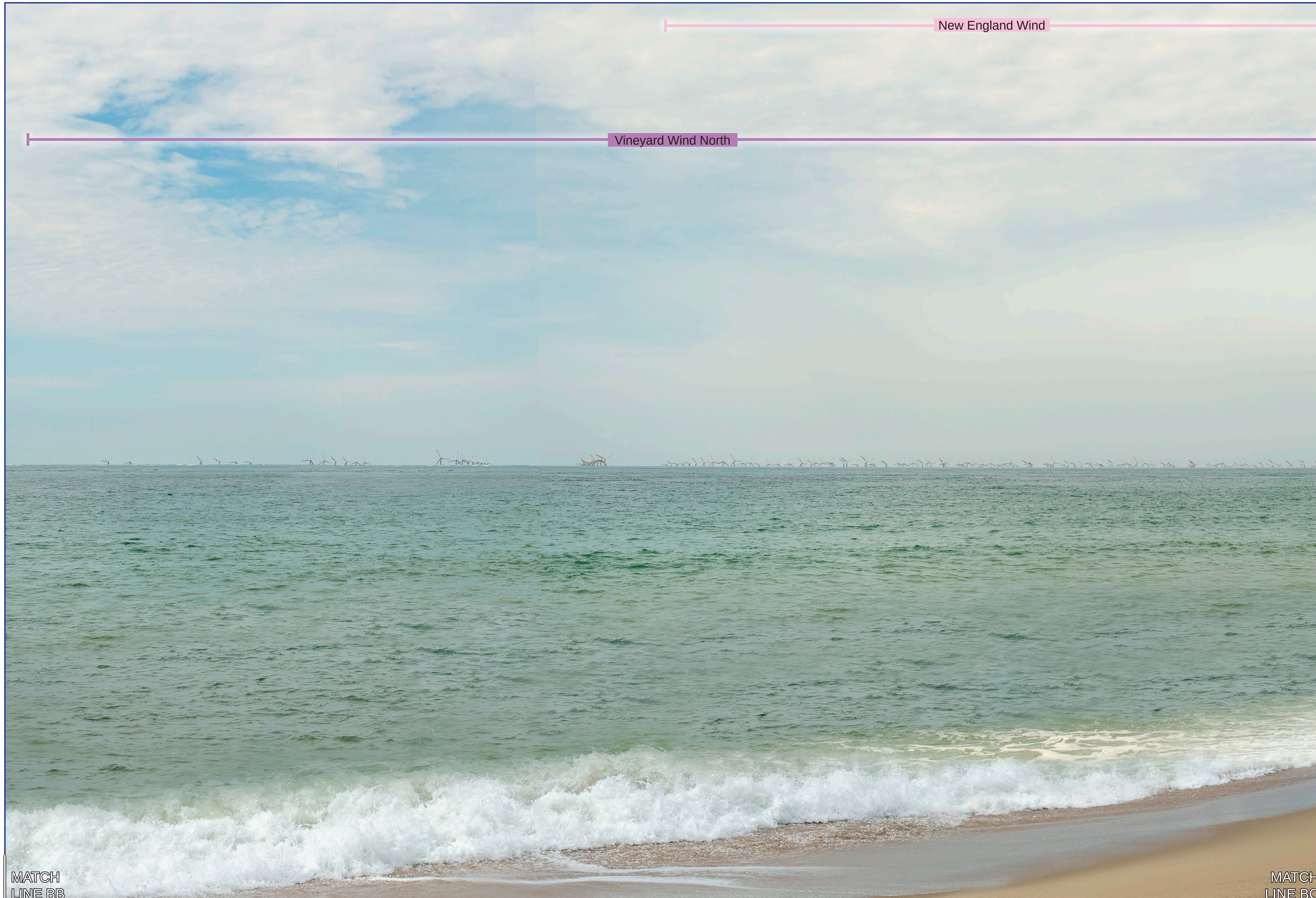
MATCH LINE A

MATCH LINE BB

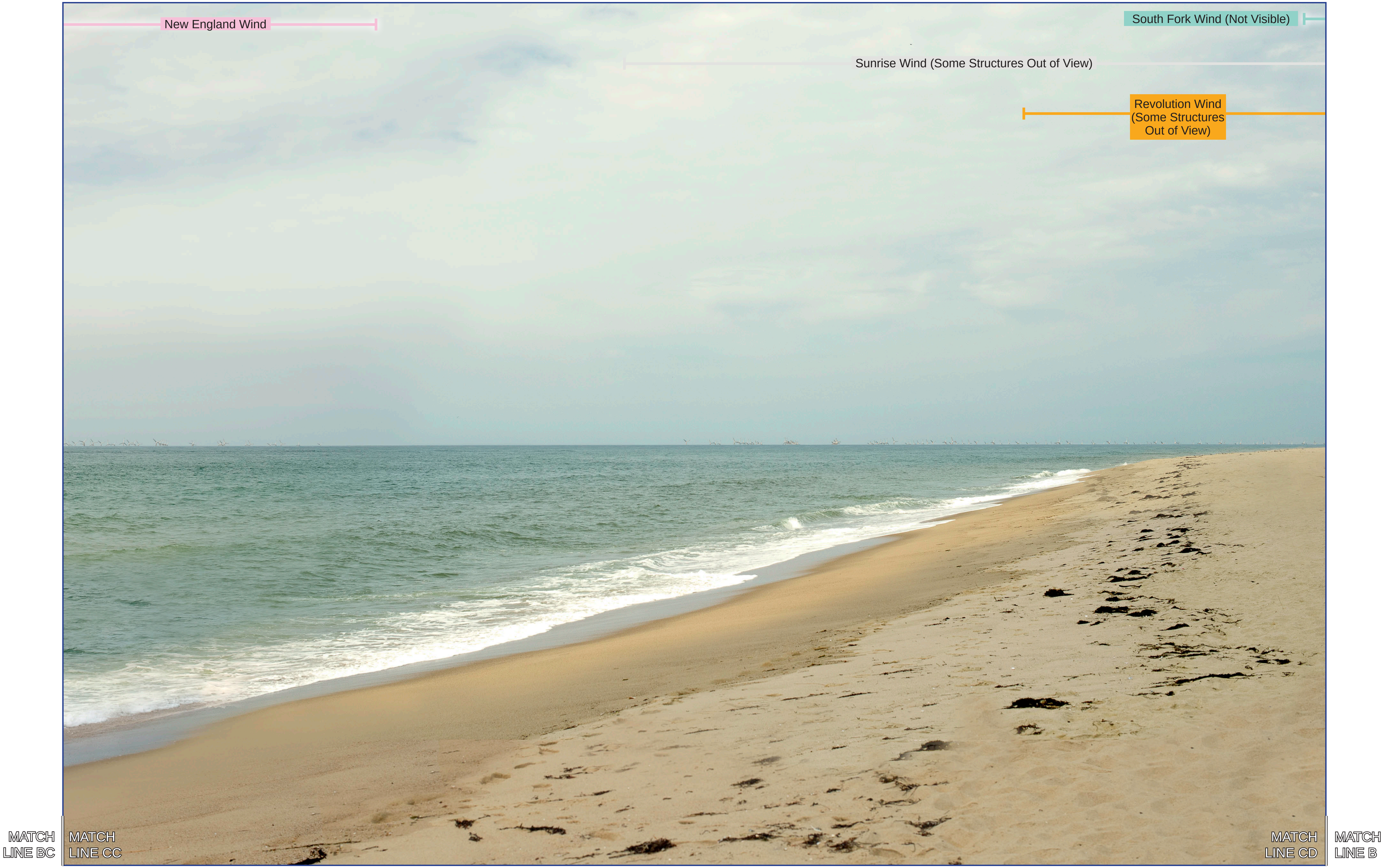
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 1-MV Wasque Point - Scenario 1 (50mm view - 27° vertical / 40° horizontal) 2 of 3

SIMULATED CONDITIONS



The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



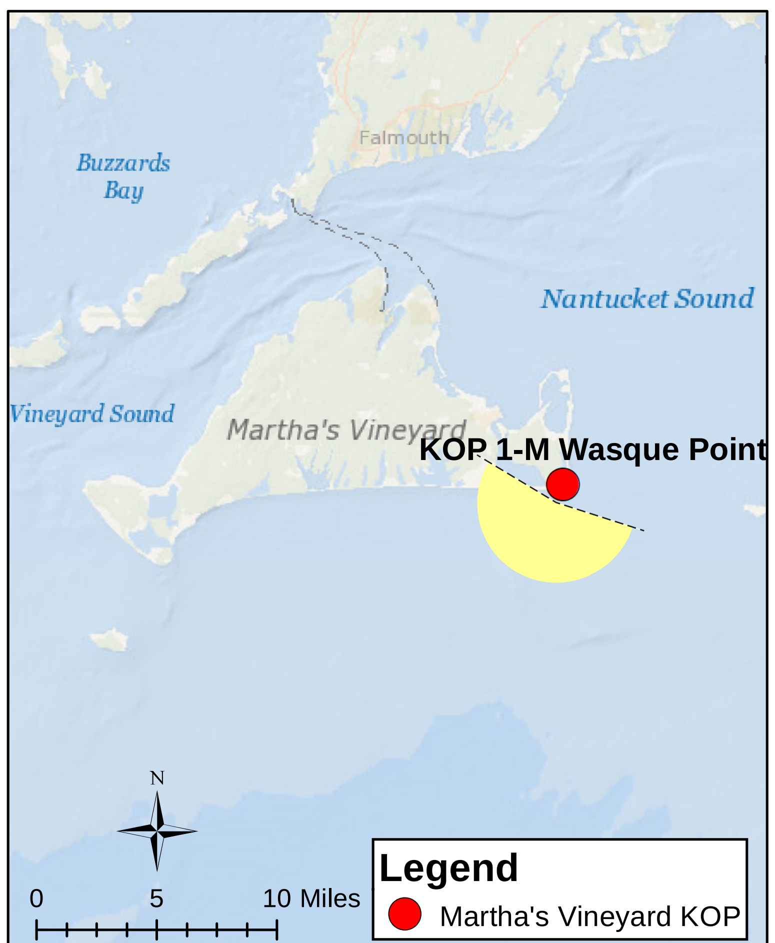
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 1-MV Wasque Point - Scenario 2

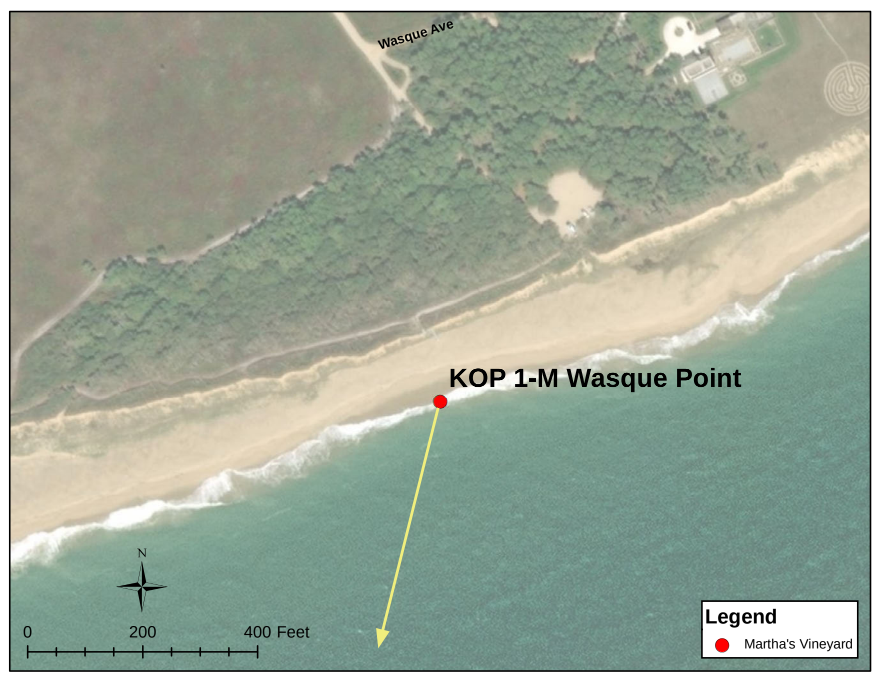
Martha's Vineyard

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 4 km
Furthest Visible WTG: 43 mi / 69 km
Potential Number of Structures Visible: 438
Potential Number of Structures Not Visible: 160

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM
Date of photograph: 6-25-20
L/SCA: Ocean Beach, Costal Scrub, Rural/Residential
Viewing direction: South (194°)
Latitude: 41.351077°N
Longitude: 70.454821°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 77° F
Humidity: 58%
Wind Dir & Speed: SSW 14mph
Weather Condition: Cloudy

CAMERA

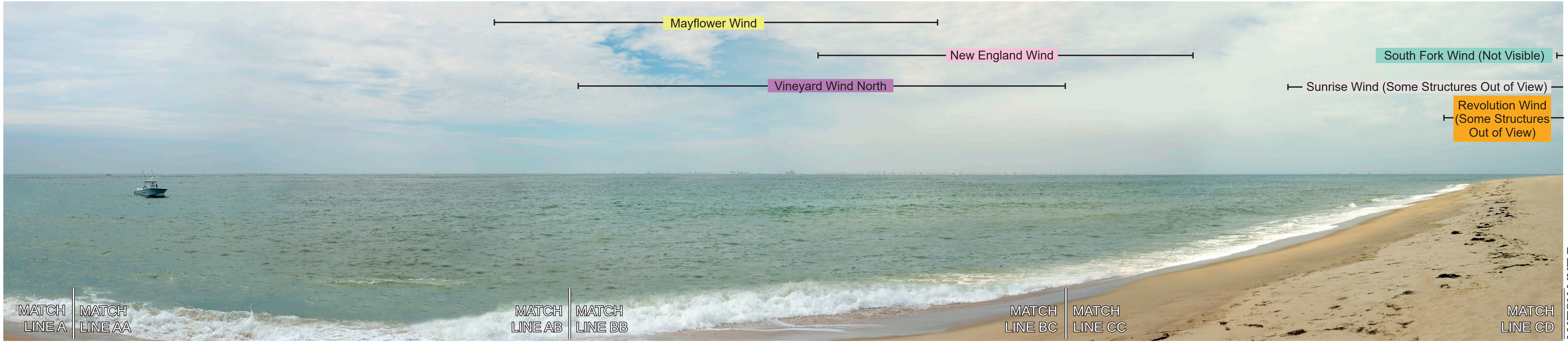
Camera Elevation: 6.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 1-MV Wasque Point - Scenario 2

Martha's Vineyard

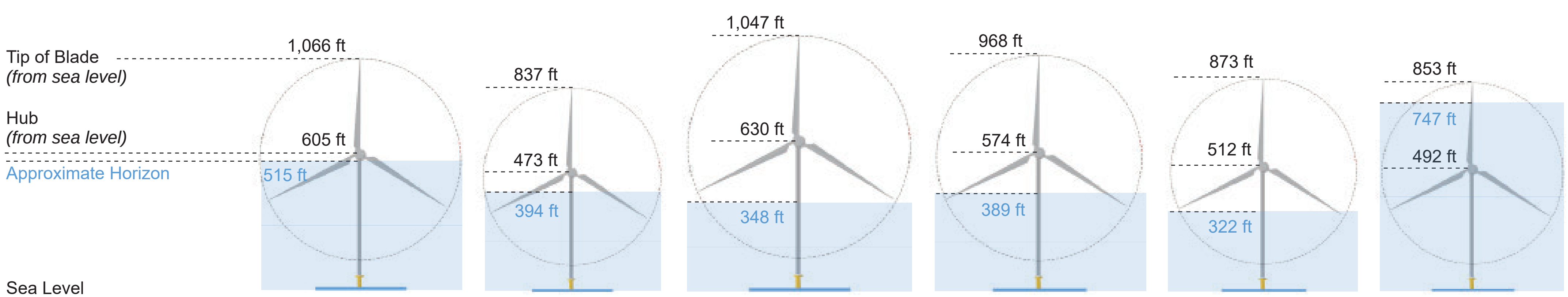
SIMULATED CONDITIONS

2



VISIBILTY OF CLOSEST TURBINES

	Mayflower Wind (OCS-A 0521)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
	919 ft rotor diameter	729 ft rotor diameter	837 ft rotor diameter	787 ft rotor diameter	722 ft rotor diameter	722 ft rotor diameter

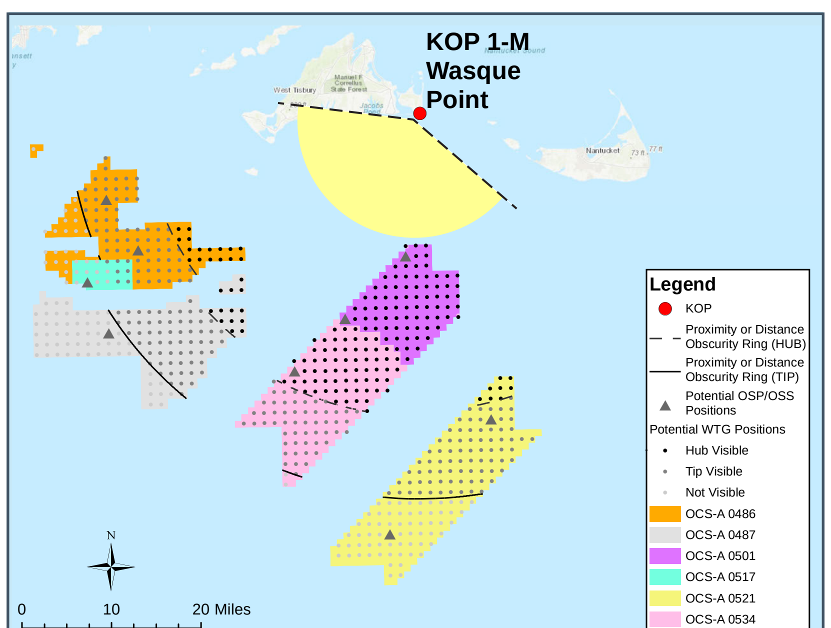


	Mayflower Wind	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	149	77	120	131	103	18
Number of Structures within View of KOP	86	77	118	74	83	0
Distance to Closest Structure	20.92 mi (33.66 km)	15 mi (24 km)	26 mi (42 km)	27 mi (44 km)	25 mi (40 km)	37 mi (59 km)
Distance to Furthest Structure	42.84 mi (68.94 km)	27 mi (44 km)	43 mi (69 km)	41 mi (66 km)	39 mi (63 km)	43 mi (69 km)

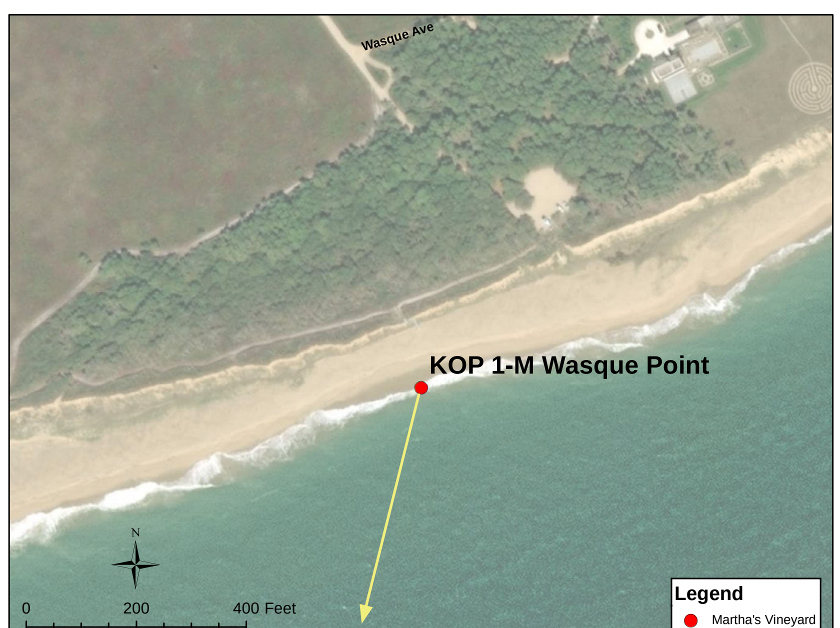
KOP 1-MV Wasque Point - Scenario 2 (Human Field of View - 124°)

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 4 km

Furthest Visible WTG: 43 mi / 69 km
Potential Number of Structures Visible: 438
Potential Number of Structures Not Visible: 160

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM
Date of photograph: 6-25-20
L/SCA: Ocean Beach, Costal Scrub, Rural/Residential

Viewing direction: South (194°)
Latitude: 41.351077°N
Longitude: 70.454821°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 77° F
Humidity: 58%
Wind Dir & Speed: SSW 14mph
Weather Condition: Cloudy

CAMERA

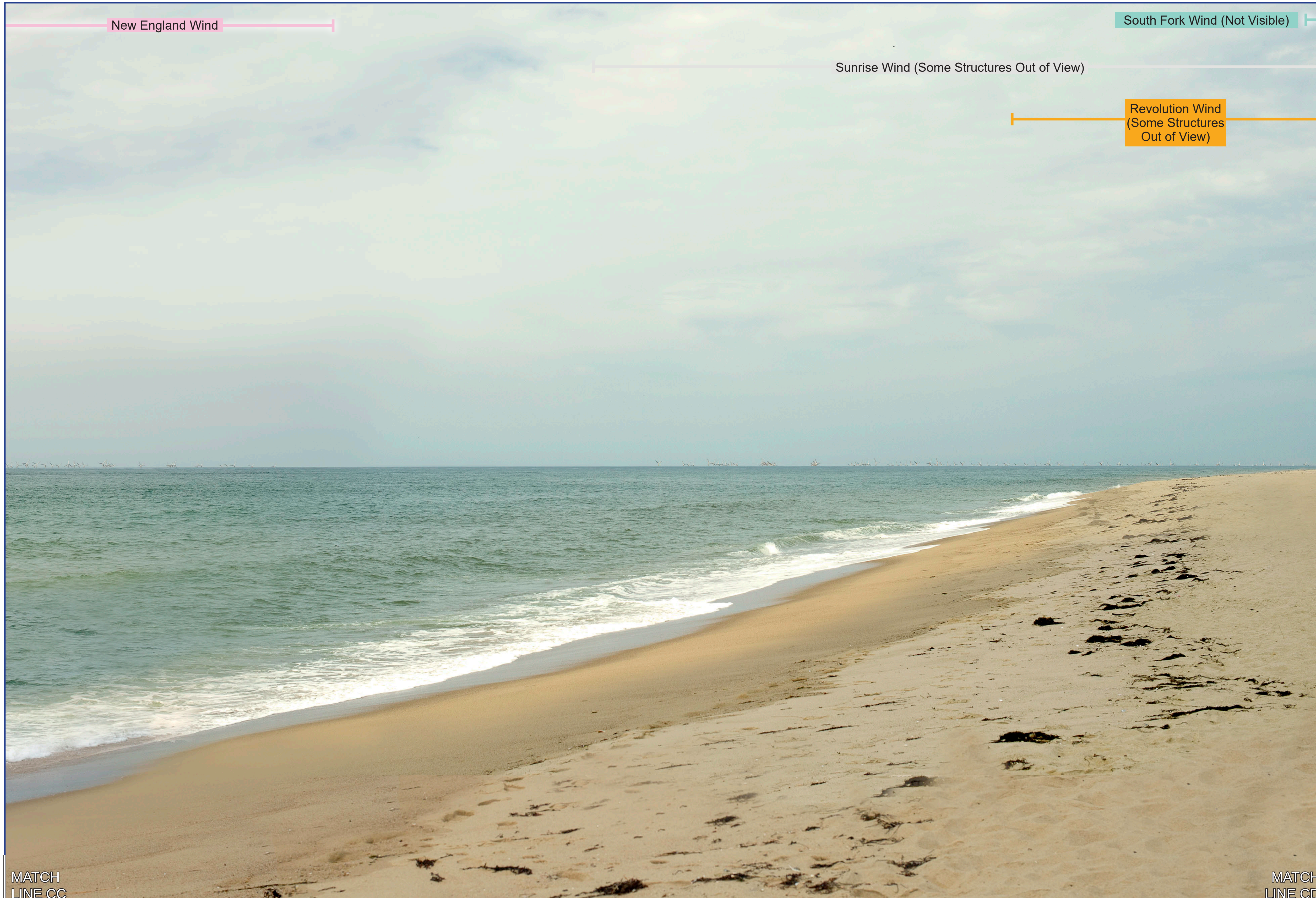
Camera Elevation: 6.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 1-MV Wasque Point - Scenario 2 (50mm view - 27° vertical / 40° horizontal) 1 of 3

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

SIMULATED CONDITIONS

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



MATCH LINE BC
MATCH LINE CC
MATCH LINE CD
MATCH LINE B

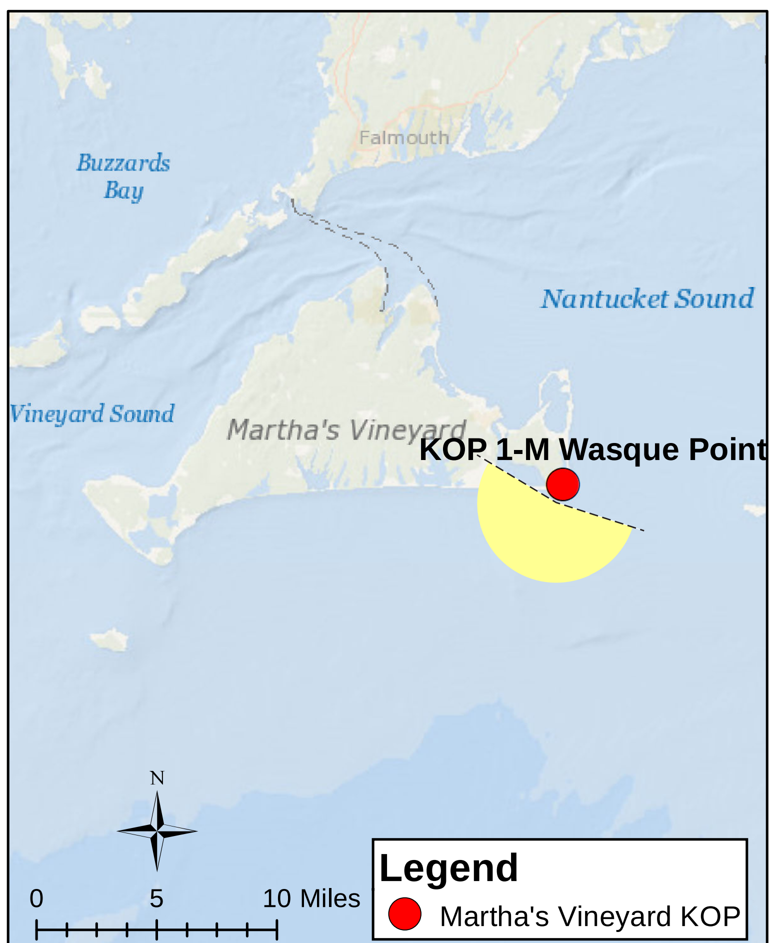
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 1-MV Wasque Point - Scenario 3

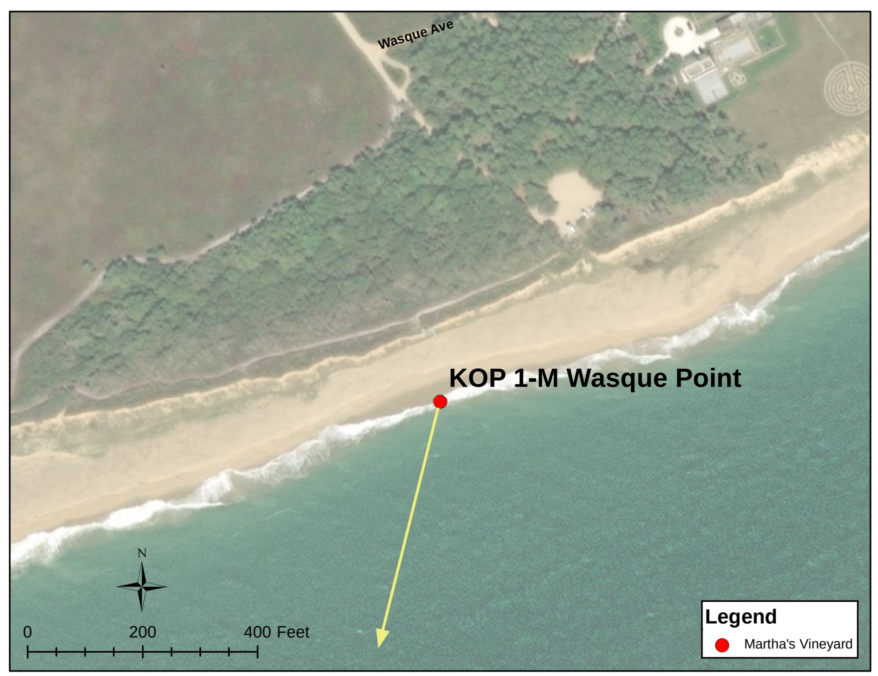
PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

MATCH LINE B

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 24 km
Furthest Visible WTG: 43 mi / 70 km
Potential Number of Structures Visible: 686
Potential Number of Structures Not Visible: 384

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM
Date of photograph: 6-25-20
L/SCA: Ocean Beach, Costal Scrub, Rural/Residential
Viewing direction: South (194°)
Latitude: 41.351077°N
Longitude: 70.454821°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 77° F
Humidity: 58%
Wind Dir & Speed: SSW 14mph
Weather Condition: Cloudy

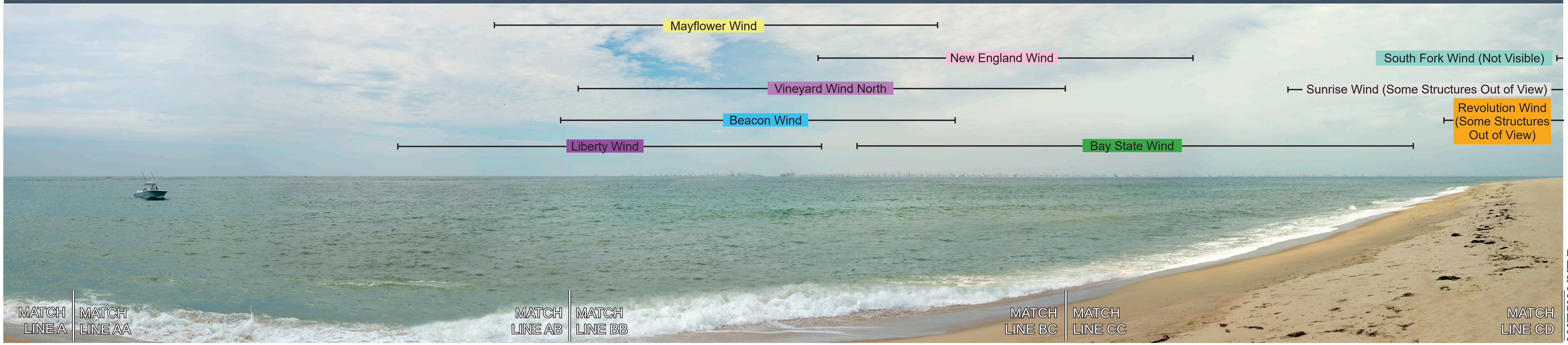
CAMERA

Camera Elevation: 6.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

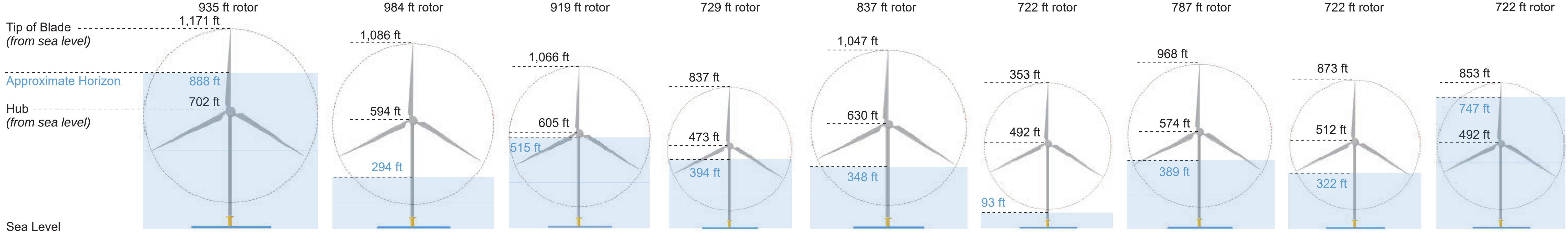
KOP 1-MV Wasque Point - Scenario 3

SIMULATED CONDITIONS

2



VISIBILTY OF CLOSEST TURBINES



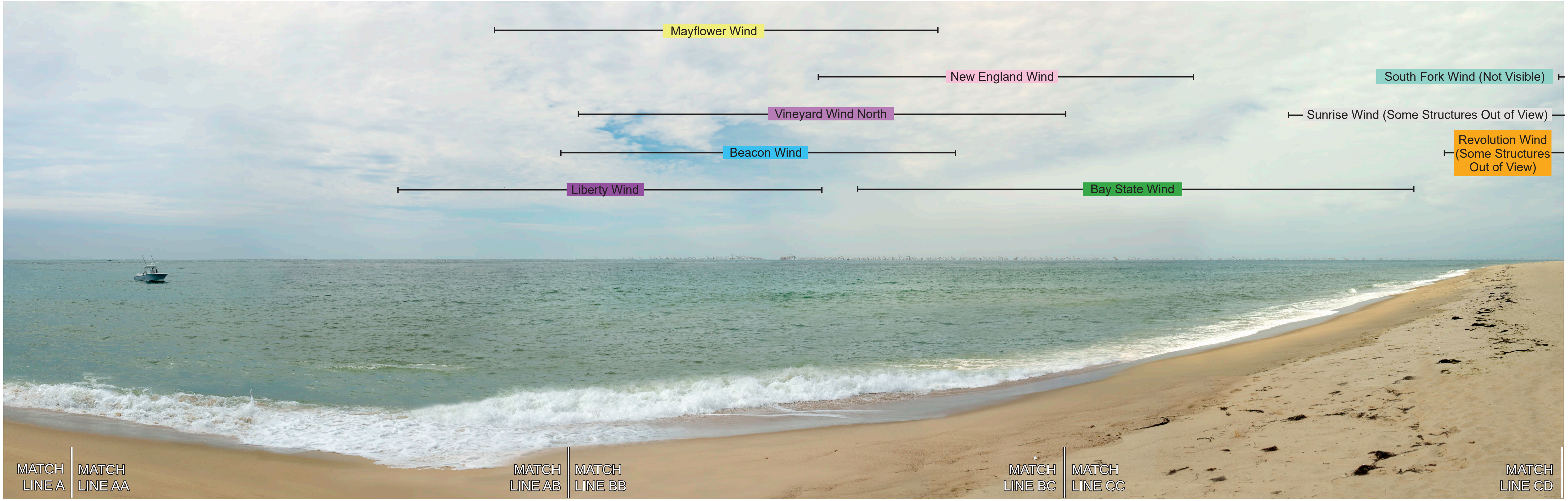
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Mayflower Wind (OCS-A 0521)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
	935 ft rotor	984 ft rotor	919 ft rotor	729 ft rotor	837 ft rotor	722 ft rotor	787 ft rotor	722 ft rotor	722 ft rotor
Year Forecasted for Development	2025-2030	2025-2030	2025	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	149	77	120	169	131	103	18
Number of Structures within View of KOP	13	95	86	77	118	133	74	83	0
Distance to Closest Structure	40 mi (64 km)	24 mi (39 km)	31 mi (50 km)	15 mi (24 km)	26 mi (42 km)	15 mi (24 km)	27 mi (44 km)	25 mi (40 km)	37 mi (59 km)
Distance to Furthest Structure	43 mi (70 km)	39 mi (62 km)	43 mi (69 km)	27 mi (44 km)	43 mi (69 km)	39 mi (62 km)	41 mi (66 km)	39 mi (63 km)	43 mi (69 km)

KOP 1-MV Wasque Point - Scenario 3 (Human Field of View - 124°)

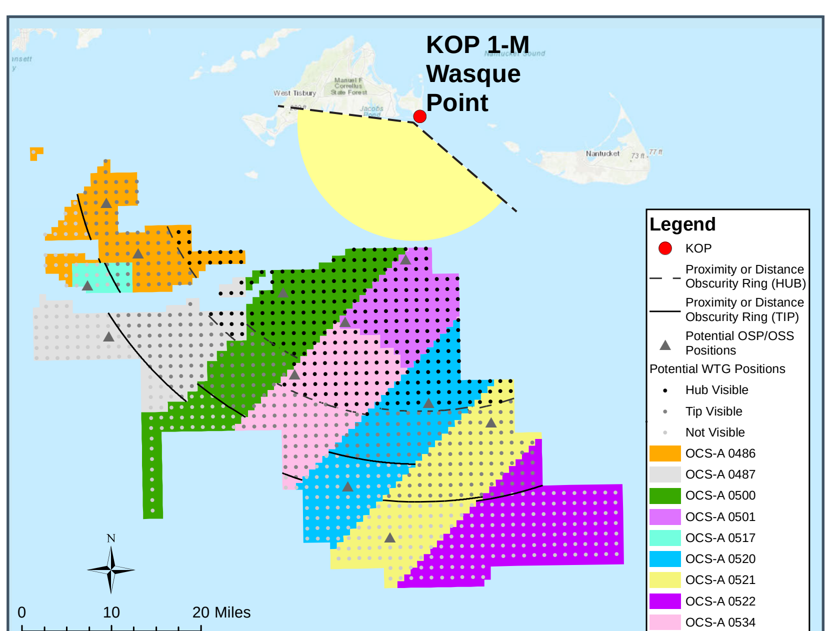
Martha's Vineyard

SIMULATED CONDITIONS

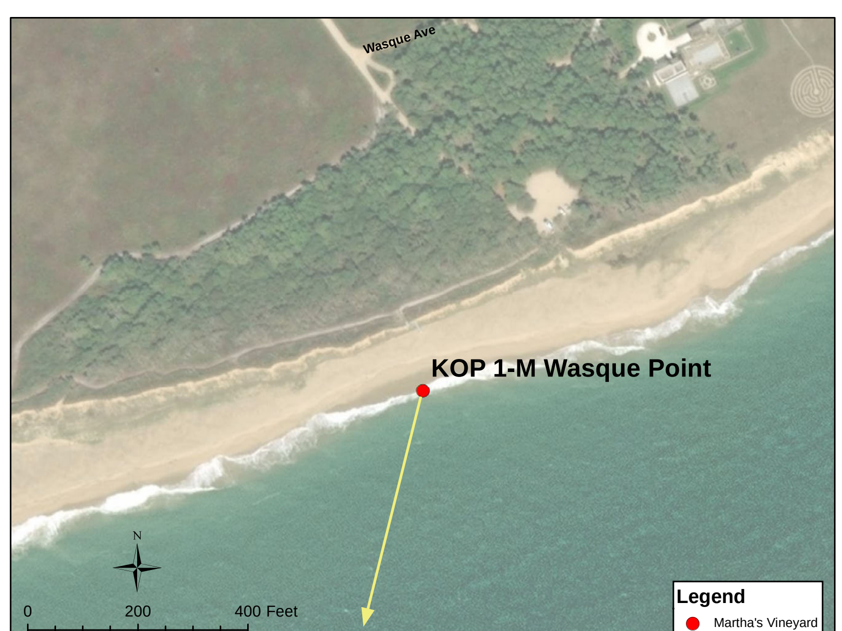
3



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 24 km
Furthest Visible WTG: 43 mi / 70 km
Potential Number of Structures Visible: 686
Potential Number of Structures Not Visible: 384

ENVIRONMENT

Temperature: 77° F
Humidity: 58%
Wind Dir & Speed: SSW 14mph
Weather Condition: Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM
Date of photograph: 6-25-20
L/SCA: Ocean Beach, Costal Scrub, Rural/Residential
Viewing direction: South (194°)
Latitude: 41.351077°N
Longitude: 70.454821°W
Lighting Direction: Backlit diffused

CAMERA

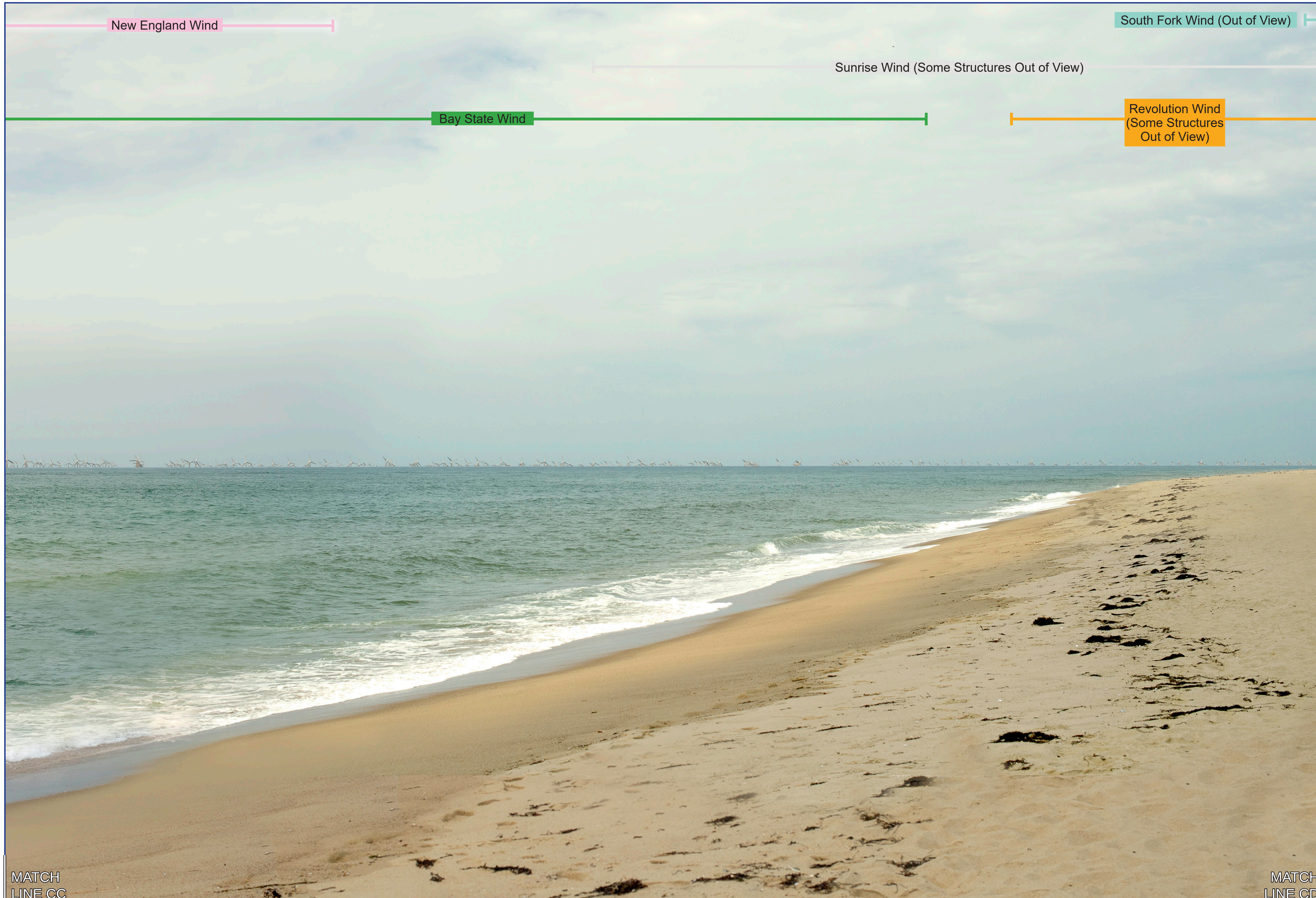
Camera Elevation: 6.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

MATCH
LINE A

MATCH
LINE BB

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

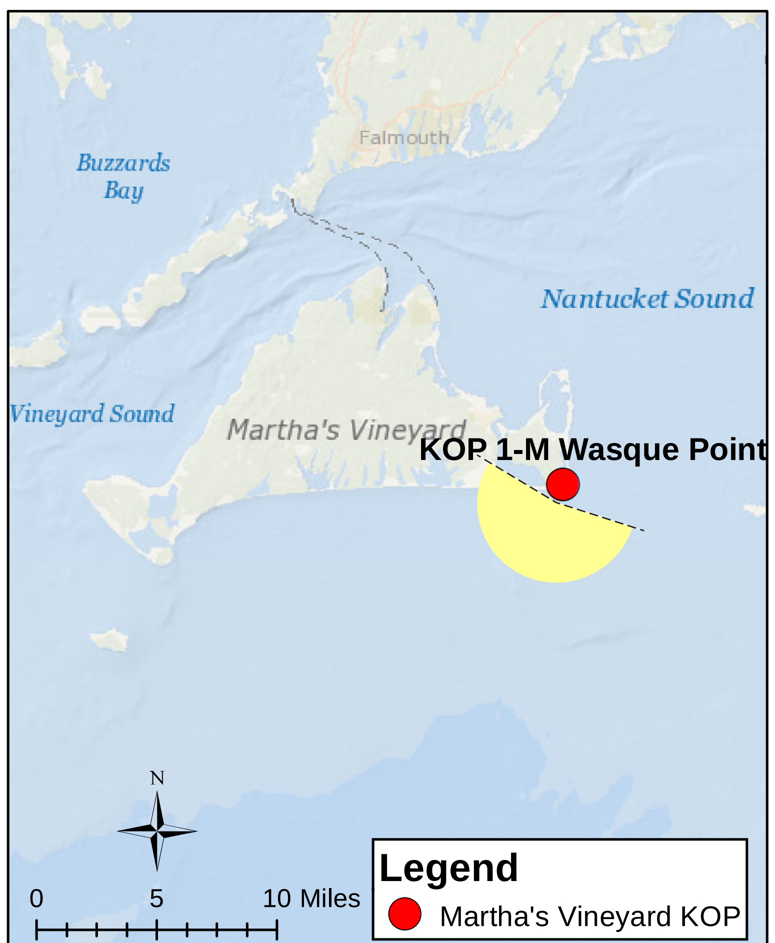


The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

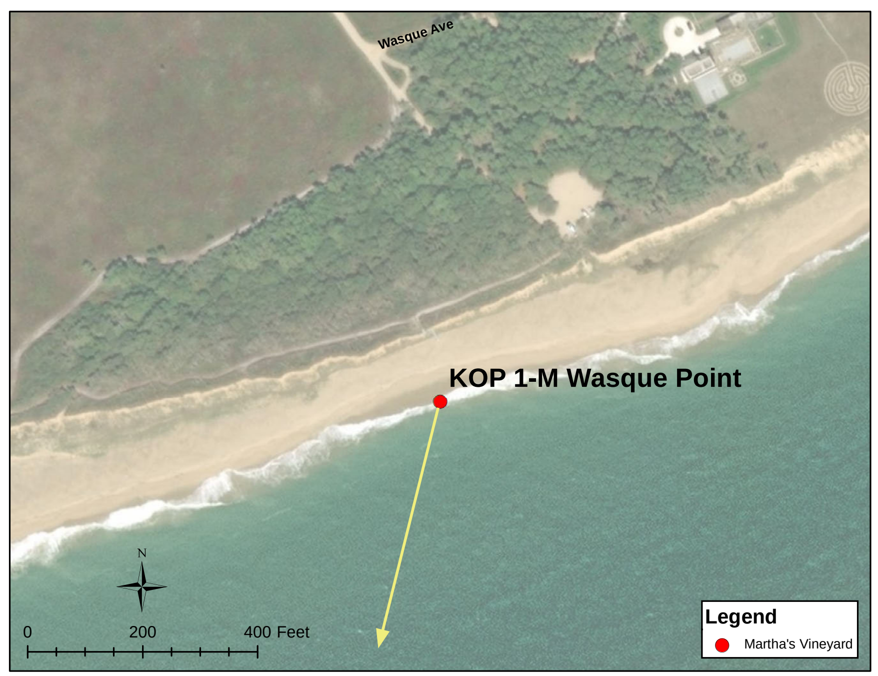
KOP 1-MV Wasque Point - Scenario 4

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 24 km
Furthest Visible WTG: 43 mi / 70 km
Potential Number of Structures Visible: 593
Potential Number of Structures Not Visible: 321

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM
Date of photograph: 6-25-20
L/SCA: Ocean Beach, Costal Scrub, Rural/Residential
Viewing direction: South (194°)
Latitude: 41.351077°N
Longitude: 70.454821°W
Lighting Direction: Backlit diffused

ENVIRONMENT

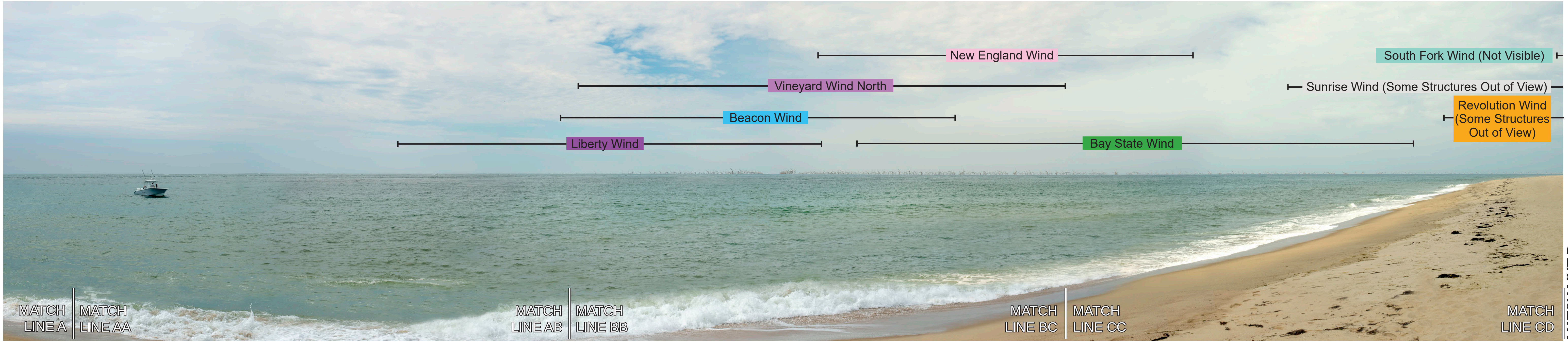
Temperature: 77° F
Humidity: 58%
Wind Dir & Speed: SSW 14mph
Weather Condition: Cloudy

CAMERA

Camera Elevation: 6.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

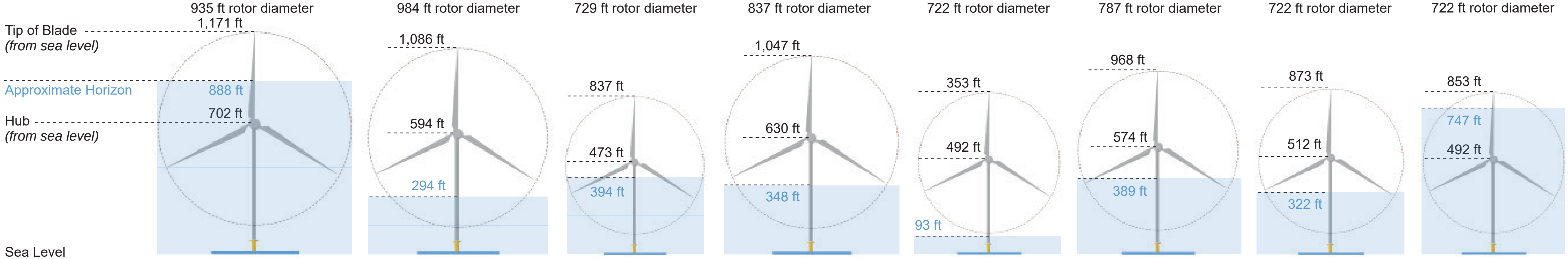
KOP 1-MV Wasque Point - Scenario 4

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES

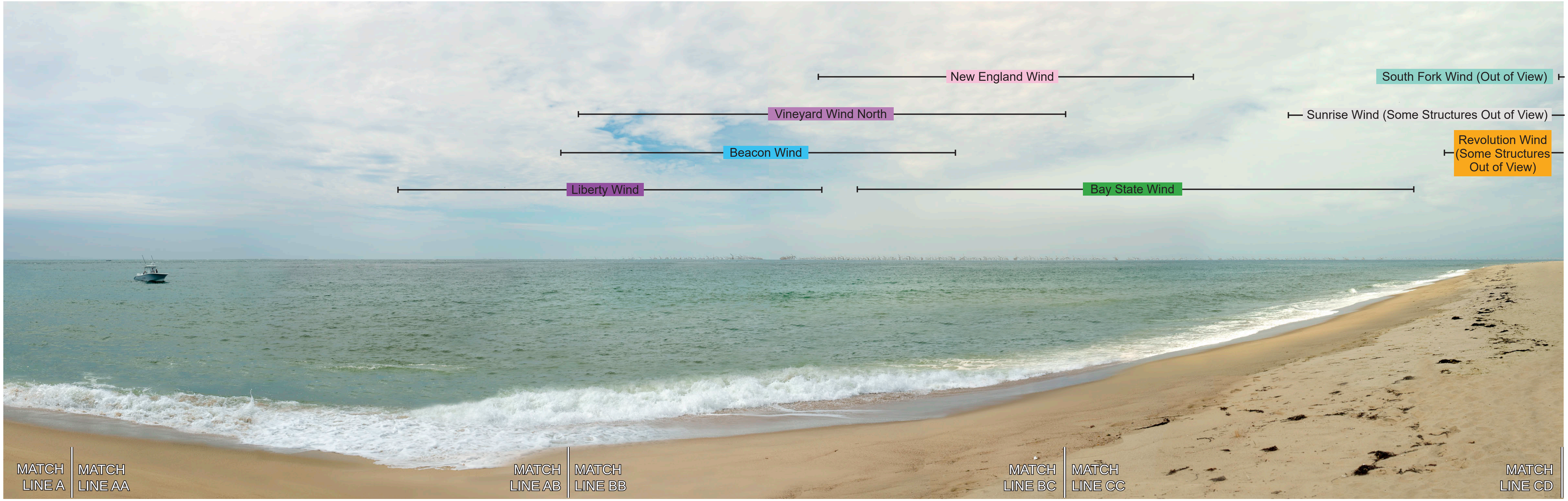
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
	935 ft rotor diameter	984 ft rotor diameter	729 ft rotor diameter	837 ft rotor diameter	722 ft rotor diameter	787 ft rotor diameter	722 ft rotor diameter	722 ft rotor diameter



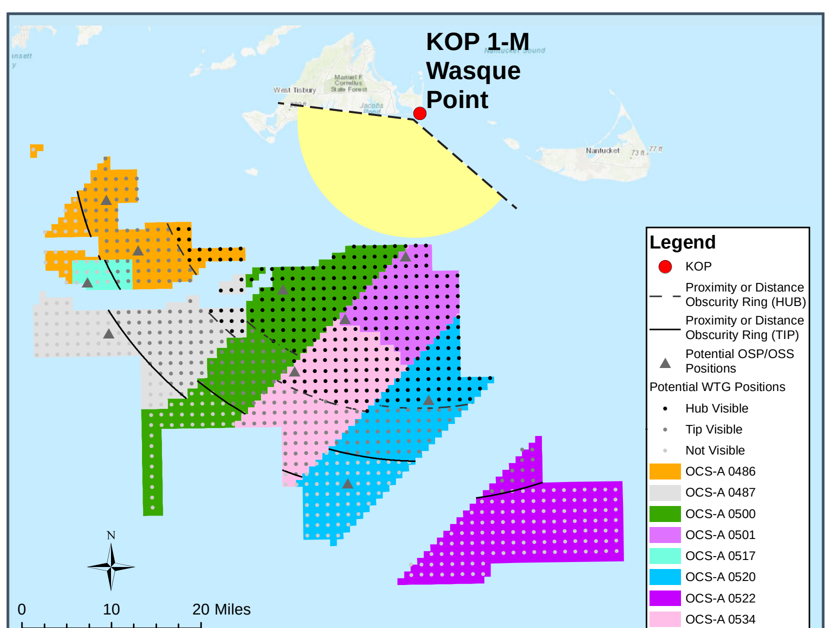
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2025-2030	2025-2030	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	77	120	169	131	103	18
Number of Structures within View of KOP	13	95	77	118	133	74	83	0
Distance to Closest Structure	40 mi (64 km)	24 mi (39 km)	15 mi (24 km)	26 mi (42 km)	15 mi (24 km)	27 mi (44 km)	25 mi (40 km)	37 mi (59 km)
Distance to Furthest Structure	43 mi (70 km)	39 mi (62 km)	27 mi (44 km)	43 mi (69 km)	39 mi (62 km)	41 mi (66 km)	39 mi (63 km)	43 mi (69 km)

KOP 1-MV Wasque Point - Scenario 4 (Human Field of View - 124°)

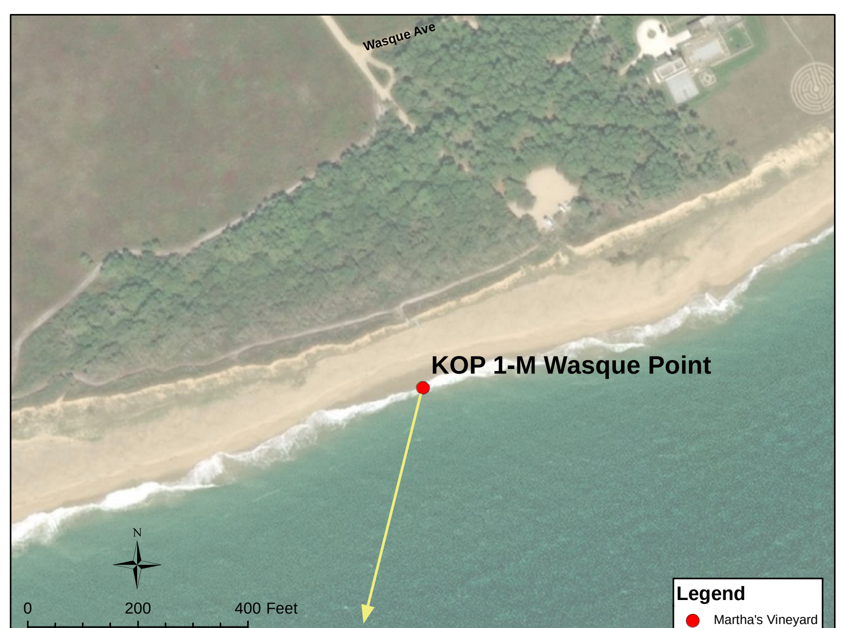
SIMULATED CONDITIONS



REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 15 mi / 24 km

Furthest Visible WTG: 43 mi / 70 km
Potential Number of Structures Visible: 593
Potential Number of Structures Not Visible: 321

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM
Date of photograph: 6-25-20
L/SCA: Ocean Beach, Costal Scrub, Rural/Residential

Viewing direction: South (194°)
Latitude: 41.351077°N
Longitude: 70.454821°W
Lighting Direction: Backlit diffused

ENVIRONMENT

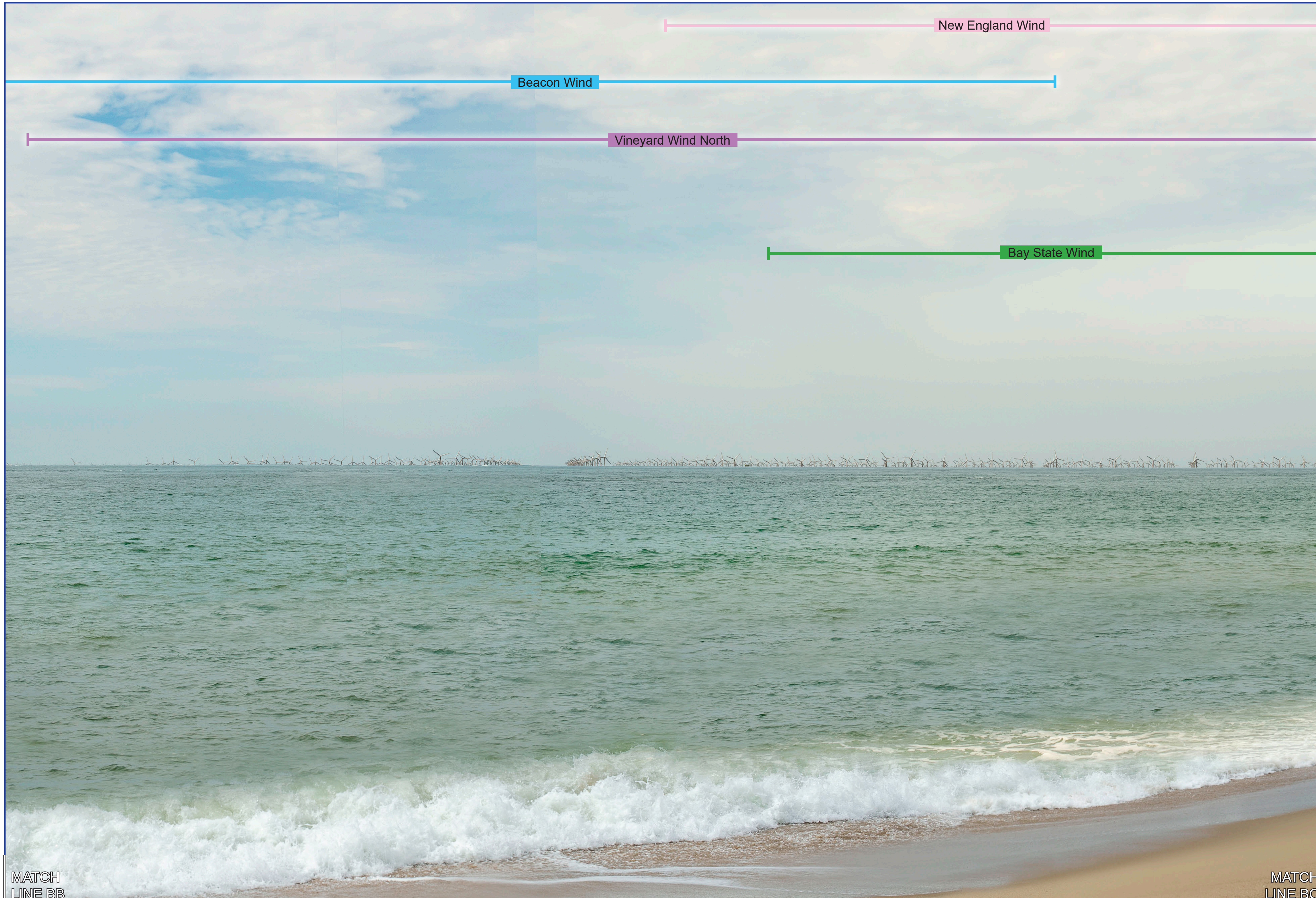
Temperature: 77° F
Humidity: 58%
Wind Dir & Speed: SSW 14mph
Weather Condition: Cloudy

CAMERA

Camera Elevation: 6.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

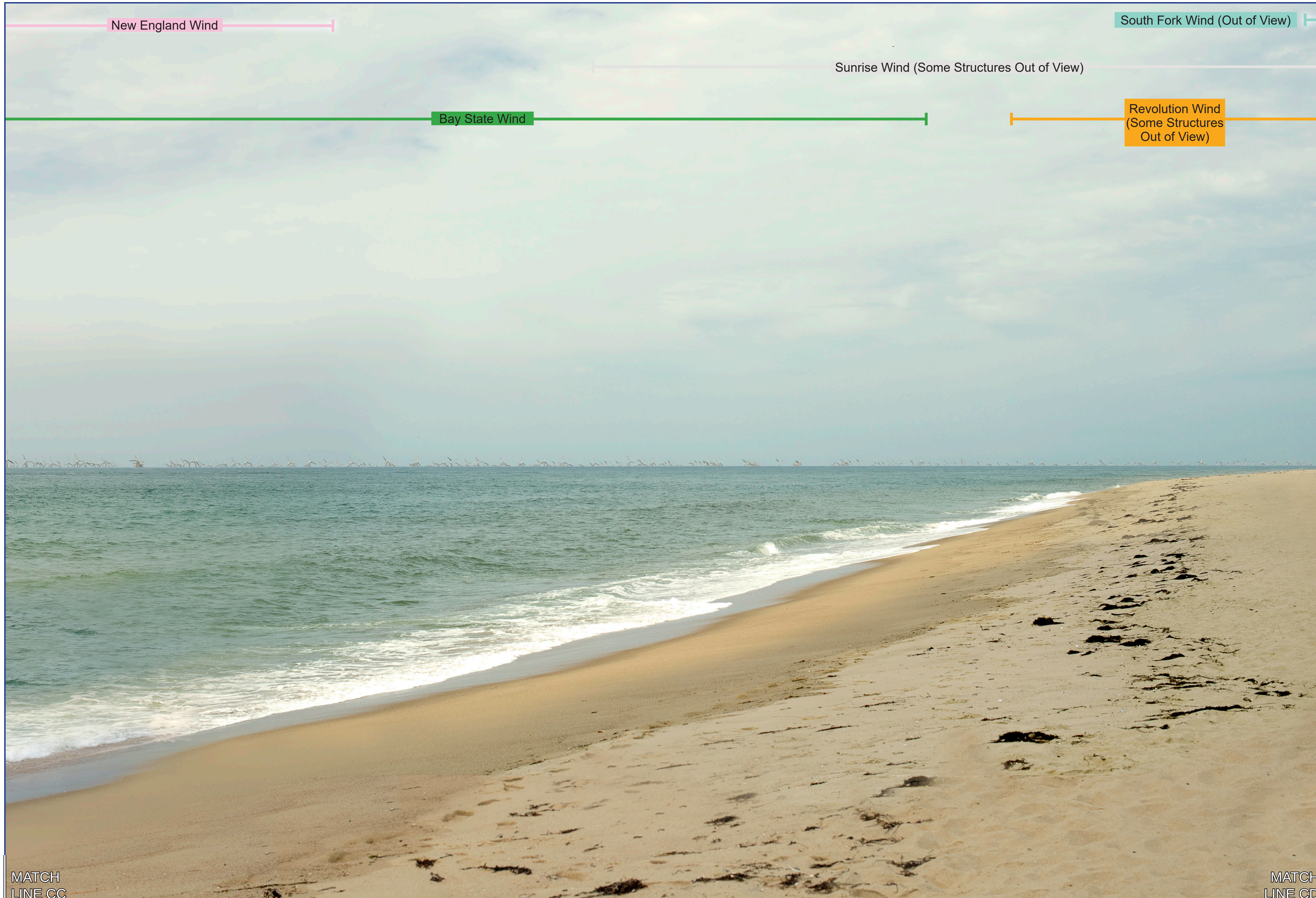
KOP 1-MV Wasque Point - Scenario 4 (50mm view - 27° vertical / 40° horizontal) 1 of 3

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 1-MV Wasque Point - Scenario 4 (50mm view - 27° vertical / 40° horizontal) 3 of 3



MATCH LINE BC

MATCH LINE CC

MATCH LINE CD

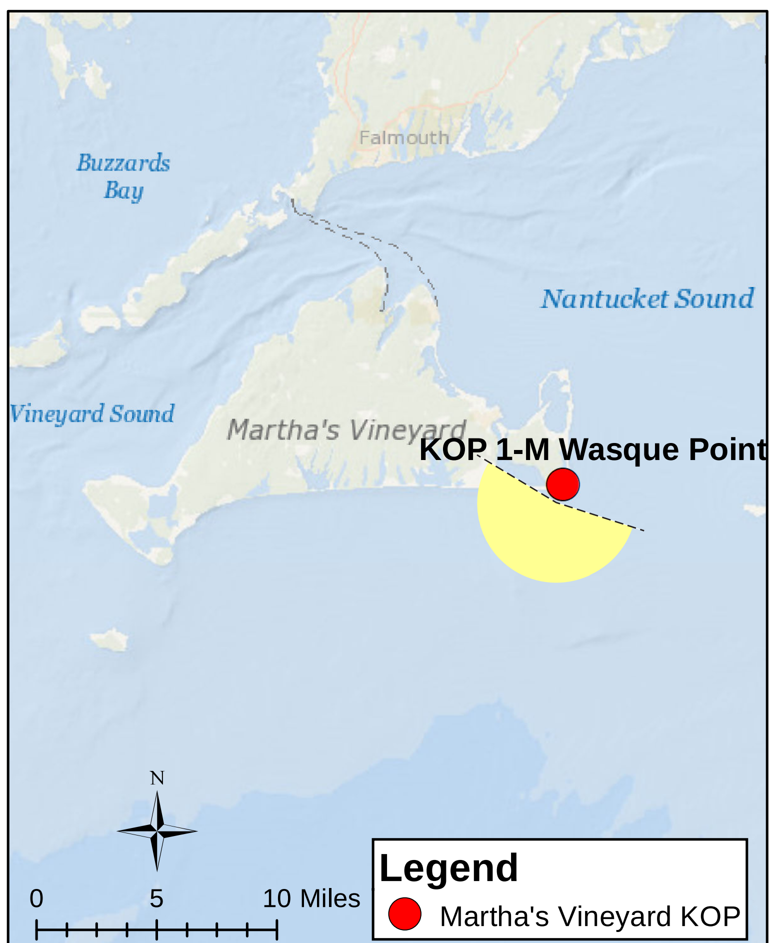
MATCH LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

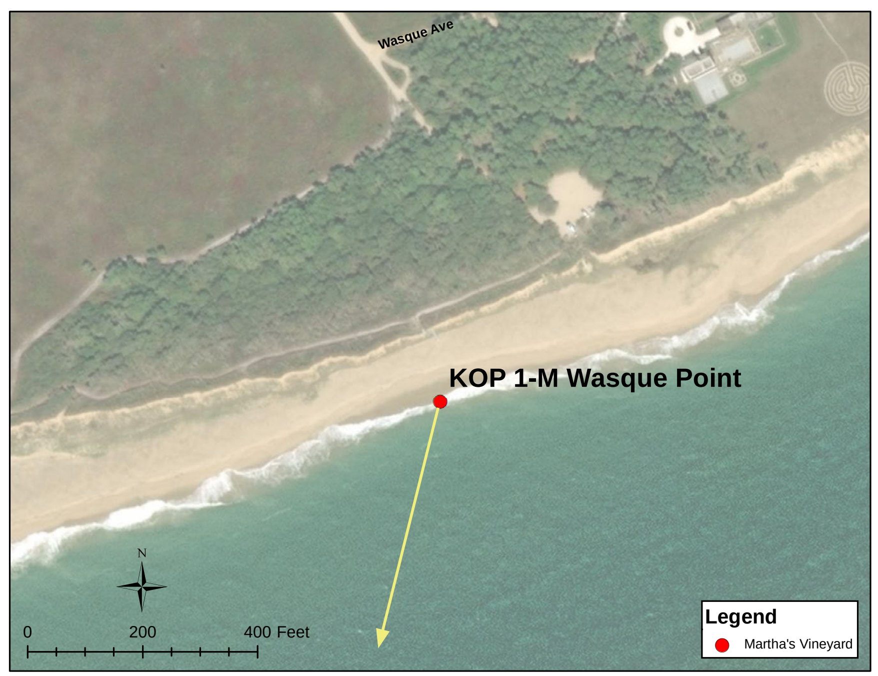
KOP 1-MV Wasque Point - Scenario 5

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 31 mi / 50 km
Furthest Visible WTG: 43 mi / 69 km
Potential Number of Structures Visible: 86
Potential Number of Structures Not Visible: 63

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM
Date of photograph: 6-25-20
L/SCA: Ocean Beach, Costal Scrub, Rural/Residential
Viewing direction: South (194°)
Latitude: 41.351077°N
Longitude: 70.454821°W
Lighting Direction: Backlit diffused

ENVIRONMENT

Temperature: 77° F
Humidity: 58%
Wind Dir & Speed: SSW 14mph
Weather Condition: Cloudy

CAMERA

Camera Elevation: 20.5 ft / 6.3 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

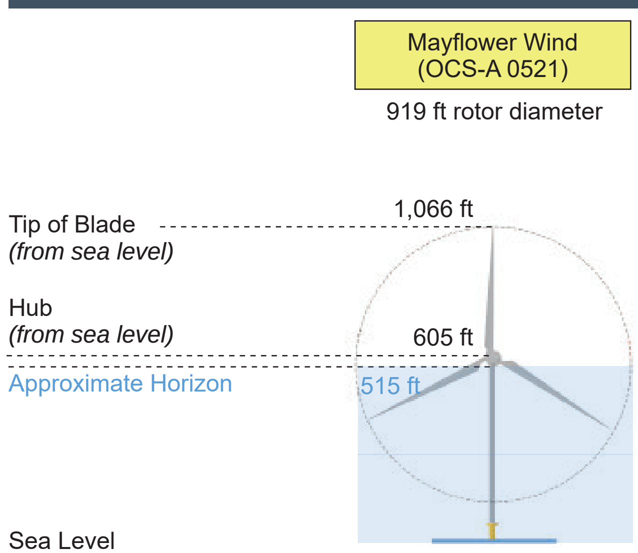
KOP 1-MV Wasque Point - Scenario 5

Martha's Vineyard

SIMULATED CONDITIONS

2

VISIBILTY OF CLOSEST TURBINES



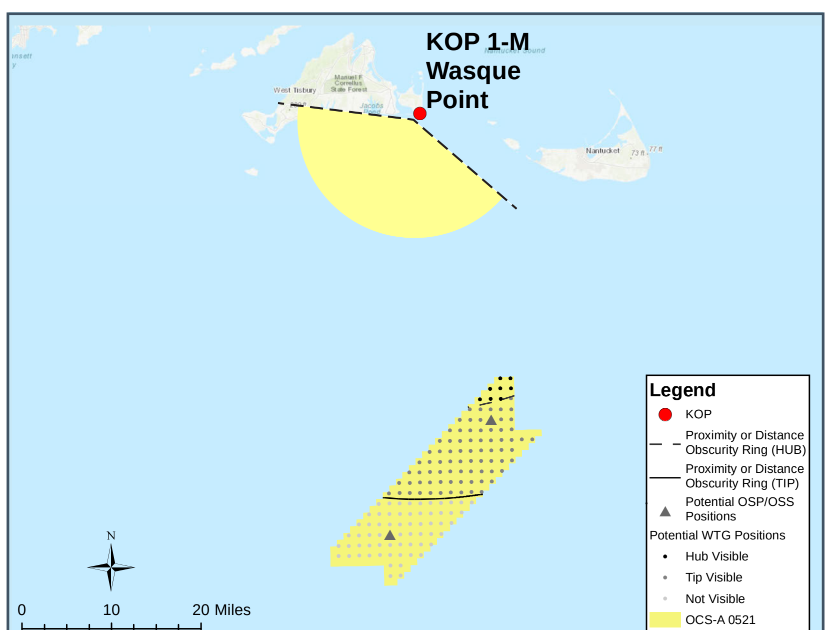
Year Forecasted for Development	2025
Number of Structures in Lease Area	149
Number of Structures within View of KOP	86
Distance to Closest Structure	20.92 mi (33.66 km)
Distance to Furthest Structure	42.84 mi (68.94 km)

KOP 1-MV Wasque Point - Scenario 5 (Human Field of View - 124°)

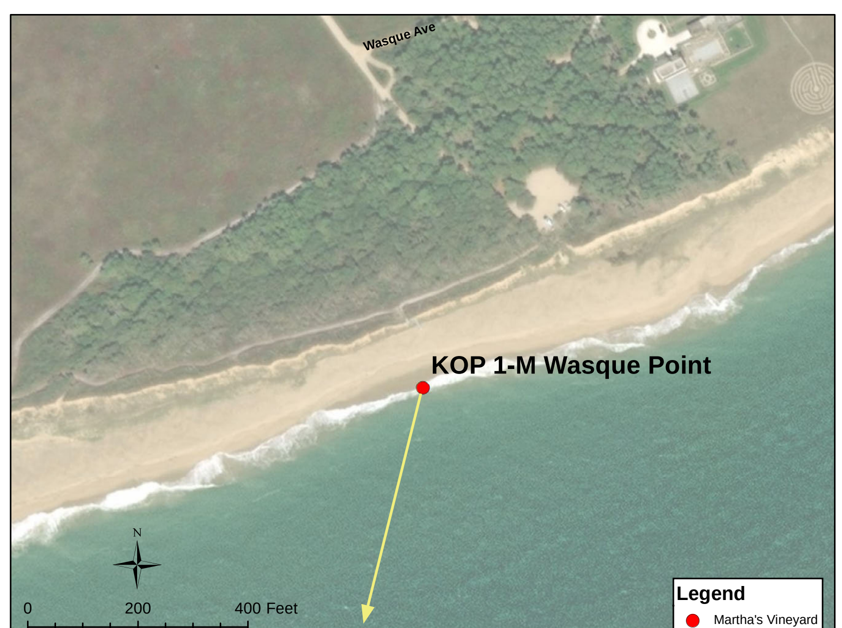
Martha's Vineyard

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°

Vertical Field of View: 40°

Nearest WTG: 31 mi / 50 km

Furthest Visible WTG: 43 mi / 69 km

Potential Number of Structures Visible: 86

Potential Number of Structures Not Visible: 63

ENVIRONMENT

Temperature: 77° F

Humidity: 58%

Wind Dir & Speed: SSW 14mph

Weather Condition: Cloudy

PHOTOGRAPH AND SITE

Time of photograph: 9:01AM

Date of photograph: 6-25-20

L/SCA: Ocean Beach, Costal Scrub, Rural/Residential

Viewing direction: South (194°)

Latitude: 41.351077°N

Longitude: 70.454821°W

Lighting Direction: Backlit diffused

CAMERA

Camera Elevation: 20.5 ft / 6.3 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

MATCH LINE A

MATCH LINE BB

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

MATCH LINE AB

MATCH LINE BB

MATCH LINE BC

MATCH LINE CC

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

MATCH LINE BC

MATCH LINE B

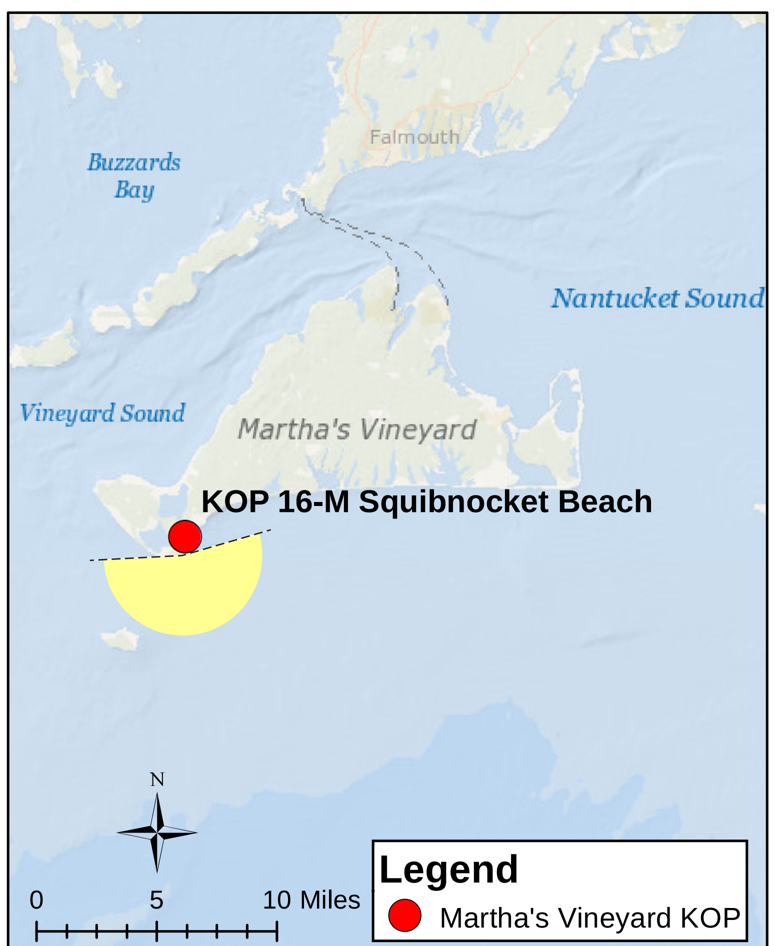
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 16-MV Squibnocket Beach - Scenario 1

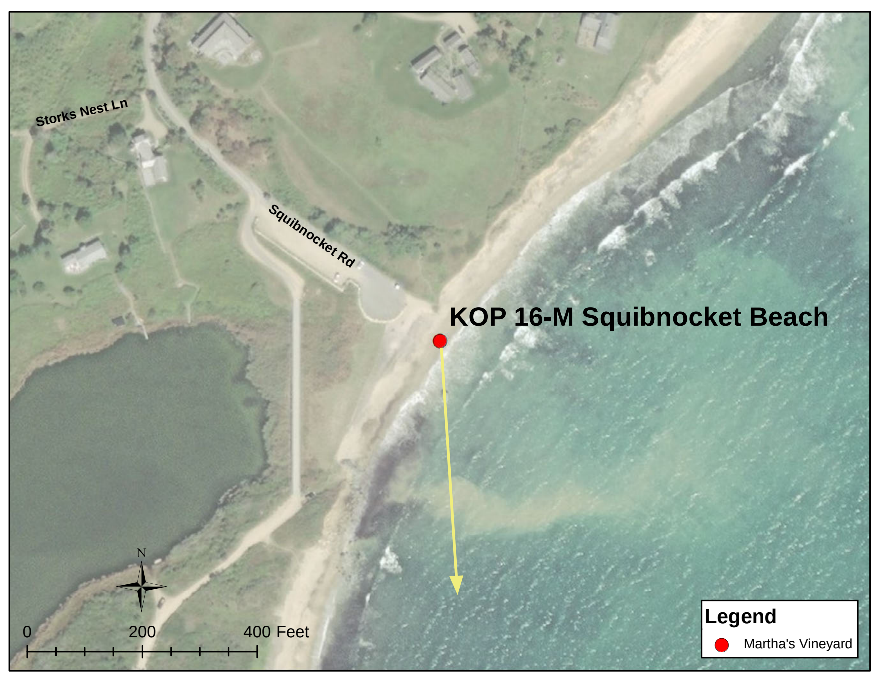
Martha's Vineyard

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 13 mi / 22 km
Furthest Visible WTG: 39 mi / 63 km
Potential Number of Structures Visible: 191
Potential Number of Structures Not Visible: 258

PHOTOGRAPH AND SITE

Time of photograph: 2:08PM
Date of photograph: 11-6-20
L/SCA: Ocean Beach, Open Ocean
Viewing direction: Southeast (176°)
Latitude: 41.318873°N
Longitude: 70.764908°W
Lighting Direction:Sidelit diffused

ENVIRONMENT

Temperature: 65° F
Humidity: 78%
Wind Dir & Speed: SSW 16mph
Weather Condition: Hazy

CAMERA

Camera Elevation: 16.5 ft / 5.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

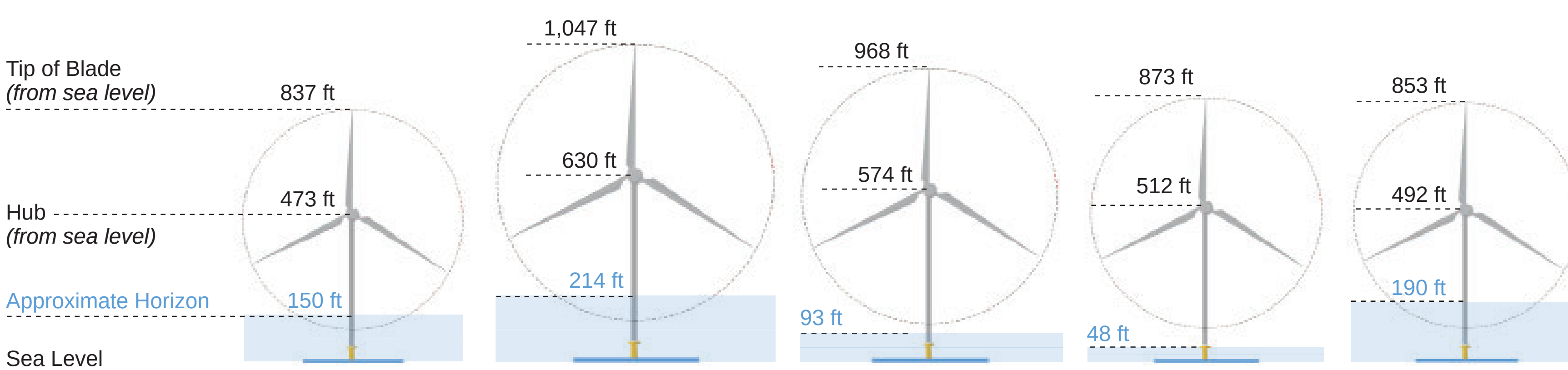
Vineyard Wind North (OCS-A 0501) — 729 ft rotor diamater

New England Wind (OCS-A 0534) — 837 ft rotor diamater

Sunrise Wind (OCS-A 0487) — 787 ft rotor diamater

Revolution Wind (OCS-A 0486) — 722 ft rotor diamater

South Fork Wind (OCS-A 0517) — 722 ft rotor diamater



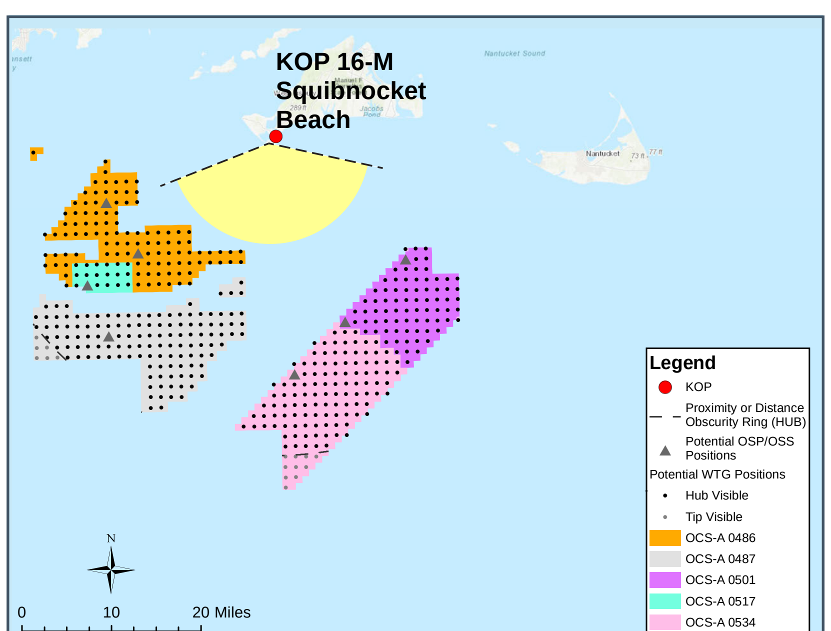
	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	77	120	131	103	18
Number of Structures within View of KOP	71	120	0	0	0
Distance to Closest Structure	20 mi (32 km)	23 mi (37 km)	17 mi (27 km)	13 mi (22 km)	22 mi (35 km)
Distance to Furthest Structure	29 mi (47 km)	39 mi (63 km)	36 mi (59 km)	30 mi (47 km)	28 mi (45 km)

KOP 16-MV Squibnocket Beach - Scenario 1 (Human Field of View - 124°)

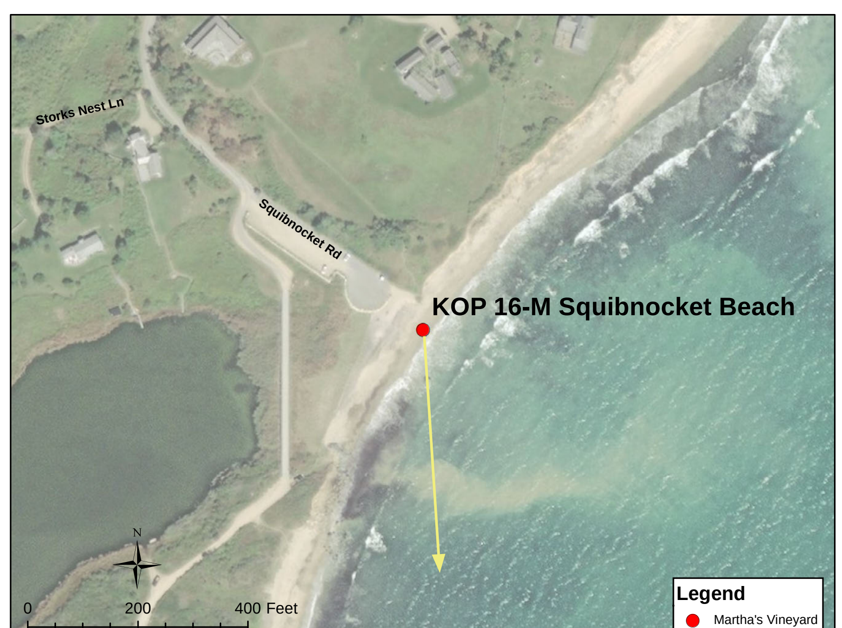
Martha's Vineyard

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 13 mi / 22 km

Furthest Visible WTG: 39 mi / 63 km
Potential Number of Structures Visible: 191
Potential Number of Structures Not Visible: 258

ENVIRONMENT

Temperature: 65° F
Humidity: 78%
Wind Dir & Speed: SSW 16mph
Weather Condition: Hazy

PHOTOGRAPH AND SITE

Time of photograph: 2:08PM
Date of photograph: 11-6-20
L/SCA: Ocean Beach, Open Ocean

Viewing direction: Southeast (176°)
Latitude: 41.318873°N
Longitude: 70.764908°W
Lighting Direction:Sidelit diffused

CAMERA

Camera Elevation: 16.5 ft / 5.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-MV Squibnocket Beach - Scenario 1 (50mm view - 27° vertical / 40° horizontal) 1 of 3

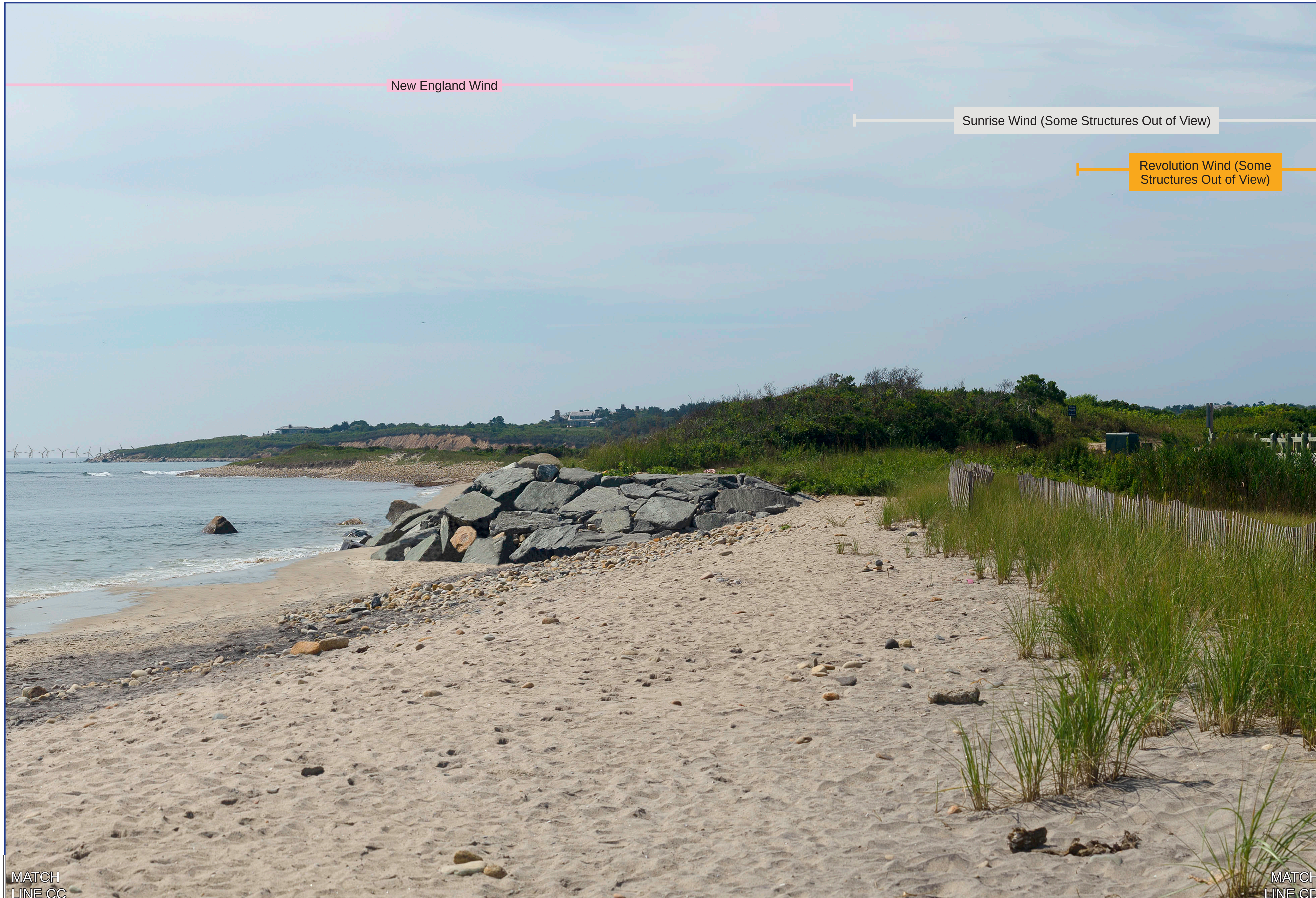
SIMULATED CONDITIONS

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

MATCH LINE AB

MATCH LINE CC

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



MATCH LINE BC

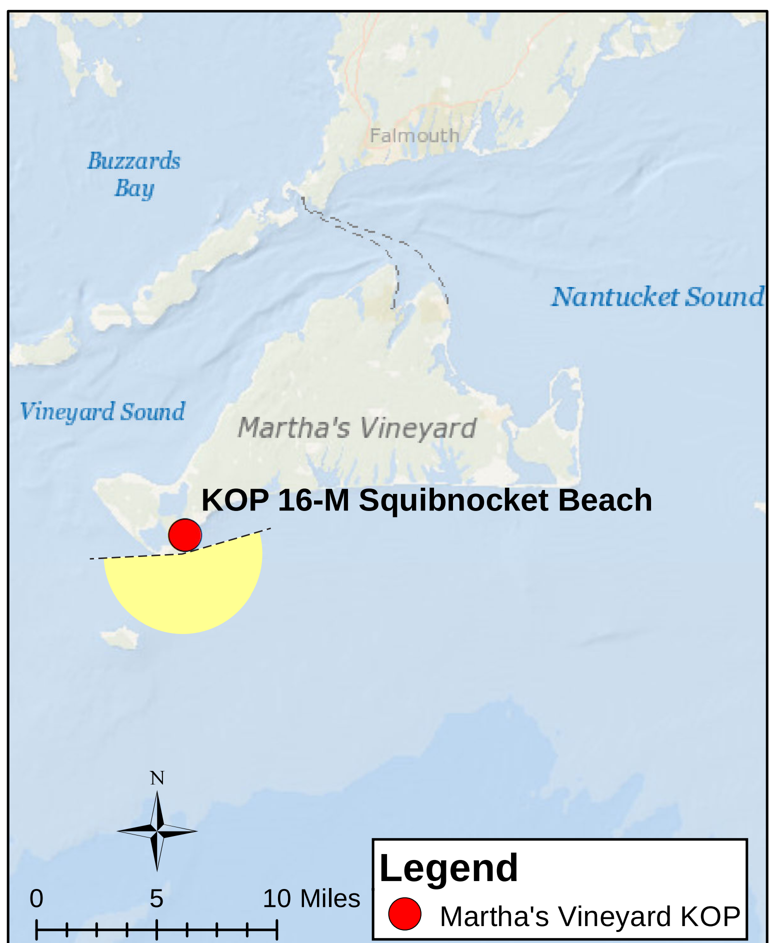
MATCH LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

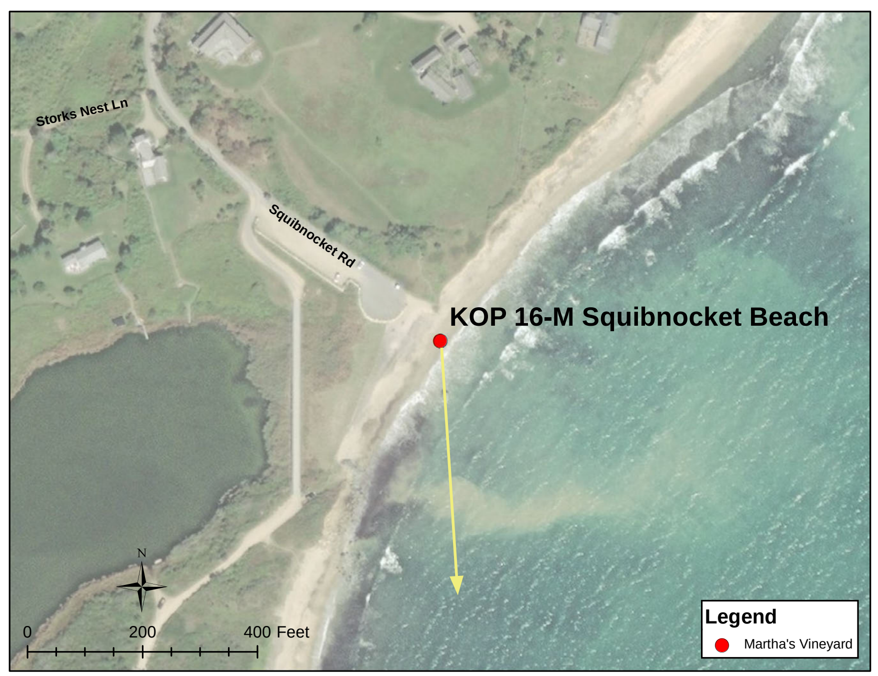
KOP 16-MV Squibnocket Beach - Scenario 2

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 12 mi / 20 km
Furthest Visible WTG: 45 mi / 72 km
Potential Number of Structures Visible: 239
Potential Number of Structures Not Visible: 359

PHOTOGRAPH AND SITE

Time of photograph: 2:08PM
Date of photograph: 11-6-20
L/SCA: Ocean Beach, Open Ocean
Viewing direction: Southeast (176°)
Latitude: 41.318873°N
Longitude: 70.764908°W
Lighting Direction:Sidelit diffused

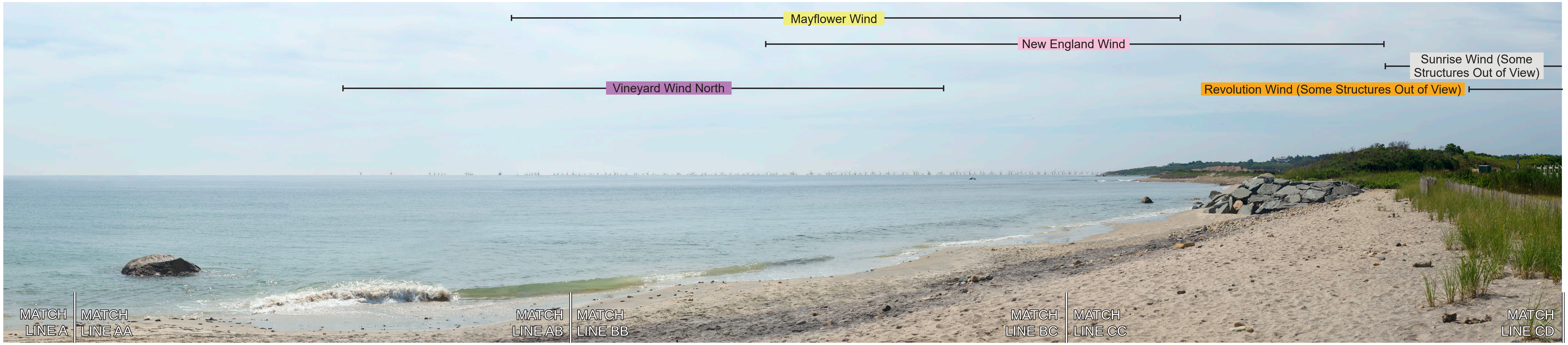
ENVIRONMENT

Temperature: 65° F
Humidity: 78%
Wind Dir & Speed: SSW 16mph
Weather Condition: Hazy

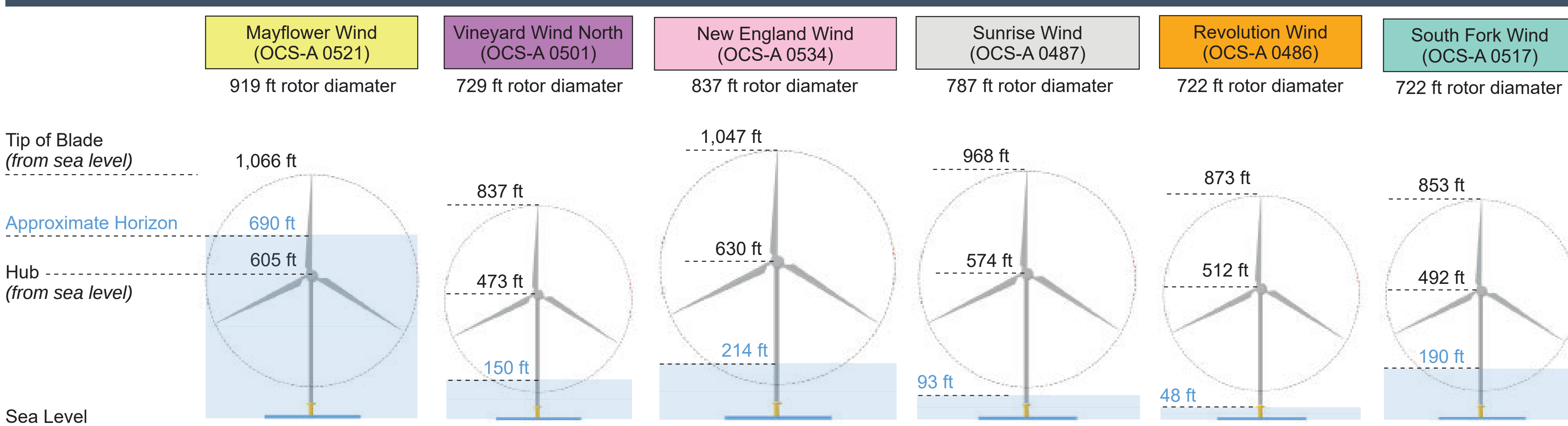
CAMERA

Camera Elevation: 16.5 ft / 5.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES



	Mayflower Wind	Vineyard Wind North	New England Wind	Sunrise Wind	Revolution Wind	South Fork Wind
Year Forecasted for Development	2025	2023	2024 Phase II 2026	2025	2023	2023
Number of Structures in Lease Area	149	77	120	131	103	18
Number of Structures within View of KOP	90	77	72	0	0	0
Distance to Closest Structure	37 mi (60 km)	20 mi (32 km)	23 mi (37 km)	17 mi (27 km)	13 mi (22 km)	22 mi (35 km)
Distance to Furthest Structure	45 mi (72 km)	29 mi (47 km)	39 mi (63 km)	36 mi (59 km)	30 mi (47 km)	28 mi (45 km)

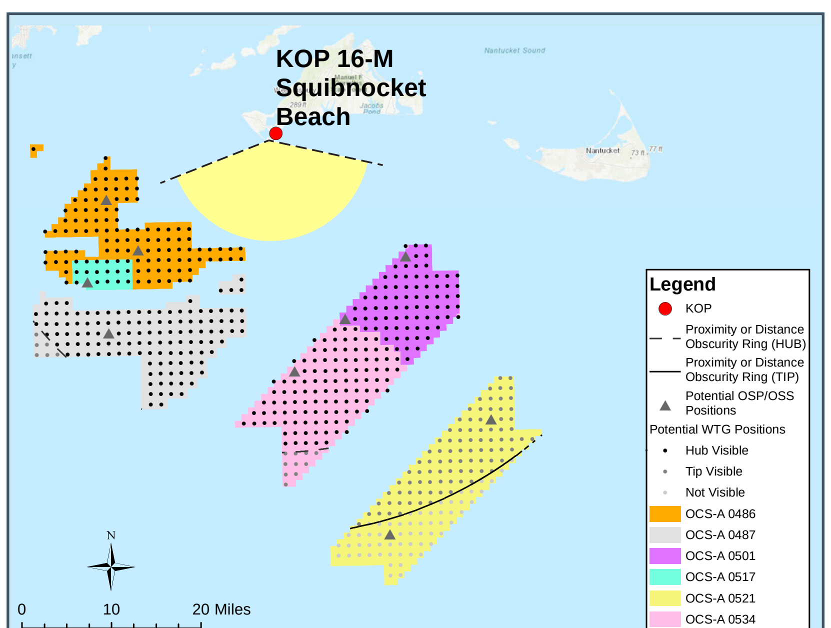
KOP 16-MV Squibnocket Beach - Scenario 2 (Human Field of View - 124°)

Martha's Vineyard

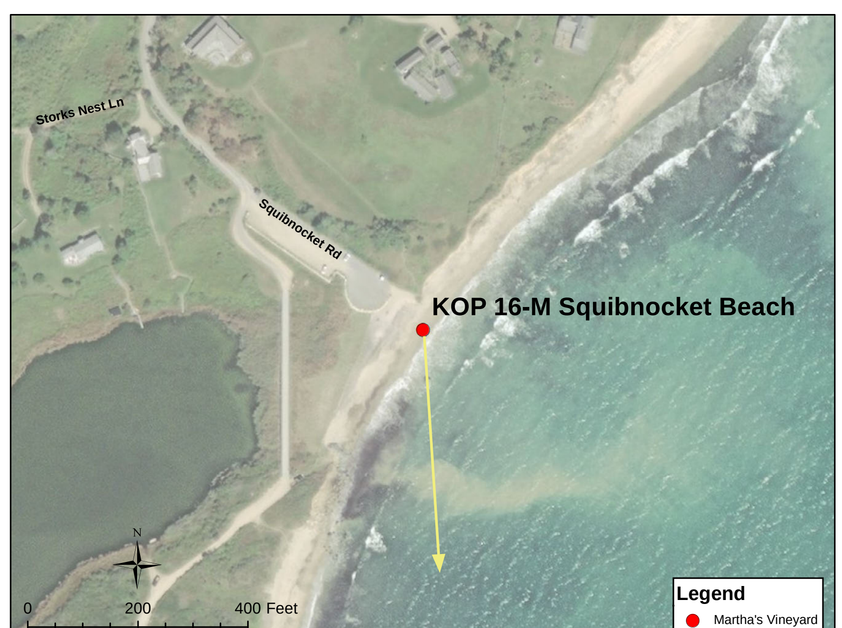
SIMULATED CONDITIONS

3

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 12 mi / 20 km
Furthest Visible WTG: 45 mi / 72 km
Potential Number of Structures Visible: 239
Potential Number of Structures Not Visible: 359

ENVIRONMENT

Temperature: 65° F
Humidity: 78%
Wind Dir & Speed: SSW 16mph
Weather Condition: Hazy

PHOTOGRAPH AND SITE

Time of photograph: 2:08PM
Date of photograph: 11-6-20
L/SCA: Ocean Beach, Open Ocean
Viewing direction: Southeast (176°)
Latitude: 41.318873°N
Longitude: 70.764908°W
Lighting Direction:Sidelit diffused

CAMERA

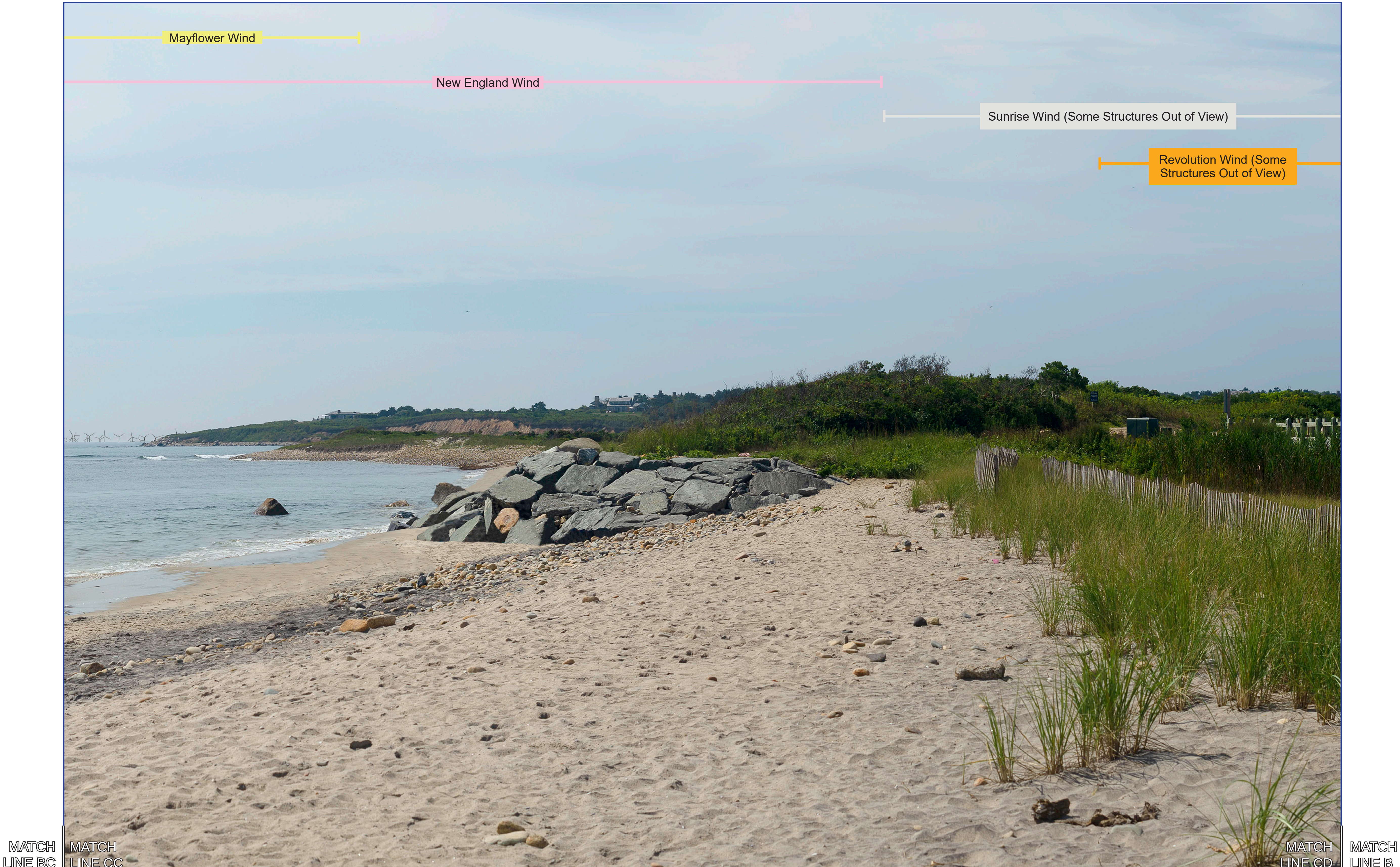
Camera Elevation: 16.5 ft / 5.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-MV Squibnocket Beach - Scenario 2 (50mm view - 27° vertical / 40° horizontal) 1 of 3

SIMULATED CONDITIONS

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



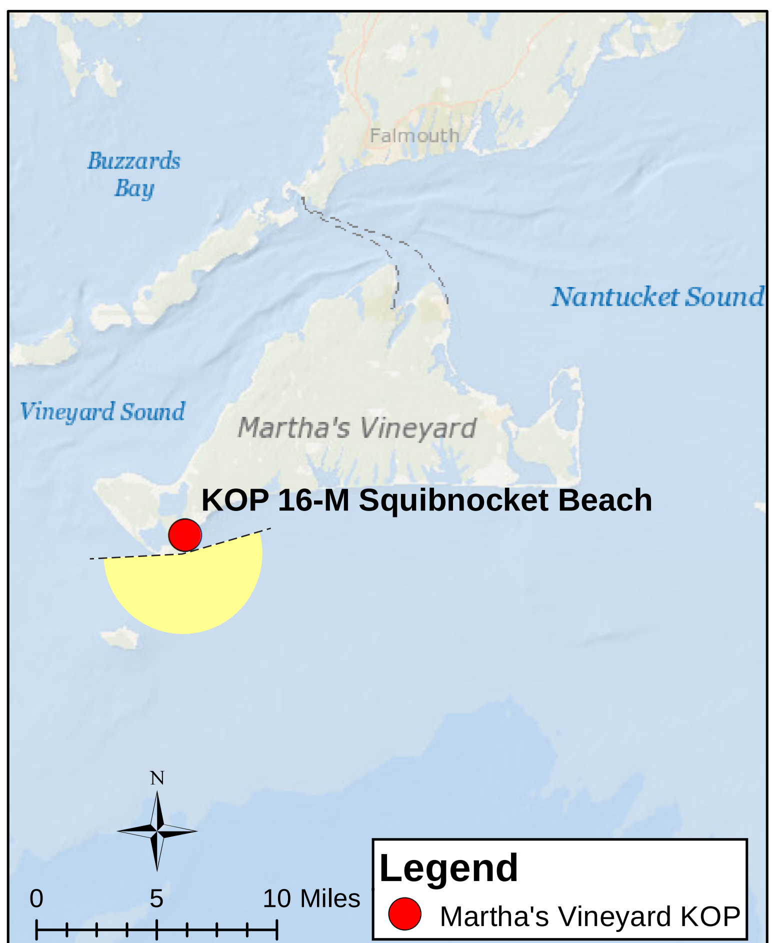
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

KOP 16-MV Squibnocket Beach - Scenario 3

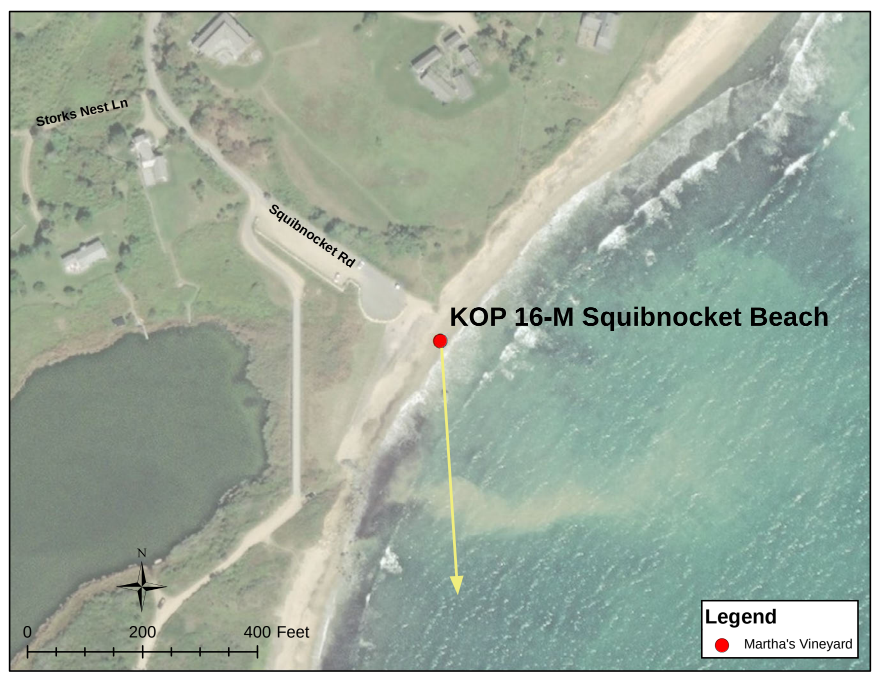
Martha's Vineyard

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 13 mi / 22 km
Furthest Visible WTG: 45 mi / 72 km
Potential Number of Structures Visible: 425
Potential Number of Structures Not Visible: 638

PHOTOGRAPH AND SITE

Time of photograph: 2:08PM
Date of photograph: 11-6-20
L/SCA: Ocean Beach, Open Ocean
Viewing direction: Southeast (176°)
Latitude: 41.318873°N
Longitude: 70.764908°W
Lighting Direction:Sidelit diffused

ENVIRONMENT

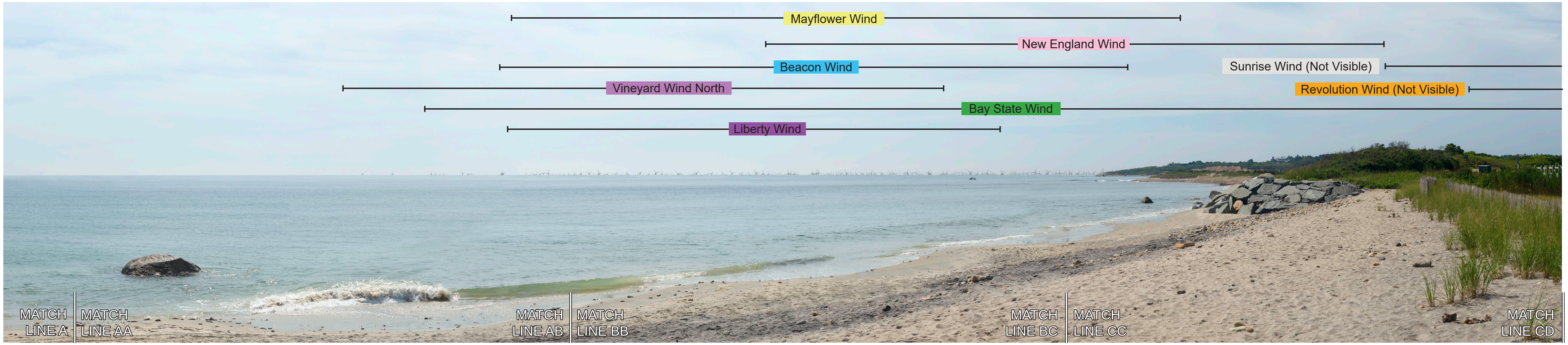
Temperature: 65° F
Humidity: 78%
Wind Dir & Speed: SSW 16mph
Weather Condition: Hazy

CAMERA

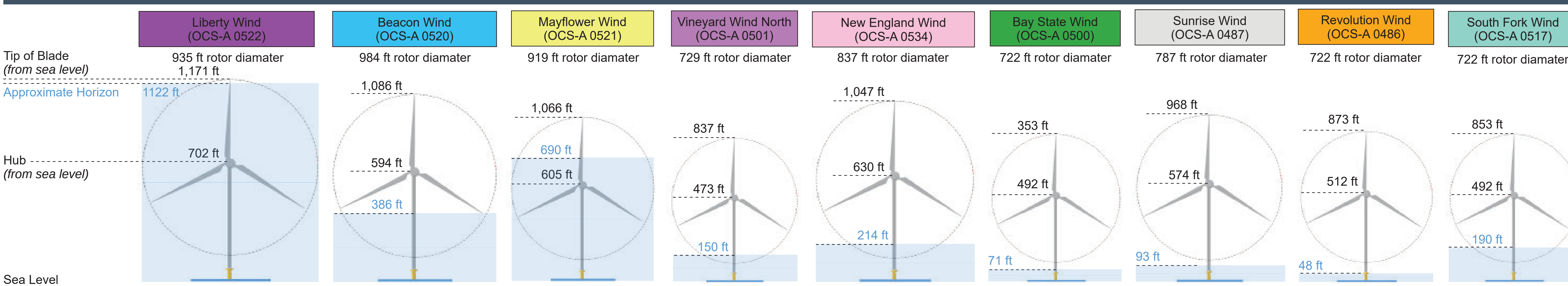
Camera Elevation: 16.5 ft / 5.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-MV Squibnocket Beach - Scenario 3

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES



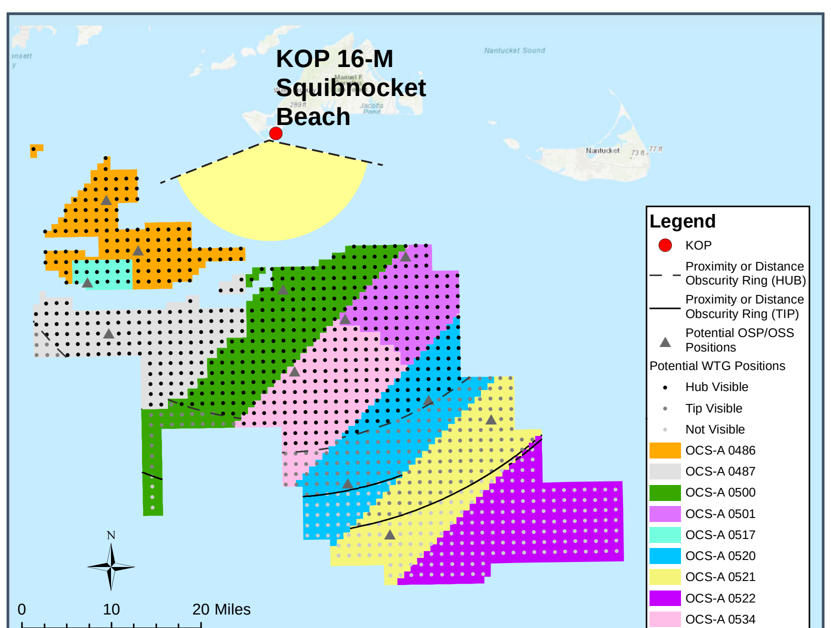
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Mayflower Wind (OCS-A 0521)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2025-2030	2025-2030	2025	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	149	77	120	169	131	103	18
Number of Structures within View of KOP	1	127	90	77	72	58	0	0	0
Distance to Closest Structure	46 mi (73 km)	29 mi (47 km)	37 mi (60 km)	20 mi (32 km)	23 mi (37 km)	15 mi (25 km)	17 mi (27 km)	13 mi (22 km)	22 mi (35 km)
Distance to Furthest Structure	60 mi (97 km)	41 mi (65 km)	45 mi (72 km)	29 mi (47 km)	39 mi (63 km)	40 mi (64 km)	36 mi (59 km)	30 mi (47 km)	28 mi (45 km)

KOP 16-MV Squibnocket Beach - Scenario 3 (Human Field of View - 124°)

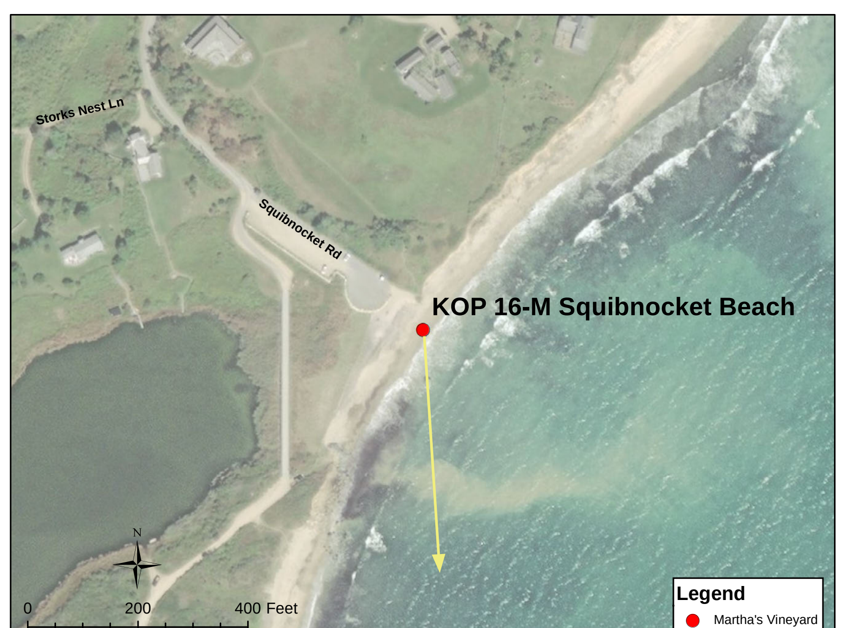
Martha's Vineyard

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 124°
Vertical Field of View: 40°
Nearest WTG: 13 mi / 22 km
Furthest Visible WTG: 45 mi / 72 km
Potential Number of Structures Visible: 425
Potential Number of Structures Not Visible: 638

PHOTOGRAPH AND SITE

Time of photograph: 2:08PM
Date of photograph: 11-6-20
L/SCA: Ocean Beach, Open Ocean
Viewing direction: Southeast (176°)
Latitude: 41.318873°N
Longitude: 70.764908°W
Lighting Direction:Sidelit diffused

ENVIRONMENT

Temperature: 65° F
Humidity: 78%
Wind Dir & Speed: SSW 16mph
Weather Condition: Hazy

CAMERA

Camera Elevation: 16.5 ft / 5.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

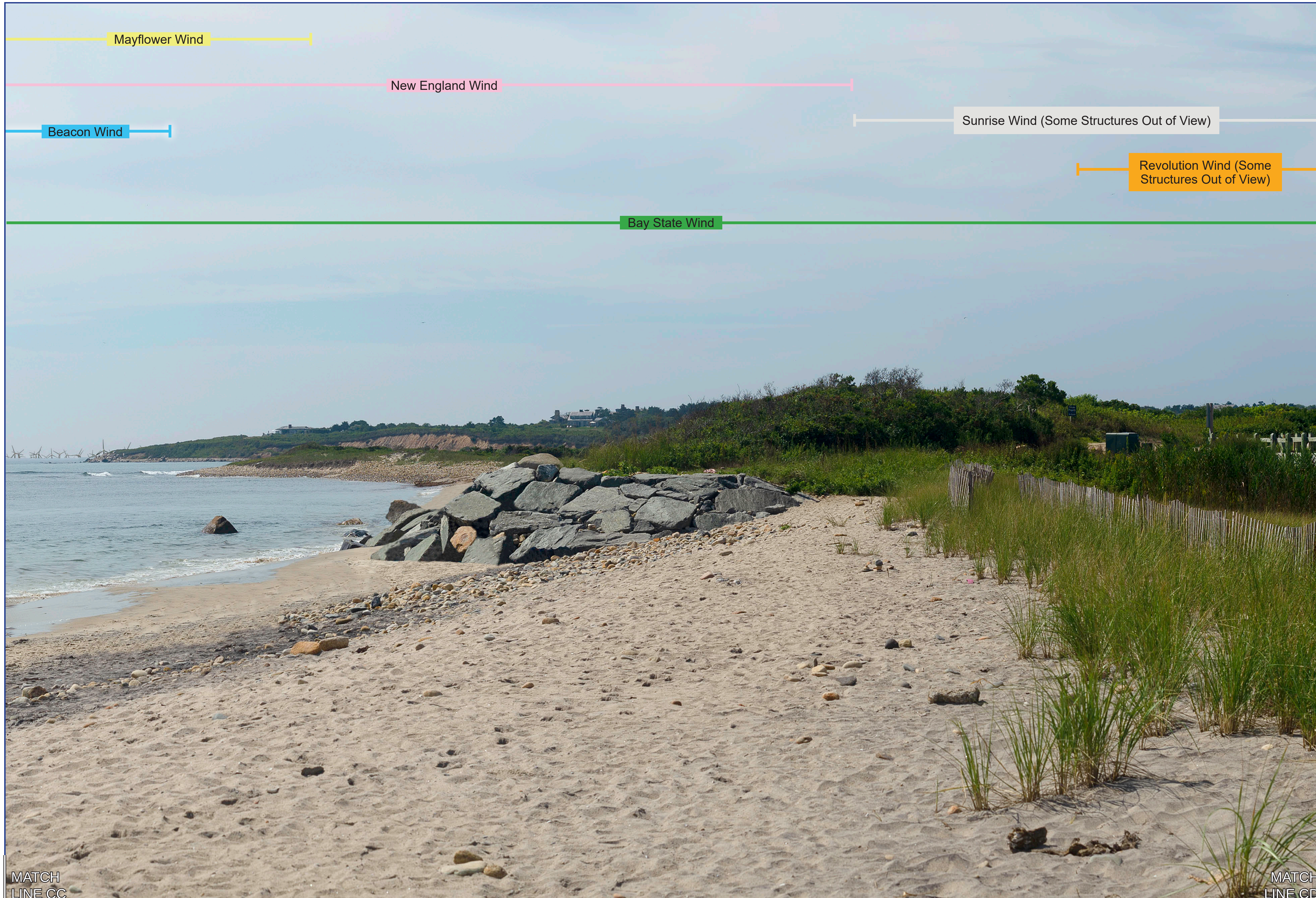
MATCH LINE AB

MATCH LINE BB

MATCH LINE BC

MATCH LINE CC

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



MATCH LINE BC

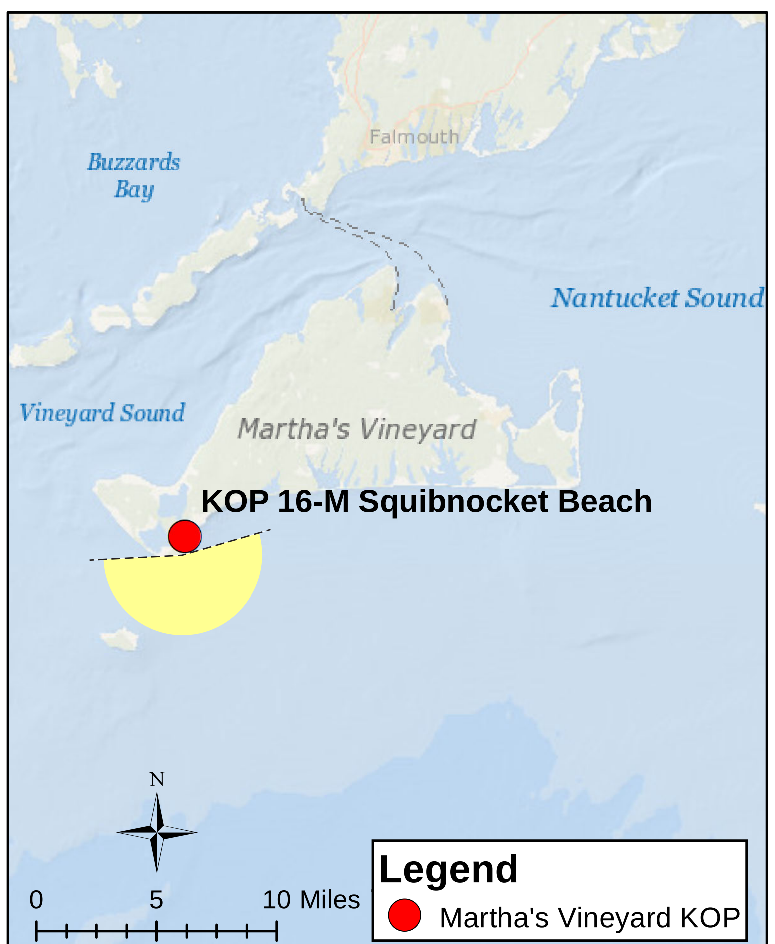
MATCH LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

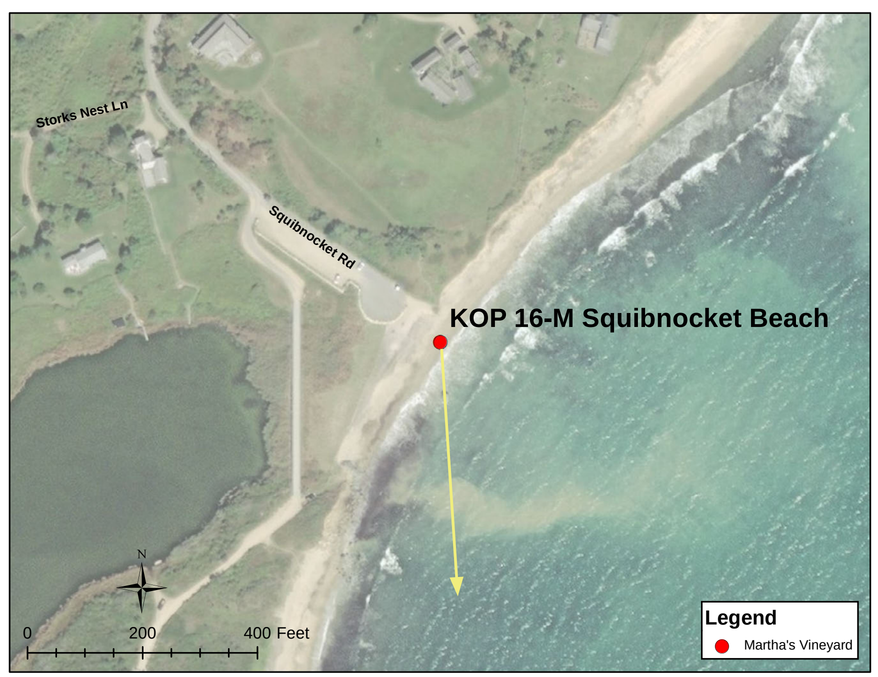
KOP 16-MV Squibnocket - Scenario 4

PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 13 mi / 22 km
Furthest Visible WTG: 45 mi / 72 km
Potential Number of Structures Visible: 335
Potential Number of Structures Not Visible: 579

ENVIRONMENT

Temperature: 65° F
Humidity: 78%
Wind Dir & Speed: SSW 16mph
Weather Condition: Hazy

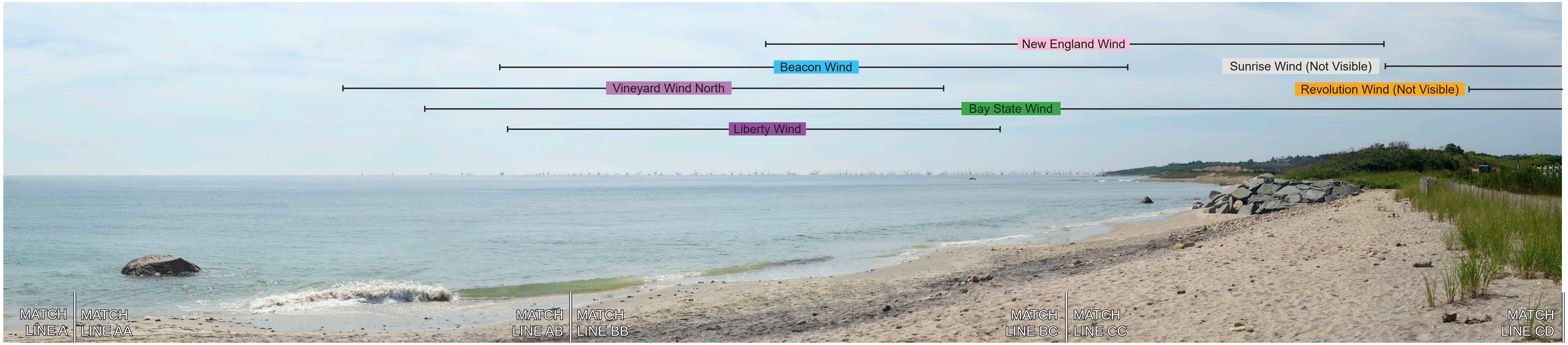
PHOTOGRAPH AND SITE

Time of photograph: 2:08PM
Date of photograph: 11-6-20
L/SCA: Ocean Beach, Open Ocean
Viewing direction: Southeast (176°)
Latitude: 41.318873°N
Longitude: 70.764908°W
Lighting Direction:Sidelit diffused

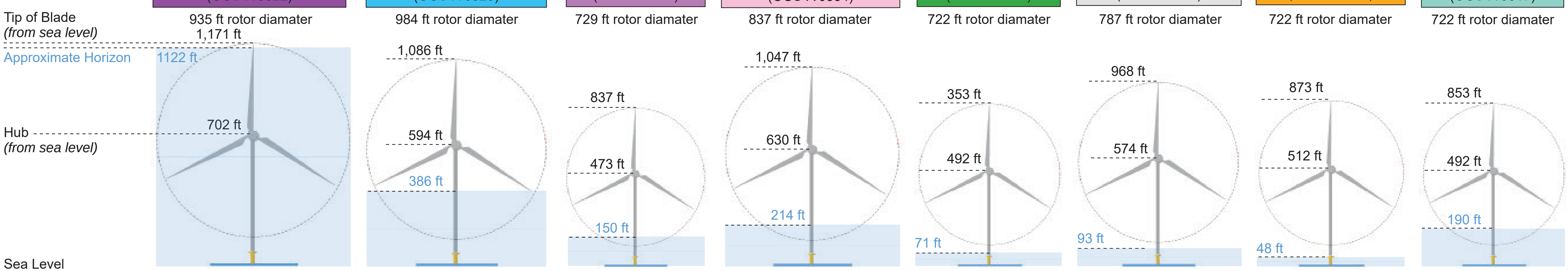
CAMERA

Camera Elevation: 16.5 ft / 5.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

SIMULATED CONDITIONS



VISIBILTY OF CLOSEST TURBINES



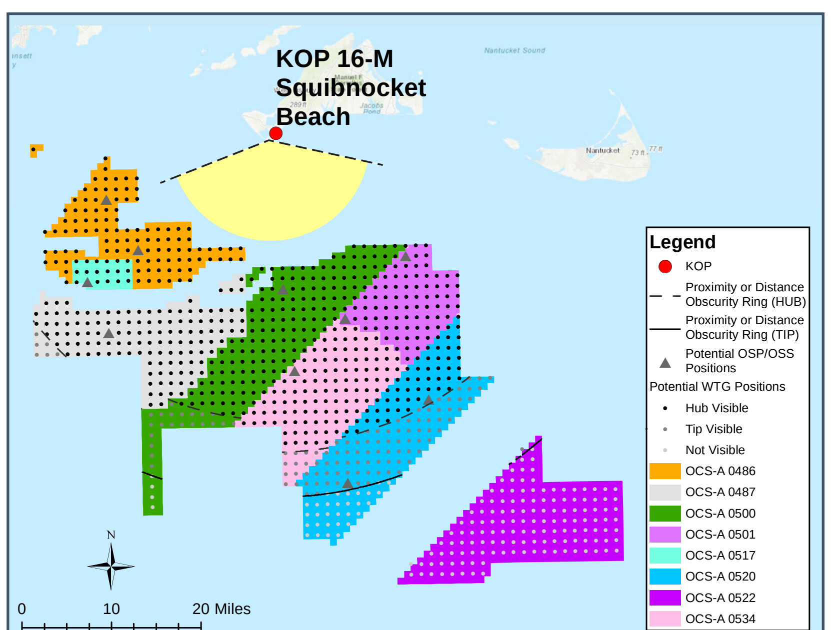
	Liberty Wind (OCS-A 0522)	Beacon Wind (OCS-A 0520)	Vineyard Wind North (OCS-A 0501)	New England Wind (OCS-A 0534)	Bay State Wind (OCS-A 0500)	Sunrise Wind (OCS-A 0487)	Revolution Wind (OCS-A 0486)	South Fork Wind (OCS-A 0517)
Year Forecasted for Development	2025-2030	2025-2030	2023	2024 Phase II 2026	2025-2030	2025	2023	2023
Number of Structures in Lease Area	139	157	77	120	169	131	103	18
Number of Structures within View of KOP	1	127	77	72	58	0	0	0
Distance to Closest Structure	46 mi (73 km)	29 mi (47 km)	20 mi (32 km)	23 mi (37 km)	15 mi (25 km)	17 mi (27 km)	13 mi (22 km)	22 mi (35 km)
Distance to Furthest Structure	60 mi (97 km)	41 mi (65 km)	29 mi (47 km)	39 mi (63 km)	40 mi (64 km)	36 mi (59 km)	30 mi (47 km)	28 mi (45 km)

KOP 16-MV Squibnocket - Scenario 4 (Human Field of View - 124°)

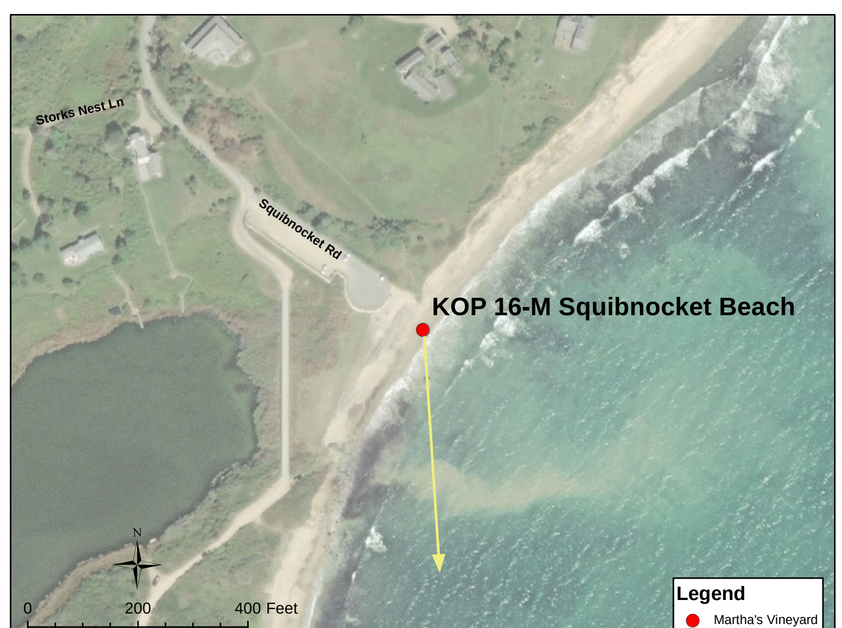
Martha's Vineyard

SIMULATED CONDITIONS

REGIONAL MAP



SITE MAP



PROJECT VIEW

Horizontal Field of View: 193°

Vertical Field of View: 40°

Nearest WTG: 13 mi / 22 km

Furthest Visible WTG: 45 mi / 72 km

Potential Number of Structures Visible: 335

Potential Number of Structures Not Visible: 579

PHOTOGRAPH AND SITE

Time of photograph: 2:08PM

Date of photograph: 11-6-20

L/SCA: Ocean Beach, Open Ocean

Viewing direction: Southeast (176°)

Latitude: 41.318873°N

Longitude: 70.764908°W

Lighting Direction:Sidelit diffused

ENVIRONMENT

Temperature: 65° F

Humidity: 78%

Wind Dir & Speed: SSW 16mph

Weather Condition: Hazy

CAMERA

Camera Elevation: 16.5 ft / 5.0 m

Nikon D4

Nikon 50mm

ISO: 100

Fstop: f/7.1

Shutter: 1/1250 sec

Exposure bias: -0.7 step

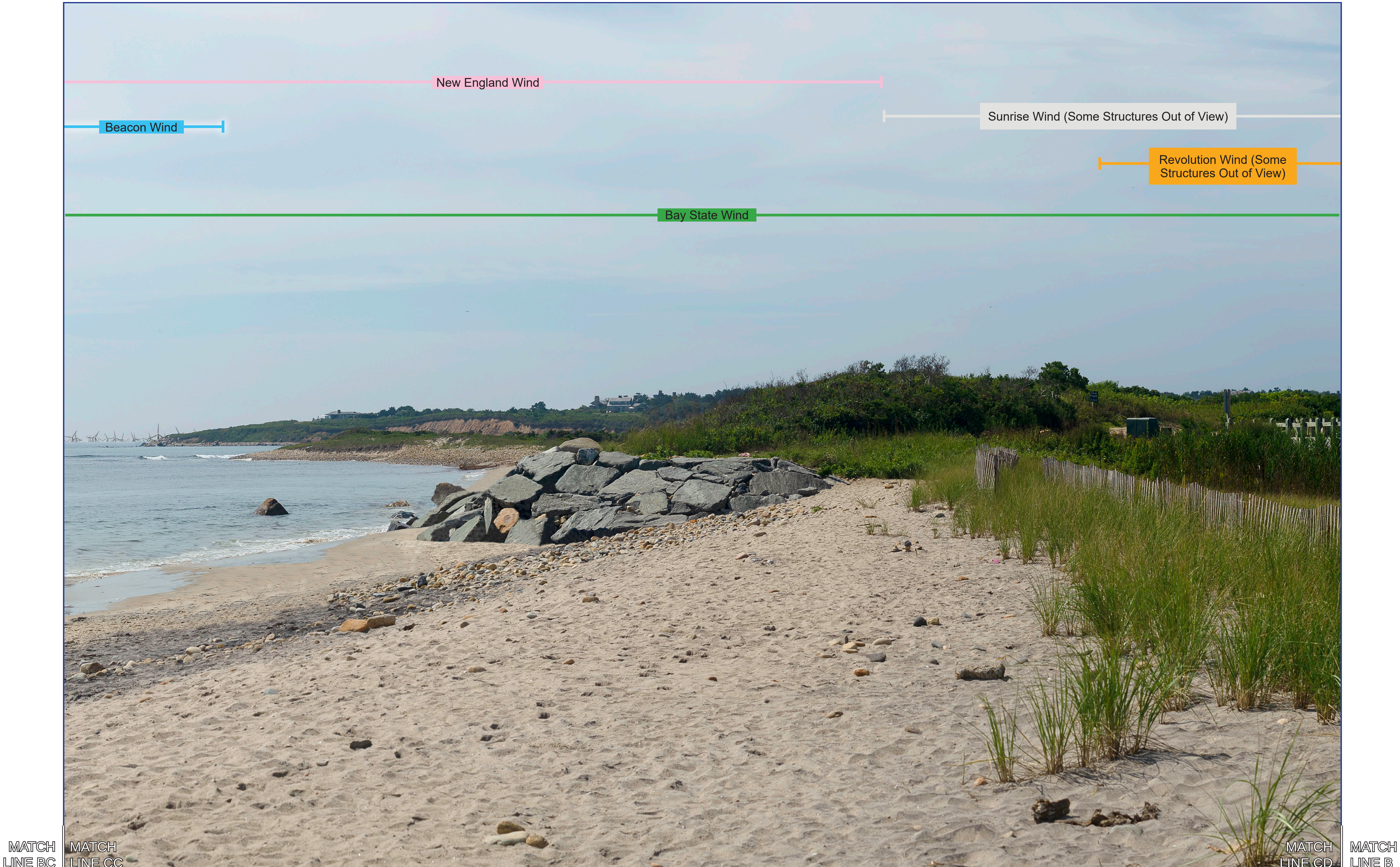
The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

SIMULATED CONDITIONS

MATCH LINE AB

MATCH LINE CC

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .



The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

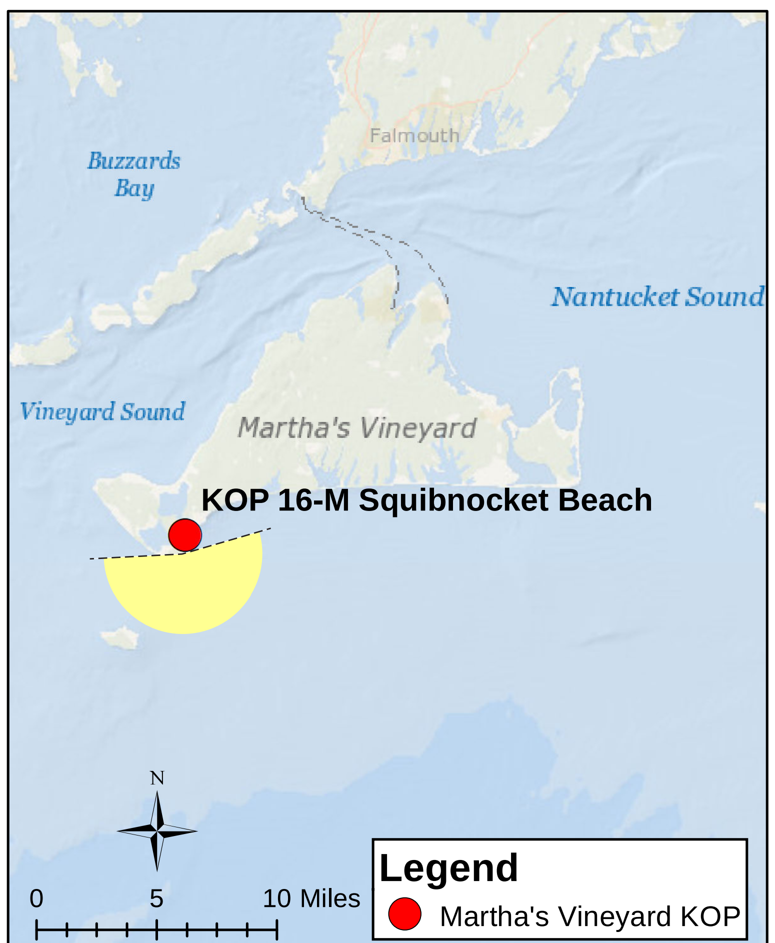
KOP 16-MV Squibnocket - Scenario 5

Martha's Vineyard

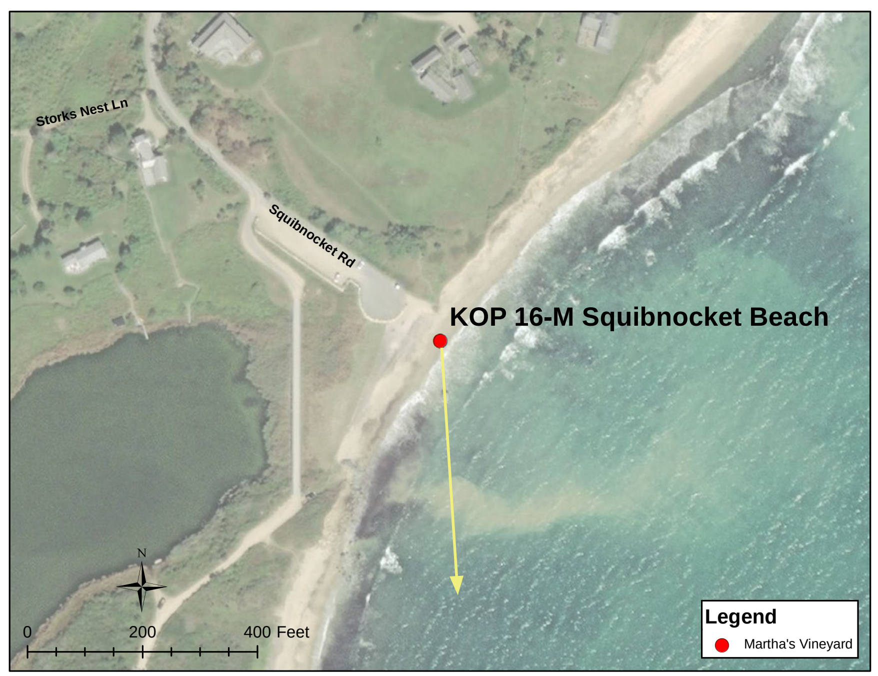
PANORAMIC PHOTOGRAPH - EXISTING CONDITIONS

MATCH LINE B

REGIONAL MAP



SITE MAP



MATCH LINES define visual simulation detail areas

A-B is shown on pages 2-3
AA-AB is shown on page 4
BB-BC is shown on page 5
CC-CD is shown on page 6

PROJECT VIEW

Horizontal Field of View: 193°
Vertical Field of View: 40°
Nearest WTG: 37 mi / 60 km
Furthest Visible WTG: 45 mi / 72 km
Potential Number of Structures Visible: 90
Potential Number of Structures Not Visible: 59

ENVIRONMENT

Temperature: 65° F
Humidity: 78%
Wind Dir & Speed: SSW 16mph
Weather Condition: Hazy

PHOTOGRAPH AND SITE

Time of photograph: 2:08PM
Date of photograph: 11-6-20
L/SCA: Ocean Beach, Open Ocean
Viewing direction: Southeast (176°)
Latitude: 41.318873°N
Longitude: 70.764908°W
Lighting Direction:Sidelit diffused

CAMERA

Camera Elevation: 16.5 ft / 5.0 m
Nikon D4
Nikon 50mm
ISO: 100
Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-MV Squibnocket - Scenario 5

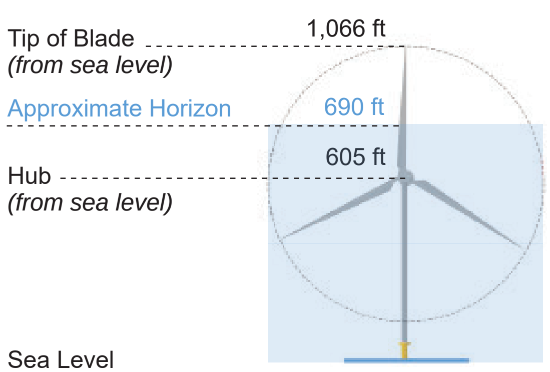
Martha's Vineyard

SIMULATED CONDITIONS

VISIBILTY OF CLOSEST TURBINES

Mayflower Wind (OCS-A 0521)

919 ft rotor diamater

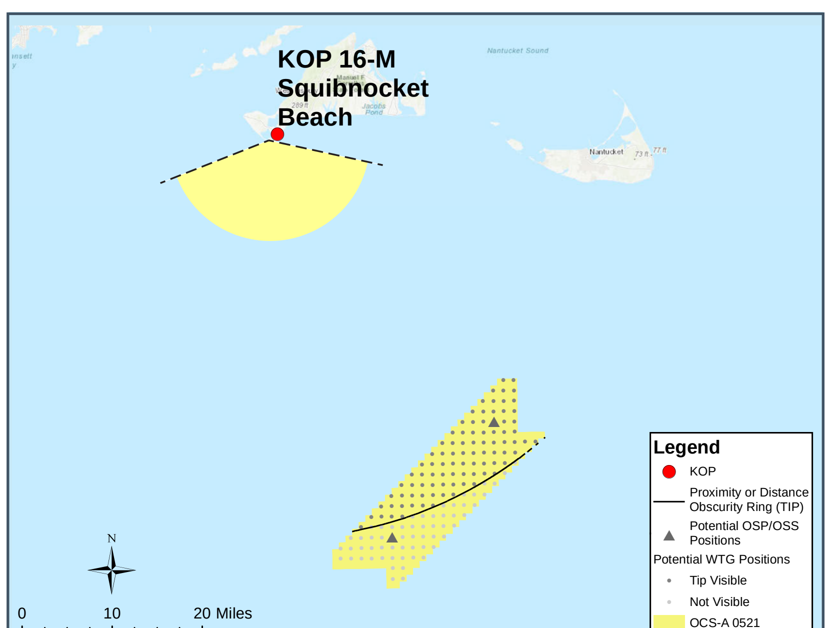


	Mayflower Wind (OCS-A 0521)
Year Forecasted for Development	2025
Number of Structures in Lease Area	149
Number of Structures within View of KOP	90
Distance to Closest Structure	37 mi (60 km)
Distance to Furthest Structure	45 mi (72 km)

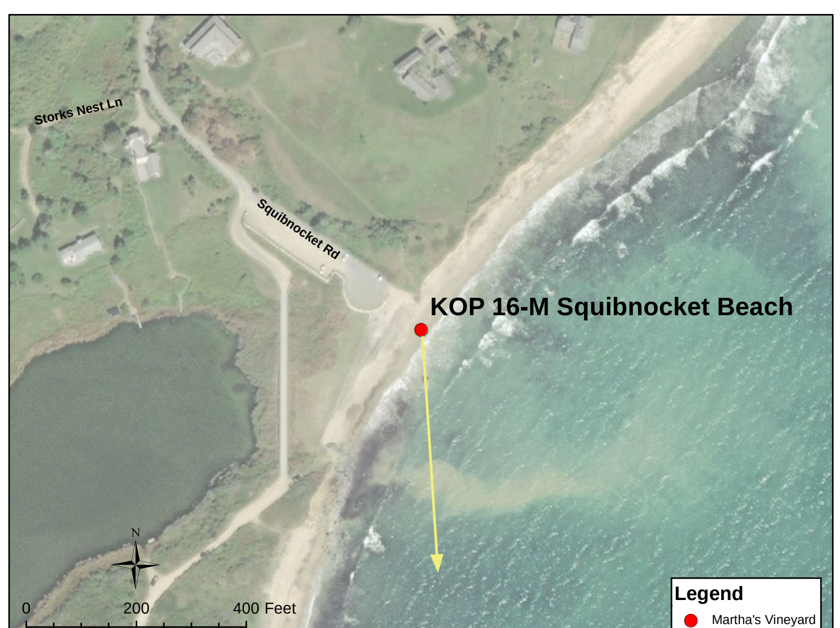
SIMULATED CONDITIONS

MATCH LINE B

REGIONAL MAP



SITE MAP



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Camera Elevation: 16.5 ft / 5.0 m
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Nikon 50mm
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Fstop: f/7.1
Shutter: 1/1250 sec
Exposure bias: -0.7 step

KOP 16-MV Squibnocket - Scenario 5 (50mm view - 27° vertical / 40° horizontal) 1 of 3

SIMULATED CONDITIONS

The page should viewed at 11” x 17” approximately 15” from viewer’s eyes .

KOP 16-MV Squibnocket - Scenario 5 (50mm view - 27° vertical / 40° horizontal) 2 of 3

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

MATCH LINE BC

MATCH LINE B

The page should viewed at 11" x 17" approximately 15" from viewer's eyes .

Appendix I: Finding of Adverse Effect for the SouthCoast Wind Construction and Operations Plan

Please note: This document reflects the status of NHPA Section 106 information and consultations as of October 29, 2024, and has mostly recently been revised based on Tribal Nation and consulting party feedback received during an NHPA review and comment period held from July 1–31, 2024.

The Bureau of Ocean Energy Management (BOEM) has made a Finding of Adverse Effect under Section 106 of the National Historic Preservation Act (NHPA) pursuant to 36 Code of Federal Regulations (CFR) 800.5 for the undertaking, defined as the construction, installation, operations and maintenance (O&M), and conceptual decommissioning of the SouthCoast Wind Project (Project), as described in the SouthCoast Wind Energy, LLC (SouthCoast Wind) Construction and Operations Plan (COP) (SouthCoast Wind 2024). The Project would have adverse effects on historic properties. As defined in 36 CFR 800.16(l)(1), the term *historic property* means "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places [NRHP; National Register] maintained by the Secretary of the Interior." The term *historic property* also includes National Historic Landmarks (NHLs) as well as sites of traditional religious and cultural importance to Tribal Nations that meet National Register criteria.

BOEM finds that the undertaking would adversely affect the following historic properties:

- One marine archaeological resource (Table I-5; Section I.3.1.1, *Assessment of Effects on Historic Properties in the Marine APE*).
- Two ancient submerged landform features (ASLFs) with potential or known archaeological or traditional cultural place (TCP) significance (Table I-7; Section I.3.1.1, *Assessment of Effects on Historic Properties in the Marine APE*).
- Two terrestrial archaeological resources (Table I-8; Section I.3.1.2, *Assessment of Effects on Historic Properties in the Terrestrial APE*).
- Two TCPs: Chappaquiddick Island and Nantucket Sound (Section I.3.1.1, *Assessment of Effects on Historic Properties in the Marine APE*; Section I.3.1.3, *Assessment of Effects on Historic Properties in the Visual APE*).
- Two aboveground historic properties: the Nantucket Historic District NHL and Oak Grove Cemetery (Section I.3.1.3, *Assessment of Effects on Historic Properties in the Visual APE*).

Per 36 CFR 800.5(a)(1), the Project would cause adverse effects on a historic property by altering, directly or indirectly, characteristics that qualify the historic property for inclusion in the National Register (refer to Section I.3, *Application of the Criteria of Adverse Effect*).

Construction of the Project would cause physical adverse effects on historic properties that are marine cultural resources (i.e., marine archaeological resources and ASLFs) in the marine portion of the area of potential effects (APE) and terrestrial archaeological resources in the terrestrial portion of the APE as

Project components and/or associated work zones are proposed for locations within the defined areas of these resources (COP, Appendices Q and R; SouthCoast Wind 2024). Additional terrestrial archaeological resources potentially subject to adverse effects from the Project may be identified during SouthCoast Wind's process of phased identification and evaluation of historic properties as defined in 36 CFR 800.4(b)(2) (COP, Appendix R.2; SouthCoast Wind 2024; Section I.5, *Phased Identification and Evaluation*).

The Project would also cause visual effects, and contribute to cumulative effects, on two historic properties that are TCPs: Chappaquiddick Island and Nantucket Sound. For Chappaquiddick Island TCP and Nantucket Sound TCP, BOEM determined that contributing historic aboveground elements would be visually affected by the visibility of Offshore Project components (COP, Appendix S; SouthCoast Wind 2024).

In addition to the two aforementioned TCPs, the Project would also cause visual effects from Project component visibility on two other aboveground historic properties: the Oak Grove Cemetery in Falmouth, Massachusetts, and Nantucket Historic District NHL (COP, Appendix S; SouthCoast Wind 2024). The Oak Grove Cemetery has landscape views that are a character-defining feature contributing to its NRHP eligibility; these landscape views are subject to adverse effects from Onshore Project components associated with the Lawrence Lynch substation. The Nantucket Historic District NHL has ocean views that are a character-defining feature contributing to the historic property's NRHP eligibility and subject to adverse effect from Offshore Project components. BOEM has determined that the Project would contribute to cumulative adverse effects from Offshore Project component visibility to this NHL. For compliance with NHPA Section 110(f) per 36 CFR 800.10, which applies specifically to NHLs, BOEM has determined that the Nantucket Historic District NHL would be adversely affected by the Project and has, to the maximum extent possible, undertaken planning and actions as may be necessary to minimize harm to the NHL.

BOEM elected to use the National Environmental Policy Act (NEPA) substitution process for Section 106 purposes, as described in 36 CFR 800.8(c), during its review. The regulations at 36 CFR 800.8(c) 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. The NEPA substitution process is described at https://www.achp.gov/integrating_nepa_106. Both NEPA and Section 106 allow participation of consulting parties. Consistent with use of the NEPA substitution process to fulfill Section 106 requirements, BOEM has stipulated mitigation measures to resolve adverse effects in a Memorandum of Agreement (MOA) pursuant to 36 CFR 800.8(c)(4)(i)(B). Simultaneous to the publication of this Final EIS, BOEM is coordinating with signatories to the MOA to have the MOA fully signed and executed no later than December 19, 2024. The version of the MOA, attached to this document as Attachment A, is a draft of the MOA as of September 30, 2024. The executed MOA will be posted on BOEM's website following issuance of the Record of Decision (ROD): https://www.boem.gov/renewable-energy/state-activities/southcoast-wind-formerly-mayflower-wind.

I.1 Project Overview

In February 2021, BOEM received a COP from SouthCoast Wind proposing an offshore wind energy facility in Renewable Energy Lease Area OCS-A 0521 (Lease Area), offshore Massachusetts. In addition, SouthCoast Wind submitted updates to the COP in August 2021, October 2021, March 2022, December 2022, and September 2023. In its COP, SouthCoast Wind proposes construction and installation, O&M, and conceptual decommissioning of an up to 2,400-megawatt (MW) wind energy project consisting of offshore wind turbine generators (WTGs) and their foundations, offshore substation platforms (OSPs) and their foundations, scour protection for foundations, interarray cables linking the individual turbines to the OSPs, offshore export cables and an onshore export cable system, onshore substations, and connections to the existing electrical grid in Massachusetts (Figure I-1). At their nearest point, WTG and OSP components of the Project would be approximately 26 nautical miles (30 statutory miles, 48 kilometers) south of Martha's Vineyard and 20 nautical miles (23 statutory miles, 37 kilometers) south of Nantucket, Massachusetts. Offshore Project components would be on the OCS, with the exception of portions of the offshore export cables in Massachusetts and Rhode Island state waters. SouthCoast Wind is using a Project Design Envelope (PDE) in its COP, which represents a reasonable range of design parameters that may be used for the Project. In reviewing the PDE, BOEM is analyzing the maximum-case scenario that could occur from any combination of the contemplated parameters. This includes any Project alternatives that may require phased identification of historic properties (COP, Appendix R.2; SouthCoast Wind 2024; Section I.5, *Phased Identification and Evaluation*). BOEM's analysis and review of the PDE may result in the approval of a project that is constructed within that range or a subset of design parameters within the proposed range.

If approved by BOEM and other agencies with authority to approve Project components outside of BOEM's jurisdiction, SouthCoast Wind would construct and operate WTGs, export cables to shore, and associated facilities, including those outside BOEM's jurisdiction, for a specified term. BOEM is now conducting its environmental and technical reviews of the COP and has published a Final Environmental Impact Statement (EIS) under NEPA for its decision regarding approval of the plan. A detailed description of the proposed Project can be found in Chapter 2, *Alternatives*, of the Final EIS. This Final EIS considers reasonably foreseeable impacts of the Project, including impacts on cultural resources, which include historic properties.

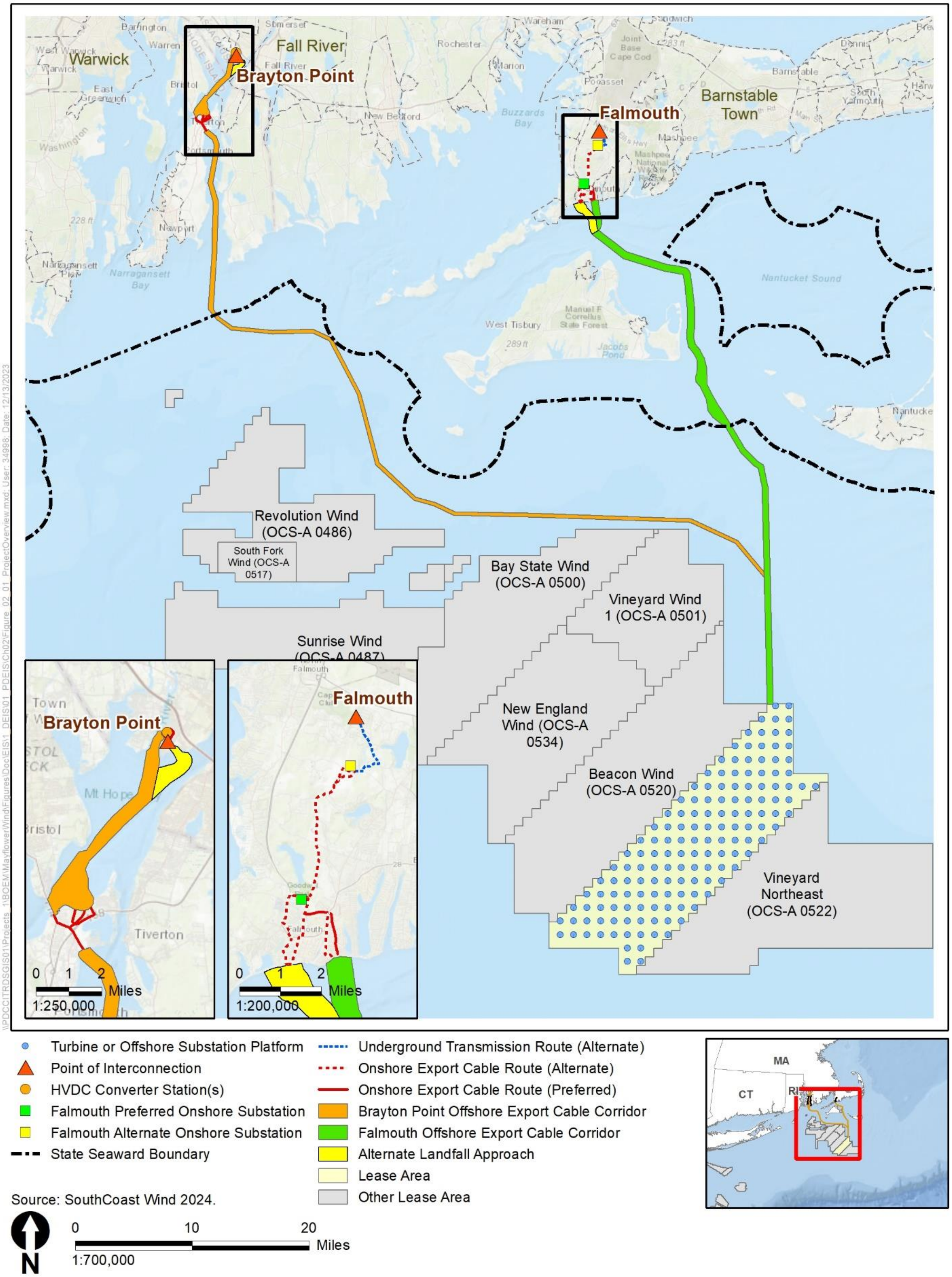

Figure I-1. SouthCoast Wind COP proposed Project elements

I.1.1 Background

The Project is in a commercial lease area that received previous Section 106 review by BOEM regarding the issuance of the commercial lease and approval of site assessment activities.

On February 6, 2012, BOEM published in the *Federal Register* (FR) a *Notice of Intent to Prepare an Environmental Assessment for Commercial Wind Lease Issuance and Site Characterization Activities on the Atlantic OCS Offshore Massachusetts* (77 FR 5830). On November 2, 2012, BOEM announced the availability of an environmental assessment (EA) for public review and comment (77 FR 66185). BOEM considered comments received from this notice and on June 18, 2014, made available a revised EA for the Wind Energy Area (WEA) offshore Massachusetts (79 FR 34781). As a result of the analysis in the revised EA, BOEM issued a Finding of No Significant Impact, which concluded that reasonably foreseeable environmental effects associated with commercial wind lease issuance and related site assessment activities would not significantly affect the environment. The Section 106 process was completed pursuant to a programmatic agreement (PA), executed on June 8, 2012 (*Programmatic Agreement among the U.S. Department of the Interior, Bureau of Ocean Energy Management; the State Historic Preservation Officers of Massachusetts and Rhode Island; the Mashpee Wampanoag Tribe; the Narragansett Indian Tribe; the Wampanoag Tribe of Gay Head (Aquinnah); and the Advisory Council on Historic Preservation Regarding the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities Offshore Massachusetts and Rhode Island*) and concluded with a BOEM determination of no historic properties affected for lease issuance, corresponding to the Finding of No Significant Impact for the EA. On December 2018, BOEM held a competitive lease sale for WEAs offshore Massachusetts. SouthCoast Wind was identified as the winner of Lease Area OCS-A 0521.

Subsequent to award of the lease, SouthCoast Wind submitted a site assessment plan describing the proposed installation, O&M, and decommissioning of a meteorological buoy within the Lease Area. Pursuant to Stipulation 1 of the PA, BOEM issued a Finding of No Historic Properties Affected on January 28, 2020 and notified the signatories of the PA to the finding.

SouthCoast Wind's COP proposed to develop the entire Lease Area as an offshore wind renewable energy project. The Project would consist of up to 149 positions in the Lease Area to be occupied by WTGs and OSPs. The 149 positions would conform to a 1.0-by-1.0-nautical mile (1.9-by-1.9-kilometer) grid layout with an east–west and north–south orientation across the entire Massachusetts Rhode Island Wind Energy Area (MA/RI WEA), as agreed upon by SouthCoast Wind and the other MA/RI WEA leaseholders. WTGs, which would be up to 1,066 feet tall above mean sea level, and OSPs would be connected via interarray cables in the Lease Area. The Project would be developed in two parts or projects: Project 1 refers to the development in the northern portion of the Lease Area and associated interconnection, and Project 2 refers to the development in the southern portion of the Lease Area and associated interconnection.

The Project would include one preferred export cable corridor (ECC) making landfall and interconnecting to the ISO New England Inc. (ISO-NE) grid at Brayton Point in Somerset, Massachusetts. This preferred ECC to Brayton Point will be used for both Project 1 and Project 2 within the Lease Area. The Project will also include one variant ECC which, if utilized, would make landfall and interconnect to the ISO-NE grid in the town of Falmouth, Massachusetts. In the event that technical, logistical, grid interconnection, or other unforeseen challenges arise during the design and engineering phase that prevent Project 2 from making interconnection at Brayton Point, Project 2 will utilize the Falmouth variant ECC and make landfall and interconnect in Falmouth, Massachusetts.

Within the Brayton Point ECC, up to six submarine offshore export cables, including up to four power cables and up to two dedicated communications cables, would be installed from one or more OSPs in the Lease Area on the OCS, and run through the Sakonnet River, make intermediate landfall on Aquidneck Island in Portsmouth, Rhode Island, which includes an underground onshore export cable route, and then into Mount Hope Bay, to make landfall at Brayton Point in Somerset, Massachusetts. The two landfall sites considered in the PDE include developed coastal locations on either side of Brayton Point: the Western landfall from the Lee River and the Eastern landfall from the Taunton River.

Within the variant Falmouth ECC, up to five submarine offshore export cables, including up to four power cables and up to one dedicated communications cable, would be installed from one or more OSPs in the Lease Area on the OCS, and run through Muskeget Channel into Nantucket Sound in Massachusetts state waters, to make landfall in Falmouth, Massachusetts. The three landfall sites considered in the PDE include coastal locations at the end of Worcester Avenue, Central Park, and Shore Street.

SouthCoast Wind would use horizontal directional drilling (HDD) for the sea-to-shore transition of export cables between the ocean and the land. For the offshore export cable landfall sites at Brayton Point in Somerset, Massachusetts, up to four new underground onshore export power cables would transmit the Project's high-voltage direct-current (HVDC) electric generation to up to two new, SouthCoast Wind-developed onshore HVDC converter stations. The onshore converter stations are specialized electrical substations designed to convert the HVDC power from the export cables to high-voltage alternating-current power to enable interconnection to the existing transmission infrastructure. The new underground 345-kV transmission line would be constructed entirely within the previously disturbed industrial Brayton Point property. The underground transmission line would connect the converter stations to the existing National Grid Substation at Brayton Point in Somerset, Massachusetts, the Brayton Point POI. Collectively, these onshore components at Brayton Point in Somerset, Massachusetts are referred to as the Brayton Point Onshore Project Area.

For the variant Falmouth interconnection, up to 12 new underground onshore export power cables would transmit the proposed Project's electric generation from the landfall site to a new SouthCoast Wind-developed onshore substation. The onshore export cables would travel underground from the landfall location to the newly constructed onshore substation, located in Falmouth, Massachusetts. There are two onshore substation locations under consideration in Falmouth, Massachusetts consisting of the potential Lawrence Lynch (preferred) substation site and the potential Cape Cod Aggregates (alternative) substation site. The onshore substation would transform the export cable voltage to 345 kilovolts (kV) to enable connection to the transmission line. Eversource Energy (Eversource) would be responsible for designing, permitting, constructing, and operating the overhead transmission line in

Eversource Right-of-Way #341 that would connect the proposed onshore substation to the existing POI at Falmouth Tap in Falmouth, Massachusetts; the overheard transmission line is not considered part of the PDE. Alternatively, the Project is also considering an underground transmission route, which would connect the onshore substation to the Falmouth POI. Collectively, these onshore components in Falmouth, Massachusetts are referred to as the Falmouth Onshore Project Area.

The proposed Project has a designed life span of approximately 35 years; some installations and components may remain fit for continued service after this time. O&M activities would include inspections, preventative maintenance, and, as needed, corrective maintenance for onshore substations, onshore export cables, and grid connections. SouthCoast Wind would conduct annual maintenance of WTGs, including safety surveys of lifesaving equipment. Substructures would undergo internal and external inspections every 2 years. SouthCoast Wind would need to use vessels, vehicles, and aircraft during O&M activities.

Although the proposed Project is anticipated to have an operational life of 35 years, it is possible that some installations and components may remain fit for continued service after this time. SouthCoast Wind would have to apply for and be granted a renewal of the operations term of its lease under BOEM’s regulations at 30 CFR 585.425, et seq., if it wanted to operate the proposed Project for more than the 33-year operations term stated in its lease. The process of decommissioning would remove all facilities, cables, pipelines, and obstructions and clear the seafloor of all obstructions created by the proposed Project. All foundations would need to be removed 15 feet (4.6 meters) below the mudline (30 CFR 285.910(a)). Absent permission from BOEM, SouthCoast Wind would have to achieve complete decommissioning within 2 years of termination of the lease and either reuse, recycle, or responsibly dispose of all materials removed. A Section 106 review would be conducted at the decommissioning stage.

I.1.2 Undertaking

BOEM has determined that the Project constitutes an undertaking subject to Section 106 of the NHPA as amended (54 USC 306108) and its implementing regulations (36 CFR 800), and the Project activities proposed under the COP have the potential to affect historic properties. Confidential appendices to the COP referenced in this document were sent electronically or by mail depending on expressed preference to consulting parties on February 2, 2023, January 17, 2024, and September 30, 2024. The COP, as well as its public and confidential appendices, is hereby incorporated by reference.

The undertaking for this Section 106 review is the Proposed Action. As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action*, of the Final EIS, the Proposed Action would include the construction, installation, O&M, and conceptual decommissioning of a wind energy facility on the OCS offshore Massachusetts, occurring within the range of design parameters outlined in the COP (SouthCoast Wind 2024), subject to applicable mitigation measures. BOEM’s election to use NEPA substitution for the Section 106 review of the Project includes the identification and evaluation of historic properties for the undertaking and assessment of effects for all the action alternatives identified during the NEPA review and as presented in the Final EIS. For BOEM's assessment of the action alternatives, see Section I.4.1, *Alternatives Considered*.

I.1.3 Area of Potential Effects

Per 36 CFR 800.16(d), the APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." BOEM (2020) defines the APE for the undertaking to include the following areas:

- The depth and breadth of the seabed potentially impacted by any bottom-disturbing activities, constituting the marine portion of the APE.
- The depth and breadth of terrestrial areas potentially impacted by any ground-disturbing activities, constituting the terrestrial portion of the APE.
- The viewshed from which renewable energy structures, whether offshore or onshore, would be visible, constituting the visual portion of the APE.
- Any temporary or permanent construction or staging areas, both onshore and offshore, which may fall into any of the above portions of the APE.

These are described below in greater detail with respect to the proposed activities, consistent with BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (BOEM 2020). Refer to Attachment B, Figure I.B-1 for an overview map of the Project APE.

I.1.3.1 Marine Portion of the APE

The marine portion of the APE (hereafter referred to as the *marine APE*) for the Project is the depth and breadth of the seabed potentially impacted by any bottom-disturbing activities and temporary or permanent offshore construction or staging areas. It includes a conservative PDE that can accommodate a number of potential designs, whether piled or suction bucket foundations are used and installed by jack-up vessels as well as necessary support vessels and barges. The marine APE (Figure I.B-2) encompasses activities in the Lease Area (Figure I.B-3), Falmouth offshore ECC (Figure I.B-4), and Brayton Point offshore ECC (Figure I.B-5). The defined vertical extent of the marine APE, as discussed below, varies based on the type of Offshore Project component and accounts for the maximum vertical burial depth and seabed disturbance identified for each of those Project components and their installation.

The Lease Area encompasses 127,388 acres (51,552 hectares) with water depths ranging from 121.7 feet (37.1 meters) to 208.3 feet (63.5 meters) in relation to mean lower low water (MLLW) (COP Volume 1, Section 1.2; SouthCoast Wind 2024). In the Lease Area, SouthCoast Wind proposes up to 149 positions to be occupied by WTGs and OSPs. WTGs and OSPs would be connected via interarray cables in the Lease Area.

The marine APE also includes offshore portions of the two proposed ECCs: Brayton Point and Falmouth ECCs (COP Volume 1, Section 3.3.5 and Table 3-14; SouthCoast Wind 2024). Within the maximum 124-

mile (200-kilometer) long preferred Brayton Point ECC, up to six submarine offshore export cables would be installed from one or more OSPs in the Lease Area on the OCS, and run through the Sakonnet River, make intermediate landfall on Aquidneck Island in Portsmouth, Rhode Island, which includes an underground onshore export cable route, and then into Mount Hope Bay, to make landfall at Brayton Point in Somerset, Massachusetts. Within the maximum 87.0-mile (140.0-kilometer) long variant Falmouth ECC, if it is used, up to five submarine offshore export cables would be installed from one or more OSPs in the Lease Area on the OCS and would run through Muskeget Channel into Nantucket Sound in Massachusetts state waters, to make landfall in Falmouth, Massachusetts. SouthCoast Wind intends to maintain an ECC width of between 2,625 feet to 3,280 feet (800 meters to 1,000 meters) for the Falmouth ECC and between 1,640 feet to 2,300 feet (500 meters to 700 meters) for the Brayton Point ECC to allow for maneuverability during installation and maintenance. The offshore ECCs may be locally narrower or wider to accommodate sensitive locations and to provide sufficient area at landfall locations, at crossing locations, or for anchoring (COP Volume 1, Section 3.3.5.2; SouthCoast Wind 2024).

SouthCoast Wind would use horizontal directional drilling (HDD) for the sea-to-shore transition of export cables between the ocean and the land. Two potential sea-to-shore transition (landfall) locations at Brayton Point in Somerset, Massachusetts, four potential locations on Aquidneck Island in Portsmouth, Rhode Island, and three potential sea-to-shore transition (landfall) locations in Falmouth, Massachusetts are under consideration. The submerged areas of these activities are included in the marine APE; the landfall locations and related HDD activities located onshore are included in the terrestrial APE (discussed in section that follows).

The approximate maximum horizontal area and vertical depth of seabed disturbance associated with the construction or installation each of these aforementioned Offshore Project components and composing the marine APE are provided in Table I-1.

Table I-1. Approximate maximum horizontal and vertical extents of seabed disturbance for construction of Offshore Project components composing the marine APE

<table>
<tr><th rowspan="2">Project Component</th><th colspan="2">Seabed Disturbance</th></tr>
<tr><th>Maximum Horizontal Area</th><th>Maximum Vertical Depth</th></tr>
<tr><td>Per WTG foundation</td><td>22.2 ac (9.0 ha);
984 ft x 984 ft (300 m x 300 m)</td><td>262 ft (80 m)</td></tr>
<tr><td>Per OSP foundation</td><td>22.2 ac (9.0 ha);
984 ft x 984 ft (300 m x 300 m)</td><td>262 ft (80 m)</td></tr>
<tr><td>Interarray cables</td><td>35,180.6 ac (14,237.1 ha);
497.1 mi (800 km) x 591 ft (180 m)</td><td>9.8 ft (3 m)</td></tr>
<tr><td>Brayton Point offshore ECC (Preferred)</td><td rowspan="3">Up to 2,300 ft (700 m) centered on the cables along their entire length</td><td>16.4 ft (5.0 m)</td></tr>
<tr><td>Brayton Point HDD</td><td>98 ft (30 m)</td></tr>
<tr><td>Aquidneck Island HDD</td><td>98 ft (30 m)</td></tr>
</table>

Project Component	Seabed Disturbance	
	Maximum Horizontal Area	Maximum Vertical Depth
Falmouth offshore ECC (Variant)	2,624-3,280 ft (800-1,000 m) centered on the cables along their entire length	16.4 ft (5.0 m)
Falmouth HDD		98 ft (30 m)

Notes: Cable corridors may be locally wider in specific areas to allow for micro-routing and hazard avoidance. Cables may be micro-routed within the defined and surveyed horizontal marine APE extent.
Source: COP Volume 2, Table 7-1 and Appendix II-Q1, Tables II-1 and II-2; SouthCoast Wind 2024.
ac = acres; ft = feet; ha = hectares; m = meters.

I.1.3.2 Terrestrial Portion of the APE

The terrestrial portion of the APE (hereafter referred to as the *terrestrial APE*) includes the depth and breadth of terrestrial areas potentially impacted by any ground-disturbing activities and temporary or permanent onshore construction or staging areas. The APE is presented as part of a conservative PDE and includes the export cable landfall sites, onshore export cable routes and associated installation areas, onshore HDD areas, onshore substation, and converter stations. Figure I.B-6 depicts the terrestrial APE for onshore cable and landfall site options in Falmouth, Massachusetts. Figure I.B-7 depicts the terrestrial APE for onshore cable and landfall site options in Aquidneck Island in Portsmouth, Rhode Island and Somerset, Massachusetts. Figure I.B-8 depicts the terrestrial APE for onshore cable and landfall site options in Brayton Point in Somerset, Massachusetts. The defined vertical extents of the terrestrial APE, as discussed below, vary based on the type of Onshore Project component and account for the maximum burial depth and vertical ground disturbance identified for each of those Project components and their installation.

The terrestrial APE includes the sea-to-shore transition landfall sites. Two potential sea-to-shore transition locations at Brayton Point in Somerset, Massachusetts, four potential locations on Aquidneck Island in Portsmouth, Rhode Island, and two potential locations in Falmouth, Massachusetts are under consideration (COP Volume 1, Section 3.3.6; SouthCoast Wind 2024). The landfall locations at Brayton Point in Somerset, Massachusetts include the western landfall location from the Lee River and the eastern landfall location from the Taunton River. Additionally, the Brayton Point offshore export cables would make intermediate landfall on Aquidneck Island in Portsmouth, Rhode Island. This landfall would require HDDs at two locations: one entering and one exiting Aquidneck Island. One landfall location is under consideration for entering Aquidneck Island; three route options, one of which has two sub-options, are under consideration for exiting Aquidneck Island. The landfall locations in Falmouth, Massachusetts include Worcester Avenue, Central Park, and Shore Street. At all potential landfall locations, including those on Aquidneck Island, SouthCoast Wind would use HDD to transition between ocean and land (COP Volume 1, Section 3.3.6; SouthCoast Wind 2024).

From the landfall site options, the underground onshore export cables would be routed to the new onshore substation or converter stations, depending on the landfall location (COP Volume 1, Sections 3.3.6 and 3.3.7; SouthCoast Wind 2024). The onshore export cables would be installed in existing roadways, where feasible. As the preferred ECC for Projects 1 and 2, one of two Brayton Point onshore export cable routes from the landfall site options would be used based on landfall site selection. If the

Brayton Point ECC cannot be used for Project 2, one of three Falmouth onshore export cable routes from the landfall site options would be used based on landfall site selection. For the preferred Brayton Point onshore export cable route options, the maximum length would be 3,940 feet (1,200 meters; COP Volume 1, Table 3-18; SouthCoast Wind 2024). Additionally, an intermediate landfall would occur on Aquidneck Island in Portsmouth, Rhode Island, including a 3-mile (4.8-kilometer) underground onshore export cable route, as part of the Brayton Point export cable route. For the variant Falmouth onshore export cable route options, the minimum length would be 1.9 miles (3.0 kilometers) and maximum length would be 6.4 miles (10.3 kilometers) (COP Volume 1, Table 3-18; SouthCoast Wind 2024). The maximum width of the trench excavation for cable installation is anticipated to be approximately 11.0 feet (3.3 meters) per trench (COP Volume 1, Section 3.3.7.1; SouthCoast Wind 2024). In areas where trench boxes cannot be used, the maximum width of disturbance would be 35.0 feet (10.7 meters) per trench

The onshore cables would connect to the proposed onshore substation and converter stations. SouthCoast Wind would commission the development of up to two new HVDC converter stations to convert the Project's HVDC power for interconnection with the Brayton Point POI. The converter stations would be constructed at the site of the former Brayton Point Power Station. If the variant Falmouth ECC is used for Project 2, SouthCoast Wind would commission the development of one new onshore substation to transform the underground export cable transmission circuit for interconnection with the Falmouth POI (COP Volume 1, Section 3.3.8; SouthCoast Wind 2024). There are two onshore substation locations under consideration for the variant Falmouth ECC, including the Lawrence Lynch site at 396 Gifford Street (Option A) and Cape Cod Aggregates site at 469 Thomas Landers Road (Option B).

Since a final determination for the location(s) of the O&M facility has not yet been made, the terrestrial and visual APE for the O&M facility will be defined using a process of phased identification and evaluation, in consultation with BOEM and the State Historic Preservation Officer (SHPO), as defined in 36 CFR 800.4(b)(2).

The approximate maximum horizontal area and vertical depth of ground disturbance associated with constructing or installing each of the aforementioned Onshore Project components and composing the terrestrial APE are provided in Table I-2.

Table I-2. Approximate maximum horizontal and vertical extents of ground disturbance for construction of Onshore Project components composing the terrestrial APE

Project Component		Ground Disturbance (per Project Component)	
		Maximum Horizontal Area	Maximum Vertical Depth
Brayton Point (Preferred)	Export cable landfall	1.2 ac (0.49 ha)	90 ft (27 m)
	Onshore export cable installation area	2.2 ac (0.89 ha)	25 ft (7.6 m)
	Converter stations	10 ac (4.0 ha)	60 ft (18.3 m)
	Underground transmission route	2.2 ac (0.89 ha)	25 ft (7.6 m)

Project Component		Ground Disturbance (per Project Component)	
		Maximum Horizontal Area	Maximum Vertical Depth
Aquidneck (Preferred)	Export cable landfall	1.6 ac (0.65 ha)	90 ft (27 m)
	Onshore export cable route	8.5 ac (3.4 ha)	25 ft (7.6 m)
	Export cable route departure (HDD)	1.8 ac (0.73 ha)	90 ft (27 m)
Falmouth (Variant)	Export cable landfall	2.5 ac (1.0 ha)	90 ft (27 m)
	Onshore export cable installation area	36.2 ac (14.6 ha)	25 ft (7.6 m)
	Onshore substation	31 ac (12.5 ha)	60 ft (18.3 m)
	Underground transmission route	9.0 ac (3.6 ha)	25 ft (7.6 m)

Source: COP Volume 2, Table 7-3; SouthCoast Wind 2024.
ac = acres; ft = feet; ha = hectares; HDD = horizontal directional drilling; m = meters.

I.1.3.3 Visual Portion of the APE

The visual portion of the APE (hereafter referred to as the visual APE) includes the viewshed from which renewable energy structures—whether offshore or onshore—would be visible.

Development of the visual APE for Offshore Project components begins with a boundary of 43 miles radial distance from the Lease Area, which is the approximate maximum theoretical distance—a distance that does not factor in certain environmental factors such as weather or environmental conditions—at which the WTGs could be visible (COP, Appendix S; SouthCoast Wind 2024). Geographic information system analysis and subsequent field investigation delineated the visual APE for Offshore Project components methodically through a series of steps, beginning with the maximum theoretical distance WTGs could be visible. This was determined by first considering the visibility of a WTG from the water level to the tip of an upright rotor blade at a height of 1,066.3 feet (325 meters). The analysis then accounted for how distance and Earth curvature impede visibility as the distance increases between the viewer and WTGs (i.e., by a 43-mile distance, even blade tips would be below the sea level horizon line). The mapping effort then removed all areas with obstructed views toward WTGs, such as those views impeded by intervening topography, vegetation, and structures. Areas with unobstructed views of Offshore Project components then constituted the APE. Based on this analysis, the visual APE for Offshore Project components is defined as portions of the Preliminary APE, which includes all areas with views of the Offshore Project components located within 1 mile (1.6 kilometers) of the southern shorelines of Martha’s Vineyard and Nantucket (COP, Appendix S; SouthCoast Wind 2024). Figures I.B-9 through I.B-11 show the visual APE for Offshore Project components. Development of the visual APE for Onshore Project components followed a similar process. The Preliminary visual APE for the Brayton Point Onshore Project area (preferred) was developed based on the maximum height of the onshore structures, including temporary and permanent construction and staging areas, and was refined based on areas of potential visibility through viewshed modeling. Views were verified through field visits in sensitive viewpoints identified in the resultant viewshed, which was determined to be a 0.5-mile (0.8-kilometer) radius around the converter stations siting area (Figure I.B-14; COP, Appendix S.1; SouthCoast Wind 2024). Similarly, a preliminary viewshed was established for the onshore substation locations under consideration in the Falmouth Onshore Project area (variant option), including Lawrence Lynch

(Figure I.B-12) and Cape Cod Aggregates substation (Figure I.B-13), based on the maximum height of the onshore structures, and was refined based on areas of potential visibility. The resultant visual APE reflects the maximum visibility of the substation structures, which considers screening associated with intervening topography, vegetation, and structures. The Preliminary APE for each onshore substation in the Falmouth Onshore Project area is based on actual field verified visibility and is limited to an area extending 0.1 mile (0.16 kilometer) from the substation boundary (COP, Appendix S; SouthCoast Wind 2024). Onshore export cables and transmission routes are anticipated to have only temporary visual effects on aboveground historic properties and TCPs during the construction phase (COP Volume 2, Section 7.3; SouthCoast Wind 2024); therefore, these areas are not included in the visual APE for Onshore Project components. Figures I.B-12 through I.B-14 show the visual APE for Onshore Project components.

BOEM released a technical memorandum delineating the APE on February 2, 2023, and updated June 5, 2024, concurring with the scope and boundaries of the Project APE as defined in the SouthCoast Wind technical reports.

I.2 Steps Taken to Identify Historic Properties

I.2.1 Technical Studies and Reports

To support the identification of historic properties in the APE, SouthCoast Wind has provided technical reports detailing the results of cultural resource investigations in the marine, terrestrial, and visual portions of the APE. Table I-3 provides a summary of these efforts to identify historic properties and the results and key findings of each investigation. Collectively, BOEM finds that these reports represent a good-faith effort to identify historic properties in portions of the Project APE that are not subject to the phased identification process. The documents summarized in Table I-3 have been shared with consulting parties and are hereby incorporated by reference.

BOEM has reviewed the reports summarized in Table I-3, found them sufficient, and reached the following conclusions:

- BOEM has reviewed the Marine Archaeological Resources Assessment (MARA) Report and has determined that the data are sufficient for identifying historic properties in the marine APE.
- BOEM has reviewed the Terrestrial Archaeological Resources Assessment (TARA) Reports and Phased Identification Plan (PIP) and determined that the completed and planned investigations summarized in the documents will be sufficient for identifying historic properties in the terrestrial APE. Efforts conducted for the TARA thus far are sufficient for determining effects on some identified historic properties, but given logistical limitations, not all of the terrestrial APE has been fully investigated. SouthCoast Wind will be using phased identification of historic properties, as defined in 36 CFR 800.4(b)(2), for completion of archaeological investigations in the terrestrial APE, a process specifically provided for in the MOA that will be issued pursuant to 36 CFR 800.8(c)(4)(i)(B). Refer to Section I.5, *Phased Identification and Evaluation,* for additional details on the phased process, and Attachment A for a draft of the MOA as of September 30, 2024.

- BOEM has reviewed the Analysis of Visual Effects to Historic Properties (AVEHP) Reports and determined the studies and reports are sufficient for identifying and assessing effects on historic properties in the visual APE. BOEM finds that the APE for potential visual effects analyzed is appropriate for the scale and scope of the undertaking.

In addition to these conclusions, BOEM has found that the assessment of effects on historic properties in the marine, terrestrial, and visual APEs contained in these reports is sufficient to apply the criteria of adverse effects and continue consultations with consulting parties for resolving adverse effects on historic properties.

Consequent to the reports prepared for the COP submittal, ICF prepared for BOEM a technical report to support BOEM's cumulative effects analysis, the *Cumulative Historic Resources Visual Effects Analysis for SouthCoast Wind Energy Project* (BOEM 2023). The Cumulative Historic Resources Visual Effects Assessment (CHRVEA) presents the analysis of cumulative visual effects where BOEM, in review of the AVEHP (COP, Appendix S; SouthCoast Wind 2024), has determined that Offshore Project components would cause adverse visual effects on historic properties (BOEM 2023). The effects of other reasonably foreseeable wind energy development activities are additive to those adverse effects from the Project, resulting in cumulative effects. Three aboveground historic properties in the viewshed of WTGs for the Project and other reasonably foreseeable offshore wind energy development activities would be adversely affected by cumulative visual effects: the Chappaquiddick Island TCP, Nantucket Historic District NHL, and Nantucket Sound TCP.

Table I-3. Summary of cultural resources investigations performed by SouthCoast Wind in the Project APE

Portion of APE	Report	Description	Key Findings/ Recommendations
Marine	*Marine Archaeological Resources Assessment for the SouthCoast Wind Project Located in Massachusetts and Rhode Island State Waters and OCS Block OCS-A 0521 Offshore Massachusetts* (COP, Appendix Q; SouthCoast Wind 2024)	Marine Archaeological Resources Assessment. Prepared by RCG&A. Assessment of HRG survey data collected during multiple non-intrusive survey campaigns conducted by marine survey contractors and geotechnical investigations in the marine APE representing the extent of anticipated seabed impacts associated with the Project.	RCG&A identified 50 potential marine archaeological resources: five in the Lease Area, 16 in the Falmouth ECC, 25 in the Brayton Point ECC, and four outside the marine APE but included in the report. Upon review of the HRG survey data, 32 of the 46 targets in the marine Preliminary APE (PAPE) have been recommended for avoidance due to their potential cultural significance. The remaining 14 targets were determined to not be culturally significant; therefore, avoidance of these targets was not recommended. RCG&A also identified nine ASLFs in the marine PAPE and seven outside the marine PAPE. All ASLFs in the marine APE have been recommended for avoidance with an avoidance buffer derived from a review of seismic profiles and informed by the ground model to ensure that it covers the extent of the potentially preserved features. The Nantucket Sound TCP was also identified in the marine APE.
Terrestrial	*Archaeological Reconnaissance Survey of SouthCoast Wind Project, Falmouth, Barnstable County, Massachusetts* (COP, Appendix R; SouthCoast Wind 2024)	Terrestrial Archaeological Resources Assessment: Falmouth Phase IA Report. Prepared by AECOM. Background research of known cultural resources, development of archaeological sensitivity model, and reconnaissance-level field assessment of existing field conditions in the Falmouth, Barnstable County, MA portion of the terrestrial APE.	AECOM conducted a reconnaissance study for Onshore Project components in Falmouth, Barnstable County, MA. The survey area included roughly 10.0 mi (16.1 km) of linear routes along with an additional 64 ac (25.9 ha) in larger areas at proposed sea-to-shore transition and facility sites. The reconnaissance survey includes a contextualizing review of existing documentation. Based on that review, an archaeological sensitivity model was developed, identifying much of the survey area to be archaeologically sensitive due to the desirable environmental features that have made the area a place of human habitation for millennia. Lastly, a field assessment was conducted to document existing conditions and provide further nuance to the overall sensitivity. The entire survey area was surveyed, which included 13 soil profiles sampled using a 1-3/8-in diameter split-spoon hand

Portion of APE	Report	Description	Key Findings/ Recommendations
			auger. Additionally, geotechnical borings were assessed for potential buried landscapes at two of the landfall locations.
Terrestrial	Intensive (Locational) Archaeological Survey and Archaeological Construction Monitoring Plan (COP, Appendix R; SouthCoast Wind 2024)	Terrestrial Archaeological Resources Assessment: Falmouth Phase 1B Work Plan. Prepared by AECOM. Work and archaeological construction monitoring plan for AECOM to conduct archaeological field investigation in Falmouth, Barnstable County, MA on behalf of SouthCoast Wind.	No substantive findings or recommendations beyond those presented in *Archaeological Reconnaissance Survey of SouthCoast Wind Project, Falmouth, Barnstable County, Massachusetts* (COP, Appendix R; SouthCoast Wind 2022). Contains work and archaeological construction monitoring plan to conduct archaeological field investigation in Falmouth, Barnstable County, MA.
Terrestrial	*Terrestrial Archaeological Resources Assessment, SouthCoast Wind Offshore Wind Project: Brayton Point HVDC Converter Station Onshore Facilities and Underground Cable Route* (COP, Appendix R; SouthCoast Wind 2024)	Terrestrial Archaeological Resources Assessment: Brayton Point Phase 1A Report. Prepared by PAL. Background research of known cultural resources, previous and current land use, and assessment of archaeological sensitivity in the Somerset, Bristol County, MA portion of the terrestrial APE.	PAL conducted a field assessment for the proposed Brayton Point HVDC converter station onshore component of the Project in Somerset, Bristol County, MA. Historical maps and aerial imagery document substantial development in the Project area since the mid-20th century that includes canal excavation and infilling, power generation facilities improvements and demolition, and environmental management (landfill burial) of waste coal ash. Although pre- and post-Contact archaeological resources have been recorded on Brayton Point and the adjacent area, significant disturbance from previous construction has occurred. Installation of the Brayton Point HVDC converter station, underground cable system, and HDD sites are unlikely to affect any historic properties potentially eligible for listing in the State or NRHP, and no further archaeological investigation was recommended.
Terrestrial	*Terrestrial Archaeological Resources Assessment, SouthCoast Wind Project, Aquidneck Island (Portsmouth) Landfall* (COP, Appendix R; SouthCoast Wind 2024)	Terrestrial Archaeological Resources Assessment: Aquidneck Phase 1A/1B Report. Prepared by PAL. Background research of known cultural resources, previous and current land use, assessment of archaeological sensitivity, and Phase IB subsurface archaeological survey in the Portsmouth, Newport County, RI portion of the terrestrial APE.	Two terrestrial archaeological resources were newly identified in Phase IB survey. Both resources were recommended as potentially eligible for the NRHP under Criteria A and D and for avoidance and/or construction monitoring by the Project. Phase IB survey of Route Segment F and Mount Hope Bridge HDD Option 4 was recommended if Segment F is selected as the preferred duct bank alternate. Archaeological monitoring of HDD Options 1 and 3 was recommended to document any pre- or post-Contact

Portion of APE	Report	Description	Key Findings/ Recommendations
			archaeological features or deposits that may be encountered during boring for the HDDs. No archaeological testing was conducted along Boyds Lane north of Anthony Road; therefore, the presence of archaeological resources along Route Segment F and Mount Hope Bridge HDD Option 4 are unknown.
Visual	*Analysis of Visual Effects to Historic Properties* (COP, Appendix S; SouthCoast Wind 2024)	Historic Resource Visual Effects Assessment. Prepared by AECOM. Background research of known aboveground historic properties and TCPs in the visual APE for offshore and Onshore Project components in Falmouth, MA.	This report analyzed the effects of the Project on historic aboveground resources in the visual PAPE. The report determined that there were 11 historic aboveground resources, historic properties, and historic districts and three TCPs in the visual PAPE for Offshore Project components. The report also determined that there are two historic aboveground resources and historic properties for Onshore Project components in Falmouth, MA. The report recommended that two historic properties would experience an adverse effect as a result of the project: the Nantucket Historic District NHL and the Oak Grove Cemetery in Falmouth, MA.
Visual	*Analysis of Visual Effect to Historic Properties—Brayton Point* (COP, Appendix S.1; SouthCoast Wind 2024)	Historic Resource Visual Effects Assessment. Prepared by Tetra Tech. Visual effects analysis of aboveground historic properties (including known properties and a desktop analysis of potentially eligible properties) in the visual APE for Onshore Project components at Brayton Point in Somerset, MA.	This report analyzed the effects of the Project on historic aboveground resources in the visual PAPE for Onshore Project components at Brayton Point in Somerset, MA. A total of 11 previously identified historic aboveground resources, historic properties, and historic districts identified in this portion of the visual PAPE have potential views of the Onshore Project components. The report concluded that the Project would result in no adverse effect on all 11 properties.

HRG = high-resolution geophysical; PAPE = preliminary area of potential effects

I.2.2 Consultation and Coordination with the Parties and Public

I.2.2.1 Early Coordination

Since 2009, BOEM has coordinated OCS renewable energy activities offshore Massachusetts and Rhode Island with its federal, state, local, and Tribal government partners through its Intergovernmental Renewable Energy Task Force. In January 2019, Governor Christopher Sununu of the State of New Hampshire requested the establishment of an intergovernmental offshore wind renewable energy Task Force for the state. Given the regional nature of offshore wind energy development, BOEM has decided to establish a Gulf of Maine Task Force—including representation from New Hampshire, Massachusetts, Maine, and federally recognized Native American Tribes in the area. BOEM has met regularly with federally recognized Tribes that may be affected by renewable energy activities in the area, 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 Intergovernmental Renewable Energy Task Force meetings is available at https://www.boem.gov/renewable-energy/state-activities/renewable-energy-task-force-meetings. Information pertaining to BOEM's stakeholder engagement efforts in Massachusetts is available at https://www.boem.gov/renewable-energy/state-activities/massachusetts-activities. Information pertaining to BOEM's stakeholder engagement efforts in Rhode Island is available at https://www.boem.gov/renewable-energy/state-activities/rhode-island-activities. Information pertaining to the Gulf of Maine Task Force is available at: https://www.boem.gov/Gulf-of-Maine.

I.2.2.2 NEPA Scoping and Public Hearing

On November 1, 2021, BOEM announced its Notice of Intent (NOI) to prepare an EIS for the COP. The NOI commenced the public scoping process to identify issues and potential alternatives for consideration in the EIS. Throughout the scoping process, federal agencies; state, Tribal, and local governments; and the general public had the opportunity to help BOEM determine significant resources and issues, impact-producing factors, reasonable alternatives, and potential mitigation measures to be analyzed in the EIS, as well as provide additional information. BOEM also used the NEPA commenting process to allow for public involvement in the NHPA Section 106 consultation process (54 USC 300101 et seq.), as permitted by 36 CFR 800.2(d)(3). Through this notice, BOEM announced its intention to inform its NHPA Section 106 consultation using the NEPA commenting process and invited public comment and input regarding the identification of historic properties or potential effects on historic properties from activities associated with approval of the COP.

Additionally, BOEM held virtual public scoping meetings, which included specific opportunities for engaging on issues relative to NHPA Section 106 for the COP, on November 10, 15, and 18, 2021. Virtual public scoping meeting materials and records are available at https://www.boem.gov/renewable-energy/state-activities/southcoast-wind-virtual-meeting-room.

Through this NEPA scoping process, BOEM received comments related to cultural, historic, archaeological, or Tribal resources. These are presented in BOEM's EIS Scoping Report and are summarized as follows:

- Commenters asked that BOEM ensure compliance with Sections 106 and 110(f) of the NHPA as well as NEPA, including ensuring adequate consultation with consulting parties, SHPOs, Tribal Nations, National Historic Lighthouse and National Historic Lighthouse Preservation Act Lighthouse owners, and other stakeholders throughout the EIS process. Commenters also emphasized that BOEM must consider a wide range of potential effects on historic and cultural resources to ensure compliance with these laws, including visual impacts on NHLs.
- Commenters stated that BOEM should recognize Tribal Nations' sovereign status and provide adequate government-to-government consultation with Tribal governments throughout the EIS process.
- Commenters noted that the proposed Project would have an adverse visual impact on Nantucket's historic properties and cultural heritage, including the Nantucket Historic District, and requested that BOEM select an alternative that preserves the historic integrity of historic properties in Nantucket. Commenters also asked that BOEM consult with the Nantucket Historic District Commission, as well as Nantucket's historic and cultural review boards and stakeholders during any historic or archaeological review.
- Commenters felt that the VIA was not adequate and expressed concern over viewshed or visual impacts on historic properties from the proposed Project including impacts on Nantucket. Commenters requested that additional visual assessments be conducted including during different lighting and atmospheric conditions to accurately assess adverse impacts and to develop appropriate avoidance, minimization, and mitigation (AMM) measures. Other commenters asked for clarification regarding aspects of the VIA including the heights of the key observation points.
- Commenters identified specific historic properties to be identified in the APE for the cultural resources analysis including Nantucket Historic District NHL, Gay Head Light, Muskeget Island National Natural Landmark (NNL), Gay Head Cliff NNL. They also noted that all NHLs, National Historic Lighthouse Preservation Act Lighthouses, and NNLs should be identified on relevant Project maps.
- Commenters asked for Tribal Nations to be included in the development of the Marine Archaeological Resources Assessment and the Terrestrial Resources Assessment, as well as an Unanticipated (Post-Review) Discovery Plan and that the EIS provide an overview of BOEM and proponent engagement with Tribal Nations and a discussion of issues important to Tribal Nations.

On February 17, 2023, BOEM issued a Notice of Availability of the Draft EIS, initiating a 45-day public comment period from February 17 to April 3, 2023 (88 *Federal Register* 10377). BOEM held three virtual public hearings on March 20, March 22, and March 27, 2023. On April 4, 2023, BOEM announced a 15-day extension to the comment period, which concluded on April 18, 2023 (88 *Federal Register* 19986). Public comments were received through Regulations.gov on docket number BOEM-2023-0011, via email and through oral testimony at each of the three public hearings. BOEM received a total of 182 comment submissions from federal and state agencies, Tribal governments, local governments, non-governmental organizations, and the general public during the comment period. BOEM assessed and considered all the comments received in preparation of the Final EIS.

I.2.2.3 NHPA Section 106 Consultations

On September 29, 2021, BOEM contacted the Advisory Council on Historic Preservation (ACHP), MHC, and RIHPHC to provide Project information and notify these agencies of BOEM's intention to use the NEPA substitution process to fulfill Section 106 obligations under 36 CFR 800.8(c) in lieu of the procedures set forth in 36 CFR 800.3 through 800.6.

On September 29, 2021, BOEM contacted the Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, The Delaware Nation, The Narragansett Indian Tribe, The Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah) with information about the Project, and an invitation to be a consulting party to the NHPA Section 106 review of the COP. BOEM also used this correspondence to notify of its intention to use the NEPA substitution process for Section 106 purposes, as described in 36 CFR 800.8(c), during its review. The following five Tribal Nations notified BOEM of their interest in participating as a consulting party: the Mashantucket (Western) Pequot Tribal Nation on October 19, 2021; Mashpee Wampanoag Tribe on October 6, 2021; The Narragansett Indian Tribe on November 1, 2021; The Shinnecock Indian Nation on February 4, 2022; and Wampanoag Tribe of Gay Head (Aquinnah) on November 1, 2021. The Delaware Tribe of Indians and Mohegan Tribe of Connecticut did not respond to BOEM's initiation of consultation; however, BOEM has included these Tribal Nations in all consulting party communications and considers them consulting parties. One Tribe, The Delaware Nation, declined the invitation to be a consulting party on October 13, 2021. BOEM requested information from Tribal consulting parties on sites of religious and cultural significance to the Tribal Nations that the proposed Project could affect, and BOEM offered its assistance in providing additional details and information on the proposed Project to the Tribal Nations.

From September 29 to October 7, 2021, BOEM corresponded with 88 points of contact from local, state, and federal government agencies and agencies and organizations due to the nature of their legal or economic relation to the undertaking or affected properties by mail and email, including information about the Project and an invitation to be a consulting party to the NHPA Section 106 review of the COP. BOEM also used this correspondence to notify of its intention to use the NEPA substitution process for Section 106 purposes, as described in 36 CFR 800.8(c), during its review. To aid those consulting parties not familiar with the NEPA substitution process, BOEM developed a *National Environmental Policy Act (NEPA) Substitution for Section 106 Consulting Party Guide* (available at https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/NEPA-Substitution-Consulting-Party-Guide.pdf), which it attached to the correspondence.

On October 8, 2021, BOEM sent a Memorandum of Understanding (MOU) to the Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, The Delaware Nation, The Narragansett Indian Tribe, The Shinnecock Indian Nation, and

Wampanoag Tribe of Gay Head (Aquinnah) to establish a cooperating Tribal government relationship with the purpose of preparing an EIS.

From October 13 to November 2, 2021, BOEM conducted outreach by phone to confirm receipt of correspondence among the governments and organizations that had not responded to the invitation to consult.

On October 26, 2021, BOEM corresponded with an additional six points of contact from governments and organizations by mail and email, to invite them to be consulting parties to the NHPA Section 106 review of the COP and provide the aforementioned NEPA substitution and Section 106 materials. On November 2, 2021, BOEM conducted outreach by phone to confirm receipt of correspondence among the additional points of contact from governments and organizations.

On November 1, 2021, BOEM contacted ACHP, MHC (the Massachusetts SHPO), the Rhode Island Historical Preservation & Heritage Commission (RIHPHC; the Rhode Island SHPO), and points of contact from consulting party governments and organizations by mail and email to notify all parties of the issuance the NOI to prepare an EIS consistent with NEPA regulations to assess the potential impacts of the Proposed Action and alternatives.

On November 2, 2021, BOEM contacted the Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, The Narragansett Indian Tribe, The Delaware Nation, The Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah) by mail and email to notify the Tribal Nations of the issuance the NOI to prepare an EIS consistent with NEPA regulations to assess the potential impacts of the Proposed Action and alternatives.

On November 2, 2021, BOEM invited the Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, The Delaware Nation, The Narragansett Indian Tribe, The Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah) to participate in a government-to-government consultation meeting. The email outreach also notified the Tribal Nations that public scoping meeting recordings and materials could be accessed via the virtual meeting website. On November 5, 2021, BOEM distributed an email reminder to consulting parties regarding the opportunity to participate in virtual public scoping meetings on November 10, November 15, and November 18, 2021.

From November 2 to November 18, 2021, BOEM corresponded with Tribal Nations who responded to the government-to-government consultation meeting invitation to schedule the meeting during a day and time of mutual availability.

BOEM invited Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, The Delaware Nation, The Narragansett Indian Tribe, The Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah) to participate in a government-to-government consultation meeting on November 19, 2021.

On November 19, 2021, BOEM hosted a government-to-government consultation meeting with Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, and Wampanoag Tribe of Gay Head (Aquinnah). During the meeting, BOEM presented information about the NEPA/NHPA review process for offshore renewable energy projects, about the Project, and solicited input regarding reasonable alternatives for consideration in the EIS; the identification of historic properties or potential effects on historic properties from activities associated with the proposed Project; and potential measures to avoid, minimize, or mitigate impacts on environmental and cultural resources to be analyzed in the EIS.

On May 2, 2022, BOEM held a government-to-government meeting with the Chairwoman, Tribal Historic Preservation Officer (THPO), and Council members of the Wampanoag Tribe of Gay Head (Aquinnah). In the meeting, BOEM introduced and discussed the overall renewable energy program and process and summarized details and status of projects off the coast of New England. Topics identified for future discussion included cumulative visual simulations and resource impacts, the transmission process that is part of a lease, decommissioning process and oversight, proposed mitigation plans and agreements, and the Tribal capacity building initiatives.

On June 1, 2022, BOEM held a government-to-government meeting with the Chairwoman and Council members of the Wampanoag Tribe of Gay Head (Aquinnah). This meeting was a follow up to the May 2, 2022, meeting to continue the conversation on various topics and Tribal concerns related to offshore wind development off the New England coast collectively.

On June 2, 2022, the BOEM Director met in-person with the Mashpee Wampanoag Tribe to provide the Tribal Council with an overview of the current state of wind farm permitting off the coast of New England, including Gulf of Maine. Topics discussed during the meeting included the following: project and regional biological and economic concerns and potential mitigation strategies; cumulative visual impacts and simulations; and other programmatic topics, including transmission as part of a lease and capacity building initiatives.

From July 1 to July 8, 2022, BOEM corresponded with an additional three points of contact from governments and organizations by phone, mail, email, to invite them to be consulting parties to the NHPA Section 106 review of the COP and provide the aforementioned NEPA substitution and Section 106 materials.

On July 7, 2022, BOEM held virtual NHPA Section 106 Consultation Meeting #1. The presentation included a brief Project overview, review of NEPA substitution for the NHPA Section 106 process, overview of Section 106 consultation opportunities for the Project, NHPA Section 110(f) compliance requirements, and a question-and-answer session with discussion.

On September 1, 2022, BOEM held a government-to-government meeting with representatives from the Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, and Wampanoag Tribe of Gay Head (Aquinnah) to follow up on topics raised during NHPA Section 106 Consulting Meeting #1.

On February 2, 2023, BOEM shared with consulting parties drafts of the cultural resource technical reports prepared by SouthCoast Wind (Table I-3), the Cumulative Historic Resources Visual Effects Assessment (CHRVEA) (BOEM 2023), a technical memorandum detailing the delineation of the APE for the Project, this Finding of Adverse Effect, and the Draft MOA (Draft 1) for a 60-day comment period.

BOEM distributed a Notice of Availability to notify the consulting parties that the Draft EIS was available for public review and comment for a 45-day period commencing on February 17, 2023 (88 *Federal Register* 10377). BOEM held three virtual public hearings on March 20, March 22, and March 27, 2023. On April 3, 2023, BOEM notified consulting parties that the comment period for the Draft EIS and cultural resource technical reports and documents was extended to April 18, 2023. Public comments were received through Regulations.gov on docket number BOEM-2023-0011, via email and through oral testimony at each of the three public hearings. BOEM assessed and considered all the comments received and related to Section 106 consultation in preparation of the Final EIS.

On March 16, 2023, BOEM held virtual NHPA Section 106 Consultation Meeting #2. The presentation included a brief Project overview, an overview of BOEM's APE delineation, a review of the MARA, TARA, AVEHP, and CHRVEA reports, and a question-and-answer session with discussion.

On September 27, 2023, BOEM notified consulting parties that the Project required changes to the schedule for environmental review, which affected the Section 106 consultation schedule under NEPA substitution. BOEM informed consulting parties that project milestones on the Fast-41 permitting dashboard and the Section 106 consultation schedule would be updated when additional information is available about the project schedule.

On January 17, 2024, BOEM shared with consulting parties the revised cultural resource technical reports, Finding of Adverse Effect, and Draft MOA (Draft 2) for a 30-day comment period. At that time, BOEM also shared responses to NHPA Section 106 comments received on the Draft EIS and documents distributed to consulting parties on February 2, 2023.

On January 24, 2024, BOEM held virtual NHPA Section 106 Consultation Meeting #3. The presentation included an overview of Project updates, an overview of the revised technical reports, an overview of APE revisions, a summary of the revised Finding of Effect, and the Draft MOA (Draft 2), and solicited input on avoidance, minimization, mitigation, and monitoring measures to be stipulated in the MOA. The meeting also included a question-and-answer session with discussion.

On July 1, 2024, BOEM shared with consulting parties responses to comments received on documents distributed to consulting parties on January 17, 2024, and the revised cultural resource technical reports, Finding of Adverse Effect, and Draft MOA (Draft 3) for a 30-day comment period.

On July 15, 2024, BOEM held virtual NHPA Section 106 Consultation Meeting #4. The presentation included an overview of Project updates and its schedule, non-substantive revisions made to the cultural resource technical reports, the revised Finding of Adverse Effect, the Draft MOA (Draft 3), and a question-and-answer session with discussion.

On September 30, 2024, BOEM shared with consulting parties responses to comments received on documents distributed to consulting parties on July 1, 2024, and the revised Finding of Adverse Effect and Draft Final MOA (Draft 4) for a 30-day comment period.

On October 8, 2024, BOEM held virtual NHPA Section 106 Consultation Meeting #5. The presentation included an overview of Project updates and was held to consult on and finalize measures to avoid, minimize, and mitigate adverse effects on historic properties as stipulated in the MOA.

[Written in anticipation of Final MOA distribution and execution:] On November 19, 2024, BOEM distributed the Final MOA to signatories, Tribal Nations, and consulting parties for signature. Additional consultation meetings may be scheduled after publication of the Final EIS and prior to issuance of the ROD, if necessary, to resolve adverse effects via the MOA. Additional consultation will also occur for the process of phased identification and evaluation of historic properties to be completed in remaining unsurveyed portions of the terrestrial APE as stipulated in the MOA or if any alternatives that require phased identification are selected for the final Project design (Section I.5, *Phased Identification and Evaluation*). Simultaneous to the publication of the Final EIS, BOEM is coordinating with signatories to the MOA to have the MOA fully signed and executed by December 19, 2024 [anticipated]. The version of the MOA attached to this document as Attachment A is a draft of the MOA as of September 30, 2024 (Draft 4). The fully executed MOA will be posted on BOEM's website at https://www.boem.gov/renewable-energy/state-activities/southcoast-wind-formerly-mayflower-wind.

The list of Tribal Nations, governments, and organizations invited to participate as consulting parties is included in Attachment C. Entities that responded to BOEM's invitation or were subsequently made known to BOEM and added as consulting parties are listed in Attachment D.

I.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 if the following 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 NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association…Adverse Effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

According to regulation, 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 of the Interior'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 that 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.

I.3.1 Assessment of Effects on Historic Properties

This section documents the assessment of effects of the undertaking on historic properties in the marine, terrestrial, and visual APEs.

In addition to the assessment in the following subsections, Final EIS Chapter 3, Section 3.6.2, *Cultural Resources*, analyzes the impacts of the Proposed Action (the undertaking) on cultural resources identified in the APE. This analysis entails the assessment of the Proposed Action’s primary impact-producing factors (IPFs) determined relevant to cultural resources; these include accidental releases, anchoring, cable emplacement and maintenance, gear utilization, land disturbance, lighting, noise, and presence of structures. Unlike the other IPFs, accidental releases are considered a type of non-routine event, the occurrence of which is impossible to predict with certainty. Other non-routine events could include corrective maintenance activities; collisions involving vessels or vessels and marine life; allisions (a vessel striking a stationary object) involving vessels and WTGs or OSPs; cable displacement or damage by anchors or fishing gear; chemical spills or releases; severe weather and other natural events; fires; structural failures; and terrorist attacks. In the circumstance of an accidental release or other non-routine event that affects a historic property, BOEM would implement the process for responding to and consulting on an unanticipated effect as defined in the MOA stipulation for Post-Review Discoveries (Stipulation XI; refer to Section I.6, *Post-Review Discoveries and Unanticipated Effects*, for additional information). Refer to Attachment A for a draft of the MOA as of September 30, 2024.

BOEM has considered the primary IPFs for cultural resources in its assessment of the undertaking’s potential effects on historic properties as provided in the following subsections. Refer to Table I-4 for descriptions of these IPFs and summaries of BOEM’s conclusions as to how the Proposed Action’s IPFs may have impacts on cultural resources (refer to Final EIS, Section 3.6.2, *Cultural Resources*, for detailed analyses). BOEM has also considered the IPFs relevant to cultural resources in its assessment of the action alternatives identified during the NEPA review (i.e., Alternatives C, D, E, and F); refer to Section I.4.1, *Alternatives Considered*, for a summary of these alternatives and their potential effects on historic properties.

Table I-4. Primary IPFs and summary of impacts on cultural resources (from Final EIS, Chapter 3, Section 3.6.2, *Cultural Resources*)

IPF	Sources and Activities	Description	Impacts on Cultural Resources [a]
Accidental releases	• Mobile sources (e.g., vessels) • Installation, operation, and maintenance of onshore or offshore stationary sources (e.g., wind turbine generators, offshore substations, transmission lines, and interarray cables)	Refers to unanticipated releases or spills into receiving waters of a fluid or other substance, such as fuel, hazardous materials, suspended sediment, invasive species, trash, or debris. Accidental releases are distinct from routine discharges, consisting of authorized operational effluents, and they are restricted via treatment and monitoring systems and permit limitations.	Overall, localized, short term, and negligible to major depending on the number and scale of accidental releases. Although considered unlikely, large-scale accidental release and associated cleanup could result in temporary to permanent, geographically extensive, and large-scale major impacts.
Anchoring	• Anchoring of vessels • Attachment of a structure to the sea bottom by use of an anchor, mooring, or gravity-based weighted structure (i.e., bottom-founded structure)	Refers to seafloor disturbance (anything below Mean Higher High Water [MHHW]) related to any offshore construction or maintenance activities. Refers to an activity or action that disturbs or attaches objects to the seafloor.	Localized, permanent, and range from negligible to major impacts.
Cable emplacement and maintenance	• Dredging or trenching • Cable placement • Seabed profile alterations • Sediment deposition and burial • Cable protection of concrete mattress and rock placement	Refers to seafloor disturbances (anything below MHHW) related to the installation and maintenance of new offshore submarine cables. Cable placement methods include trenchless installation (such as HDD, direct pipe, and auger bore), jetting, vertical injection, control flow excavation, trenching, and plowing.	Localized, permanent, and range from negligible to major impacts.
Gear utilization	• Monitoring surveys	Refers to entanglement and bycatch during monitoring surveys.	Localized, permanent, and range from negligible to major impacts.
Land disturbance	• Vegetation clearance • Excavation • Grading • Placement of fill material	Refers to land disturbances during onshore construction activities.	Localized, range from short-term to permanent, and range from negligible to major impacts.

IPF	Sources and Activities	Description	Impacts on Cultural Resources [a]
Lighting	• Vessels or offshore structures above or under water • Onshore infrastructure	Refers to lighting associated with offshore wind development and activities that use offshore vessels, and that may produce light above the water onshore and offshore, as well as underwater. Refers to lighting associated with onshore Project infrastructure during construction and O&M, such as permanent lighting at O&M facilities.	Construction and decommissioning area lighting: localized, range from temporary to short-term, and negligible impacts. Operational lighting with use of ADLS: [b] negligible impacts.
Noise	• Aircraft • Vessels • Turbines • Geophysical (HRG surveys) and geotechnical surveys (drilling) • Construction equipment • Operations and maintenance • Onshore and offshore construction and installation • Vibratory and impact pile driving • Dredging and trenching • Unexploded ordnances (UXO) detonations	Refers to noise from various sources. Commonly associated with construction activities, geophysical and geotechnical surveys, and vessel traffic. May be impulsive (e.g., pile driving) or broad spectrum and continuous (e.g., from Project-associated marine transportation vessels and onshore substations). May also be noise generated from turbines themselves or interactions of the turbines with wind and waves.	Overall, negligible to moderate impacts.
Presence of structures	• Onshore structures including towers and transmission cable infrastructure • Offshore structures including WTGs, OSPs, and scour/cable protection	Refers to the post-construction, long-term presence of onshore or offshore structures.	Long-term, continuous, widespread, and moderate impacts.

[a] For the Proposed Action

[b] ADLS would be activated for less than 5 hours per year, or 0.1 percent of nighttime hours, compared to standard continuous Federal Aviation Administration hazard lighting (COP Appendix T, Section 5.1.3; SouthCoast Wind 2024).

Source: Final EIS, Chapter 3, Table 3.1-1, *Primary IPFs addressed in this analysis*, and Section 3.6.2, *Cultural Resources*.

I.3.1.1 Assessment of Effects on Historic Properties in the Marine APE

This section assesses effects on marine cultural resources (i.e., marine archaeological resources and ASLFs, including those affiliated with any TCPs) in the marine APE. Based on the information presented below, BOEM finds that historic properties would be adversely affected in the marine APE.

Marine Archaeological Resources

Marine geophysical archaeological surveys performed for the Proposed Action identified 50 magnetic anomalies, acoustic contacts, and buried reflectors representing potential marine archaeological resources (COP, Appendix Q; SouthCoast Wind 2024). Of this total, 46 resources are in the marine APE: five in the Lease Area, 16 in the Falmouth ECC, and 25 in the Brayton Point ECC. The remaining four other resources were identified outside the marine APE but reported for due diligence purposes; BOEM anticipates the Proposed Action will have no effect on these resources. Of the 46 resources in the marine APE, 32 resources were recommended to be historic properties potentially eligible for listing in the NRHP and are, therefore, considered for potential effects from the undertaking (Table I-4; COP, Appendix Q, SouthCoast Wind 2024). The remaining 14 marine archaeological resources likely relate to recent debris, industrial objects, and non-cultural geological features and therefore are not recommended to be historic properties; these are therefore not considered for potential effects from the Proposed Action. Table I-6lists the four resources outside of the marine APE and the 14 marine archaeological resources not recommended to be historic properties.

Table I-5. Potentially NRHP-eligible marine archaeological resources identified in the marine APE

Resource ID	Potential Source	Location	Location in Marine APE	Finding of Effect
Target 20-02	Unknown shipwreck	U.S. OCS	Lease Area	No effect (will be avoided)
Target 21-01	Unknown shipwreck	U.S. OCS	Lease Area	Adverse effect
Target 21-02	Unknown objects	U.S. OCS	Lease Area	No effect (will be avoided)
Target 21-03	Unknown shipwreck	U.S. OCS	Lease Area	No effect (will be avoided)
Target 20-03	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Potential NOAA 7840	Known shipwreck *Kershaw*	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-04	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-05	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-07	Known shipwreck NOAA 9820	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-08	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-09	Disarticulated debris	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-10	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-11	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)

Resource ID	Potential Source	Location	Location in Marine APE	Finding of Effect
Potential AWOIS 9821	Known shipwreck *Sagamore*	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-12	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-13	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 20-14	Unknown debris	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 21-04	Unknown object	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 21-05	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target 21-06	Unknown shipwreck	Massachusetts State	Falmouth ECC	No effect (will be avoided)
Target BP-03	Disarticulated debris	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-04	Unknown shipwreck	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-05	Unknown shipwreck	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-09	Unknown shipwreck	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-11	Unknown object	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-12	Known shipwreck NOAA 13323	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-13	Known shipwreck NOAA 13324	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-14	Known shipwreck NOAA 13322	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-18	Unknown object	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-19	Unknown debris	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-20	Unknown shipwreck	Rhode Island State	Brayton Point ECC	No effect (will be avoided)
Target BP-21 (Swn-Ha-20)	Known shipwreck *Offshore Berth Area Potential Shipwreck Target*	Massachusetts State	Brayton Point ECC	No effect (will be avoided)

Source: COP, Appendix Q; SouthCoast Wind 2024.
ID = identification

Table I-6. Marine archaeological resources identified in SouthCoast Wind's investigations that are no longer in the marine APE or are not considered historic properties

Resource ID	Potential Source	Location	Location in Marine APE	Finding of Effect
Target 20-01	Unknown shipwreck	U.S. OCS	Outside marine APE (near Lease Area)	No effect (outside APE)
N/A	Known shipwreck *Rebecca Mary*	U.S. OCS	Lease Area	Not applicable
Target 20-06	Unknown shipwreck	U.S. OCS	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
N/A	Known shipwreck *Darnoc*	Massachusetts State	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
Target BP-01	Unknown shipwreck	U.S. OCS	Brayton Point ECC	Not applicable
Target BP-02	Unknown shipwreck	U.S. OCS	Outside marine APE (near Brayton Point ECC)	No effect (outside APE)
Target BP-06	Unknown objects	Rhode Island State	Brayton Point ECC	Not applicable
Target BP-07	Unknown shipwreck	Rhode Island State	Brayton Point ECC	Not applicable
Target BP-08	Unknown shipwreck	Rhode Island State	Brayton Point ECC	Not applicable
Target BP-10	Unknown shipwreck	Rhode Island State	Brayton Point ECC	Not applicable
Target BP-15	Unknown shipwreck	Rhode Island State	Brayton Point ECC	Not applicable
Target BP-16	Unknown shipwreck or boulder	Rhode Island State	Brayton Point ECC	Not applicable
Target BP-17	Unknown lobster traps or debris	Rhode Island State	Brayton Point ECC	Not applicable
Target BP-22	Unknown shipwreck	Massachusetts State	Brayton Point ECC	Not applicable
Target BP-23	Unknown object	Massachusetts State	Brayton Point ECC	Not applicable
Target BP-24	Unknown shipwreck	Massachusetts State	Brayton Point ECC	Not applicable
Target BP-25	Unknown shipwreck	Massachusetts State	Brayton Point ECC	Not applicable
Target BP-26	Unknown shipwreck	Massachusetts State	Brayton Point ECC	Not applicable

Notes: Resources for which the finding of effect has been marked as "Not applicable" are those resources that have been recommended not eligible for listing in the NRHP.
Source: COP, Appendix Q; SouthCoast Wind 2024.
ID = identification

The severity of effects would depend on the extent to which integral or significant components of the affected marine archaeological resource are disturbed, damaged, or destroyed, resulting in the loss of contributing elements to the historic property's eligibility or potential eligibility for listing in the NRHP. Avoidance buffers for the marine archaeological resources that are historic properties in the marine APE are stipulated in the MOA as a result of consultations (Attachment A). The avoidance buffers for these historic properties were determined using several factors in a process developed by SouthCoast Wind's Qualified Marine Archaeologist (QMA). Those resources with a small visual footprint (i.e., <16.4 feet [<5 meters]) are to be protected by an avoidance buffer comprising a minimum 165-foot (50-meter) radius (84,539.54 ft^2 [7,853.98 $meters^2$]) extending from the target's centroid. Those with a larger visual footprint are to be protected by an avoidance buffer comprising a 164-foot (50-meter) buffer established off of all extant features, typically creating an ellipsoid or polygon-shaped avoidance area. Avoidance buffers recommended for each resource may contain contributing elements to the NRHP eligibility of the resources.

The SouthCoast Wind Project would avoid 31 of the 32 marine archaeological resources in the marine APE that are historic properties eligible for listing in the NRHP; therefore, the undertaking would have no effect on these resources. Measures to avoid the 31 marine archaeological resources, including specific avoidance buffers with which the Lessee is required to comply, are stipulated in the MOA. The SouthCoast Wind Project would not avoid the remaining marine archaeological resource (i.e., 21-01; Table I-5). As such, BOEM finds this marine archaeological resource would be subject to adverse effects from the undertaking. On September 27, 2024, the Lessee conducted a remotely operated vehicle (ROV) survey of marine archaeological resource 21-01. The ROV survey determined that marine archaeological resource 21-01 is in a high-energy, high-current environment and the historic property is currently buried just beneath the seafloor surface.

The MOA includes a stipulation requiring the Lessee to prepare a monitoring plan for marine archaeological resource 21-01 for the duration of the lease that will encompass construction, post-construction, and periodic inspections of the historic property. BOEM will use the procedures in MOA Stipulation VI (Review Process for Documents Produced Under MOA Stipulations) to consult with the signatories, Tribal Nations, and consulting parties on the monitoring plan. Refer to Table I-5 for BOEM's finding of effect for each marine archaeological resource in the marine APE and Attachment A for a draft of the MOA as of September 30, 2024.

Ancient Submerged Landform Features

ASLFs may be individually eligible for listing in the NRHP or considered contributing elements to a TCP eligible for listing in the NRHP. ASLFs in the marine APE are considered archaeologically sensitive. Although the marine geophysical remote-sensing studies performed to identify historic properties did not find direct evidence of pre-Contact Native American cultural materials, they represent a good-faith effort to identify submerged historic properties in the APE potentially affected by the undertaking, as defined at 36 CFR 800.4. If undiscovered archaeological resources are present within the identified ASLFs and they retain sufficient integrity, these resources could be eligible for listing in the NRHP under Criterion D. Furthermore, ASLFs are considered by Native American Tribes in the region to be culturally significant resources as the lands where their ancestors lived and as locations where events described in Tribal histories occurred prior to inundation. In addition, BOEM recognizes these landforms are similar to features previously determined to be TCPs and that are presumed to be eligible for listing in the NRHP under Criterion A.

SouthCoast Wind's marine geophysical archaeological surveys and geoarchaeological core processing identified 16 geomorphic features representing potential ASLFs (6). Of this total, nine are in the marine APE: one in the Lease Area, four in the Falmouth ECC, and four in the Brayton Point ECC (COP, Appendix Q; SouthCoast Wind 2024). The seven other identified ASLFs are below the maximum vertical extent of the marine APE; therefore, BOEM anticipates the Proposed Action will have no effect on these resources. In addition to the archaeological potential of ASLFs, a number of the identified landforms along the Falmouth ECC may be contributing elements to one or more TCPs, including the Nantucket Sound TCP (Section I.3.1.4, *Assessment of Effects on Historic Properties Located in Multiple Portions of the APE*). The extent of marine cultural investigations performed for the Proposed Action does not enable conclusive determinations of eligibility for listing identified resources in the NRHP; as such, all identified ASLFs are considered eligible for the purposes of this assessment and, therefore, historic properties. Additional archaeological surveys or analyses, if completed, may enable more refined assessments of integrity, significance, and eligibility for listing these resources in the NRHP.

Table I-7. ASLFs identified in SouthCoast Wind's investigations

Resource ID	Location	Location in Marine APE	Finding of Effect
LA-P-20-01	U.S. OCS	Lease Area	Adverse effect
FM-P-20-01	Massachusetts State	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
FM-P-21-01A	Massachusetts State	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
FM-P-21-01B	Massachusetts State	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
FM-P-21-01C	Massachusetts State	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
FM-P-21-02	Massachusetts State	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
FM-P-21-03	Massachusetts State	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
FM-P-21-04A	Massachusetts State	Falmouth ECC	No effect (will be avoided)
FM-P-21-04B	Massachusetts State	Falmouth ECC	No effect (will be avoided)
FM-P-21-05	Massachusetts State	Falmouth ECC	No effect (will be avoided)
FM-P-21-06	Massachusetts State	Outside marine APE (near Falmouth ECC)	No effect (outside APE)
FM-P-21-07	Massachusetts State	Falmouth ECC	No effect (will be avoided)
BP-P-21-01A	Massachusetts State	Brayton Point ECC	No effect (will be avoided)
BP-P-21-01B	Massachusetts State	Brayton Point ECC	No effect (will be avoided)
BP-P-21-02	Rhode Island State	Brayton Point ECC	Adverse effect
BP-P-21-03	Rhode Island State	Brayton Point ECC	No effect (will be avoided)

Source: COP, Appendix Q; SouthCoast Wind 2024.
ECC = export cable corridor; ID = identification.

The severity of effects would depend on the extent to which integral or significant components of the affected ASLF are disturbed, damaged, or destroyed, resulting in the loss of contributing elements to the historic property's eligibility for listing in the NRHP. Resource-specific minimum avoidance areas for ASLFs are stipulated in the MOA as a result of consultations (Attachment A).

SouthCoast Wind has presently committed to avoiding seven of the nine ASLFs in the marine APE, and therefore, the undertaking would have no effect on these resources. BOEM finds that two ASLFs would be subject to adverse effects from the undertaking. Mitigation measures to resolve adverse effects on these resources have been determined through consultations and are stipulated in the MOA. Refer to Table I-7 for BOEM's finding of effect for each ASLF and Attachment A for a draft of the MOA as of September 30, 2024.

Nantucket Sound TCP

SouthCoast Wind's cultural resource background research identified the Nantucket Sound TCP in and potentially affected by Project activities occurring in the marine APE (COP, Appendix Q; SouthCoast Wind 2024). However, this TCP was also identified in the visual APE for Offshore Project components (COP, Appendices S; SouthCoast Wind 2024). As such, BOEM's assessment of effects on this historic property can be found in Section I.3.1.4, *Assessment of Effects on Historic Properties Located in Multiple Portions of the APE*.

I.3.1.2 Assessment of Effects on Historic Properties in the Terrestrial APE

Cultural resource investigations completed for the Proposed Action identified historic properties in the terrestrial APE (COP, Appendix R; SouthCoast Wind 2024). Based on the information presented below, BOEM finds historic properties would be adversely affected in the terrestrial APE.

Terrestrial Archaeological Resources

As of November 2023, SouthCoast Wind's investigations have identified two terrestrial archaeological resources in the terrestrial APE (Table I-8; COP, Appendix R; SouthCoast Wind 2024), which are recommended to be eligible for listing in the NRHP under Criteria A and D, and BOEM is treating them as historic properties. Terrestrial archaeological investigations have not been fully completed in the terrestrial APE. As such, potential, presently undiscovered terrestrial archaeological resources may be present in the terrestrial APE and subject to adverse effects from the Proposed Action; these may be identified during SouthCoast Wind's process of phased identification and evaluation of historic properties (COP, Appendix R.2; SouthCoast Wind 2024; Section I.5, *Phased Identification and Evaluation*). The terrestrial APE also intersects the NRHP-listed Mount Hope Bridge boundary as defined by the U.S. National Park Service (NPS); further discussion of this historic property is provided in the *Historic Aboveground Resources* section below. BOEM anticipates that the number of identified terrestrial archaeological resources and historic properties in the terrestrial APE may be refined through the phased identification process and ongoing Section 106 consultations.

Table I-8. Terrestrial archaeological resources in the terrestrial APE

Resource ID	Cultural Component	Location in Terrestrial APE	Finding of Effect
RI-2816	Indeterminate pre-Contact Native American	Aquidneck Island, Portsmouth, Rhode Island	Adverse effect
RI-2817	Indeterminate pre-Contact Native American, possibly Transitional Archaic or Middle Woodland	Aquidneck Island, Portsmouth, Rhode Island	Adverse effect

Source: COP, Appendix R; SouthCoast Wind 2024.
APE = area of potential effect; ID = identification.

The severity of effects would depend on the extent to which integral or significant components of the affected terrestrial archaeological resource are disturbed, damaged, or destroyed, resulting in the loss of contributing elements to the historic property's eligibility for listing in the NRHP. Avoidance of the two known terrestrial archaeological resources has been recommended. If avoidance is not feasible, mitigation in the form of data recovery excavation in portions of the sites that cannot be avoided; installation of temporary site protective fencing prior to the start of construction; identifying the sensitive resource areas to construction work crews as areas where no ground-disturbing activities can take place; and archaeological construction monitoring has been recommended (COP, Appendix R; SouthCoast Wind 2024; MOA, Attachment 7). SouthCoast Wind has committed to monitoring during construction in areas determined to have a moderate to high potential for undiscovered archaeological resources (COP Volume 2, Table 16-1 and Appendix R.3; SouthCoast Wind 2024).

Phased identification as defined in 36 CFR 800.4(b)(2) will be used for the areas of the terrestrial APE identified in the Terrestrial Archaeology Phased Identification Plan (Attachment 12 of the MOA). Completion of Phase IB archaeological surveys during the phased identification process may lead to the identification of archaeological resources in the terrestrial APE. As such, the undertaking is currently anticipated to have adverse effects on the two known terrestrial archaeological resources identified in the terrestrial APE. The identification of other terrestrial archaeological resources in the terrestrial APE is possible in the completion of the phased identification process. BOEM will use the MOA to establish commitments for reviewing the sufficiency of any supplemental terrestrial archaeological investigations; assessing effects on historic properties; and implementing measures to avoid, minimize, or mitigate effects in these areas prior to construction. For additional details, refer to Section I.5, *Phased Identification and Evaluation*, and Attachment A for a draft of the MOA as of September 30, 2024.

Historic Aboveground Resources

One historic aboveground resource listed in the NRHP has been identified in the terrestrial APE: the Mount Hope Bridge (COP, Appendix R; SouthCoast Wind 2024). The terrestrial APE intersects the Mount Hope Bridge boundary as defined by NPS; however, the structure itself is not subject to physical adverse effects from the Proposed Action, and the Mount Hope Bridge has been determined to be significant and eligible for listing in the NRHP unrelated to potential archaeological elements. As such, BOEM determined the Project would have no effect on this historic property.

I.3.1.3 Assessment of Effects on Historic Properties in the Visual APE

Cultural resource investigations completed for the Proposed Action have identified historic properties in the visual APE (COP, Appendices S and S.1; SouthCoast Wind 2024). Based on the information presented below, BOEM finds historic properties would be adversely affected in the visual APE.

Review of the visual APE for Offshore Project components identified 11 historic aboveground resources and three TCPs (i.e., Chappaquiddick Island, Nantucket Sound, and Vineyard Sound and Moshup's Bridge) that would have views of the Project components. Review of the visual APE for Onshore Project components identified a total of 13 historic aboveground resources in Falmouth and Brayton Point, of which two would have views of the Onshore Project components in Falmouth. BOEM determined that four aboveground historic properties would experience adverse effects from the visibility of Project components (Table I-9).

The MOA stipulates that SouthCoast Wind will implement an Aircraft Detection Lighting System (ADLS) for aviation safety lighting on Offshore Project components (e.g., WTGs and OSPs). During operation of Offshore Project components, an ADLS would be activated for less than 5 hours per year, or 0.1 percent of nighttime hours, compared to standard continuous Federal Aviation Administration hazard lighting (COP Appendix T, Section 5.1.3; SouthCoast Wind 2024). When ADLS is not activated during construction and decommissioning, effects from lighting on Offshore Project components would be localized and range from temporary to short term. As a result, BOEM anticipates implementation of an ADLS will reduce nighttime visual effects on aboveground historic properties.

Table I-9. Adversely affected aboveground historic properties in the visual APE

Resource Name	Portion of Visual APE	Distance to Nearest WTG [a]	NRHP Status
Chappaquiddick Island TCP	Offshore Project components	30.8 miles	Eligible
Nantucket Historic District	Offshore Project components	23.4 miles	National Historic Landmark
Nantucket Sound TCP	Offshore Project components	25.1 miles	Eligible
Oak Grove Cemetery	Onshore Project components	N/A	Eligible

[a] For the Proposed Action.

Chappaquiddick Island TCP

Chappaquiddick Island TCP is located 30 miles (48.2 kilometers) north of the Lease Area at the eastern end of Martha's Vineyard. It is connected to the main island by a narrow barrier beach that is often breached by storms and winds (Epsilon Associates, Inc. 2020 as cited in the COP, Appendix S:3-10; SouthCoast Wind 2024). The landscape of this undeveloped island is largely scrub oak, pitch pines, oak trees, and red cedars that are up to approximately 20 feet (6.1 meters) tall (COP, Appendix S:3-10; SouthCoast Wind 2024).

The historic Chappaquiddick branch of the Wampanoag Tribe inhabited the island into the nineteenth century and currently are settled on a 100-acre (40-hectare) reservation within the island's brush land interior (Chappaquiddick Tribe, 2022, as cited in the COP, Appendix S:3-10; SouthCoast Wind 2024). In May and June 2019, the non-federally recognized historic Massachusetts Chappaquiddick Tribe of Wampanoag Nation notified BOEM of potential impacts on Chappaquiddick Island resulting from the Vineyard Wind project (BOEM 2019). As a result, Chappaquiddick Island was determined by BOEM to be potentially eligible for listing in the NRHP as a TCP.

Chappaquiddick Island TCP retains its maritime setting and continues to offer significant seaward views that support the integrity of this setting, which contributes to this resource's NRHP eligibility. Those seaward views include vantage points with the potential for an unobstructed view from contributing resources toward the Offshore Project components. Introduction of the WTGs and OSPs into the seascape horizon of the Chappaquiddick Island TCP would result in an adverse visual effect on the viewshed and maritime setting. Simulated conditions of the south shore of the island Wasque Point, Wasque Reservation, and Wasque Avenue Key Observation Points (KOP) revealed potential weak to moderate visual change to the island; the greatest visual change was found at the Wasque Avenue KOP (COP, Appendix S; SouthCoast Wind 2024). The intensity of the visual effect depends on blade movement, differing atmospheric conditions, and lighting. Based on this assessment, the introduction of Offshore Project components would result in a change to the unobstructed ocean viewshed of the TCP and would potentially compromise the setting of the TCP, which is a key character-defining feature. As a result, the Project would result in an adverse effect on the Chappaquiddick Island TCP.

As described in the *SouthCoast Wind Cumulative Historic Resources Visual Effects Analysis*, the Chappaquiddick Island TCP is 30.8 miles (49.6 kilometers) from the nearest WTG associated with the proposed Project and 14.7 miles (23.7 kilometers) from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible WTGs is 679. Of these, 86 theoretically visible WTGs (12.66 percent) would be from the proposed Project. As such, BOEM determined the Project would add to the cumulative visual effects on the Chappaquiddick Island TCP when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2023).

Nantucket Historic District NHL

Nantucket Historic District is located 22.3 miles (35.9 kilometers) north of the Lease Area and encompasses Tuckernuck Island, Muskeget Island, and Nantucket Island. Nantucket Island is a well-preserved New England seaport, which retains intact buildings dating to the eighteenth and nineteenth centuries, when the whaling industry provided the primary source of commerce in the town. Economic decline on the island is largely responsible for the survival of excellent and intact architectural resources from the Colonial, Federal, Greek Revival, and Victorian periods. Preservation of these resources, and the island's location off the coast of Cape Cod, led to its significance as an early vacation resort. Tuckernuck Island contains a small collection of nineteenth and twentieth century buildings. Like Nantucket Island, this island is known for its nineteenth century architecture and benefited from the rise of the whaling industry. Muskeget Island contains only one building, a circa 1910 former Coast Guard boathouse, which is used as a summer residence. The Nantucket Historic District includes dense residential development from the era of whaling, residential development associated with tourism, grassy public parcels and lawns, undeveloped barren areas with grasslands, heathlands and salt marshes, scrub oak, deciduous trees, and barrens of pitch pine barrens that are up to 40 feet (12.2 meters) tall (COP, Appendix S:3-7; SouthCoast Wind 2024).

The Nantucket Historic District was determined to be an NHL and was listed in the NRHP in November 1966. In October 2012, the NHL nomination was updated and the historic district boundaries were expanded from just Nantucket Island to include Tuckernuck and Muskeget Islands. The district is significant under NRHP Criterion A/NHL Criterion 1 for its association with the whaling industry in New England; NRHP Criterion C/NHL Criterion 4 for the array of well-preserved resources reflecting a range of architectural styles and eras; and NRHP Criterion D for important cultural and historical data it has yielded or may yield. The period of significance begins in 1650 with the origination of the whaling industry, through the industry's demise in 1849, and spans to 1975 to include the period in which it emerged and thrived as a summer resort (Chase-Herrill and Pfeiffer 2012 as cited in COP, Appendix S:3-7; SouthCoast Wind 2024). Character-defining features of Nantucket Historic District include the collection of well-preserved buildings from Colonial, Federal, Greek Revival, and Victorian periods; the maritime setting of the district as an important whaling center with a high concentration of buildings, both simple and elaborate, oriented toward shorelines, harbors, and ocean vistas; and unobstructed views of the ocean from locations throughout the island. As a collection of resources that are united historically and aesthetically by plan and physical development, setting is an important character-defining feature of the historic district's integrity (COP, Appendix S:3-7; SouthCoast Wind 2024).

The Nantucket Historical Commission maintains a list of contributing and noncontributing resources within the district; this list contains 3,782 properties that are classified as either contributing, noncontributing, or some combination. Within the PAPE, there are 1,822 contributing properties are contributing, 1,108 noncontributing properties, and 852 properties that are either vacant or uncategorized (COP, Appendix S:3-7; SouthCoast Wind 2024).

Nantucket Historic District retains its maritime setting and continues to offer significant seaward views that support the integrity of this setting, which contributes to this resource's NRHP eligibility. Those seaward views include vantage points with the potential for an unobstructed view from contributing resources toward the Offshore Project components. Introduction of the WTGs and OSPs into the seascape horizon of the District would result in an adverse visual effect upon the viewshed and setting. Simulated conditions, particularly along the south shore of the island at historic locations, such as Tom Nevers Field and Miacomet Beach, revealed potential moderate visual change from some areas of the district, and moderate to major visual changes in other places, such as Cisco Beach and the Hummock Pond Road Bike Path. The intensity of the visual effect depends on blade movement, differing atmospheric conditions, and lighting. Based on this assessment, the introduction of Offshore Project components would result in a change to the unobstructed ocean viewshed of the district, would potentially compromise the setting of the district and its contributing resources, which is one of its key character-defining features. As a result, the Project would result in an adverse effect on Nantucket Historic District (COP, Appendix S:3-7-3-8; SouthCoast Wind 2024).

As described in the *SouthCoast Wind Cumulative Historic Resources Visual Effects Analysis*, the Nantucket Historic District is 23.4 miles (37.7 kilometers) from the nearest WTG associated with the proposed Project and 14.8 miles (23.8 kilometers) from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible WTGs is 743. Of these, 129 theoretically visible WTGs (17.36 percent) would be from the proposed Project. As such, BOEM determined the Project would add to the cumulative visual effects on the Nantucket Historic District when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2023).

Nantucket Sound TCP

SouthCoast Wind's cultural resource background research identified the Nantucket Sound TCP in and potentially affected by Project activities occurring in the visual APE for Offshore Project components (COP, Appendix S; SouthCoast Wind 2024). However, this TCP was also identified in the marine APE (COP, Appendices Q; SouthCoast Wind 2024). As such, BOEM's assessment of effects on this historic property can be found in Section I.3.1.4, *Assessment of Effects on Historic Properties Located in Multiple Portions of the APE*.

Oak Grove Cemetery (Falmouth, Massachusetts)

The Oak Grove Cemetery was established circa 1850. It encompasses 18.9 acres and consists of 35 contributing resources. The landscape includes manicured lawns and native plantings under an open canopy of deciduous and evergreen trees that are up to 40 feet tall. The cemetery exhibits a mix of the ideals of the rural/garden cemetery movement and the more geometric configuration of formal nineteenth century community cemeteries. The Oak Grove Cemetery was determined to be eligible for listing in the NRHP in 2014. The cemetery is significant under Criterion A for its association with the history of the town of Falmouth and is the town's largest nineteenth century cemetery. It is also significant under Criterion C as a well-preserved local example of both a nineteenth century rural and formal cemetery. The period of significance of the resource area is 1850 to 1964. Character-defining features of the cemetery include the layout and landscape, greenspace, and myriad markers. As a cemetery that is significant for its association with the rural cemetery movement, which sought to create a pastoral park-like environment, the setting is an important characteristic feature of the resource (COP, Appendix S:3-22; SouthCoast Wind 2024).

The Oak Grove Cemetery retains its rural setting, which contributes to its NRHP eligibility. From the cemetery, views toward the Falmouth Onshore Project components would be possible. The Oak Grove Cemetery is located immediately approximately 0.1 mile west of the Lawrence Lynch substation site and 3.34 miles from the Cape Cod Aggregates Substation site. Distance, vegetation, and other buildings partially obstruct views of the Cape Cod Aggregates Substation site from the cemetery. Though there is some vegetation between the historic property and the Lawrence Lynch substation site, the historic property is immediately adjacent and would have a view of the substation building along its eastern edge. In addition, there is the potential for short-term, temporary auditory effects due to construction activities. As a rural, garden-style cemetery that was designed to provide a natural sanctuary for mourners, setting is a character-defining feature of its significance. The cemetery would experience a long-term visual change in setting due to the construction of the Lawrence Lynch substation. The introduction of a new, modern visual element has the potential to compromise the rural and contemplative setting, affecting its ability to convey significance. As a result, the Project would have an adverse effect on the Oak Grove Cemetery if the Falmouth ECC were used (COP, Appendix S:3-22; SouthCoast Wind 2024).

I.3.1.4 Assessment of Effects on Historic Properties Located in Multiple Portions of the APE

The historic property discussed in this section has been identified within multiple portions of the APE and, as such, is subject to both physical and visual effects.

Nantucket Sound TCP

In 2009, MHC determined Nantucket Sound was eligible for listing in the NRHP as a TCP under Criterion D in recognition of the high potential for preserved cultural areas (Simon 2009 as cited in the COP, Appendix Q:32; SouthCoast Wind 2024). Per Criterion D, Nantucket Sound was found to yield and have the potential to yield valuable information related to pre-Contact Cape Cod and its surrounding islands (NPS 1995, 2010 as cited in the COP, Appendix Q:44; SouthCoast Wind 2024). ASLFs identified through SouthCoast Wind's marine geophysical archaeological surveys within or in proximity to the Nantucket Sound may be contributing elements to the TCP's eligibility for listing in the NRHP.

By approximately 17,000 calibrated years Before Present (cal BP), the Laurentide Ice Sheet had retreated to the north shore of Cape Cod, and the southward draining braided streams deposited sediments on a glacial outwash plain. As the stream system migrated laterally south of the retreating ice front, glacial lakes along the coastal plain were buried beneath the prograding outwash. However, some glacial lakes may have drained southward into the Lease Area by way of water gaps between Nantucket and Martha's Vineyard before they were buried (Gutierrez et al. 2003 as cited in the COP, Appendix Q:31; SouthCoast Wind 2024). As late as 15,000 cal BP, the southern edge of the continental ice sheet still extended as far south as Cape Cod. At that time, sea stands were as much as 300 feet (91.5 meters) lower than present levels; now-inundated areas of the sea floor were exposed and potentially open to human habitation (Daley 2005 as cited in the COP, Appendix Q:31; SouthCoast Wind 2024). However, by cal 13,000 BP, as the climate moderated, most of southeastern New England was ice free (Raposa 2009 and Plymouth Archaeological Research Project [PARP] 2016 as cited in the COP, Appendix Q:31; SouthCoast Wind 2024). Sediment cores taken in Nantucket Sound in water depths of between 30 feet (9.1 meters) and 50 feet (15.2 meters) below mean sea level (MSL) demonstrated that the region surrounding Massachusetts' offshore islands once incorporated deciduous forests, wetlands, and swamps (Daley 2005 and Simon 2009 as cited in the COP, Appendix Q:31–32; SouthCoast Wind 2024).

Warming climatic conditions combined with isostatic rebound of the land mass resulted in rising sea levels that inundated exposed and potentially habitable landscapes (Bright et al. 2013:31 and Mahlstedt 2007a:24 as cited in the COP, Appendix Q:32; SouthCoast Wind 2024). Most of Nantucket Sound and the adjacent Vineyard Sound were submerged by 8,000 cal BP (Dunford 1999:43 as cited in the COP,

Appendix Q:32; SouthCoast Wind 2024). Despite this trend, the potential for intact early archaeological resources on or beneath the seafloor in this area is generally high.

A number of the ASLFs identified by SouthCoast Wind along the Falmouth ECC may be contributing elements to the Nantucket Sound TCP. The Falmouth ECC runs through Muskeget Channel into Nantucket Sound in Massachusetts state waters to make landfall in Falmouth, Massachusetts. SouthCoast Wind has presently committed to avoiding the four ASLFs located in the Falmouth ECC portion of the marine APE (i.e., FM-P-21-04A, FM-P-21-04B, FM-P-21-05, and FM-P-21-07) and therefore there would be no effect on these resources. As such, BOEM has concluded that the Project would not result in physical effects on ASLFs that are contributing elements to the Nantucket Sound TCP.

BOEM has concluded that the Project would result in an adverse *visual* effect on the Nantucket Sound TCP. In addition to being determined eligible under Criterion D, the TCP is significant under Criterion A and Criterion C. (COP, Appendix S:3-9; SouthCoast Wind 2024). Nantucket Sound TCP retains its maritime setting and continues to offer significant seaward views that support the integrity of this setting, which contributes to this resource's NRHP eligibility. Those seaward views include vantage points with the potential for an unobstructed view from contributing resources toward the Offshore Project components. As a result of the introduction of modern, intrusive elements associated with the Offshore Project components, the Nantucket Sound TCP would experience visual adverse effects.

As described in the *SouthCoast Wind Cumulative Historic Resources Visual Effects Analysis*, the Nantucket Sound TCP is 25.1 miles (40.4 kilometers) from the nearest WTG associated with the proposed Project and 14.3 miles (23.0 kilometers) from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible WTGs is 744. Of these, 129 theoretically visible WTGs (17.33 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Chappaquiddick Island TCP when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2023).

I.3.2 Summary of Adversely Affected Historic Properties

I.3.2.1 Adverse Effects on Historic Properties in the Marine APE

The Project would have no adverse effect on 31 of 32 marine archaeological resources, and seven of nine ASLFs in the marine APE due to SouthCoast Wind's commitment to avoidance of these historic properties. However, the Project would have adverse effects on one marine archaeological resource and two ASLFs in the marine APE. Mitigation measures to resolve adverse effects on these resources will be determined through consultations and will be stipulated in the MOA. Refer to Attachment A for a draft of the MOA as of September 30, 2024.

I.3.2.2 Adverse Effects on Historic Properties in the Terrestrial APE

The Project would have adverse effects on known historic properties in the terrestrial APE: two terrestrial archaeological resources. Avoidance has been recommended for these two historic properties; avoidance of a historic property would result in no effect on the historic property. However, development of the final Project design is ongoing, and it is currently unclear whether SouthCoast Wind would be able to avoid adverse effects. If avoidance is not feasible, mitigation in the form of data recovery, excavation in portions of the sites that cannot be avoided; installation of temporary site protective fencing prior to the start of construction; identifying the sensitive resource areas to construction work crews as areas where no ground-disturbing activities can take place; and archaeological construction monitoring has been recommended (COP, Appendix R; SouthCoast Wind 2024). Therefore, BOEM has determined the undertaking would have adverse effects on historic properties in the terrestrial APE.

Additional terrestrial archaeological resources, of which all or some may be subject to adverse effects from the Project, may be identified during SouthCoast's process of phased identification and evaluation of historic properties as defined in 36 CFR 800.4(b)(2) (Section I.5, *Phased Identification and Evaluation*). BOEM has used the MOA to establish commitments for reviewing the sufficiency of any supplemental terrestrial archaeological investigations as phased identification; assessing effects on historic properties; and implementing measures to avoid, minimize, or mitigate effects in these areas prior to construction. Refer to Section I.5, *Phased Identification and Evaluation*, and Attachment A for a draft of the MOA as of September 30, 2024.

I.3.2.3 Adverse Effects on Historic Properties in the Visual APE

Based on the information BOEM has available from the studies conducted to identify historic properties in the visual APE of the Project and the assessment of effects upon those properties determined in consultation with consulting parties, BOEM has found that the Proposed Action would have direct visual adverse effects on a total of three aboveground historic properties, including one NHL (Nantucket Historic District) within the visual APE for Offshore Project components (Table I-9). BOEM determined that one historic property within the visual APE for Onshore Project components would be adversely affected if the variant Falmouth ECC is used. The undertaking would introduce visual elements that are out of character with the historic setting that contributes to the historic properties' significance. However, BOEM has determined that, due to the distance and open viewshed between the historic properties and affecting Project components, the integrity of the historic properties would not be so diminished as to *disqualify* any of them from NRHP eligibility. The adverse effects on the viewshed of the aboveground historic properties would occupy the space for approximately 35 years, but they are unavoidable for reasons discussed in Section I.3.1.3, *Assessment of Effects on Historic Properties in the Visual APE*. This application of the Criteria of Adverse Effect and determination that the effects are direct are based on pertinent NRHP bulletins, subsequent clarification and guidance by ACHP and NPS, and other documentation, including professionally prepared viewshed assessments and computer-simulated photographs.

Where BOEM determined adverse visual effects would occur from Offshore Project components on historic properties, BOEM then assessed whether those effects would add to the potential adverse effects of other reasonably foreseeable actions and thereby result in cumulative effects, which are additive effects. Where BOEM found visual adverse effects on historic properties in the visual APE for

Offshore Project components (Table I-9), BOEM also determined that the undertaking would contribute to cumulative adverse effects (BOEM 2023).

I.4 Actions to Avoid, Minimize, or Mitigate Adverse Effects

As a requirement of COP approval, BOEM developed avoidance, minimization, or mitigation, and monitoring measures that would be implemented to avoid and resolve adverse effects on historic properties, including cumulative visual adverse effects to which the Project would be additive. These measures were developed through consultations and would be implemented through the execution of the MOA by BOEM and the required signatories in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f). This process considers all prudent and feasible alternatives to avoid adverse effects as discussed in Section I.4.1, *Alternatives Considered*, and included, to the maximum extent possible, taking such planning actions as may be necessary to minimize harm to any NHL that may be directly and adversely affected by an undertaking.

Simultaneous to the publication of the final EIS, BOEM will coordinate with signatories to the MOA to have the MOA fully signed and executed by December 19, 2024. The version of the MOA attached to this document as Attachment A is a draft of the MOA as of September 30, 2024. The fully executed MOA will be posted on BOEM's website at: https://www.boem.gov/renewable-energy/state-activities/southcoast-wind-formerly-mayflower-wind.

I.4.1 Alternatives Considered

BOEM's election to use NEPA substitution for the Section 106 review of the Project included the identification and evaluation of historic properties for the undertaking and assessment of effects for all the action alternatives identified during the NEPA review. BOEM's NEPA EIS and Section 106 reviews have analyzed six action alternatives (i.e., A through F; Table I-10) for impacts on cultural resources (Final EIS, Chapter 3, Section 3.6.2, *Cultural Resources*) and effects on historic properties as presented in this section. Table I-10also denotes Alternative D as BOEM's Preferred Alternative as identified in the Final EIS. Additional details on the action alternatives and Preferred Alternative can be found in Chapter 2 of the Final EIS.

Table I-10. Summary of alternatives analyzed in the Final EIS and Section 106 review

Alternative	Description
Alternative A – No Action Alternative	Under Alternative A, BOEM would not approve the COP, and the Project's construction and installation, operations and maintenance, and eventual decommissioning would not occur, and no additional permits or authorizations for the Project would be required. Any potential environmental and socioeconomic impacts, including benefits, associated with the Project as described under the Proposed Action would not occur. However, all other existing or other reasonably foreseeable future impact-producing activities would continue. The impact of the No Action Alternative serves as the baseline against which all action alternatives are evaluated.

Alternative	Description
Alternative B – Proposed Action	Under Alternative B, the construction, operations and maintenance, and conceptual decommissioning of the Project on the OCS offshore of Massachusetts would occur within the range of design parameters outlined in the SouthCoast Offshore Wind COP (SouthCoast Wind 2024), subject to applicable mitigation measures. The Project would have a capacity of up to 2,400 MW and would consist of up to 147 WTGs in the Lease Area, up to 5 OSPs and associated export cables. SouthCoast Wind would space WTGs in a 1-by-1-nautical-mile offset grid pattern (east–west-by-north–south-gridded layout). The Project would include one preferred ECC making landfall and interconnecting to the power grid at Brayton Point, in Somerset, Massachusetts, and one variant ECC making landfall and interconnecting to the power grid in Falmouth, Massachusetts. The ECC to Brayton Point would have an intermediate landfall on Aquidneck Island, Rhode Island.
Alternative C – Fisheries Habitat Impact Minimization	Under Alternative C, the construction, operations and maintenance, and eventual decommissioning of the Project on the OCS offshore Massachusetts would occur within the range of the design parameters outlined in the SouthCoast Wind COP, subject to applicable mitigation measures. However, the Project would include an onshore export cable route that would avoid placing the offshore export cable in the Sakonnet River to avoid impacts on fisheries habitats. Alternative C includes two possible onshore export cable routes. • Alternative C-1: Aquidneck Island, Rhode Island Route • Alternative C-2: Little Compton/Tiverton, Rhode Island Route
Alternative D – Nantucket Shoals (Preferred Alternative)	Under Alternative D, the construction, operations and maintenance, and eventual decommissioning of the Project on the OCS offshore Massachusetts would occur within the range of the design parameters outlined in the SouthCoast Wind COP, subject to applicable mitigation measures. However, up to 6 WTGs (AZ-47, BA-47, BB-47, BC-47, BC-48, and BF-49) would be eliminated in the northeastern portion of the Lease Area to reduce potential impacts on foraging habitat and potential displacement of wildlife from this habitat adjacent to Nantucket Shoals.
Alternative E – Foundation Structures	Under Alternative E, the construction and installation, operations and maintenance, and eventual decommissioning of the Project on the OCS offshore Massachusetts would occur within the range of the design parameters, which includes a range of foundation types (monopile, piled jacket, suction bucket, and gravity based), subject to applicable mitigation measures. This alternative includes three foundation options, which assume the maximum use of piled (monopile and piled jacket), suction bucket, and gravity-based foundation structures to assess the extent of potential impacts from each foundation type. • Alternative E-1: Piled Foundations (monopile and piled jacket) only • Alternative E-2: Suction Bucket Foundations only • Alternative E-3: Gravity-based Foundations only
Alternative F – Muskeget Channel Cable Modification	Under Alternative F, the construction, operations and maintenance, and eventual decommissioning of the Project on the OCS offshore Massachusetts would occur within the range of the design parameters outlined in the SouthCoast Wind COP, subject to applicable mitigation measures. However, to minimize seabed disturbance in the Muskeget Channel, the Falmouth offshore export cable route would use ±525kV HVDC cables connected to an HVDC converter station, instead of HVAC cables connected to offshore substations, and would only use up to 3 offshore export cables, instead of up to 5 offshore export cables.

I.4.1.1 Action Alternatives that Would Minimize the Adverse Effect of the Project

While some of the action alternatives and sub-alternatives identified for the Project may avoid, minimize, or mitigate adverse effects on some historic properties, no alternative that meets the purpose and need of Project development in the Lease Area would fully avoid adverse effects on historic properties, including visual effects on NHLs. BOEM's Preferred Alternative (Alternative D) would include up to six fewer WTGs (Table I-10). The Preferred Alternative is unlikely to lessen physical impacts on historic properties, and while it would reduce the number of Project components contributing to visual effects on historic properties, the number of eliminated WTGs is not anticipated to result in a substantial minimization of visual adverse effects. Overall, the adoption of the Preferred Alternative (Alternative D) would result in the same adverse effects on historic properties as the Proposed Action.

The following sections compare the other action alternatives to the Proposed Action and discuss which would avoid or minimize the adverse effect of the Project on historic properties. Additionally, as described in Section I.3.1, BOEM has considered the primary IPFs relevant to cultural resources (i.e., accidental releases, anchoring, cable emplacement and maintenance, gear utilization, land disturbance, lighting, noise, and presence of structures) in its assessment of the action alternatives' potential effects on historic properties as provided in the following subsections. Refer to Chapter 3, Section 3.6.2, *Cultural Resources,* of the Final EIS for additional details on each alternative as is applicable to cultural resources and historic properties and for NEPA analyses of the potential impacts of these alternatives on cultural resources, including BOEM's Preferred Alternative.

Minimization of Physical Effects on Historic Properties

The Proposed Action (Alternative B) is anticipated to have physical adverse effects on historic properties. Specifically, these include one marine archaeological resource, two ASLFs, and one TCP (i.e., the Nantucket Sound TCP) in the marine APE; and two terrestrial archaeological resources in the terrestrial APE.

Alternatives C, D, E, and F all involve a potential reduction in number or size of Offshore Project components that would be built for the Project, thereby reducing potential seabed-disturbing activities that could cause physical adverse effects on historic properties. The reduction in number or size of WTGs, OSPs, interlink cables, and export cables may minimize effects on one marine archaeological resource, two ASLFs, and one TCP depending on the locations of the removed components in relation to the specific locations of these historic properties. The marine archaeological resource and the ASLFs located within the area from which Offshore Project components would be removed would experience no or minimized effects from the Project. Additionally, removal of Offshore Project components under these alternatives would minimize potential physical adverse effects on presently undiscovered marine archaeological resources in these areas. However, while these alternatives may minimize adverse effects on some specific historic properties, they may also introduce adverse effects on others. A discussion of each alternative and sub-alternative is provided below.

Alternative C includes two sub-alternatives (C-1 and C-2) to analyze alternate onshore cable route options developed to avoid installation of a portion of the proposed Brayton Point Offshore Export Cable that runs through the Sakonnet River (Figure I.B-15). Alternative C-1 includes a western and eastern onshore route variation on Aquidneck Island, Rhode Island.

Alternative C-1 (Aquidneck Island, Rhode Island Route) would result in full avoidance of adverse effects on one ASLF (i.e., BP-P-21-02) that is a historic property potentially eligible for listing in the NRHP. Alternative C-2 (Little Compton/Tiverton, Rhode Island Route) would also result in full avoidance of adverse effects on one ASLF (i.e., BP-P-21-02). BOEM would require SouthCoast Wind to uphold the same applicable commitments to avoid specific marine cultural resources should this alternative be adopted (refer to Attachment A for a draft of the MOA as of September 30, 2024). However, either sub-alternative may introduce adverse effects on currently unidentified but potential historic properties that may be present within a potential offshore ECC that would encompass this alternate route.

Additionally, for the Alternative C-1 cable route option overall, background research identified a total of 10 known terrestrial archaeological resources and 21 known historic aboveground resources, including six historic properties listed in the NRHP and six historic cemeteries (Table I-11; PAL 2022).[1] One of the terrestrial archaeological resources (RI-1587, Fairview Site) has been previously recommended not eligible for listing in the NRHP; however, because it is the only resource with such a recommendation, BOEM has included consideration of this resource in discussion here for the purposes of NHPA consultation. Adoption of Alternative C-1 using the western route variation would have potential adverse effects on nine terrestrial archaeological resources and 18 historic aboveground resources, including five historic properties listed in the NRHP and five historic cemeteries (PAL 2022). Adoption of Alternative C-1 using the eastern route variation would have potential adverse effects on seven known terrestrial archaeological resources and 15 known historic aboveground resources, including three historic properties listed in the NRHP and four historic cemeteries (PAL 2022). For Alternative C-2, background research identified three known terrestrial archaeological resources and 23 known historic aboveground resources, including four historic properties listed in the NRHP and eight historic cemeteries, that have the potential to be subject to adverse effects (Table I-12; PAL 2022). Overall, BOEM finds Alternative C is unlikely to minimize adverse effects on historic properties.

Table I-11. Cultural resources and historic properties subject to potential adverse effects from adoption of Alternative C-1 and its route variations

Resource ID or Name	Resource Type	NRHP Status	Alt. C-1 Route	
			West Variation	East Variation
Bailey Farm	Historic above.	Listed	X	
Boyd's Windmill	Historic above.	Listed	X	

[1] Rhode Island General Law [RIGL] 23-18-11 et seq. (State Cemeteries Act) conditionally prohibits any town or city from permitting "construction, excavation or other ground disturbing activity within twenty-five (25) feet of a recorded historic cemetery" unless the "boundaries of the cemetery are adequately documented and there is no reason to believe additional graves exist outside the recorded cemetery." As such, BOEM assumes historic cemeteries within 25 feet (7.6 meters) of the Project would be subject to adverse impacts without the adoption of AMMs.

Resource ID or Name	Resource Type	NRHP Status	Alt. C-1 Route	
			West Variation	East Variation
Cory Farm	Historic above.	Poten. eligible	X	X
David Albro Farm	Historic above.	Poten. eligible	X	
Dennis House	Historic above.	Poten. eligible	X	X
Newton HD	Historic above.	Eligible	X	X
Paradise Rocks HD	Historic above.	Eligible	X	X
Paradise School	Historic above.	Listed	X	
Peabody School	Historic above.	Eligible		X
Portsmouth Friends Meeting House/ Parsonage & Cemetery	Historic above.	Listed	X	X
Rural Estates HD	Historic above.	Eligible	X	X
Smith-Gardiner-Norman Farm HD	Historic above.	Listed		X
St. Mary's Episcopal Church & Cemetery	Historic above.	Eligible	X	X
Union Church & Southernmost Schoolhouse	Historic above.	Listed	X	X
Webb House	Historic above.	Poten. eligible	X	X
MT9 (Middletown Cemetery)	Historic above. (cem.)	Undetermined	X	X
MT10 (Gideon Bailey Lot)	Historic above. (cem.)	Undetermined	X	
MT25 (Jewish Cemetery)	Historic above. (cem.)	Undetermined	X	
PO13 (Job Sherman Lot)	Historic above. (cem.)	Undetermined	X	X
PO16 (Union Cemetery)	Historic above. (cem.)	Undetermined	X	X
PO26 (David Albro Lot)	Historic above. (cem.)	Undetermined		X
RI-0100 (RI-MI-02)	Terrestrial arch.	Undetermined	X	
RI-1585	Terrestrial arch.	Undetermined	X	X
RI-1586 (Dennis-Tallman Site)	Terrestrial arch.	Eligible	X	X
RI-1587 (Fairview Site)	Terrestrial arch.	Not eligible	X	X
RI-1591 (Sisson-Greene)	Terrestrial arch.	Eligible	X	X
RI-1601 (SCS field # BM15)	Terrestrial arch.	Undetermined	X	
RI-1614 (SCS field # KP13)	Terrestrial arch.	Undetermined	X	X
RI-1615 (SCS field # KP18)	Terrestrial arch.	Undetermined	X	X
RI-1628 (SCS field # MM13)	Terrestrial arch.	Undetermined		X
RI-1629 (SCS field # MM18)	Terrestrial arch.	Undetermined	X	

Notes: BOEM assumes resources with "undetermined" NRHP eligibility are potentially eligible for the purposes of this analysis. Terrestrial archaeological resources and cemeteries in this table are within 25 feet (7.62 meters) of the Alternative C cable routes options.
Source: PAL 2022.
above. = aboveground; cem. = cemetery; HD = historic district; ID = identification; Poten. = potentially

Table I-12. Historic properties subject to potential adverse effects from adoption of Alternative C-2

Resource ID or Name	Resource Type	NRHP Status
Brownell House	Historic above.	Eligible
Col. D. Durfee House/Old Durfee Farm	Historic above.	Eligible
Cory-Hicks-Borden-Gardner-Stevens House	Historic above.	Eligible
David White Farm	Historic above.	Eligible
Edw. Cook Farm/White Homestead	Historic above.	Eligible
Friends Meeting House and Cemetery	Historic above.	Listed
Manchester House	Historic above.	Eligible
Rod Feather Farm/The Almy Farm & Barn	Historic above.	Eligible
Simmons-Wood-Palmer House	Historic above.	Eligible
Stone House Inn	Historic above.	Listed
Taylors Lane HD	Historic above.	Eligible
Tiverton Four Corners Historic District	Historic above.	Listed
Wilbor House	Historic above.	Listed
Wm. Durfee Farm	Historic above.	Eligible
West Main Road HD	Historic above.	Eligible
LC4 (Woodman Cemetery)	Historic above. (cem.)	Undetermined
LC5 (Woodman Lot)	Historic above. (cem.)	Undetermined
LC6 (Irish Lot)	Historic above. (cem.)	Undetermined
LC10 (New Wilbur Lot)	Historic above. (cem.)	Undetermined
TV5 (William Gray Lot)	Historic above. (cem.)	Undetermined
TV6 (Hillside Cemetery)	Historic above. (cem.)	Undetermined
TV19 (Charles Durfee Lot)	Historic above. (cem.)	Undetermined
TV20 (Samuel Negus Lot)	Historic above. (cem.)	Undetermined
RI-0340 (Jew House)	Terrestrial arch.	Undetermined
RI-0516 (8 Rod Highway)	Terrestrial arch.	Undetermined

Resource ID or Name	Resource Type	NRHP Status
RI-2461 (Wilbor House)	Terrestrial arch.	Undetermined

Notes: BOEM assumes resources with "undetermined" NRHP eligibility are potentially eligible for the purposes of this analysis. Terrestrial archaeological resources and cemeteries in this table are within 25 feet (7.62 meters) of the Alternative C cable routes options.
Source: PAL 2022.
above. = aboveground; cem. = cemetery; HD = historic district; ID = identification; Poten. = potentially

Alternative D would involve elimination of six WTGs in the northeastern portion of the Lease Area. No known marine cultural resources are located in the area from which WTGs would be eliminated. However, removal of these Offshore Project components would reduce potential impacts on currently undiscovered marine archaeological resources that may be present in these areas. In general, Alternative D is unlikely to minimize physical adverse effects on historic properties.

Alternative E includes three sub-alternatives (E-1, E-2, and E-3) to analyze the maximum design scenario for each of the three different foundation categories that could be used for WTGs and OSPs. Alternative E-1 involves the use of piled foundations for all WTGs and OSPs. Alternative E-2 involves the use of suction-bucket foundations for all WTGs and OSPs. Lastly, Alternative E-3 involves the use of gravity-based foundations for all WTGs and OSPs. Effects on marine archaeological resources and ASLFs may be reduced, the same, similar, or increased compared to those under the Proposed Action depending on the final foundation type(s) selected under the Proposed Action and specific locations of marine archaeological resources and ASLFs in relation to proposed WTGs and OSPs. The severity of effects on these historic properties increases with the size of the foundation type and anticipated seabed disturbance. However, overall, the nature and physical extent of proposed activities under this alternative would be largely comparable to those of the Proposed Action.

Alternative F would limit the number of cables installed in the Falmouth offshore export cable route to three, as opposed to five under the Proposed Action. Reduction of the number of installed cables would reduce the overall area subject to potential seabed disturbance, thereby minimizing potential adverse effects on marine cultural resources located within the Falmouth offshore ECC, including the Nantucket Sound TCP and any ASLFs that may be contributing elements to the TCP. BOEM would require SouthCoast Wind to uphold the same applicable commitments to avoid marine archaeological resources and ASLFs located in the Falmouth Offshore ECC should this alternative be adopted (refer to Table I-5 and Table I-7 for information on these specific commitments and Attachment A for a draft of the MOA as of September 30, 2024). However, any historic properties for which there are no commitments to avoidance from SouthCoast Wind still be subject to physical adverse effects.

Overall, the potential reduced scale of Alternatives C, D, E, and F may minimize physical adverse effects on historic properties. However, the majority of historic properties subject to effect under the Proposed Action are located in other areas of the marine APE that are unchanged under Alternatives C, D, E, and F. As a result, these alternatives may reduce adverse effects on specific individual historic properties but would not avoid or substantially minimize adverse effects on historic properties in general. Because of all these factors, the only alternative that BOEM was able to identify that avoids any Project effects on these historic properties was the No Action Alternative.

Minimization of Visual and Cumulative Visual Effects on Historic Properties

The Proposed Action (Alternative B) is anticipated to have visual adverse effects on historic properties. Specifically, these are three historic aboveground resources, including one NHL, in the visual APE for Offshore Project components and one historic aboveground resource in the visual APE for Onshore Project components. A discussion specific to NHLs is provided in *National Historic Landmarks*.

Of all alternatives, only Alternative D involves the reduction in Project components that would reduce Project visibility that could cause visual adverse effects on historic properties. Alternative D would involve elimination of 6 WTGs in the northeastern portion of the Lease Area. However, the number of eliminated WTGs is not anticipated to result in a substantial minimization of visual adverse effects. As a result, BOEM determined that all feasible alternatives, including all feasible WTG layouts, would result in visual adverse effects on aboveground historic properties. Because of all these factors, the only alternative that BOEM was able to identify that avoids any Project effects on these historic properties was the No Action Alternative.

Contributing to the potential 901 WTGs modeled in a maximum-case scenario for other future offshore wind activities, all the action alternatives (B through F) would result in visual adverse effects from offshore WTG structure visibility and lighting, including from navigational and aviation hazard lighting systems. Due to cumulative effects from other offshore wind activities, the same three historic properties in the visual APE for Offshore Project components would continue to be adversely affected by offshore structure and lighting visibility under Alternatives C through F as under the Proposed Action. The cumulative visual effects and lighting on historic properties in the visual APE associated with Alternatives C through F, when combined with past, present, and reasonably foreseeable activities, would be long-term and adverse, until decommissioning of the Project.

National Historic Landmarks

The implementing regulations for Section 106 of the NHPA at 36 CFR 800.10 provide special requirements for protecting NHLs and complying with the NHPA Section 110(f). NHPA Section 110(f) applies specifically to NHLs. 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.

BOEM is implementing the special set of requirements for protecting NHLs and for compliance with NHPA Section 110(f) at 36 CFR 800.10, which, in summary:

- Requires 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;
- Requires 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
- Further directs 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.

BOEM has planned, and is, taking action to avoid adverse effects on NHLs in accordance with NHPA 110(f) and pursuant to *The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act* (NPS 2021). BOEM has determined that one NHL, the Nantucket Historic District, would be visually adversely affected by the Proposed Action. BOEM has notified NPS (as the delegate of the Secretary of the Interior) and the ACHP of this determination with distribution of this Finding. ACHP and NPS have been active consulting parties on the Project since BOEM invited them to consult at the initiation of the NHPA Section 106 process on the Project beginning on September 29, 2021. BOEM is fulfilling its responsibilities to give a higher level of consideration to minimizing harm to NHLs, as required by NHPA Section 110(f), through implementation of the special requirements outlined at 36 CFR 800.10.

In the Final EIS and as described herein (Table 1-9), BOEM has identified one alternative that reduces the number of WTGs from the maximum-case scenario of the Proposed Action (i.e., Alternative D). This alternative would reduce the visibility of the Project from the NHL. However, BOEM has determined that the Nantucket Historic District would still be adversely affected by the Project given the size, location, and number of proposed WTGs and distance of the Wind Farm Area to the shoreline under this alternative. As a result, BOEM determined that all feasible alternatives would result in visual adverse effects on this NHL. The only alternative that BOEM was able to identify that avoids any Project effects on this NHL was the No Action Alternative.

When prudent and feasible alternatives "appear to require undue cost or to compromise the undertaking's goals and objectives, the agency must balance those goals and objectives with the intent of section 110(f)" (NPS 2021). In this balancing, the NPS suggests that agencies should consider "(1) the magnitude of the undertaking's harm to the historical, archaeological and cultural qualities of the NHL; (2) the public interest in the NHL and in the undertaking as proposed, and (3) the effect a mitigation action would have on meeting the goals and objectives of the undertaking" (NPS 2021). For the Project, the magnitude of the visual effects on the Nantucket Historic District would be minimized by the distance between proposed offshore WTGs and NHL and through environmental factors, including weather and atmospheric conditions, that limit views of the Project WTGs from the NHL. Moreover, while the undertaking would affect the maritime setting of the NHL, it would not affect other character-defining features or aspects of the NHL's integrity. The Nantucket Historic District, should the undertaking proceed, would still illustrate its regional and national significance, and continue to exemplify its national importance.

Through consultation, BOEM refined the minimization measures to the maximum extent feasible and further developed mitigation measures to resolve adverse effects that remain at the Nantucket Historic District after the application of minimization efforts. BOEM has identified and is finalizing mitigation measures specific to the NHL with the consulting parties through development of the MOA (refer to Attachment A for a draft of the MOA as of September 30, 2024). Mitigation measures for adverse effects on the NHL must be reasonable in cost and not be determined using inflexible criteria, as described by the NPS (2021). Mitigation of adverse effects on the NHL meet the following requirements.

- Reflect the heightened, national importance of the property and be appropriate in magnitude, extent, nature, and location of the adverse effect.
- Focus on replacing lost historic resource values with outcomes that are in the public interest, such as through development of products that convey the important history of the property.
- Comply with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (NPS 2017).

I.4.2 Avoidance, Minimization, and Mitigation Measures

BOEM is consulting with Tribal Nations, SHPOs, ACHP, and consulting parties to finalize avoidance, minimization, mitigation, and monitoring measures for addressing the Project's adverse effects on historic properties. Specifically, BOEM's consultation has developed measures to avoid physical effects and minimize visual effects on historic properties in the APE. BOEM has also consulted on mitigation measures that would be triggered in cases where avoidance of adverse effects on historic properties is not feasible.

The NHPA Section 106 consultation process will culminate in an MOA detailing avoidance, minimization, mitigation, and monitoring measures to avoid and resolve adverse effects on historic properties, including cumulative visual adverse effects to which the Project would be additive. These measures will be stipulated in the MOA and summarized in Final EIS Appendix G, *Mitigation and Monitoring*. Attachment A is a draft of the MOA as of September 30, 2024.

I.5 Phased Identification and Evaluation

In consultation with BOEM and the relevant SHPO, SouthCoast Wind will be using a process of phased identification and evaluation of historic properties as defined in 36 CFR 800.4(b)(2). This includes any remaining unsurveyed areas of the terrestrial APE that would require phased identification of historic properties.

SouthCoast Wind has developed a plan for the process of completing additional required cultural resource investigations (refer to Attachment A for a draft of the MOA as of September 30, 2024; Attachment 12 of the MOA is the *Terrestrial Archaeology Phased Identification Plan*). As of September 2024, efforts to identify and evaluate terrestrial archaeological resources in the terrestrial APE have encompassed areas proposed for Onshore Project components in Massachusetts and Rhode Island. However, the identification and evaluation of historic properties for the entire terrestrial APE is incomplete. Additional archaeological surveys conducted during the phased process may lead to the identification of additional archaeological resources and historic properties in the terrestrial APE. Additionally, if any Project alternatives are approved or there are any changes to the current Project design for either onshore or Offshore Project components that result in Project components falling outside of the previously assessed APE, updated technical studies and reports will be required. While updated information regarding the identification of historic properties was obtained after publication of the Draft EIS and is presented in the Final EIS, additional information may not be available until after the Final EIS.

Information pertaining to identification of historic properties for some Project alternatives may not be available until after the ROD is issued and the COP is approved. For Alternative C, if either sub-alternative (i.e., C-1 and C-2) is selected, BOEM will use the MOA to establish commitments for phasing identification and evaluation of historic properties in the APE, amending the APE, assessing effects, and resolving adverse effects prior to construction. If Alternative C-1 is selected, previously unsurveyed areas associated with the use of a cable route located west of the Sakonnet River would need to be surveyed for marine cultural resources, terrestrial archaeological resources, and historic aboveground resources. If Alternative C-2 is selected, previously unsurveyed areas associated with the use of a cable route located east of the Sakonnet River would need to be surveyed for marine cultural resources, terrestrial archaeological resources, and historic aboveground resources. The approach for phased identification and evaluation will be in accordance with BOEM's existing *Guidelines for Providing Archaeological and Historic Property Information Pursuant to Title 30 Code of Federal Regulations Part 585* and ensure potential historic properties are identified, effects are assessed, and adverse effects are resolved prior to construction.

BOEM has used the MOA to establish commitments for reviewing the sufficiency of any supplemental terrestrial archaeological investigations as phased identification and evaluation of historic properties in the APE; amending the APE per the final Project design, as necessary; and assessing and consulting on effects on historic properties (refer to Attachment A for a draft of the MOA as of September 30, 2024; Stipulation IV provides the protocol for implementing the process of phased identification and evaluation of historic properties). Simultaneous to the publication of the Final EIS, BOEM is coordinating with signatories to the MOA to have the MOA fully signed and executed by December 19, 2024.

I.6 Post-Review Discoveries and Unanticipated Effects

Despite sufficient completion of marine and terrestrial archaeological resource identification surveys, it is possible that unanticipated marine or terrestrial archaeological resources are encountered after BOEM's NHPA Section 106 review is complete and during construction, O&M, or decommissioning of the Project. Non-routine events also could result in an unanticipated effect on a historic property. BOEM has developed a protocol for cases in which there is either the unanticipated discovery of a previously unidentified historic property or an unanticipated effect on a known historic property, both of which are considered to be post-review discoveries. *The Post-Review Discoveries* stipulation of the MOA (Stipulation XI) provides the process for consultations, stabilization of the discovery location, additional investigations, and implementation of resolution measures in the case of a post-review discovery. Attachments 13 and 14 of the MOA are the Post-Review Discoveries Plans (PRDPs; also known as Unanticipated Discoveries Plans [UDPs]) describing the specific processes that would be followed in the case of an unanticipated, post-review discovery of a marine or terrestrial archaeological resource, respectively. Refer to Attachment A for a draft of the MOA as of September 30, 2024.

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ATTACHMENT A. DRAFT MEMORANDUM OF AGREEMENT (AS OF SEPTEMBER 30, 2024)

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ATTACHMENT B. FIGURES

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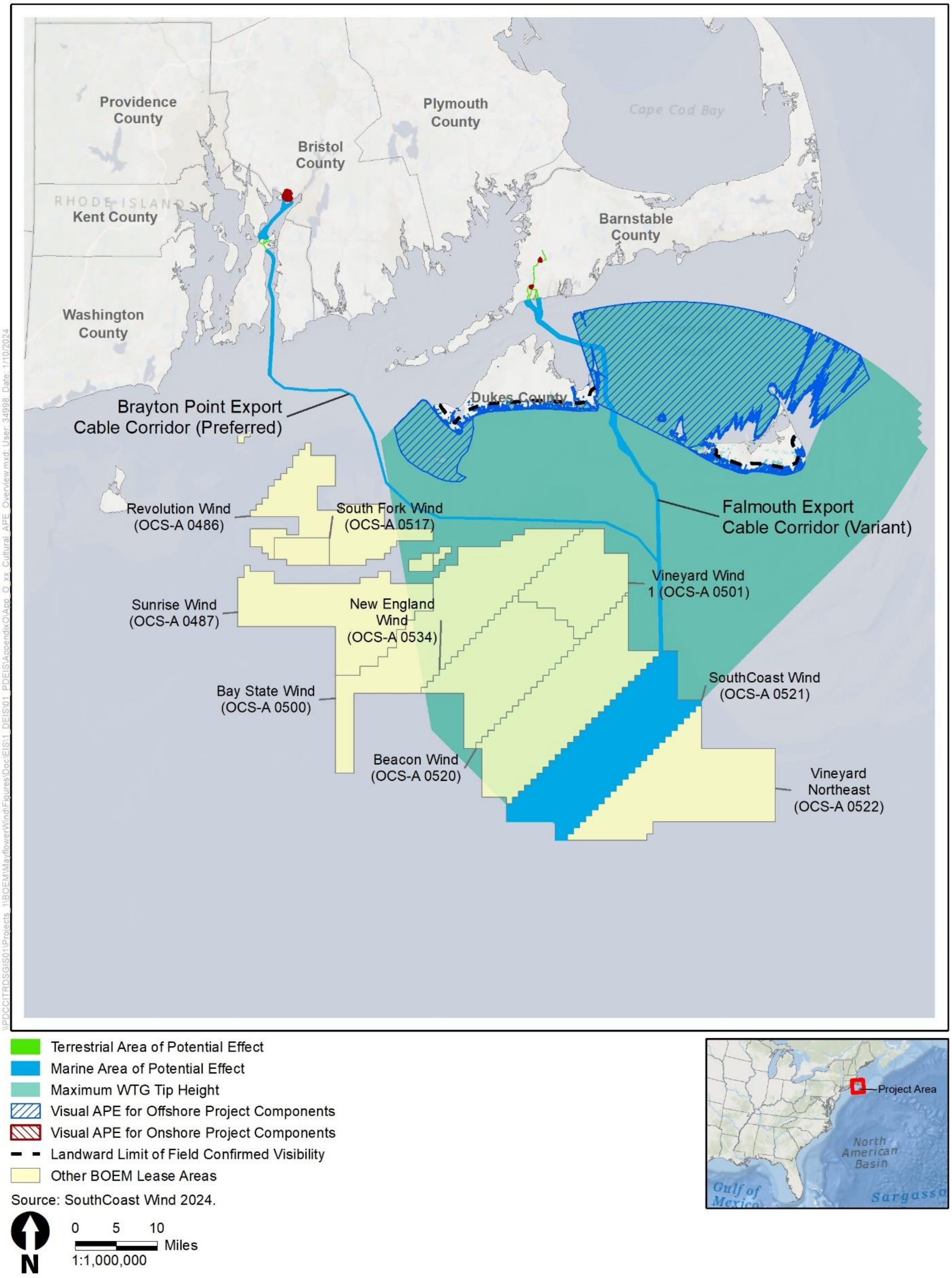

Figure I.B-1. Project APE overview

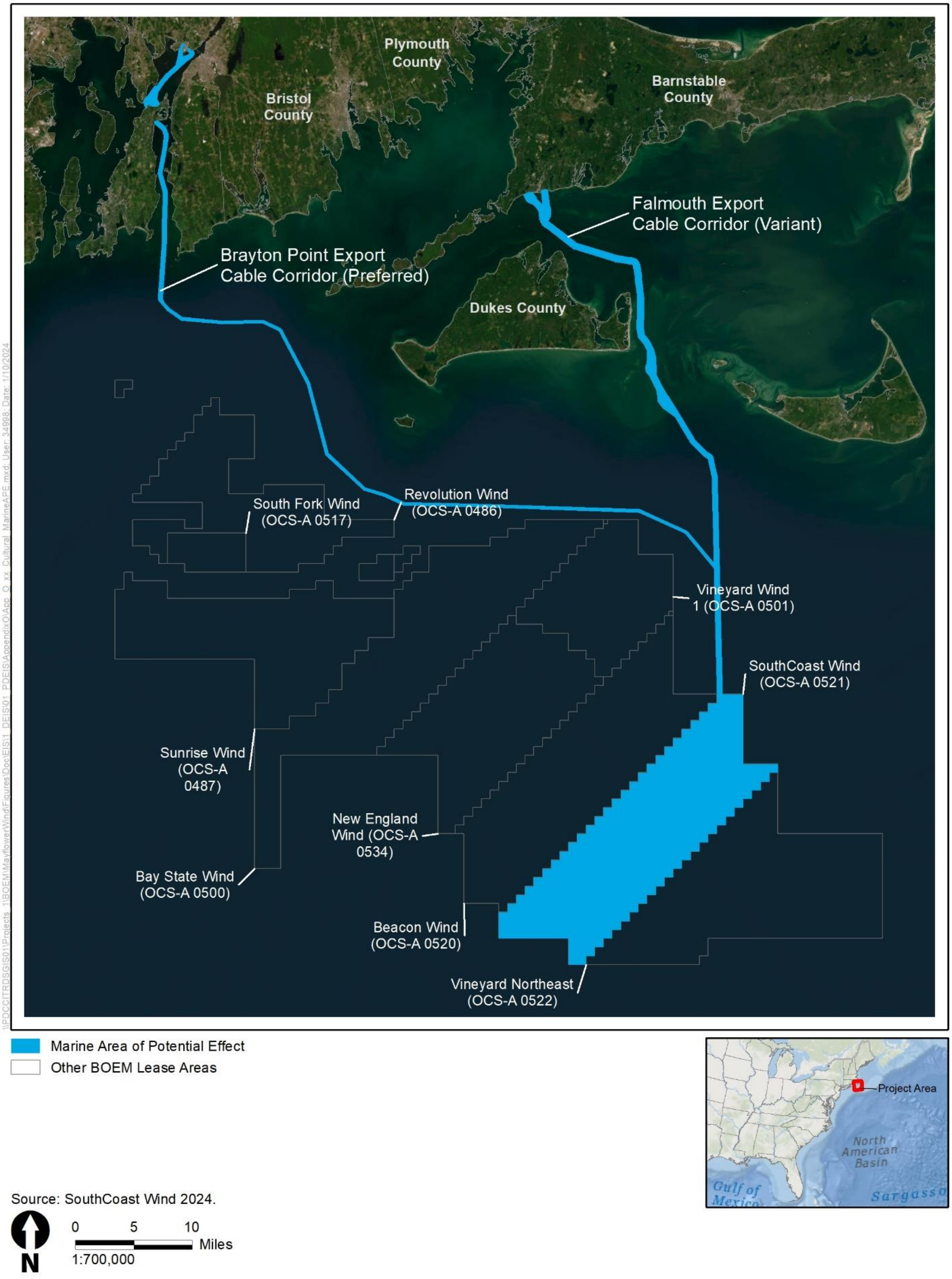

Figure I.B-2. Marine APE

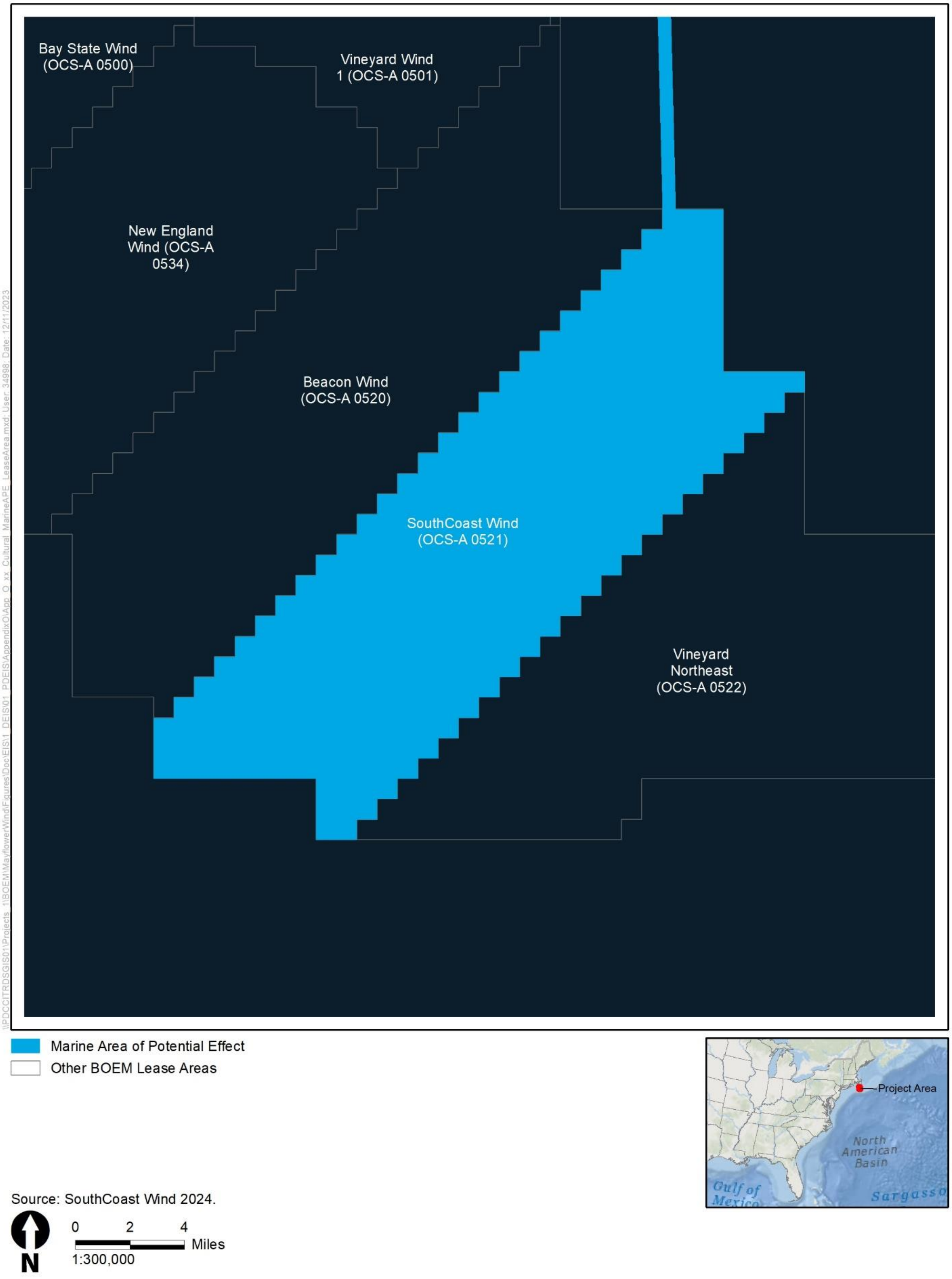

Figure I.B-3. Detail of marine APE within the Lease Area

Figure I.B-4. Detail of marine APE within the Falmouth Export Cable Route Corridor

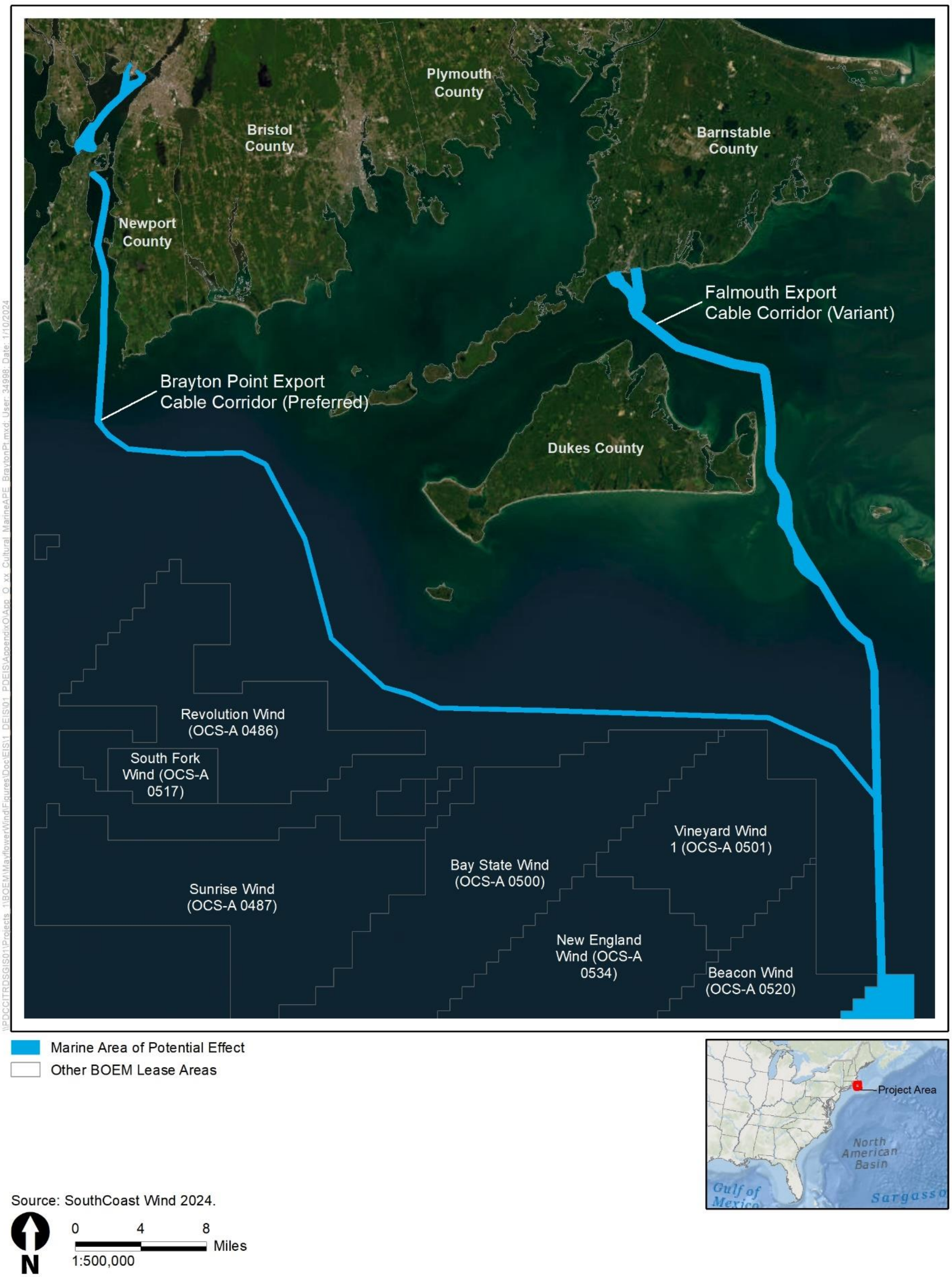

Figure I.B-5. Detail of marine APE within the Brayton Point Export Cable Route Corridor

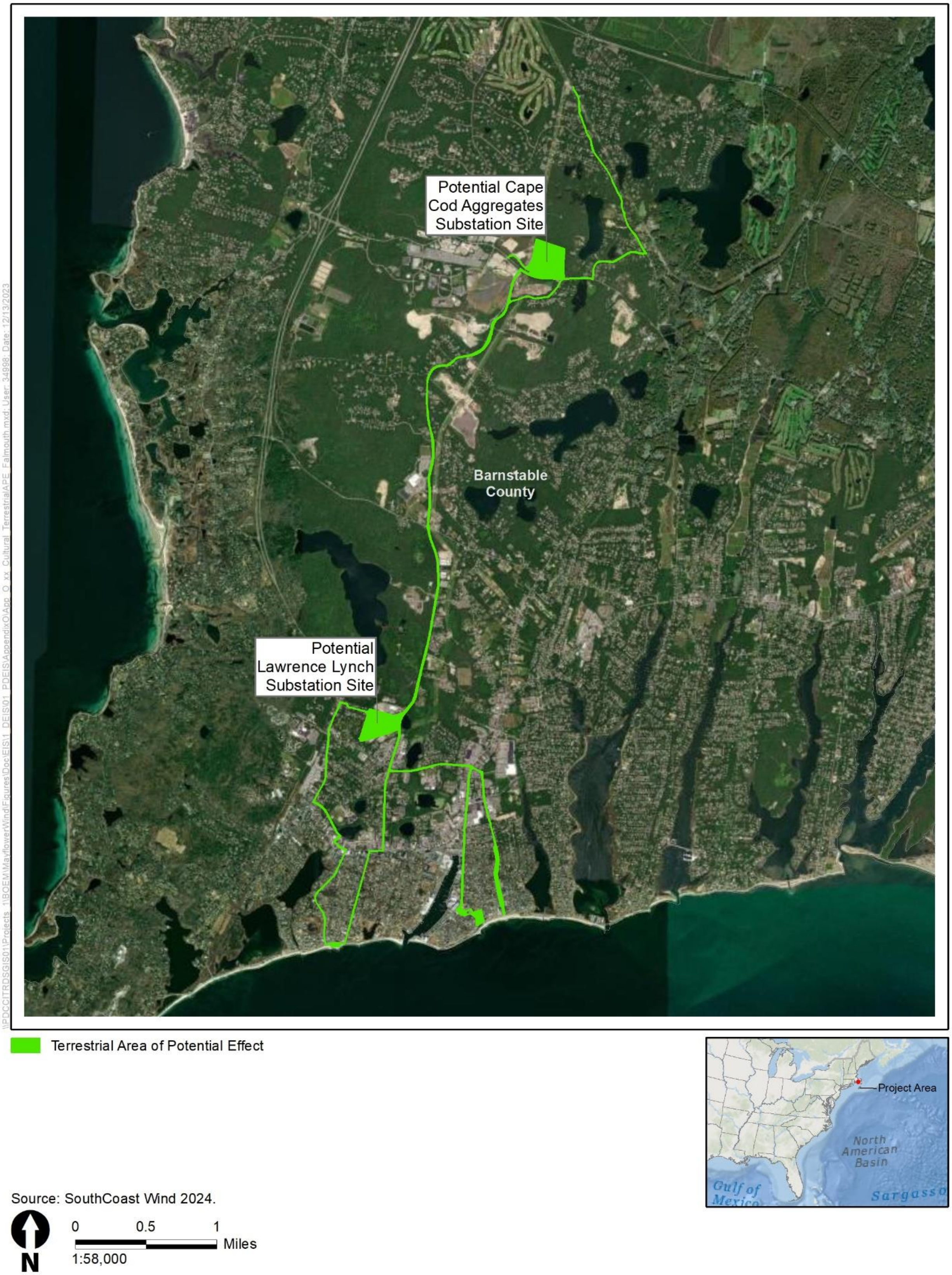

Figure I.B-6. Detail of terrestrial APE for Falmouth (Variant ECC)

Figure I.B-7. Detail of terrestrial APE for Aquidneck Island (Preferred ECC)

Figure I.B-8. Detail of terrestrial APE for Brayton Point (Preferred ECC)

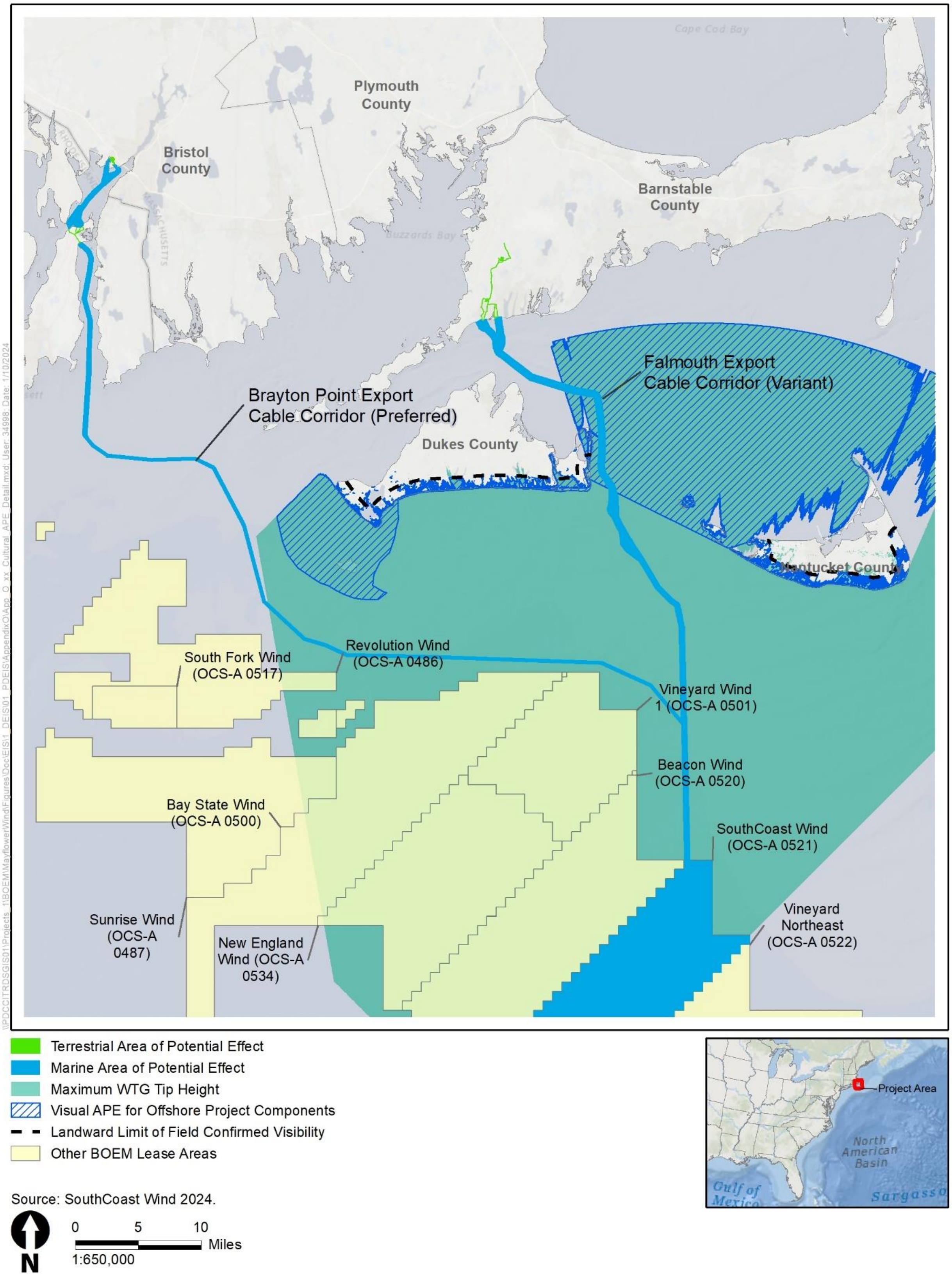

Figure I.B-9. Visual APE for Offshore Project components

Figure I.B-10. Detail of visual APE for Offshore Project components for Martha's Vineyard

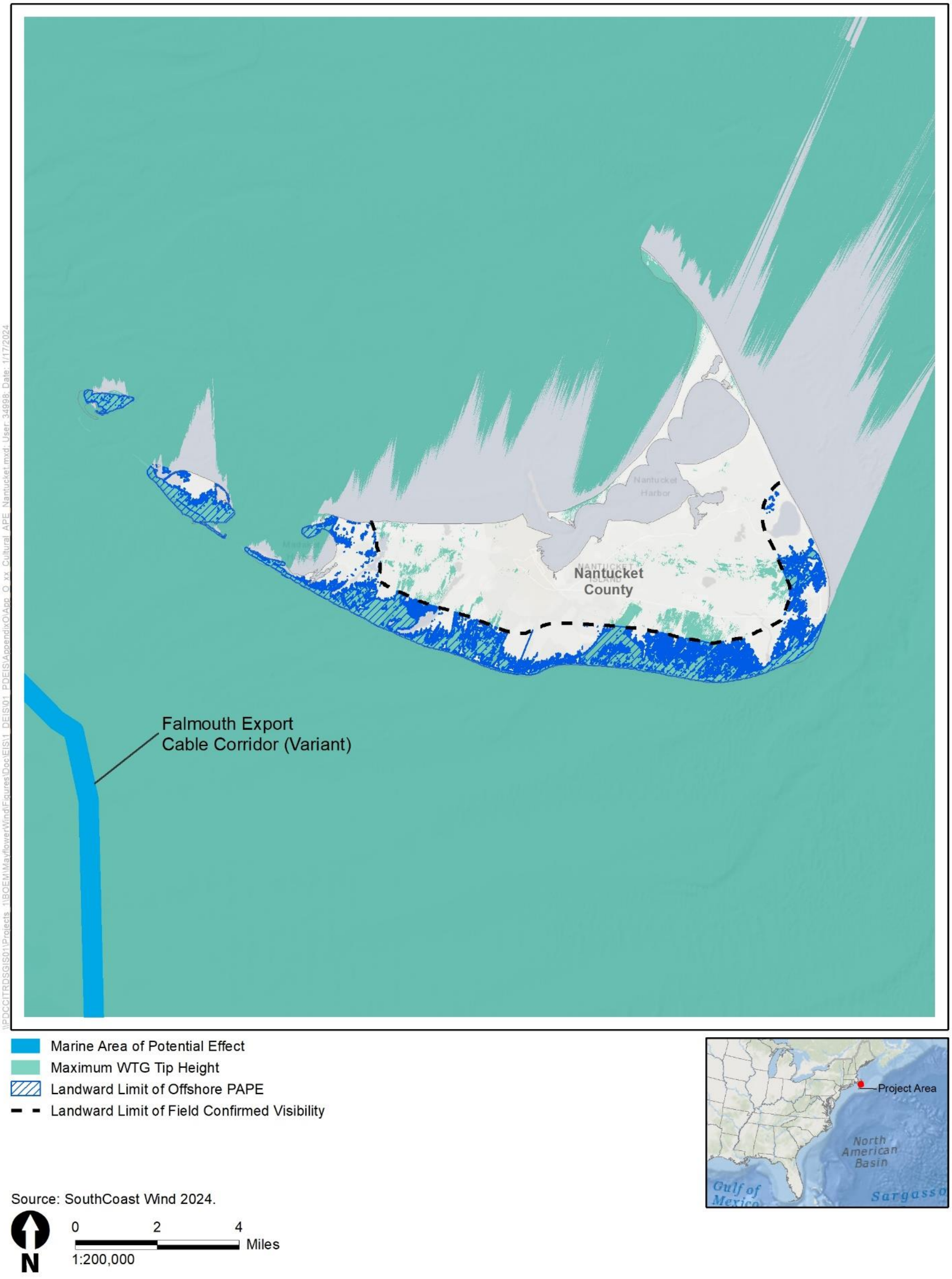

Figure I.B-11. Detail of visual APE for Offshore Project components for Nantucket

Figure I.B-12. Detail of visual APE for Onshore Project components for proposed Lawrence Lynch Preferred Substation in Falmouth (Variant ECC)

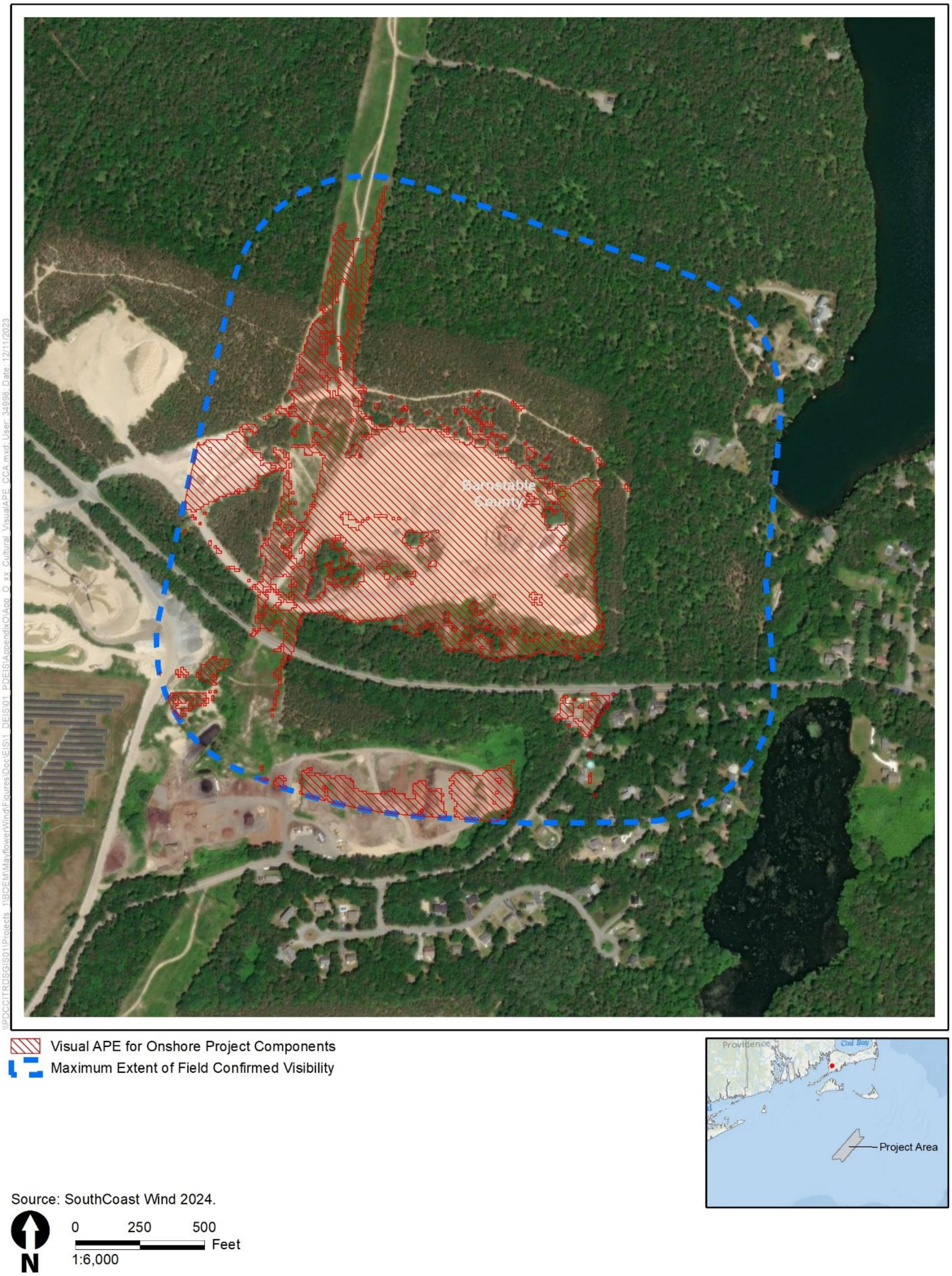

Figure I.B-13. Detail of visual APE for Onshore Project components for proposed Cape Cod Aggregates Alternative Substation in Falmouth (Variant ECC)

Figure I.B-14. Detail of visual APE for Onshore Project components for Brayton Point (Preferred ECC)

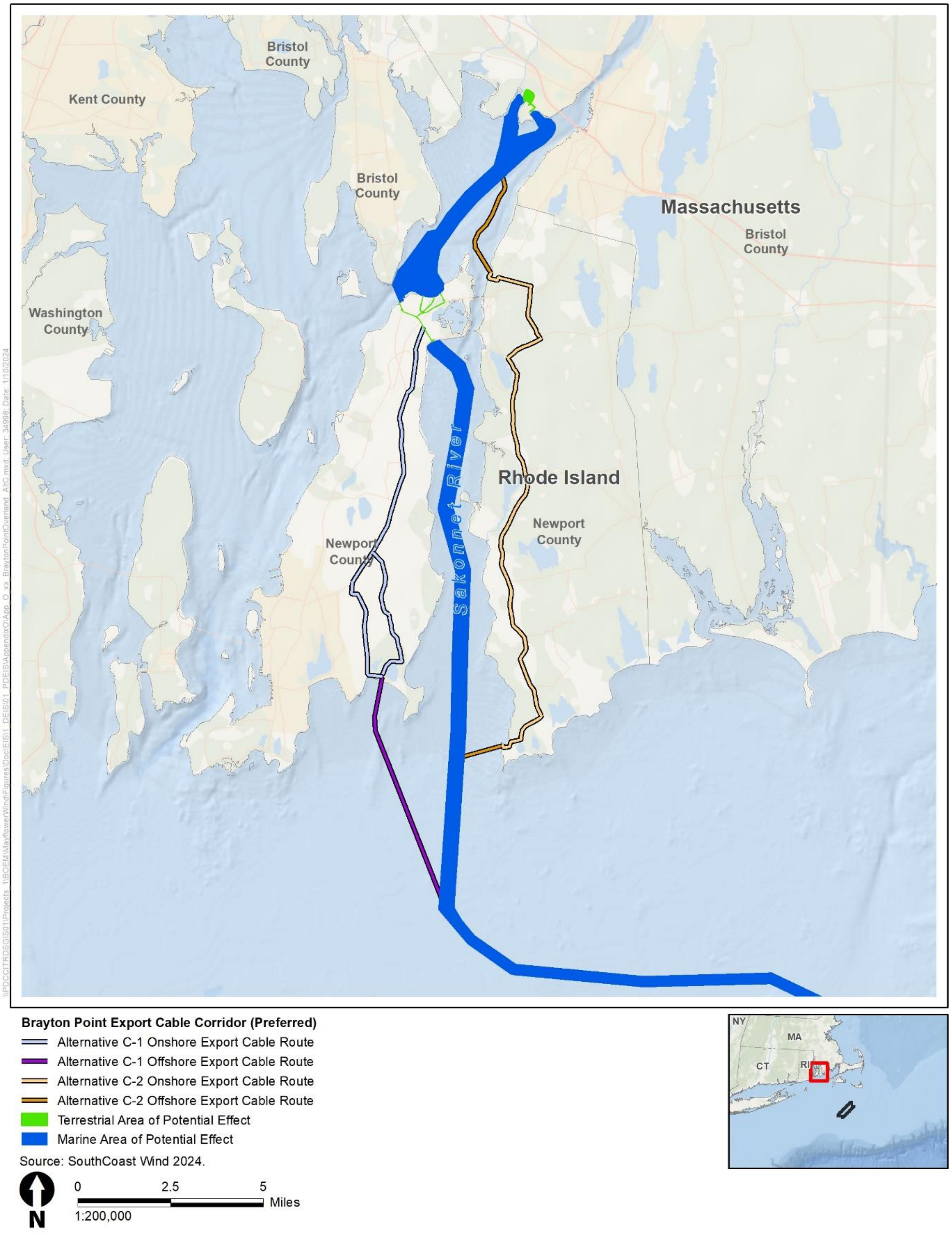

Figure I.B-15. Alternative C route options in relation to the defined Project APE

ATTACHMENT C. 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 SouthCoast Wind Project, in September and October 2021. During the consultations, additional parties were made known to BOEM and were invited as they were identified; these additional parties are included in this list.

Government or Organization Type	Participating Government or Organization Name
Federal Agencies or Facilities	U.S. Advisory Council on Historic Preservation (ACHP) U.S. Army Corps of Engineers (USACE) U.S. Bureau of Safety and Environmental Enforcement (BSEE) U.S. National Park Service (NPS) U.S. Navy, Naval Facilities Engineering Systems Command (NAVFAC) U.S. Navy, Naval History and Heritage Command
Federally Recognized Tribal Nations	Delaware Tribe of Indians Mashantucket (Western) Pequot Tribal Nation Mashpee Wampanoag Tribe Mohegan Tribe of Connecticut The Delaware Nation The Narragansett Indian Tribe The Shinnecock Indian Nation Wampanoag Tribe of Gay Head (Aquinnah)
SHPOs and State Agencies	Massachusetts Board of Underwater Archaeological Resources (BUAR) Massachusetts Commission on Indian Affairs Massachusetts Historical Commission (MHC) Rhode Island Historical Preservation & Heritage Commission (RIHPHC)
Non-Federally Recognized Tribes	Chappaquiddick Tribe of Wampanoag Nation
Local Governments	Barnstable County Board of Commissioners Cape Cod Commission City of Cranston, Rhode Island City of East Providence, Rhode Island City of Fall River, Massachusetts City of New Bedford, Massachusetts City of New Bedford, New Bedford Port Authority, Massachusetts City of Pawtucket, Rhode Island City of Providence, Rhode Island City of Warwick, Rhode Island County of Edgartown, Massachusetts Dukes County Commission, Edgartown, Massachusetts Falmouth Historical Commission Martha's Vineyard Commission Nantucket Historic District Commission Nantucket Historical Commission

Government or Organization Type	Participating Government or Organization Name
	Nantucket Planning & Economic Development Commission (NPEDC) Town of Aquinnah, Massachusetts Town of Barnstable, Massachusetts Town of Barnstable, Historical Commission, Massachusetts Town of Barrington, Rhode Island Town of Bristol, Rhode Island Town of Charlestown, Rhode Island Town of Chilmark, Massachusetts Town of Dartmouth, Massachusetts Town of East Greenwich, Rhode Island Town of Falmouth, Massachusetts Town of Gosnold, Cuttyhunk Island, Massachusetts Town of Jamestown, Rhode Island Town of Little Compton, Rhode Island Town of Middletown, Rhode Island Town of Nantucket, Massachusetts Town of Narragansett, Rhode Island Town of New Shoreham, Block Island, Rhode Island Town of Oak Bluffs, Massachusetts Town of Portsmouth, Rhode Island Town of Somerset, Historical Commission, Massachusetts Town of South Kingstown, Rhode Island Town of Swansea, Massachusetts Town of Tisbury, Vineyard Haven, Massachusetts Town of Tiverton, Rhode Island Town of Warren, Rhode Island Town of Westerly, Rhode Island Town of Westport, Massachusetts
Nongovernmental Organizations or Groups	Alliance to Protect Nantucket Sound (APNS) Charlestown Historical Society Gay Head Lighthouse Advisory Board Martha’s Vineyard Museum Massachusetts Historical Society Museum of African American History, Boston Museum of African American History, Nantucket Nantucket Conservation Foundation Nantucket Historical Association Nantucket Preservation Trust Oak Grove Cemetery Association of Falmouth, Inc. Preservation Massachusetts Rhode Island Historical Society South County History Center, Kingston, Rhode Island The Maria Mitchell Association (Dark Skies Initiative) Trustees Martha's Vineyard and Nantucket Vineyard Power Cooperative
Lessee	SouthCoast Wind Energy LLC

ATTACHMENT D. CONSULTING PARTIES TO THE SOUTHCOAST WIND PROJECT

The following is a current list of consulting parties to the NHPA Section 106 review of the SouthCoast Wind Project as of January 2024. During the consultations, additional parties were made known to BOEM and were added as they were identified; these additional parties are included in this list.

Government or Organization Type	Government or Organization Name	Contact Person
Federal Agencies or Facilities	U.S. Advisory Council on Historic Preservation (ACHP)	Christopher Daniel Jamie Lee Marks
	U.S. Bureau of Safety and Environmental Enforcement (BSEE)	Barry Bleichner Douglas Jones
	U.S. National Park Service (NPS)	Kristin Andel Sherry Frear Mary Krueger Kathy Schlegel
	U.S. Army Corps of Engineers (USACE)	Ruthann Brien Roberta Budnik
	U.S. Navy, Naval Facilities Engineering Systems Command (NAVFAC) HQ	Jennifer L. Harty Juliana Henkel
	U.S. Navy, Naval History and Heritage Command	Alexis Catsambis Bradley A. Krueger
Federally Recognized Tribal Nations	Delaware Tribe of Indians	Susan Bachor Brad KillsCrow Joanna Maurer Martina Thomas Tristen Tucker
	Mashantucket (Western) Pequot Tribal Nation	Rodney Butler Stormy Hay Michael Kickingbear Johnson Crystal Whipple Joelina G. Whitford-Anthony
	Mashpee Wampanoag Tribe	Carlton Hendricks Jason Steiding Brian Weeden David Weeden
	Mohegan Tribe of Connecticut	James Gessner Jean McInnis James Quinn
	The Narragansett Indian Tribe	John Brown Anthony Dean Stanton Dinalyn Spears

Government or Organization Type	Government or Organization Name	Contact Person
	The Shinnecock Indian Nation	T. Rainbow Chavis Jason Cofield Rachel Valdez-Castillo
	Wampanoag Tribe of Gay Head (Aquinnah)	Cheryl Andrews-Maltais Kevin Devine Lael Echo-Hawk Kimberlina Gomez Ryan Sawyer Barbara Spain Jennifer Wade Bettina Washington
SHPOs and State Agencies	Massachusetts Board of Underwater Archaeological Resources (BUAR)	David S. Robinson
	Massachusetts Historical Commission (MHC)	Ed Bell Brona Simon
	Rhode Island Historical Preservation & Heritage Commission (RIHPHC)	Jeffrey Emidy Elizabeth Totten
Non-Federally Recognized Historic Massachusetts Tribe	Chappaquiddick Tribe of Wampanoag Nation	Penny Gamble-Williams Alexis Moreis Lamar Moreis Grace Robinson Ray Williams
Local Government	Cape Cod Commission	Sarah Korjeff Jordan Velozo
	City of East Providence, Rhode Island	Roberto DaSilva
	City of New Bedford and New Bedford Port Authority, Massachusetts	Blair Bailey
	Martha's Vineyard Commission	Dan Doyle Bill Veno
	Nantucket Historic District Commission	Angus MacLeod
	Nantucket Historical Commission	Abby DeMolina
	Nantucket Planning & Economic Development Commission (NPEDC, represented by Cultural Heritage Partners [CHP])	Holly Backus Will Cook (CHP)
	Town of Aquinnah, Massachusetts	Gisele Gauthier Jeffrey Madison
	Town of Barnstable	Erica Brown
	Town of Barnstable, Historical Commission, Massachusetts	George Jessop Cheryl Powell
	Town of Bristol, Rhode Island	Gregg Marsili
	Town of Falmouth, Massachusetts	Jed Cornock
	Town of Jamestown, Rhode Island	Lisa Bryer Edward Mello

Government or Organization Type	Government or Organization Name	Contact Person
	Town of Middletown, Rhode Island	Wendy Marshall
	Town of Nantucket, Massachusetts (represented by CHP)	Lauren Sinatra Will Cook (CHP)
	Town of Somerset, Historical Commission, Massachusetts	James O'Rourke
	Town of South Kingstown, Rhode Island	Theresa Murphy Lucas Murray
	Town of Swansea, Massachusetts	Mallory Aronstein
	Town of Swansea, Conservation Commission, Massachusetts	Adeline Bellesheim
	Town of Warren, Rhode Island	Anthony DeSisto Kate Michaud
	Town of Westport, Massachusetts	Jim Hartnett
Non-governmental Organizations or Groups	Alliance to Protect Nantucket Sound (APNS)	Audra Parker Sandy Taylor
	Gay Head Lighthouse Advisory Board	Richard Skidmore
	Nantucket Preservation Trust	Mary Bergman
	Oak Grove Cemetery Association of Falmouth, Inc.	Jerry Luby
	The Maria Mitchell Association	Joanna Roche
Lessee	SouthCoast Wind Energy LLC	Jennifer Flood Kori Ktona Victor Mastone

Appendix J: References Cited

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J.1.4 Chapter 4, Other Required Impact Analysis

None.

Appendix K: Glossary

Term	Definition
affected environment	Environment as it exists today that could be potentially affected by the proposed Project
algal blooms	Rapid growth of the population of algae, also known as *algae bloom*
allision	A moving ship running into a stationary ship
anthropogenic	Generated by human activity
archaeological resource	Historical place, site, building, shipwreck, or other archaeological site on the landscape
below grade	Below ground level
benthic	Related to the bottom of a body of water
benthic resources	The seafloor surface, the substrate itself, and the communities of bottom-dwelling organisms that live within these habitats
Cetacea	Order of aquatic mammals made up of whales, dolphins, porpoises, and related lifeforms
coastal habitat	Coastal areas where flora and fauna live, including salt marshes and aquatic habitats
coastal waters	Waters in nearshore areas where bottom depth is less than 98.4 feet (30 meters)
coastal zone	The lands and waters starting at 3 nautical mile (nm) from the land and ending at the first major land transportation route
commercial fisheries	Areas or entities raising and catching fish for commercial profit
commercial-scale wind energy facility	Wind energy facility usually greater than 1 megawatt (MW) that sells the produced electricity
criteria pollutant	One of six common air pollutants for which the United States 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
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)
demersal	Living close to the ocean floor
design envelope	The range of proposed project characteristics defined by the applicant and used by Bureau of Ocean Energy Management (BOEM) for purposes of environmental review and permitting
dredging	Removal of sediments and debris from the bottom of lakes, rivers, harbors, and other waterbodies
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 nonliving components (such as air, water, soil)
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
Endangered Species Act–listed species	Species listed under the Endangered Species Act (ESA) of 1973 (as amended)
environmental protection measure	Measure proposed to avoid or minimize potential impacts
ensonification	The process of filling with sound
environmental consequences	The potential direct, indirect, and cumulative impacts that the construction, operations and maintenance (O&M), and decommissioning of a proposed project would have on the environment
environmental justice communities	Minority and low-income populations affected by a proposed project
epifauna	Fauna that lives on the surface of a seabed (or riverbed), or is attached to underwater objects or aquatic plants or animals
essential fish habitat	Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (50 code of federal regulations [CFR] 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 United States Coast Guard (USCG), including radar transponders, lights, sound signals, buoys, and lighthouses, that support safe maritime navigation
finfish	Vertebrate and cartilaginous fishery species, not including crustaceans, cephalopods, or other mollusks
for-hire commercial fishing	Commercial fishing on a for-hire vessel (i.e., a vessel on which the passengers make a contribution to a person having an interest in the vessel in exchange for carriage)
for-hire recreational fishing	Fishing from a vessel carrying a passenger for hire who is engaged in recreational fishing
foundation	The bases to which the wind turbine generators (WTGs) and offshore substation platforms (OSPs) are installed on the seabed; four types of foundations have been considered and reviewed for the Project: monopile, piled jacket, suction bucket, and gravity based
geomagnetic	Relating to the magnetism of the Earth
gravity-based structure	Typically constructed of steel, concrete, or a combination of both, gravity-based structures sit on top of the sea floor and are not pile driven
hard-bottom habitat	Benthic habitats composed of hard-bottom (e.g., cobble, rock, and ledge) substrates

Term	Definition
historic property	Prehistoric or historic district, site, building, structure, or object that is eligible for or already listed in the National Register of Historic Places (NRHP); also includes any artifacts, records, and remains (surface or subsurface) related to and located within such a resource
historical resource	Prehistoric or historic district, site, building, structure, or object that is eligible for or already listed in the NRHP; 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
infauna	Fauna living in the sediments of the ocean floor (or river or lake beds)
interarray cables	Cables connecting the wind turbine generators to the electrical service platforms
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 then be fed 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 nm (1.8 kilometer) per hour
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 (30 meters)
mechanical cutter	Method of submarine cable installation equipment that involves a cutting wheel or excavation chain to cut a narrow trench into the seabed allowing the cable to sink under its own weight or be pushed to the bottom of the trench via a cable depressor
mechanical plow	Method of submarine cable installation equipment that involves pulling a plow along the cable route to lay and bury the cable; the plow's share cuts into the soil, opening a temporary trench, which is held open by the side walls of the share, while the cable is lowered to the base of the trench via a depressor; some plows may use additional jets to fluidize the soil in front of the share
monopile or monopile foundation	A long steel tube driven into the seabed that supports a tower
nautical mile	A unit used to measure sea distances and equivalent to approximately 1.15 miles (1.85 kilometers)
offshore substation	The interconnection point between the WTGs and the export cable; the necessary electrical equipment needed to connect the inter-array cables to the offshore export cables
onshore substation	Substation connecting the proposed Project to the existing bulk power grid system

Term	Definition
operations and maintenance facilities	Would include offices, control rooms, warehouses, shop space, and pier space
Outer Continental Shelf	All submerged land, subsoil, and seabed belonging to the United States but outside of states' jurisdiction
pile	A type a foundation akin to a pole
pile driving	Installing foundation piles by driving them into the seafloor
pinnipeds	Carnivorous, semiaquatic marine mammals with fins, also known as seals
pin pile	Small-diameter pipe driven into the ground as foundation support
plume	Column of fluid moving through another fluid
private aids to navigation	Visual references on structures positioned in or near navigable waters of the U.S., including radar transponders, lights, sound signals, buoys, and lighthouses, that support safe maritime navigation; permits for the aids are administered by USCG
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 ESA of 1973 (as amended)
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, ledge) substrates, as well as biogenic habitat (e.g., eelgrass, mussel beds, worm tubes) created by structure-forming species
substrate	Earthy material at the bottom of a marine habitat; the natural environment that an organism lives in
suction-bucket jacket	Latticed steel frame with three to four supporting suction-bucket foundations securing the structure to the seabed
suspended sediments	Very fine soil particles that remain in suspension in water for a considerable period of time without contact with the bottom; such material remains in suspension due to the upward components of turbulence and currents, 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
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

Term	Definition
vibracore	Technology/technique for collecting core samples of underwater sediments and wetland soils
viewshed	Area visible from a specific location
visual resource	The visible physical features on a landscape, including natural elements such as topography, landforms, water, vegetation, and anthropogenic structures
wetland	Land saturated with water; marshes; swamps
wind energy	Electricity from naturally occurring wind
wind energy area	Areas with significant wind energy potential and defined by BOEM
wind turbine generator	Component that puts out electricity in a structure that converts kinetic energy from wind into electricity

Appendix L: List of Preparers and Reviewers

L.1 List of Preparer and Reviews

Table L-1. Bureau of Ocean Energy Management contributors

Name	Role/Resource Area
National Environmental Policy Act (NEPA) Coordinator	
Brune, Genevieve	Environmental Protection Specialist
Resource Scientists and Contributors	
Ajilore, Ololade	Navigation and Vessel Traffic
Baker, Arianna	Navigation and Vessel Traffic
Baker, Kyle	Marine Mammals; Sea Turtles
Beser, Todd (USACE)	Wetlands
Bigger, David	Birds; Bats; Coastal Habitat and Fauna
Browning, Jeffrey	Project Coordinator
Brune, Genevieve	Land Use and Coastal Infrastructure
Bucatari, Jennifer	Other Uses (Marine Minerals)
Chaiken, Emma	Commercial Fisheries and For Hire Recreational Fishing
Chakey, Sindey	Environmental Justice; Recreation and Tourism; CZMA
Conrad, Alex	Finfish, Invertebrates, and Essential Fish Habitat; Marine Mammals; Sea Turtles
Cornelison, Meghan	Environmental Justice
Draher, Jennifer	Water Quality
Fulling, Gregory	Marine Mammals; Sea Turtles
Horrell, Christopher	Cultural Resources
Jensen, Brandon	Benthic Resources; Coastal Habitat and Fauna; Finfish, Invertebrates, and Essential Fish Habitat; Wetlands; Commercial Fisheries and For-Hire Recreational Fishing; Other Uses (Scientific Research and Surveys)
Jensen, Mark	Commercial Fisheries and For-Hire Recreational Fishing; Demographics, Employment, and Economics; Recreation and Tourism
Lewis, Jo'Anne	Navigation and Vessel Traffic; Other Uses (SAR)
McCarty, John	Scenic and Visual Resources; Recreation and Tourism
McCoy, Angel	Meteorologist
McGuffin, Andrew	Other Uses (Cables and Pipelines)
Miller, Jennifer	Other Uses (Radar Systems)
Moshier, Marissa	Cultural Resources and Section 106 Lead

Name	Role/Resource Area
O’Connell, Daniel	Technical Design Elements
Oliver, Elizabeth	Tribal Liaison
Pollock, Jayson	Commercial Fisheries and For Hire Recreational Fishing
Richards, Renee	Other Uses (Cables and Pipelines; Radar Systems)
Schnitzer, Laura	Cultural Resources
Slayton, Ian	Air Quality; Cumulative
Stokely, Sarah	Cultural Resources
Sullivan, Kimberly	Environmental Justice
Wisman, Jeri	Marine Mammals; Sea Turtles
Wolf, Jacob	Air Quality

Table L-2. Reviewers

Name	Title	Agency
Bureau of Ocean Energy Management (BOEM) and U.S. Department of the Interior (DOI) Reviewers		
Brown, William Y.	Chief Environmental Officer	BOEM
Hildreth, Emily	Renewable Energy Policy Specialist	BOEM
Krevor, Brian	Lead Environmental Protection Specialist	BOEM
Landers, Lisa	BOEM NEPA Section Chief	BOEM
Melendez-Arreaga, Pedro	Lead Attorney-Advisor, Office of the Solicitor	DOI
Morin, Michelle	Chief, Environmental Branch for Renewable Energy	BOEM
Ottman, Noel	Attorney-Advisor, Office of the Solicitor	DOI
Sebastian, Robert	Lead Attorney-Advisor, Office of the Solicitor	DOI
Stromberg, Jessica	Deputy Chief, Environmental Branch for Renewable Energy	DOI
Vorkoper, Stephen	Attorney-Advisor, Office of the Solicitor	DOI
Cooperating and Participating Agency Reviewers		
Boeri, Robert	Project Review Coordinator/Dredging Coordinator	Massachusetts Office of Coastal Zone Management
Brien, Ruthann	Regulatory Project Manager	U.S. Army Corps of Engineers (USACE)
Butler, Ryan	Lieutenant Commander	U.S. Coast Guard (USCG)
DeMeo, Sharon	Region 1 Staff	Environmental Protection Agency (USEPA)
Desautels, Michele	District 1 Staff	USCG
Gaito, Danielle	Region 1 Staff	USEPA

Name	Title	Agency
Haight, Terra	Ocean and Lakes Policy Analyst	New York State Department of State
Heckman, Andrea	Lead Environmental Protection Specialist	Bureau of Safety and Environmental Enforcement (BSEE)
Krueger, Mary	Energy Specialist, Interior Region 1, North Atlantic-Appalachian	National Park Service
McLean, Laura	Ocean and Lakes Policy Analyst	New York State Department of State
Pentony, Michael	Regional Administrator	National Marine Fisheries Service
Sinclair, Jim	Marine Ecologist	BSEE
Sparkman, Christopher	Marine Information Specialist	USCG
Teixeira, Stacy	Coast Guard Officer/Emergency Management	USCG
Timmermann, Timothy	Director, Office of Environmental Review, New England-Region 1	USEPA
Tuttle, Graham	Marine Protected Species Program National Lead	BSEE
West, Stephen	Commander	USCG

Table L-3. Consultants

Name	Company	Role/Resource Area
Ackerman, Caitlyn	ICF	Environmental Justice; Demographics, Employment, and Economics
Baer, Sarah	ICF	Land Use and Coastal Infrastructure; Demographics, Employment, and Economics
Bartlett, Alex	ICF	Wetlands
Coleman, Randall	ICF (formerly)	Project Manager
Crawford, Karen	ICF	Cultural Resources and Section 106 Lead
Diller, Elizabeth	ICF	Project Director
Ernst, David	ICF	Air Quality
Gleaton, Soniya	ICF	Comment Processing
Ha, Anthony	ICF	Publications Specialist
Hatfield, Teresa	ICF	Navigation and Vessel Traffic
Jost, Rebecca	ICF	Other Uses, Recreation and Tourism
Lanza, Robert	ICF	Planned Activities Scenario
Lundstrom, Kristen	ICF	Editor
McCoy, Maureen	ICF	Cultural Resources and Section 106 Support
Muntz, Alice	ICF	Cultural Resources and Section 106 Support
ODonnell, Megan	ICF	Project Manager

Name	Company	Role/Resource Area
Paulson, Merlyn	ICF (formerly)	Scenic and Visual Resources
Schanel, Pam	ICF	Public Involvement
Slankard, Scott	ICF	Water Quality
Thoene, Jason	ICF	Geographic Information Systems
Weaver, Alexis	ICF	Project Coordinator
Conetta, Dennis	RPS	Benthic Resources, Marine Mammals
Dauksis, Russell	RPS	Benthic Resources, Commercial Fisheries and For-Hire Recreational Fishing, Sea Turtles, Coastal Habitats and Fauna
Davies, Stephen	RPS	Commercial Fisheries and For-Hire Recreational Fishing, Finfish and Invertebrates
Garvey, Derek	RPS	Finfish and Invertebrates, Sea Turtles, Marine Mammals
Morandi, Alicia	RPS (formerly)	Project Manager, Reviewer, Sea Turtles, Marine Mammals, Coastal Habitats and Fauna
Misa, Paula	RPS	Project Manager, Reviewer, Sea Turtles, Marine Mammals, Finfish and Invertebrates
Misa, William	RPS	Benthic Resources, Finfish and Invertebrates, Marine Mammals

Appendix M: Distribution List

This Environmental Impact Statement (EIS) is available in electronic form for public viewing at https://www.boem.gov/southcoast-wind. Hard copies and digital copies 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 could provide comments and input. The Bureau of Ocean Energy Management (BOEM) accepted comments received or postmarked no later than April 18, 2023, in any of the following ways:

- In hard copy form, delivered by hand or by mail, enclosed in an envelope labeled "Mayflower 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-2023-0011."
- By attending one of the EIS public meetings on the 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 Project are provided in Table M-1 through Table M-5.

M.1 Notification List

Table M-1. Federal agencies

Agency	Contact
Cooperating Federal Agencies	
U.S. Army Corps of Engineers (USACE)	Naomi Handell, Regulatory Program Manager, USACE North Atlantic Division Roberta Budnik, Regulatory Division, New England District
Bureau of Safety and Environmental Enforcement	Jordan Creed, FAST-41 Coordinator Andrea Heckman, Office of Environmental Compliance
Environmental Protection Agency	Timothy Timmerman, National Environmental Policy Act Program Manager, Region 1
National Marine Fisheries Service	Sue Tuxbury, Fishery Biologist/Wind Coordinator, Greater Atlantic Regional Fisheries Office, Habitat and Ecosystems Services Division
United States Coast Guard	Michele Desautels, District 1
Participating Federal Agencies	
Fish and Wildlife Service	Audrey Mayer, Field Supervisor, New England Field Office Jane Ledwin, Infrastructure Streamlining Coordinator
National Park Service	Mary Krueger, Energy Specialist, Project Lead
Department of Navy	Matt Senska, Director, Marine Resources and At-Sea Policy

Agency	Contact
Department of Defense	Steven Sample, Executive Director, Department of Defense Siting Clearinghouse
Advisory Council on Historic Preservation	Blythe Semmer, Assistant Director for Special Initiatives

Table M-2. State agencies

Agency	Contact
Cooperating State Agencies	
Massachusetts Office of Coastal Zone Management	Lisa Engler, Director
Rhode Island Coastal Resources Management Council	Jeffrey Willis, Executive Director
State of New York Department of State	Michael Snyder, Ocean and Great Lakes Program Manager Terra Haight, Ocean and Lakes Policy Analyst

Table M-3. Federally Recognized Tribal Nations and Native organizations

Tribal Nation	Contact
Delaware Tribe of Indians	Susan Bachor, Archaeologist, Deputy Tribal Historic Preservation Officer Representative Brad KillsCrow, Chief Joanna Maurer, GIS Specialist Martina Thomas, Preservation Generalist Tristen Tucker, Environmental Program Director
Mashantucket (Western) Pequot Tribal Nation	Rodney Butler, Chairman Stormy Hay, THPO Coordinator Michael Kickingbear Johnson, Acting Tribal Historic Preservation Officer Crystal Whipple, Vice Chairwoman Joelina G. Whitford-Anthony, THPO Coordinator
Mashpee Wampanoag Tribe	Carlton Hendricks, Vice Chairman Jason Steiding, Natural Resources Department Brian Weeden, Chairman David Weeden, THPO
Mohegan Tribe of Indians of Connecticut	James Gessner, Chairman Jean McInnis, Environmental Protection Administrator James Quinn, Tribal Historic Preservation Officer
The Narragansett Indian Tribe	John Brown, Tribal Historic Preservation Officer Anthony Dean Stanton, Sachem Dinalyn Spears, Natural Resource Manager
The Shinnecock Indian Nation	T. Rainbow Chavis Jason Cofield, Director of Tribal Operations Rachel Valdez-Castillo, THPO

Tribal Nation	Contact
Wampanoag Tribe of Gay Head (Aquinnah)	Cheryl Andrews-Maltais, Chairwoman Kevin Devine, Councilman Lael Echo-Hawk, General Counsel Kimberlina Gomez Ryan Sawyer Barbara Spain, Executive Assistant Jennifer Wade, Consultant for Tribe Bettina Washington, Tribal Historic Preservation Officer

Table M-4. Public libraries

Public Library	Address
Falmouth Public Library	300 Main St, Falmouth, MA 02540
Somerset Public Library	1464 County St, Somerset, MA 02726
Portsmouth Free Public Library	2658 E Main Rd, Portsmouth, RI 02871
Middletown Public Library	700 W Main Rd, Middletown, RI 02842
Tiverton Public Library	34 Roosevelt Ave, Tiverton, RI 02878
Brownell Library	44 Commons St, Little Compton, RI 02837
Nantucket Atheneum	1 India St, Nantucket, MA 02554
Vineyard Haven Public Library	200 Main St, Vineyard Haven, MA 02568

Table M-5. Section 106 consulting parties

Government or Organization Type	Participating Government or Organization Name	Contact
Federal Agencies	Advisory Council on Historic Preservation	Christopher Daniel, Program Analyst Jamie Lee Marks, Senior Analyst, Office of Native American Affairs
	Bureau of Safety and Environmental Enforcement (BSEE)	Barry Bleichner, Archaeologist Douglas Jones, Acting Federal Preservation Officer/Gulf of Mexico Tribal Liaison
	National Park Service	Kristin Andel, Energy Specialist, Resource Planning and Compliance Program Sherry Frear, Chief of the National Register and National Historic Landmark Program Mary Krueger, Energy Specialist Kathy Schlegel, Historical Landscape Architect
	Naval Facilities Engineering Systems Command (NAVFAC) HQ	Jennifer L. Harty, Cultural Resources Team Lead Juliana Henkel, Cultural Resources Analyst, Chief of Naval Operations
	U.S. Army Corps of Engineers	Roberta "Birdie" Budnik, Regulatory Project Manager, USACE New England District

Government or Organization Type	Participating Government or Organization Name	Contact
	US Navy, Naval History and Heritage Command	Alexis Catsambis, PhD, RPA, Branch Head Bradley A. Krueger
Federally Recognized Tribal Nations	See Table M-3	See Table M-3
State Historic Preservation Officers (SHPOs) and State Agencies	Massachusetts Board of Underwater Archaeological Resources	David S. Robinson, Chief Archaeologist/State Underwater Archaeologist
	Massachusetts Historical Commission	Brona Simon, SHPO Ed Bell, Deputy SHPO
	Rhode Island Historical Preservation & Heritage Commission	Jeffrey Emidy, Executive Director; State Historic Preservation Officer Elizabeth Totten, Project Review Coordinator
Non-Federally Recognized Tribes	Chappaquiddick Tribe of Wampanoag Nation	Penny Gamble-Williams Alexis Moreis, Tribal Historic Preservation Officer Lamar Moreis, Tribal Council member Grace Robinson, Tribal Council member Ray Williams
Local Government	Cape Cod Commission	Sarah Korjeff, Historic Preservation Specialist Jordan Velozo, Chief Regulatory Officer
	City of East Providence, Rhode Island	Roberto DaSilva, Mayor
	City of New Bedford and New Bedford Port Authority	Blair Bailey, General Counsel
	Martha's Vineyard Commission	Dan Doyle, Special Projects Planner Bill Veno, Senior Planner
	Nantucket Historic District Commission	Angus MacLeod, District Section 106 Representative
	Nantucket Historical Commission	Abby DeMolina, Representative
	Nantucket Planning & Economic Development Commission	Holly Backus, Preservation Planner
	Town of Aquinnah, Massachusetts	Gisele Gauthier, Consultant Jeffrey Madison, Town Administrator
	Town of Barnstable	Erica Brown, Admin Asst
	Town of Barnstable, Historical Commission	George Jessop, Member Cheryl Powell, Member
	Town of Bristol, Rhode Island	Greg Marsili, Harbor Master
	Town of Falmouth	Jed Cornock, Town Planner
	Town of Jamestown, Rhode Island	Lisa Bryer, Town Planner Edward Mello, Town Administrator
	Town of Middletown, Rhode Island	Wendy Marshall, Town Clerk
	Town of Nantucket	Lauren Sinatra, Energy Coordinator

Government or Organization Type	Participating Government or Organization Name	Contact
	Town of Somerset, Historical Commission	James O'Rourke, Chairman
	Town of South Kingstown	Theresa Murphy, Interim Town Manager Lucas Murray, Director of Administrative Services
	Town of Swansea, Massachusetts	Mallory Aronstein, Town Administrator
	Town of Warren, Rhode Island	Anthony DeSisto, Town Solicitor Kate Michaud, Town Manager
	Town of Westport, Massachusetts	Jim Hartnett, Town Administrator
Nongovernmental Organizations or Groups	Alliance to Protect Nantucket Sound (APNS)	Audra Parker, President and CEO Sandy Taylor, Executive Assistant
	Gay Head Lighthouse Advisory Board	Richard Skidmore, Co-Chairman
	Nantucket Preservation Trust	Mary Bergman, Executive Director
	Oak Grove Cemetery Association of Falmouth, Inc.	Jerry Luby, President
	The Maria Mitchell Association	Joanna Roche, Executive Director
Lessee	SouthCoast Wind Energy LLC	Jennifer Flood, Offshore Permitting Manager Kori Ktona Victor Mastone, Archaeologist/Tribal Liaison

Appendix N: Responses to Comments on the Draft Environmental Impact Statement

Contents

List of Tables

N.1 Introduction

On February 17, 2023, the Bureau of Ocean Energy Management (BOEM) published a notice of availability for the SouthCoast Wind Project (Project) Draft Environmental Impact Statement (EIS), consistent with the regulations implementing the National Environmental Policy Act (NEPA; 42 U.S. Code [USC] 4321 et seq.), to assess the potential impacts of the Proposed Action and alternatives. The Draft EIS was made available in electronic form for public viewing at https://www.boem.gov/renewable-energy/state-activities/southcoast-wind, and hard copies or electronic copies were delivered to other entities as specified in Appendix M 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 45-day public comment period for the Draft EIS. BOEM extended the public comment period by 15 days. The comment period closed on April 18, 2023. This appendix describes the Draft EIS public comment processing methodology and definitions, includes responses to comments received on the Draft EIS, and describes where specific updates to the Final EIS can be found in the document.

N.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-2023-0011" in the search field.

N.3 Methodology

N.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.

N.3.2 Comment Submittals

Federal agencies, tribal governments, state/local 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-2023-0011.
- Hard-copy comment letters submitted to BOEM via traditional mail.
- 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 N.3-1.

Table N.3-1. Public hearings

Date	Time	Location
March 20, 2023	5:00 p.m. Eastern Time	Zoom Webinar: https://www.boem.gov/renewable-energy/state-activities/boem-southcoast-public-meeting-3202023
March 22, 2023	1:00 p.m. Eastern Time	Zoom Webinar: https://www.boem.gov/renewable-energy/state-activities/boem-southcoast-public-meeting-3222023
March 27, 2023	5:00 p.m. Eastern Time	Zoom Webinar: https://www.boem.gov/renewable-energy/state-activities/boem-southcoast-public-meeting-3272023

All submissions initially provided by methods other than www.regulations.gov, including the transcripts of comments recorded at each public hearing listed in Table N.3-1, were uploaded to the docket. Each submission, including testimony by individual speakers at the public hearings listed in Table N.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.

N.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 all formats was 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 SouthCoast Wind 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 testimonies were read to identify individual substantive and general comments (as defined under N.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 0005 was identified as BOEM-2023-0011-0005-0004.

Substantive comments from cooperating agencies were organized by agency and are presented verbatim in N.4. 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 N.5. General comments are summarized in Section N.7 and the specific comments that contributed to a comment summary are identified by comment number.

N.4 Responses to Cooperating and Participating Agency Comments on the Draft EIS

N.4.1 Cooperating Federal Agencies

N.4.1.1 National Oceanic and Atmospheric Administration, National Marine Fisheries Service

Table N.4.1-1. Responses to comments from National Ocean and Atmospheric Administration, National Marine Fisheries Service (BOEM-2023-0011-0185)

Comment No.	Comment	Response
BOEM-2023-0011-0185-0001	One of our most significant concerns involves the potential impacts of the construction and operation of this project on endangered North Atlantic right whales. As described in previous correspondence Nantucket Shoals and adjacent waters are a biologically important area for right whales and a primary winter foraging aggregation area for right whales (see for example Quintana-Rizzo et al. 2021 Davis et al. 2017). Use of this area has increased significantly since 2010 as right whale habitat use has shifted (Quintana-Rizzo et al. 2021 NMFS 2022). Without the implementation of robust and effective mitigation measures it is our view that significant impacts on North Atlantic right whales may occur from project construction and operation due to direct impacts on North Atlantic right whales during construction long-term impacts to foraging as a result of project operations and potential mortality or serious injury from vessel strikes over the life of the project. The DEIS preliminarily concludes that the proposed mitigation measures are not sufficient to avoid vessel strike on North Atlantic right whales. BOEM concludes in the DEIS that vessel strike of a North Atlantic right whale cannot be ruled out even with SouthCoast Wind's proposed avoidance minimization and mitigation measures (AMMs). The death of a single North Atlantic right whale would have population level consequences; therefore impacts of vessel traffic are considered major in the DEIS. As such BOEM	The EIS addresses the known use of the Project area, including the vicinity to marine mammal habitat and proximity to Nantucket Shoals, and considers the importance of these habitats. Final Environmental Impact Statement (EIS) Section 3.5.6, *Marin Mammals,* discusses the potential impact of the proposed Project on marine mammals and has been revised to include more detail on the Project's proposed mitigation measures that specifically focus on protecting North Atlantic right whales (NARWs). In response to concerns related to pile-driving activities occurring in the Nantucket Shoals region, SouthCoast Wind proposed a NARW Mitigation and Monitoring Plan (Appendix G, Attachment G-3) This plan intends to supplement the existing applicant-proposed monitoring mitigation measures and includes expanded monitoring coverage of the pre-start clearance and shutdown zones and Level B harassment zones within the National Marine Fisheries Service (NMFS) area of concern (20 kilometers [km] of the 30-meter isobath on the west side of Nantucket Shoals). Measures in this plan also include SouthCoast Wind's commitment to only use impact pile driving during the installation of the foundations associated with Project 1 in the northern portion of the Lease Area (Project 1), which includes all locations within the NMFS area of concern.

Comment No.	Comment	Response
	should require additional mitigation measures that would minimize risk of vessel strike such that it would not be expected to occur; any such measures should be clearly described and their impact and effectiveness analyzed in the FEIS.	A comprehensive list of mitigation and monitoring measures (Appendix G, Table G-1, under *Vessel Operations*) that would be implemented to avoid, minimize, and mitigate adverse impacts on marine mammals, specifically the NARW. These measures include, but are not limited to, avoidance of peak NARW seasonal presence, use of sound attenuation technologies, use of Protected Species Observers (PSOs), passive acoustic monitoring (PAM), soft-start procedures, shutdown procedures, and other measures. These mitigation measures will effectively eliminate the risk of vessel strikes, and the EIS has been updated to state this more clearly. The Bureau of Ocean Energy Management (BOEM) and NMFS continue to work together to use the best available information to determine appropriate mitigation measures. Additionally, mitigation and monitoring measures may arise from consultations from federal and state resource agencies and will be considered by decision-makers and potentially adopted as conditions for approval as necessary.
BOEM-2023-0011-0185-0002	We have previously expressed concern about the operational impacts of the project on North Atlantic right whales. Those concerns remain. We continue to encourage BOEM to more fully evaluate the available literature to assess the impacts of the presence of structures and operation of WTGs on ecological conditions that support right whale foraging in Southern New England and to develop measures to avoid and minimize these effects from the SouthCoast Wind project. While we agree that there is some uncertainty and more research is needed the DEIS does not fully evaluate the extent of all potential impacts in the Presence of Structures section for the proposed action (Alternative B section 3.5.6.5). The DEIS does not recognize the importance of Nantucket Shoals and surrounding waters as a primary foraging habitat for North Atlantic right whales and does not fully address the potential effects of the action including the approximately 30-year operational period on North Atlantic right whale prey foraging behavior and health and fitness of	BOEM has partnered with the National Academies of Science Engineering and Math (NASEM) for an independent peer review of potential hydrodynamic impacts for offshore wind facilities on prey species. The report concluded that hydrodynamic impacts from offshore wind projects adjacent to Nantucket Shoals will likely be difficult to distinguish from the ongoing effects of climate change currently occurring in this region. Likewise, BOEM finds that measurable impacts of offshore wind farms to the foraging success of whales that would result in population-level effects are not reasonably likely to occur and that a recommended NARW conservation buffer is not warranted based on the review of best available information and expert opinion found in the report. Further monitoring studies would be needed to have the spatial and temporal coverage to adequately understand the impact of future wind farms, and BOEM will continue to coordinate with partners to develop regional monitoring strategies to obtain scientific information on the potential hydrodynamic

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	individual right whales. As currently written the impact determination for Presence of Structures focuses on reef effects and accumulation of ghost gear. It does not provide any conclusion related to oceanographic or wind wake effects on the abundance or distribution of prey or the effects on North Atlantic right whale foraging within the SouthCoast Wind project area or the surrounding waters of Nantucket Shoals. We consider these issues and effects to be significant requiring focused attention and evaluation in the FEIS.	effects of wind turbine generators (WTGs). Based on the current information available, including the initial meetings associated with the peer review, BOEM is of the position that the current National Environmental Policy Act (NEPA) and Endangered Species Act (ESA) analyses accurately reflect the expected impacts on NARWs from offshore wind projects, as well as provide an adequate suite of measures to avoid, minimize, or mitigate impacts on NARWs.
BOEM-2023-0011-0185-0003	BOEM has included Alternative D which considers the removal of up to six turbine locations at the northern end of the lease as an alternative to reduce impacts to North Atlantic right whales. However as acknowledged in the DEIS this alternative would have no appreciable reduction in impacts on North Atlantic right whales as compared to the proposed action (which the DEIS describes as a major impact). We agree with BOEM's determination that Alternative D would provide no meaningful difference for North Atlantic right whales from the proposed action and recommend that BOEM not carry this alternative forward for full evaluation (i.e. include in the FEIS as considered but not carried forward). NMFS provided a recommended alternative that would have precluded development of WTGs within a 20-km buffer of the Nantucket Shoals 30- meter isobath which was not carried forward by BOEM based on the determination that it was not economically feasible. NMFS recommends that BOEM works with NMFS to identify and	The primary basis for the recommended alternative, as presented by NMFS, is the potential for the presence of WTGs to result in hydrodynamic effects that change zooplankton productivity and aggregations, which may reduce foraging opportunities for the NARW. Based on best available science, BOEM believes there is a lack of conclusive evidence that the proposed WTG locations within the Lease Area have the potential to result in hydrodynamic effects on NARW foraging in the vicinity of Nantucket Shoals.[1] The best available science suggests that effects are most likely to be localized to the immediate vicinity of the turbine array and to not extend to Nantucket Shoals. Primary studies supporting this position include modeling of the full build-out of the southern New England lease areas (Johnson et al. 2021), hydrodynamic studies of wind facilities in the North Sea (Christiansen et al. 2022), and recent comprehensive literature reviews (NASEM 2024). In particular, the NASEM study was commissioned to "evaluate the potential for

[1] Two of the primary conclusions from the NASEM report *Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales* (2024) demonstrate that it is not reasonable to conclude eliminating a large number of WTGs from SouthCoast Wind would have a significant beneficial effect. Specifically, "**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." and "**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."

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	analyze an alternative that would meaningfully reduce impacts of the project including considering the removal of a greater number of turbine positions in the northern portion of the lease area. We also request that you revisit the “Preclude the Development of WTGs within a 20-kilometer buffer of the Nantucket Shoals 30-meter isobath” and the “Eliminate up to 17 WTGs in the northeastern portion of the Lease Area” alternatives.	offshore wind farms in the Nantucket Shoals region to affect oceanic physical processes, and, in turn, how those hydrodynamic alterations might affect local regional ecosystems.” The study, titled *Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales,* concluded that “the impacts of offshore wind projects on the NARW and the availability of their prey in the Nantucket Shoals will likely be difficult to distinguish from the significant impacts of climate change and other influences on the ecosystem” (NASEM 2023). Furthermore, the key recommendation from the study is “while wind energy planning and development progresses, the BOEM, NOAA, and others should promote observational studies and modeling that will advance understanding of potential hydrodynamic effects and their consequent impacts on ecology in the Nantucket Shoals region during all phases of wind energy development.” BOEM is also supporting additional research on this topic, in accordance with the NASEM recommendations. During the process of identifying the Massachusetts lease areas BOEM excluded certain areas identified as important habitats that could be affected if ultimately developed with the installation of WTGs. Nantucket Shoals was among the areas excluded from the subsequent commercial leasing. BOEM does not assert there are no effects from wind turbine wake and corresponding wind speed and clarifies that the effects would not likely have a detectable effect on foraging and would not have population-level impacts on important species including NARW. Without impacts on foraging and a reasonable causal connection to population impacts, NMFS’s reasoning for this alternative is not justifiable or persuasive. NMFS has not demonstrated its 20-kilometer buffer alternative is warranted or provided any new information to support it, and current available peer-reviewed studies and data constituting best available science do not conclude that

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		there would be a reasonable expectation of population-level impacts.
BOEM-2023-0011-0185-0004	In order to issue an Incidental Take Authorization (ITA) under the MMPA NMFS OPR needs to make a determination that the authorized take will have a "negligible impact" on the stock. Many studies spanning marine mammal taxa and sound source types show noise exposure may result in behavioral disruption including avoidance and foraging cessation (see for example Southall et al. 2021 Duarte et al. 2021 Goldbogen et al. 2013). Persistent disturbance of foraging can accrue to impact reproduction and survival especially for unhealthy animals with limited energy reserves (Keen et al. 2021 McHuron et al. 2021 Pirotta et al. 2023). For populations with low abundance high mortality rates and low reproductive rates impacts to reproductive success or survival of any individuals can adversely impact populations. As you are aware NMFS OPR has proposed pile driving-related mitigation measures for SouthCoast to mitigate the impacts from construction related noise adequately for NMFS to be able to make a negligible impact determination. Also we continue to work with SouthCoast to identify and include measures that would adequately reduce the risk of vessel strike such that zero strikes are expected which is also necessary in order to make negligible impact determination.	BOEM has proposed a suite of mitigation, monitoring, and reporting conditions that are expected to avoid and minimize any potential impacts. These measures include seasonal restrictions on pile driving to times of year during which NARWs are least likely to occur. Additionally, conditions are proposed to lower sound levels that would decrease the area in which whales might be exposed. The monitoring conditions would also avoid exposure to noise when whales are sighted by not allowing pile driving to occur or by minimizing the duration of exposure such that long-term reductions in foraging would not occur. Stringent vessel strike avoidance measures are also proposed that go above and beyond what NMFS requires through regulation. BOEM agrees with NMFS regarding the status of the NARW, including the overall concerns for the recovery of the population. BOEM will continue to work cooperatively with NMFS to assess the best available information and identify any conditions that are reasonable provided support and analysis based upon such information.
BOEM-2023-0011-0185-0005	Last we remain concerned about the impacts of installing and operating wind turbines in North Atlantic right whale feeding habitat and how that will impact right whale foraging success. As we have clearly articulated to SouthCoast additional habitat mitigation may be necessary prior to the issuance of any final rule and will be informed by the ESA section 7 consultation and public comments on the proposed rule. NMFS OPR will continue to work with you on these issues and in particular discuss both how the NEPA process may be affected and how the additional mitigation measures can be incorporated into and analyzed in the FEIS.	Thank you for the comment. BOEM remains committed to avoiding and minimizing any impacts on the foraging success of whales if a rigorous analysis of the best available information suggests such impacts may occur. BOEM has made plausible assumptions in its analysis and has proposed mitigation measures based on its analysis of the best available information. BOEM is committed to applying the best available information throughout its environmental review.

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BOEM-2023-0011-0185-0006	We remain concerned about our ability to reach a "no jeopardy" conclusion in the pending ESA consultation for this project without incorporating mitigation measures designed to avoid and minimize impacts of construction and operation on North Atlantic right whales into the proposed action for consultation. We are currently reviewing the March 2022 draft biological assessment (BA) to determine if all of the information necessary to initiate consultation has been provided. The DEIS and BA should be consistent when addressing effects to North Atlantic right whales And drawing conclusions related to exposure to stressors including the risk of vessel strike; they currently are not. We look forward to working with you to incorporate any needed mitigation measures designed to avoid and minimize impacts of construction and operation on North Atlantic right whales throughout the ongoing ESA consultation to help BOEM ensure that the project is not likely to jeopardize the continued existence of the species.	The Final EIS and Final Biological Assessment (BA) have been revised and all conclusions are in alignment between the documents. The effects analysis of the BA includes conclusions regarding the construction, operation, and decommissioning of the proposed offshore wind project. BOEM, and SouthCoast through the Marine Mammal Protection Act (MMPA) Incidental Take Regulation (ITR) application process with NMFS, have proposed many mitigation and monitoring measures to avoid and minimize impacts on NARWs. Review of the best available information does not lead any analysis to conclusions that population-level impacts on NARWs, and jeopardy, are likely to result from the proposed action.
BOEM-2023-0011-0185-0007	We appreciate the consideration of a land-based alternative for the export cable corridor and we consider this to be the environmentally preferred alternative for the export cable route. Avoiding the Sakonnet River through a land-based cable route would reduce impacts to aquatic resources including important estuarine habitats and designated Habitat Areas of Particular Concern (HAPC) for juvenile Atlantic cod. The DEIS does not recognize or discuss the potential differences in anticipated impacts of construction within an estuarine environment compared with an offshore environment. Further the DEIS references outstanding surveys for the cable route that are necessary to evaluate how this alternative compares with the proposed action. The document appears to suggest without supporting evidence that cable installation within an estuarine environment would have the same effects as cable installation offshore and suggests that impacts to EFH finfish and invertebrates from avoiding construction in the Sakonnet River would "not [be]	The Final EIS (Section 3.5.2, *Benthic Resources*, and Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*) has been revised to include additional discussion of the difference in impacts on benthic and essential fish habitat (EFH) resources between the Proposed Action, which would lay cable in the Sakonnet River, and Alternatives C-1 and C-2, which would avoid the Sakonnet River by installing cable overland, including the difference in estuarine benthic disturbances. Following the release of the Draft EIS, SouthCoast Wind, at BOEM's request, commissioned two desktop studies using existing site-specific and regional data to inform BOEM's assessment of the Alternative C cable routes: *SouthCoast Wind BOEM Alternative C Geohazard Desktop Study* (TetraTech 2023) and *SouthCoast Wind BOEM Alternative C-1 Benthic Desktop Study* (INSPIRE 2023). The findings from these desktop studies have been incorporated into the Final EIS (principally Section 3.5.2, *Benthic Resources,* and Section

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	measurably different" from the proposed action. However the DEIS does not consider the unique features and value of the estuarine environment or how impacts of the project may vary along the alternative cable routes. Rather the analysis appears to discount the reduction in impacts to estuarine environments and associated fisheries that would be anticipated from the selection of the land-based alternative. We recommend that this analysis be revised to evaluate these unique estuarine features as further survey information becomes available.	3.5.5, *Finfish, Invertebrates, and Essential Fish Habiata*) and support BOEM's analysis of the cable routes. BOEM believes the information contained in these desktop studies, along with existing information that BOEM and SouthCoast Wind have already gathered (including a terrestrial archaeological desktop study [PAL 2022] and a marine archaeological desktop study [RCG&A 2022]; refer to Section 3.6.2, *Cultural Resourc*es) provides adequate information for BOEM to make an informed decision regarding the alternatives.
BOEM-2023-0011-0185-0008	In many sections of the DEIS there is little to no detailed analysis of the action alternatives or an evaluation of the differences in impacts between the action alternatives. The analysis for each of the action alternatives does not include consideration of the actual design parameters of the proposed action nor where these parameters are specifically located within the project area. The analyses are also very general and depict the lease area and surrounding waters as indistinguishable from any other parts of the continental shelf. This approach does not allow the reader to understand or identify any meaningful distinctions between the impacts of each of the action alternatives nor does it include a comparison of the impacts of the action alternatives to each other (beyond the affected footprint of the alternative) which is a key component of the EIS needed to inform decision making. The analysis remains solely focused on acreage of area impacted and does not consider other important factors such as the location and resources present in the affected area.	BOEM believes the analysis in the Draft EIS provided an appropriate level of detail and comparative analysis among alternatives for the public and decision-maker to distinguish the impacts between alternatives. The level of analysis and detail by alternatives is commensurate with other BOEM offshore wind EISs. However, to improve the discussion and understanding of the differences between alternatives, BOEM has added a Comparison of Alternatives section to each Chapter 3 resource section that compares the impacts among alternatives. Refer also to responses to comments by resource section regarding where BOEM has made revisions to the Final EIS based on specific NMFS comments about the alternatives analysis.
BOEM-2023-0011-0185-0009	Effects from the different alternatives will vary depending on the location of where the impact producing factors occur. However those variations in impacts are not captured in the DEIS and the analysis inaccurately assumes that fewer acres impacted is better without an assessment of potential trade-offs between alternatives. For example under Alternative F	BOEM agrees that the alternatives vary in impacts based on the location that the impact- IPFs would occur and has described those impacts to the extent the information is known and available. As it relates to Alternative F, BOEM has included additional discussion in various resource Final EIS sections (e.g., Section 3.5.2, *Benthic Resources*, and Section

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	the DEIS does not discuss the trade-offs between the installation of fewer cables and the long-term impacts to fish stocks from larval impingement associated with operation of the open loop cooling system of an HVDC converter station. This trade-off analysis may vary depending on the habitat types being impacted by cable installation and the location of the converter station but that is not discussed in the DEIS. We recognize that the EIS is a tool to inform decision making for this project; however the DEIS does not currently include the analysis and justification necessary to inform decisions related to alternatives and/or measures to reduce project impacts.	3.5.6, *Marine Mammals*) about the varying impacts and tradeoffs of Alternative F to the extent they are known. SouthCoast Wind has not yet identified the location of a potential second high-voltage direct current (HVDC) converter offshore substation platform (OSP) associated with the Project 2 interconnection, except that it would be located in the southern portion of the Lease Area. Additionally, the location of the cables that would not be installed under Alternative F (due to the reduction in the number of cables from five to three) is not known precisely, except that the amount of disturbance within the cable corridor would be reduced. Therefore, the acreage of disturbance is a useful metric in the absence of knowing the specific location of each individual cable.
BOEM-2023-0011-0185-0010	Similarly information on benthic characteristics to identify where and to what extent cable preparation activities will take place (trenching sand wave clearance boulder relocation cable protection etc.) is lacking and should be included in the FEIS.	BOEM believes the level of detail of potential area of cable preparation is sufficient and comparable to other offshore wind EIS documents. Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat,* has been revised to include a figure showing the location of boulder and sand wave clearance areas and anchoring locations. Additional project-specific detail is included in the EFH Assessment and a statement has been added to the Final EIS referring the reader to the EFH Assessment for more detail.
BOEM-2023-0011-0185-0011	Finally, the FEIS should include an evaluation of the most recent fishery data including fishing operations within state waters by state permitted vessels and impacts to shoreside support services to fully evaluate potential impacts and ensure proposed mitigation/compensation measures reflect all fishery operations and impacts. This information is needed to allow for a complete and thorough evaluation of each alternative in the FEIS.	Section 3.6.1.5 qualitatively assesses impacts on the shoreside support services, noting that the impacts on other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term and minor to major, depending on the fishery in question. Further analysis of the socioeconomic impacts on fishing support industries is included in Section 3.6.3, *Demographics, Employment, and Economics*, and Section 3.6.4, *Environmental Justice*. Furthermore, BOEM is proposing a mitigation measure that would require SouthCoast Wind to conduct an analysis of impacts on

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		shoreside seafood businesses and to develop a plan to compensate for losses to shoreside businesses. BOEM has added this measure to the Final EIS (refer to Section 3.6.1-11 and Appendix G, Table G-2; CF-5).
BOEM-2023-0011-0185-0013	The DEIS 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 scientific survey impact mitigation). We recommend the FEIS 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.	As described in Final EIS Section 2.2, Section 3.2, and Appendix G, BOEM considers all SouthCoast Wind-committed measures as part of the Proposed Action and has factored them into all impact determinations. The applicant-committed measures are listed in Appendix G, Table G-1 and Attachment G-1 and are described in the analysis of each Chapter 3 resource section as appropriate. For example, Section 3.5.5.2 summarizes several of the applicant-committed measures applicable to the resource, and the analysis of the Proposed Action in Section 3.5.5.5 analyzes how these measures reduce impacts. Additional agency-proposed mitigation measures are identified in Appendix G, Table G-2. These measures are not part of the Proposed Action but are additional measures that BOEM may require to further avoid, minimize, or mitigate impacts. These measures are not factored into the impact determinations of each alternative because they are not part of the Project. Instead, within each Chapter 3 resource section, BOEM has included a *Proposed Mitigation Measures* section that describes and analyzes the effect of each agency-proposed measure. The analysis describes how the measures reduce impacts and whether the measures would change the impact determinations.
BOEM-2023-0011-0185-0014	We continue to have significant concerns related to the major impacts offshore wind development will have on our NOAA scientific surveys. The DEIS 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	BOEM has committed to working with the National Oceanic Atmospheric Administration (NOAA) to implement the Federal Survey Mitigation Strategy program (https://repository.library.noaa.gov/view/noaa/47925). Implementation of the program is pending. As discussions between BOEM and NOAA on implementation of the program continue, specific details of appropriate mitigation measures will be added to the environmental analysis. In

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	comply. In order to minimize the major adverse impacts expected on scientific surveys we recommend mitigation measures be required and implemented before 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 FEIS.	Final EIS Section 3.6.7.10, *Proposed Mitigation Measures*, BOEM has indicated that the individual survey mitigation plans associated with the NOAA and BOEM Federal Survey Mitigation Program have not been developed and funding is not currently available to support survey mitigation plans to date.
BOEM-2023-0011-0185-0015	EIS Section: Global PDF Page: Global Comment: 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 updated to ensure an impact rating is included for each IPF considered under the *Cumulative Effects of the No Action Alternative* analysis for each Chapter 3 resource area.
BOEM-2023-0011-0185-0016	Executive Summary EIS Section: List of Tables PDF Page: 6 Comment: Table ES-1 and ES-2 should be listed here. EIS Section: List of Tables PDF Page: 12 Comment: Figure ES-1 should be listed here. Please add the following sentence that has been dropped "In addition NMFS has an independent responsibility to comply with NEPA and will rely on the information and analyses in BOEM's final EIS after independent review to fulfill its NEPA obligations." preceding the following sentence: "NMFS intends to adopt the Final EIS if after independent review and analysis it determines the Final EIS to be sufficient to support the authorization."	The tables and figure in the Executive Summary have been added to the Table of Contents in the Final EIS. The requested sentence regarding NMFS's independent responsibility to comply with NEPA has been added to the Executive Summary.
BOEM-2023-0011-0185-0017	EIS Section: ES.1 PDF Page: 22 Comment: The first sentence mentions the NEPA regulations but cites the U.S. Code for NEPA itself. The proper citation would be: (40 CFR 1500-1508).	The sentence is referencing the NEPA statute and does not mention the implementing regulations. The U.S. Code citation was retained.
BOEM-2023-0011-0185-0018	EIS Section: ES.4.4 PDF Page: 30 Comment: NMFS has proposed several changes to Alternative D in the cover letter	BOEM believes the information regarding hydrodynamic effects included in the description of Alternative D in

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	that accompanies this table. However, if Alternative D remains as is this Executive Summary section should present a description of the alternative. The discussion of the modeling conducted appears misplaced and does not describe the alternative. Accordingly please remove sentences 3 through 6 specifically the following words: "However modeling of the full build out of the entire southern New England lease areas indicates that minor local changes to the physical hydrodynamic features may occur on the western side of Nantucket Shoals adjacent to the BOEM lease areas (Johnson et al. 2021). Based on best available science, BOEM believes there is a lack of conclusive evidence that the removal of proposed turbine locations in the northeastern portion of the Lease Area would measurably lessen these minor impacts on the hydrodynamic features. If the potential hydrodynamic effects are consistent with the modeling of the southern New England lease areas and other hydrodynamic studies of wind facilities in the North Sea the effects would be local to the immediate vicinity of the turbine array and not extend to Nantucket Shoals. If the potential hydrodynamic effects are as extensive as potential wind wakes that could extend tens of kilometers under stable conditions which has not been demonstrated then the removal of turbines would not remove this potential range of effects from extending far enough from the turbine array to overlap with Nantucket Shoals. Nonetheless…" NMFS has made the same comment in Chapter 2 where the same language appears.	Executive Summary Section 4.4 and Chapter 2, Section 2.2.4 provides important context for why the alternative was identified, developed, and analyzed in the EIS. BOEM has added additional information to the Final EIS to describe the findings from the 2024 NASEM study on hydrodynamic impacts in the Nantucket Shoals region, which provides further context for the purpose and intent of the alternative.
BOEM-2023-0011-0185-0019	EIS Section: ES.5 PDF Page: 33 Comment: Please change to the title of the table to reflect that it accurately reflects that impacts do include mitigation. ES.5 37 Comment: The footnote for the table indicates that light green is used for boxes that are "negligible or beneficial to any degree" but there is no light green shown in the table.	Final EIS Table ES-2 and the text preceding the table was revised to clarify that the impacts are with no agency-proposed mitigation. The Proposed Action and action alternatives analyzed in the EIS assume implementation of all applicant avoidance, minimization, and mitigation measures (AMMs).

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	Recommend removing this from the footnote to eliminate confusion.	The footnote for Table ES-2 was updated to remove light green as the color was not used in the table.
BOEM-2023-0011-0185-0020	Chapter 2: Alternatives EIS Section: 2.1 PDF Page: 50 Comment: In the fourth paragraph there is no consultation under the MMPA. NMFS suggests correcting the sentence by replacing it with: "Consultations under ESA Section 7 and the Magnuson–Stevens Fishery Conservation and Management Act (MSA) as well as the submission for and issuance of other necessary permits and authorizations under applicable statutes including the MMPA may result in additional measures or changes to these measures."	Final EIS Section 2.1 has been revised as suggested.
BOEM-2023-0011-0185-0021	EIS Section: 2.1 PDF Page: 50 Comment: Please modify the fourth paragraph to indicate that the applicant-proposed mitigation measures listed in Table G-1 will be included in the proposed action and that additional mitigation and monitoring measures that BOEM may require are listed in Table G-2. (See Appendix G pp 1-2).	Final EIS Section 2.1 has been revised as suggested.
BOEM-2023-0011-0185-0022	EIS Section: 2.1 PDF Page: 50 Comment: NMFS advises that if any mitigation measures are analyzed in the impact analysis and they influence the impact determinations and selection of an alternative those measures must be mandatory in the preferred and selected alternative for a proper impacts analysis.	Comment acknowledged.
BOEM-2023-0011-0185-0023	EIS Section: 2.1.4 PDF Page: 67 Comment: NMFS has proposed several changes to Alternative D in the cover letter that accompanies this table. However if Alternative D remains as is this section should present a description of the alternative. The discussion of the modeling conducted appears misplaced and does not describe the alternative. Accordingly please remove sentences three through six specifically the following words: "However modeling of the full build out of the entire southern New England lease areas indicates that minor local changes to the physical hydrodynamic features may occur on the western side of	Please refer to response to Comment BOEM-2023-0011-0185-0018.

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	Nantucket Shoals adjacent to the BOEM lease areas (Johnson et al. 2021). Based on best available science BOEM believes there is a lack of conclusive evidence that the removal of proposed turbine locations in the northeastern portion of the Lease Area would measurably lessen these minor impacts on the hydrodynamic features. If the potential hydrodynamic effects are consistent with the modeling of the southern New England lease areas and other hydrodynamic studies of wind facilities in the North Sea the effects would be local to the immediate vicinity of the turbine array and not extend to Nantucket Shoals. If the potential hydrodynamic effects are as extensive as potential wind wakes that could extend tens of kilometers under stable conditions which has not been demonstrated then the removal of turbines would not remove this potential range of effects from extending far enough from the turbine array to overlap with Nantucket Shoals. Nonetheless…" NMFS has made the same comment on the Executive Summary where the same language appears.	
BOEM-2023-0011-0185-0024	EIS Section: 2.1.4 PDF Page: 69 Comment: The caption for Figure 2-7 incorrectly states that Alternative D is the removal of six WTGs. The correct language is: "up to six WTGs." This error also appears in Sections 3.5.3.7 and 3.5.6.7.	Text in Final EIS Figure 2-7, Section 3.5.3.7, and Section 3.5.6.7 has been corrected to "up to six WTGs."
BOEM-2023-0011-0185-0025	EIS Section: 2.1.6 PDF Page: 76 Comment: Please provide more detailed information about Alternative F including information on the habitat types and species of importance in the Muskeget Channel how much area of seabed disturbance would be avoided as well as locations (maps) of the HVDC converter OSPs and planned offshore export cable routes.	SouthCoast Wind has not yet identified the location of a potential second HVDC converter OSP associated with the Project 2 interconnection, except that it would be located in the southern portion of the Lease Area. It would be impracticable and imprudent for BOEM to select the location of the OSP for Alternative F as the selection of an OSP location is based upon geotechnical data, offtake agreements, material/equipment procurement process, and other factors to which BOEM is not privy. The location of the cables that would not be installed under Alternative F (due to the reduction in the number of cables from five to three) is also not precisely known except that all cables would be

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		within the Falmouth Export Cable Corridor (ECC) as mapped in Chapter 2, Figure 2-1. Additional information about habitat types, including complex habitat in the Muskeget Channel, within the Falmouth ECC where impacts could be reduced under Alternative F has been added to the relevant Chapter 3 resource sections in the Final EIS, including Section 3.5.2, *Benthic Resources*, and Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*.
BOEM-2023-0011-0185-0026	EIS Section: 2.2 PDF Page: 78 Comment: In the row of Table 2-3 for the alternative "WTG generation capacities that analyze different deployment ranges of WTG MW generation capacities" the justification for dismissal states that the developer has 1275 MW in existing offtake agreements. Earlier in the document in sections ES.2 and 1.2 it is stated that the developer has PPAs for 804 and 400 MW - for a total of 1204 MW. Please clarify the reason for the numerical difference or explain the difference between PPAs and offtake agreements.	In light of SouthCoast Wind's bid into the Massachusetts 83C IV and multi-state solicitations, selection of WTG design(s) with specific nameplate capacities cannot be deferred until the Record of Decision (ROD) under the current market conditions. Specifically, waiting until the ROD is issued for the government to decide whether to select a turbine capacity for Project 1 of the Project would undermine the integrity of SouthCoast Wind's bid and a selection of a WTG outside of SouthCoast Wind's Project Design Envelope (PDE) would render the Project infeasible by invalidating a potential award, which includes WTG specifications and economic assumptions based on the capacity of the WTG and creating delays that would prevent the ability for SouthCoast to meet the required capacity for Project 1. The needed capacity for Project 1 into the NE Multistate Solicitation is 1,275 megawatts (MW).
BOEM-2023-0011-0185-0027	EIS Section: 2.2 PDF Page: 79 Comment: In the row of Table 2-3 for the alternative "Preclude the development of WTGs within a 20-kilometer buffer of the Nantucket Shoals 30-meter isobath" the justification for dismissal states that the developer has 1275 MW in existing offtake agreements. Earlier in the document in sections ES.2 and 1.2 it is stated that the developer has PPAs for 804 and 400 MW - for a total of 1204 MW. Please clarify the reason for the numerical difference or explain the difference between PPAs and offtake agreements.	BOEM determined this alternative is economically infeasible and not consistent with the Project purpose and need to provide up to 2,400 MW of clean, renewable wind energy to the northeast United States, including Massachusetts, Connecticut, and/or Rhode Island, which each have existing state offshore wind procurement laws in place as well as decarbonization goals and targets. Under this alternative, 53 WTGs would be eliminated, leaving 94 WTG and 2 OSP positions; 85 WTGs and 1 OSP, out of the remaining 96 positions would be needed for Project 1, assuming the use of a 15 MW WTG model. BOEM determined the use of a 15 MW

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		WTG for Project 1 is a reasonable assumption based on the PDE in the Construction and Operations Plan (COP) and Request for Information (RFI) responses from SouthCoast Wind. SouthCoast Wind needs the 85 WTGs for Project 1 to achieve the 1,275 MW in planned offtake that SouthCoast Wind has bid into the Massachusetts 83C IV and multi-state Massachusetts, Rhode Island, and Connecticut solicitation for up to 6,000 MW of offshore wind power. SouthCoast Wind confirmed that their Project 1 bid includes the shallowest WTG positions in their lease (which also overlap with the positions that are closest to Nantucket Shoals and to shore) because they provide the most cost-competitive rates for consideration for an award. Consequently, if BOEM were to relocate the majority of the WTG positions for Project 1 into deeper waters it would invalidate SouthCoast Wind's bid.
BOEM-2023-0011-0185-0028	EIS Section: 2.2 PDF Page: 79 Comment: In regards to the "Preclude the development of WTGs within a 20-kilometer buffer of the Nantucket Shoals 30-meter isobath" alternative in Table 2-3 the text notes that only 2/3 of full geotechnical surveys have been completed and due to the positions impacted by the 20-km buffer SouthCoast is not able to analyze and design foundations in time in the remaining 1/3 of the lease area to meet the deadlines in their Massachusetts PPAs as rationale for why the alternative was rejected. Additionally, the rationale also states that 53 WTGs would be eliminated by the 20-km buffer but NMFS analysis shows that 49 WTGs would be removed. At 15-MW per WTG this is 60 MW that should be accounted for in the text. Lack of complete survey coverage in a timely fashion should not preclude feasible alternatives from consideration. The text also states that SouthCoast's primary goal includes interconnecting at POIs that have a maximum capacity of 1200 MW. This goal can still be achieved with the 20-km buffer as there would still be a suitable number of positions left to fulfill their 1200 MW PPA with MA.	NMFS requested that BOEM consider an alternative that would prohibit installation of WTGs within a 20-kilometer buffer of the Nantucket Shoals 30-meter isobath to reduce potential impacts on this important foraging area for aquatic species, such as the NARW and sea ducks. Under this alternative, 53 WTGs would be eliminated, leaving 94 WTG and 2 OSP positions; 85 WTGs and 1 OSP, out of the remaining 96 positions would be needed for Project 1, assuming the use of a 15 MW WTG model. BOEM determined the use of a 15 MW WTG for Project 1 is a reasonable assumption based on the PDE in the COP and RFI responses from SouthCoast Wind. SouthCoast Wind needs the 85 WTGs for Project 1 to achieve the 1,275 MW in planned offtake that SouthCoast Wind has bid into the multi-state Massachusetts, Rhode Island and Connecticut solicitation for up to 6,000 MW of offshore wind power. Under this alternative, for Project 2 SouthCoast would only have 9 WTGs and 1 OSP left with a total nameplate capacity of 162 MW, assuming 18 MW WTGs were used. BOEM determined the use of an 18 MW WTG for Project 2 is a reasonable assumption based on the PDE in the

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	Lastly the rationale also notes that SouthCoast is competing for PPAs with NY RI and MA. However, SouthCoast did not compete for RI or NY in either recent RFP. MA has not issued their RFP yet but notably Commonwealth Wind (which previously withdrew from its MA PPA) will also be bidding against SouthCoast among others. Thus, it is conceivable that SouthCoast may be selected for the MA PPA but it is not certain and this also has implications for other projects (i.e. Commonwealth Wind) and that rationale should be applied consistently across the NEPA process. Given this the rationale provided is not adequate justification for dismissal of an alternative as SouthCoast Wind can technically meet their PPA with MA and their goal of interconnecting with a POI with 1200 MW capacity.	COP and RFI responses from SouthCoast Wind. The smallest bid for which a New England state has sought in a procurement since 2022 is 600 MW for Rhode Island (State of Rhode Island General Assembly 2022). A 162 MW project falls well below this amount and the multi-state solicitation between Rhode Island, Massachusetts and Connecticut are only seeing bids that are 800 MW and above with the states trending toward requesting projects that are over 1,000 MW. Furthermore, BOEM and the National Renewable Energy Laboratory (NREL) conducted technical-economic modeling of Projects 1 and 2 and found this alternative to be economically infeasible due to uneconomical increases in the Levelized Cost of Energy (LCOE). Consequently, this alternative is not reasonable under NEPA because it is not consistent with the purpose and need, nor SouthCoast Wind's primary goals, and is not economically feasible or practicable and would, therefore, be equivalent to the No Action Alternative.
BOEM-2023-0011-0185-0029	EIS Section: 2.2 PDF Page: 79 Comment: In the row of Table 2-3 for the alternative "Preclude the development of WTGs within a 20-kilometer buffer of the Nantucket Shoals 30-meter isobath" the NMFS letter was focused on right whales and not sea ducks and other aquatic species (although the alternative could benefit other species).	This table characterizes the area as being used by multiple species.
BOEM-2023-0011-0185-0030	EIS Section: 2.4 PDF Page: 87 Comment: Please confirm that Table 2-4 represents impacts "with no mitigation." Section 2.1 states that mitigation proposed by the applicant is included in the proposed action and the analysis under Chapter 3 utilizes the implementation of mitigation when determining impact levels. If the levels in Table 2-4 do not represent the findings in the later analysis please indicate that and provide a rationale. Please ensure the title of the table on the following page reflects any changes.	Final EIS Table 2-4 and the text preceding the table was revised to clarify that the impacts are with no agency-proposed mitigation. As stated in Section 2.1, the Proposed Action and action alternatives analyzed in the EIS assume implementation of all applicant-proposed AMMs.

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BOEM-2023-0011-0185-0031	EIS Section: 2.4 PDF Page: 90 Comment: In the row for "3.5.6 Marine Mammals" in the boxes for the Proposed Action and other action alternatives the summary text states that there are "potentially beneficial impacts." Please classify the level of these impacts as negligible minor moderate or major for the Proposed Action and each action alternative. See similar comment for section 3.5.6.	Final EiS Table 2-4 has updated to indicate there would be “minor beneficial impacts.” Similar changes were also made in Section 3.6.5.
BOEM-2023-0011-0185-0032	EIS Section: 2.4 PDF Page: 90 Comment: Alternative F: Consider noting that this could have a potential beneficial impact to harbor seal pupping on Muskeget Island.	Text regarding the potential for a reduction in impacts on harbor seal pupping under Alternative F has been added to the analysis of marine mammals in Section 3.5.6.6. This information was not included in Section 2.4 because that section is intended to present only a high-level summary of impacts.
BOEM-2023-0011-0185-0033	Section 3.1-3.3 (IPFs Mitigation and Definition of Impact Levels) EIS Section: 3.2 PDF Page: 101 Comment: After the end of the 2nd sentence (after "in this chapter.") 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 required as part of the 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.	Final EIS Section 3.2 has been revised to incorporate language similar to the text suggested in the comment.
BOEM-2023-0011-0185-0034	EIS Section: 3.2 PDF Page: 101 Comment: Please change the 3rd sentence to read "In addition other mitigation measures may be required through completion of consultations, authorizations, and permits with respect to several environmental statutes such as the MMPA, Section 7 of the ESA, or the MSA." The MMPA process is not a consultation and the recommended language corrects the sentence.	Final EIS Section 3.2 has been revised as suggested in the comment.
BOEM-2023-0011-0185-0035	Section 3.5.2: Benthic Resources EIS Section: 3.5.2 PDF Page: Global Comment: For each alternative please provide a	Under the analysis of Alternatives C, D, E, and F, separate IPF headings were not considered necessary if the analysis could

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	separate subheading and complete discussion/evaluation for each IPF. Avoid using one large paragraph with minimal information for each IPF as this provides incomplete and confusing analyses.	be more concisely described without the headings or the IPF being discussed was apparent from the context. This approach is consistent with other BOEM offshore wind EISs.
BOEM-2023-0011-0185-0036	EIS Section: 3.5.2 PDF Page: Comment: It is unclear if the mitigation measures discussed are planned or confirmed to be implemented. Using language such as "may" or "potentially" when discussing implementation of mitigation or minimization measures is misleading. Additionally potential or possible mitigation measures should not be used as justification for reduced impacts. Only mitigation measures that are committed to by BOEM and the developer during the Project's lifespan should be discussed or used as part of impact evaluations.	BOEM has described all applicant measures in the EIS as proposed by SouthCoast Wind in the COP. Agency-proposed measures are included in Appendix G, Table G-2. BOEM has considered all public comments on the Draft EIS and has made changes to the mitigation measures as appropriate, which is reflected in the Final EIS.
BOEM-2023-0011-0185-0037	EIS Section: 3.5.2 PDF Page: Global Comment: Please ensure impact evaluations are specific to the Project and the alternative and do not simply reference information presented for the No Action alternative which is non-specific and encompasses much larger and often much different habitats and species. For example under Impacts of Alternative B Accidental Releases IPF an evaluation of the potential impact of invasive species releases on benthic resources should be provided which are specific to this Project area and this alternative. Simply stating that impacts will be similar to the No Action Alternative does not provide a clear analysis of effects from this specific project as it does not consider the habitat types and species in this Project area that may be affected.	The types of species to be spread or where they could be released based on accidental releases cannot be known with certainty, and no specific impacts can be stated with confidence other than what is described in the No Action Alternative. The *accidental releases* IPF in Section 3.5.2, *Benthic Resources*, is also consistent with the *accidental releases* IPF in other offshore wind EISs, including Revolution Wind and Ocean Wind 1. The *presences of structures* IPF is a good example of where the Proposed Action does not refer to the No Action Alternative for invasive species. In EIS Section 3.5.5.5, the subtidal invasive species known within the region are laid out and one species (D. vexillium) is detailed in its impact and expands on its documented spread to WTG and scour protections of other offshore wind farms.
BOEM-2023-0011-0185-0038	EIS Section: 3.5.2 PDF Page: Global Comment: At this time concluding: "The impacts resulting from individual IPFs associated with construction and installation O&M and decommissioning of the Project under [Alternatives C-F] would be similar to those described under the Proposed Action" is unsupported and the necessary level of	Under the analysis of Alternatives C, D, E, and F, separate IPF headings were not considered necessary if the analysis could be more concisely described without the headings or the IPF being discussed was apparent from the context. This approach is consistent with other BOEM offshore wind EISs. BOEM has also reviewed the impact conclusions for each

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	information to determine this is not provided. Site survey information and individual analyses for each IPF are missing. Additionally there are measureable impact reductions to benthic habitats from in these alternatives which would result in different overall impacts from to those of the Proposed Action. Currently the conclusion that impacts for Alternatives C-F are the same as the Proposed Action is unsupported and dilutes each alternative and bolsters the Proposed Action. All alternatives should receive the same level of robust analysis and consideration under NEPA. Please address.	alternative and believes they are appropriate and supported by the analysis. Alternatives C-F were developed to minimize specific environmental impacts in certain geographies, such as minimizing cable emplacement in the Muskeget Channell. While impacts may be reduced, the 149 WTG/OSP positions, interarray cables, export cables would still be installed and affect the benthic habitat so a change in the overall impact level is not supported. Regarding the analysis of Alternative C, BOEM has updated the analysis with additional desktop studies performed by SouthCoast Wind, which include a benthic desktop study and a geohazard study. To further describe the difference in impacts among the alternatives, BOEM has added Section 3.5.2.10, *Comparison of Alternatives*, to the Final EIS.
BOEM-2023-0011-0185-0039	EIS Section: 3.5.2.1 PDF Page: Global Comment: Any identified HAPC should be explicitly identified mapped and described in the Affected Environment section even if it is referenced later in the chapter. This includes in the Lease Area Sakonnet River export cable corridors landfall areas and any other areas that may be impacted by the proposed action.	All sensitive habitats are identified in Final EIS Section 3.5.5.1, *Essential Fish Habitat*. This section contains tables describing Habitat Types by Project Component – Offshore/Onshore Export Cable with acreage of each habitat type found in each EEC (Tables 3.5.5-2, 3.5.5-3, 3.5.5-4 and 3.5.5-5). A cross reference to these tables has been added to Section 3.5.2.1. Maps depicting inshore submerged aquatic vegetation (SAV) habitat for potential cable landing sites in Brayton Point and Falmouth are included in COP Appendix K (Seagrass and Macroalgae Report) Section 4.3 in Figures 4-1, 4-2, 4-3, and 4-4.
BOEM-2023-0011-0185-0040	EIS Section: 3.5.2.1 PDF Page: 180 Comment: The "three gravelly samples" observed should include further discussion and identification of location.	Exact coordinates and a brief location description has been added to the Final EIS Section 3.5.2.1, *Inshore Project Area.*
BOEM-2023-0011-0185-0041	EIS Section: 3.5.2.3 PDF Page: 182 Comment: Under Accidental Releases please provide a source for the following information: "The chemicals with potential to sink or dissolve rapidly are predicted to dilute to non-toxic levels before they would reach benthic resources."	Source (Vineyard Wind 1 EIS) has been added to the text.

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BOEM-2023-0011-0185-0042	EIS Section: 3.5.2.3 PDF Page: 190 Comment: Presence of Structures IPF: There is significant information lacking on the potential adverse impacts of newly introduced artificial material on benthic communities such as changes in oxygen and nutrient cycling heterotrophic and autotrophic community structure and changes to bacterial composition of sediment (Degraer et al. 2020; Tong et al. 2022). The "reef effect" of the proposed structures is currently described as a net benefit but there is also potential for artificial structures to cause adverse impacts to benthic ecosystems and these topics should be thoroughly addressed and evaluated.	Information regarding the impacts imposed by the presence of structures can be found in EIS Section 3.5.2.5, *Presence of structures*. In this section, BOEM discusses the invasive species present and how they can colonize novel hard bottom substrate like WTGs. Impacts from Degraer et al. (2020) are consistent with what is discussed in the Final EIS (net positive on biodiversity, increased deposition of fecal matter from biofouling community, and novel hard bottom substrate from WTG and scour protection could act as steppingstone habitat for invasive species spread). Findings from Tong et al. (2022) on bacterial activity and community composition on novel artificial structures compared to 10-year-old artificial structures and control sites is incorporated into Section 3.5.2.5.
BOEM-2023-0011-0185-0043	EIS Section: 3.5.2.5 PDF Page: 195-196 Comment: EMF IPF: This section should tie together the EMF levels studied in the cited references with the EMF levels expected by the project. Many of the referenced effects could adversely affect benthic species in the analysis area.	Information in Section 3.5.2.5, *EMF* has been expanded to indicate that the intensity of electromagnetic field (EMF) levels on benthic species in cited studies is much higher than predicted production levels for offshore wind cabling. Further reiteration is available and referenced in EIS Section 3.5.2.3 *Cumulative Impacts of No Action Alternative*.
BOEM-2023-0011-0185-0044	EIS Section: 3.5.2.5 PDF Page: 196 Comment: EMF IPF: There has been much more research on this topic since Exponent 2018 which was previously cited. The text suggests that if the animal leaves the area then it would no longer be affected by EMFs. Which area does this refer to the entire wind farm and cable corridor? Please clarify.	BOEM states that EMFs produced during operation occur from the interarray and export cabling. Section 3.5.2.5 describes measures SouthCoast Wind has committed to minimizing EMFs, including electric shielding and cable burial. Scientific literature stated in this section also points to the potential impacts of EMFs on marine mobile fauna.
BOEM-2023-0011-0185-0045	EIS Section: 3.5.2.5 PDF Page: 196 Comment: EMF IPF: The conclusion that impacts will be “localized long-term and minor” should be reconciled with the literature cited in this section which provides evidence for large adverse impacts on predator/prey interactions movement navigation avoidance or attraction behaviors and physiological and developmental processes.	The impacts were deemed as localized long term and minor because the cables are intended to be fully buried. Hence, maximal exposure to EMFs would only occur around areas where they are uncovered (land/sea interface) or if they were uncovered by sediment transport due to waves and storm events. Most literature states that there is little to minor effects on invertebrates. Most studies on fish or electrosensitive species like elasmobranchs (sharks, skates, rays) are conducted in laboratory settings in which these

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		organisms are exposed to EMFs at intensities that are two to three orders of magnitude above maximal measured EMF intensity from submarine cables (Normandeau et al. 2011). For example, Normandeau et al. (2011) measured EMF intensities at varying horizontal distances, and varying cable burial depths from energized HVAC and HVDC cables and found that 0m away and 0m beneath the sediment, HVAC and HVDC produced 7.85 µT and 78.27 µT EMFs respectively. At 4 meters away (horizontally) from the cables, the EMF intensity drops to 1.47 µT and 5.97 µT for HVAC and HVDC cables and burying these cables 5 meters beneath the surface decrease the intensities further to 0.35 µT and 2.73 µT for HVAC and HVDC cables. Since this project aims to bury interarray and export cables to a target depth of 6 feet (1.8 meters), according to Normandeau et al. (2011), the intensity of EMFs felt by marine life would be minimal.
BOEM-2023-0011-0185-0046	EIS Section: 3.5.2.5 PDF Page: 197 Comment: Cable Emplacement IPF: When discussing impacts to habitat (particularly SAV/eelgrass) please include a discussion of amount and location of HAPC that would be impacted by each of the cable emplacement methods.	All sensitive habitats are identified in Final EIS Section 3.5.5.1, *Essential Fish Habitat*. This section contains tables describing Habitat Types by Project Component – Offshore/Onshore Export Cable with acreage of each habitat type found in each EEC (Tables 3.5.5-2, 3.5.5-3, 3.5.5-4 and 3.5.5-5). A cross reference to these tables has been added to Section 3.5.2.1. A map of the Falmouth inshore SAV for alternative and potential landing sites is also referenced in Final EIS Section 3.5.2.1, *Inshore Project Area* (COP Appendix K, Figure 6, 7 and Figure 5-1). No SAV were detected offshore and, therefore, are only mapped in the nearshore maps for the sea to land ECC maps.
BOEM-2023-0011-0185-0047	EIS Section: 3.5.2.5 PDF Page: 200 Comment: Noise IPF: Analysis is insufficient. Please review relevant literature including the following and the references therein: Sole et al. 2023 (doi: 10.3389/fmars.2023.1129057) (Hyperlink: https://www.frontiersin.org/articles/10.3389/fmars.2023.1129057/full) Hawkins et al. 2021 (doi.org/10.1121/10.0004773) (Hyperlink:	The impact of noise is analyzed in greater detail in Section 3.5.2.3, *Noise*. The suggested references were added to the discussion in Final EIS Section 3.5.2.3, *Noise*. Impacts of anthropogenic sound on invertebrate taxa were noted from Sole et al. (2023). References to the analysis of particle motion sound and its relevance to benthic invertebrates from Hawkins and Popper (2017), and Popper and Hawkins (2018)

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	http://doi.org/10.1121/10.0004773); Hawkins and Popper 2017 (doi: 10.1093/icesjms/fsw205) (Hyperlink: https://academic.oup.com/icesjms/article/74/3/635/2739034?login=false); Popper and Hawkins 2018 (doi.org/10.1121/1.5021594) (Hyperlink: http://doi.org/10.1121/1.5021594).	were added to the text. WTGs generation of vibration as noted in Hawkins et al. (2021) was included in the review.
BOEM-2023-0011-0185-0048	EIS Section: 3.5.2.5 PDF Page: 200 Comment: Noise IPF: An analysis of noise from G&G activities and turbine operation should be included here. The analysis should include a discussion of both sound pressure and particle motion as well as substrate vibration for all aspects of the project the involve noise.	The noise related IPF associated with all stages of wind farm development and potential impacts on benthic resources are introduced in Alternative A and are expected to be similar for Alternative B. A note has been made in Final EIS Section 3.5.2.5, *Noise*, to clarify this. Section 3.5.2.3, *Noise* contains a discussion of geophysical and geotechnical (G&G) activities and turbine operation as well as sound pressure, particle motion, and substrate vibration.
BOEM-2023-0011-0185-0049	EIS Section: 3.5.2.5 PDF Page: 201 Comment: Presence of Structures IPF: Analysis is insufficient. This analysis should include a discussion of FAD (fish aggregating device) effects; artificial reef effects; modification of the prey field and diet for upper level predators the potential for structures to facilitate the establishment and range expansion of non-native species; local and broad scale wind-wake effects on larval transport etc. 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.	Section 3.5.2.3, *Presence of structures* has been revised to include additional analysis and references regarding effects related to nonnative species. A discussion of fish aggregating around WTGs, artificial reef effects, wind-wake effects, and vertical mixing/hydrodynamic impacts of structures are discussed extensively discussed in the finfish, invertebrates, and EFH analysis in Section 3.5.5.5, *Presence of Structures*.
BOEM-2023-0011-0185-0050	EIS Section: 3.5.2.5 PDF Page: 201 Comment: Presence of Structures IPF: Wind wakes and their effects on hydrodynamics may extend 10s of km from the wind farm. This could affect larval transport the thermal environment primary and secondary production and other important processes. These impacts should be analyzed and the following literature should be included in the analysis: Christiansen et al. 2022 (doi: 10.3389/fmars.2022.818501) (Hyperlink: https://www.frontiersin.org/articles/10.3389/fmars.2022.81	Final EIS Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, has been revised to include additional analyses of wind wake and hydrodynamic effects, including citing Christiansen et al. (2022), Daewel et al. (2022), and Dorrell et al. (2022). Within the benthic resources section, a cross reference has been added to Section 3.5.5 to refer the reader to these more detailed analyses.

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	8501/full); Daewel et al. 2022 (doi.org/10.1038/s43247-022-00625-0) (Hyperlink: http://doi.org/10.1038/s43247-022-00625-0); Dorrell et al. 2022 (doi: 10.3389/fmars.2022.830927) https://www.frontiersin.org/articles/10.3389/fmars.2022.830927/full.	
BOEM-2023-0011-0185-0051	EIS Section: 3.5.2.5 PDF Page: 201 Comment: Please provide a citation for the following sentence: "The addition of new substrate could provide stepping stones for invasive species colonization." The work by Coolen et al. 2020 (DOI: 10.1111/mec.15364) (Hyperlink: https://onlinelibrary.wiley.com/doi/10.1111/mec.15364) would be a strong citation.	The suggested citation (Coolen et al. 2020) was added to Section 3.5.2.5.
BOEM-2023-0011-0185-0052	EIS Section: 3.5.2.6 PDF Page: 205 Comment: In this section BOEM provides a quantitative measurable amount of impacts to benthic resources that would be reduced through this alternative. This includes avoidance of impacts to mixed or complex hard bottom EFH live crepidula reefs and crepidula shell hash all which are important habitats which many species depend on. However a few paragraphs later BOEM states that "the long-term effects of avoiding construction through these habitats is difficult to quantify and benthic habitats would likely recover within a few years after construction; therefore impacts would be temporary." NMFS disagrees that effects would be temporary as it is contrary to available information on recovery times for complex habitats. Impacts to complex habitats are expected to result in long-term or permanent impacts. The impacts determination language should more accurately represent the information presented and available literature related to recovery of complex habitats.	Final EIS Section 3.5.2.6 has been revised to indicate that impacts associated with cable emplacement in complex or sensitive habitats such as areas with *Crepidula* reefs, cobbles, or boulders, may impose long-term or permanent impacts where these habitats are present within the cable route.
BOEM-2023-0011-0185-0053	EIS Section: 3.5.2.6 PDF Page: 205 Comment: In this section BOEM states that "Alternative C-1 and 4 miles [6.4 kilometers] under Alternative C-2) have not been surveyed and therefore the specific benthic resources that would be	SouthCoast Wind, at BOEM's request, commissioned two desktop studies in 2023 using existing site-specific and regional data to inform BOEM's assessment of the Alternative C cable routes: *SouthCoast Wind BOEM Alternative C*

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	affected are not known at this time but are anticipated to be similar to the benthic resources found along the Proposed Action's cable corridor given the proximity of the routes." More information should be provided on the anticipated timing of these surveys including if BOEM plans to incorporate the information into the FEIS. Any currently available information should also be used to further characterize the cable routes. It is also unclear how these cable routes are considered similar to the proposed action if they avoid estuarine habitats.	*Geohazard Desktop Study* (TetraTech 2023) and *SouthCoast Wind BOEM Alternative C-1 Benthic Desktop Study* (INSPIRE 2023). The findings from these desktop studies have been incorporated into the Final EIS, Section 3.5.2.6, and BOEM believes the information contained in these desktop studies, along with existing information that BOEM and SouthCoast Wind have already gathered, provides adequate information for BOEM to make an informed decision regarding the alternatives. Text has also been added on the decrease in estuarine benthic disturbance under Alternative C.
BOEM-2023-0011-0185-0054	Section 3.5.4: Coastal Habitat and Fauna EIS Section: 3.5.4 PDF Page: Global Comment: Please include accidental releases (including marine debris oil and gas and invasive species) as part of your impacts analysis for all alternatives.	The coastal habitat and fauna geographic area analysis is defined in Section 3.5.4, *Coastal Habitat and Fauna*, as the area within a 1.0-mile buffer of the Onshore Project area and focuses on the impacts on terrestrial flora and fauna, including noise, land disturbance, presence of structures, and traffic. The effects of accidental releases on nearshore waters are described in Sections 3.5.2, *Benthic Resources*; 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*; 3.5.6, *Marine Mammals*; 3.5.7, *Sea Turtles*; and 3.4.2, *Water Quality*. This is consistent with other BOEM offshore wind EISs, such as Empire Wind.
BOEM-2023-0011-0185-0055	EIS Section: 3.5.4 PDF Page: Global Comment: Under the Noise IPF for each alternative please provide more information on what type of noise is anticipated from what activities and when these noise activities are expected to occur.	Section 3.5.4.5 describes construction and O&M noise impacts on coastal habitat and fauna, including noises from construction of converter stations/substations and cable-laying routes. Because the onshore noise impacts are temporary and would be consistent with typical construction noise in the geographic analysis area, BOEM anticipates negligible impacts and believes the information provide is adequate to characterize these onshore impacts.
BOEM-2023-0011-0185-0056	EIS Section: 3.5.4 PDF Page: Global Comment: Please present full descriptions of the BMPs alluded to. For example under Impacts of Alternative B Traffic it states "Mayflower Wind would develop a Vegetation Management Plan and implement best management practices to minimize potential impacts on vegetation communities during construction." The	The analysis in Section 3.5.4 summarizes some of the applicant-committed measures that would avoid and minimize impacts and refers the reader to Appendix G of the EIS and the COP Volume II for more details. Listing all the measures proposed by the applicant in each Chapter 3 resource section would add unnecessary page length when

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	FEIS should outline the BMPs that are committed to by BOEM and the developer.	the measures are readily available in Appendix G, *Mitigation and Monitoring*.
BOEM-2023-0011-0185-0057	EIS Section: 3.5.4 PDF Page: Global Comment: Cumulative impacts analyses for all alternatives should also consider impacts and damages to marine habitats and fauna within 3 nm of shore and should not be limited to impacts to terrestrial habitats. This includes any cable emplacement dredging HDD etc. Any impact level determinations should be modified to include these habitats if necessary.	The coastal habitat and fauna geographic area analysis is defined in the Draft EIS in Section 3.5.4, *Coastal Habitat and Fauna* (Figure 3.5.4-1). This section covers the area within a 1.0-mile buffer of the Onshore Project area. The environment and environmental consequences of Project activities that are in the geographic analysis area and extend into state waters are presented in Sections 3.5.2, *Benthic Resources*; 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*; 3.5.6, *Marine Mammals*; 3.5.7, *Sea Turtles*; and 3.4.2, *Water Quality*.
BOEM-2023-0011-0185-0058	EIS Section: 3.5.4.1 PDF Page: 242 Comment: Per the BOEM description coastal habitat includes flora and fauna within state waters (which extend 3 nm [5.6 kilometers] from the shoreline). However the current Description of Affected Environment section is lacking identification and/or description of aquatic or marine coastal habitats within this area (e.g. SAV) and the description is currently limited to primarily onshore and terrestrial resources. Please include all coastal habitats that occur within this defined area.	See response to comment BOEM-2023-0011-0185-0057.
BOEM-2023-0011-0185-0059	EIS Section: 3.5.4.5 PDF Page: 255 Comment: Land Disturbance IPF: Please provide more specific information on planned HDD operations. Where they will be occurring how much habitat will be impacted at what depths will they occur etc. Additionally provide further analysis on how these operations may impact marine coastal flora and fauna within 3 nm of shore.	Section 3.5.4.5, *Land Disturbance*, of the EIS describes the landfall and horizontal directional drilling (HDD) locations and impacts and refers to the COP for additional detailed mapping. EIS Chapter 2, *Alternatives,* includes maps showing the landfall locations. For marine coastal flora and fauna within 3 nautical miles (nm) of shore, please see response to comment BOEM-2023-0011-0185-0057.
BOEM-2023-0011-0185-0060	EIS Section: 3.5.4.5 PDF Page: 255 Comment: Land Disturbance IPF: the DEIS states "To the greatest extent practicable construction would take place away from significant fish and wildlife habitats and during times when highly sensitive species are not likely to be present." Please	The text referenced by the comment is an applicant-committed measure from the COP. The measure does not include details but is rather a general commitment to minimize effects on fish and wildlife habitat, which would include adhering to any state-required timing or avoidance

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	provide more information on these timelines and identify the highly sensitive species to which you are referring. 3.5.4.5	buffers and other requirements for ESA-listed species identified through Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS).
BOEM-2023-0011-0185-0061	EIS Section: 255 Comment: Traffic IPF: the DEIS states "To the extent practicable construction activities would take place outside of periods when highly sensitive species are likely to be present." Please provide more specific information on these timelines and identify highly sensitive species that may be impacted.	Please refer to response to comment BOEM-2023-0011-0185-0060.
BOEM-2023-0011-0185-0062	EIS Section: 3.5.4.6 PDF Page: 257 Comment: In this section the DEIS states that "The types of impacts under Alternative C-1 and Alternative C-2 would be similar to those described for the Proposed Action but slightly greater due to the larger area of land disturbance in coastal habitats" and that "In context of reasonably foreseeable environmental trends the incremental impacts contributed by Alternative C to the cumulative impacts on coastal habitat and fauna would be slightly greater than the Proposed Action..." When determining impacts it is important to consider not just total area impacted but the rarity sensitivity and importance of the habitats impacted. In this case although Alternative C does impact more area than the proposed alternative this onshore area is previously disturbed existing road ROWs which do not provide the same important habitats for managed species as does the habitat within the Sakonnet River which would be fully avoided by this alternative. As such please ensure that language and impact evaluations accurately represent the cumulative impacts not just the total area.	The impact described in Section 3.5.4.6 is on coastal habitat and fauna in the geographic analysis area, which includes the area within a 1.0-mile buffer of the Onshore Project area. Therefore, the analysis focuses on relative impacts on terrestrial resources. The beneficial impacts of avoiding environmental resources within the Sakonnet River are discussed in other resource sections, including Sections 3.5.2, *Benthic Resources*, and 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*.
BOEM-2023-0011-0185-0063	EIS Section: 3.5.4.7 PDF Page: 259 Comment: Please provide the same level of analysis for all alternatives including separate evaluations for each potential IPF. There is significant information lacking for Alternatives D E and F on Coastal Habitats and Fauna which are currently grouped together. In order to properly evaluate impacts to NOAA trust	As described in Section 3.5.4.7, because Alternatives D, E, and F would involve modifications only to offshore components, impacts on coastal habitat and fauna from Alternatives D, E, and F would be the same as those under the Proposed Action. In-depth evaluations of NOAA trust resources for Alternatives D, E, and F are presented in Draft EIS Sections 3.5.2, *Benthic Resources*; 3.5.5, *Finfish, Invertebrates, and*

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	resources complete robust evaluations of potential impacts for are necessary for all alternatives.	*Essential Fish Habitat*; 3.5.6, *Marine Mammals*; 3.5.7, *Sea Turtles*; and 3.4.2, *Water Quality.*
BOEM-2023-0011-0185-0064	EIS Section: 3.5.4.8 PDF Page: 259 Comment: Please provide rationale for why there are currently no mitigation or minimization measures proposed for this section. Various adverse impacts on coastal habitats and fauna are presented so NMFS recommends adopting BMPs and mitigation measures that can minimize these impacts where possible.	Impacts on coastal habitat and fauna are identified as minor for all resources and it was therefore determined that no mitigation was warranted. Additionally, coastal habitat and fauna are outside of BOEM's jurisdiction; any state requirements for wildlife mitigation would be followed.
BOEM-2023-0011-0185-0065	Section 3.5.5: Finfish Invertebrates and Essential Fish HabitatEIS Section: 3.5.5 PDF Page: Global Comment: NMFS biological opinions are not primary literature and should not be used as citations for project impacts. All such references should be replaced by primary literature.	NMFS (2019) and NMFS (2021d) biological opinion citations have been removed and/or replaced with primary literature throughout the Section 3.5.5*, Finfish, Invertebrates, and Essential Fish Habitat*.
BOEM-2023-0011-0185-0066	EIS Section: 3.5.5 PDF Page: Global Comment: Please provide a clear impact determination (including duration and severity) for each IPF as defined by Table 3.5.5-2. Please provide a distinct subheading for each IPF accompanied by its own complete analysis rather than lumping several IPFs into one paragraph. Robust evaluations and consideration of IPFs should be provided for all alternatives not just for the Proposed Action. Additionally ensure that impact determinations for each IPF are consistent with the best available science and consistent throughout the document and match the information provided within the analyses. Again refer back to impact determination tables at the beginning of the section for a clear definition of each impact level. Similarly, please ensure the language within the evaluations and conclusions are not being used to either dilute alternatives under consideration or bolster the Proposed Action alternative (Alternative B). For example, it is stated that Alternative C would "avoid EFH and HAPC reduce the total export cable route by 9 miles and reduce the total offshore export cable route by 12 miles." However, it is later stated that the measures under this alternative "would not have measurably different impacts on finfish invertebrates	BOEM has reviewed each Chapter 3 resource section and included an impact determination for each IPF if one was not already provided in the Draft EIS and ensured the impact determinations are appropriate based on the impact level definitions and the information contained in the analysis. Under the analysis of Alternatives C, D, E, and F, separate IPF headings were not considered necessary if the analysis could be more concisely described without the headings or the IPF being discussed was apparent from the context. This approach is consistent with other BOEM offshore wind EISs. Regarding the analysis of Alternative C, BOEM has updated the analysis with additional desktop studies performed by SouthCoast Wind, which include a benthic desktop study and a geohazard study. The language regarding difference in impacts not being measurable has been removed; however, the overall impact conclusion has not changed as Alternative C would only result in a change to a small portion of the overall Project. To further describe the difference in impacts among the alternatives, BOEM has added Section 3.5.5.10, *Comparison of Alternatives*, to the Final EIS.

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	and EFH than the Proposed Action" and that "In the context of reasonably foreseeable environmental trends cumulative impacts of Alternative C would be similar to those described under the Proposed Action." These statements are contradictory. NFMS disagrees that there would not be measurable differences. The quantitative number of miles of benthic habitat (including HAPC and EFH) spared by Alternative C is indeed a measurably different (and reduced) impact as well as the importance of locations being avoided. Please ensure evaluations are fair and indicative of all information presented and avoid language that inaccurately equalizes impacts the Proposed Alternative to other alternatives if this comparison is unsupported.	
BOEM-2023-0011-0185-0067	EIS Section: 3.5.5 PDF Page: Global Comment: Any mitigation measures that are mentioned within the evaluation of alternatives should be clearly explained and committed to during construction operation and decommissioning. Simply stating that mitigation or minimization measures "may" be put into place should not be considered within impacts evaluations. For example under Accidental Releases it is stated that "any accidental releases are expected to be localized and subject to mitigation to minimize environmental impacts." However no description or requirement of these mitigation measures is provided. Similarly a following sentence states "therefore with mitigation measures in place the total volume of contaminants and trash debrs from accidental releases would be negligible...". Lower or reduced impacts determinations cannot be justified by a mitigation measure if it is not clear what the mitigation measure fully entails or whether the developer is committed to implementing the measure. Please ensure all mitigation measures are fully explained and do not discuss actions or mitigations that will not be required of the developer.	Applicant-committed mitigation measures proposed by SouthCoast Wind in its COP or other applications (e.g., ITR application, National Pollutant Discharge Elimination System [NPDES] permit application) are considered part of the Proposed Action and are analyzed as such in the text. BOEM and other agency proposed mitigation measures are not considered part of the Proposed Action and are separately described in Section 3.5.5.11, along with a discussion of the effect of each measure. The two text excerpts referenced in the comment about accidental releases are under the analysis of the No Action Alternative and are not specific to the Proposed Action. The specific mitigation measures proposed for all ongoing or planned offshore wind and non-offshore wind project are not fully known, but BOEM anticipates compliance with regulations and industry standards would minimize the potential for and effects from accidental releases, as is stated in the text.
BOEM-2023-0011-0185-0068	EIS Section: 3.5.5 PDF Page: Global Comment: Based on our review of the DEIS it does not appear that all necessary data	Text in Section 3.5.5.5 subsection on Noise: G&G survey (HRG Surveys and Geotechnical Drilling Activities) has been revised

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	has been collected to fully evaluate effects of the proposed action and compare those effects with the proposed alternatives. It is unclear when these outstanding surveys will be completed and how BOEM will use that information to inform their decision-making process. For example site assessment surveys have not yet been completed for the alternative offshore export cable routes. Additionally under Cable Emplacement and Maintenance in Section 3.5.5.3 it is stated that "Contractors and engineers for Mayflower Wind would perform additional surveys and evaluations of geological conditions of the surface and shallow subsurface layers prior to developing the precise route." On page 3.5.5-50 under Noise it states "The geotechnical surveys would take place prior to construction... The HRG and geotechnical surveys would help identify sensitive habitats (e.g. shellfish SAV beds) and allow these areas to be avoided to the extent practicable for siting of the WTGs OSPs and cable routes." Surveys necessary to identify sensitive habitats should be done prior to the DEIS. It is also unclear if this project has completed geotechnical cores to understand the feasibility of construction in the lease area. This information should be completed earlier in the process and should inform the analysis in the EIS.	to indicate that geotechnical surveys have been completed between 2019 and 2022 including the identification of sensitive habitats. However, while reconnaissance high-resolution geophysical (HRG) surveys have been conducted, HRG surveys would be conducted intermittently during construction to identify any seabed debris and provide construction support. HRG surveys would also be carried out on a routine basis during the operations phase (3 years following the first 2 years of construction). For the geotechnical surveys already conducted, geotechnical boreholes were taken across the Lease Area in 2019 and 2020. A vibracoring campaign was conducted in 2020 to gain an understanding of site conditions along the Falmouth ECC. Additional geotechnical surveys of the shallow sections on the Falmouth ECC, the full Brayton Point ECC, and the Lease Area were completed in 2021. Text regarding additional surveys for cable emplacement has been updated in Section 3.5.5.5, *Cable emplacement and maintenance*, with updated site-specific information on cable routing and impacts in the Brayton Point and Falmouth ECCs. The shallow nearshore survey was conducted to map SAV and show that horizontal directional drilling (HDD) exit pits would occur outside of the furthest extent of eelgrass beds and not directly impacted. Further information of SAV impacts are outlined in the Final EIS, Section 3.5.2, *Benthic Resources*, section and COP Appendix K. For Alternative C, SouthCoast Wind, at BOEM's request, commissioned two desktop studies using existing site-specific and regional data to inform BOEM's assessment of the Alternative C cable routes: *SouthCoast Wind BOEM Alternative C Geohazard Desktop Study* (TetraTech 2023) and *SouthCoast Wind BOEM Alternative C-1 Benthic Desktop Study* (INSPIRE 2023). The findings from these desktop studies have been incorporated into the Final EIS (principally Section 3.5.2 and Section 3.5.5) and support BOEM's analysis of the cable routes.

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		SouthCoast Wind completed geotechnical surveys for the full Lease Area build out in 2023. Geotechnical data indicates that seabed conditions support installation of the foundation types and sizes in the PDE.
BOEM-2023-0011-0185-0069	EIS Section: 3.5.5.1 PDF Page: 260 Comment: In the 2nd sentence add "anadromous" in the parenthetical list of life history/habitat groupings. 3.5.5.1 PDF Page: 262 Comment: American eels are very common in Delaware River/Bay and Chesapeake Bay not just New England. Please clarify.	"Anadromous" has been added to the parenthetical list of life history/habitat groupings in Section 3.5.5.1. The sentence on American eel distribution has been edited to "coastal river systems along the east coast of North America."
BOEM-2023-0011-0185-0070	EIS Section: 3.5.5.1 3.5.5.3 and 3.5.5.5 PDF Page: 264 293 and 312 Comment: Given that project vessels will transit specific waterways that Atlantic sturgeon inhabit (i.e. Port of Virginia/James River) risk of vessel strike may not be extremely unlikely to occur. This text needs to be revised in the EIS to accurately assess the risk of project vessel traffic on listed fish. Risk of vessel strike to Atlantic sturgeon in the James River is of particular concern particularly during the time of year when spawning adults are entering the river. We recommend that BOEM more comprehensively address the risk of vessel strike in this portion of the action area.	The potential for vessel strikes to Atlantic sturgeon was revised to extremely unlikely to occur in the majority of the Project area. Following the release of the Draft EIS, SouthCoast Wind removed the Port of Virginia as a potential marshalling port from its COP. Therefore, the Final EIS has been revised to remove the discussion of potential effects associated with sturgeon presence in the James River.
BOEM-2023-0011-0185-0071	EIS Section: 3.5.5.1 PDF Page: 270 Comment: In Table 3.5.5.1 please ensure to differentiate the status harvest trend stock trend and biomass of individual stocks (sub- populations) of each species for which EFH exists within the project area. Specifically more detailed information is needed for separate stocks of cod yellowtail flounder haddock silver hake red hake and monkfish. Stock status and associated stock/fishery trends can differ within a species. For example cod are currently managed as 2 stocks (Georges Bank and Gulf of Maine) but that may increase to up to 5 stocks based on information provided in McBride and Smedbol 2022 (https://repository.library.noaa.gov/view/noaa/48082) (Hyperlink: https://repository.library.noaa.gov/view/noaa/48082). Stock status and resource trends for individual stocks can be found	More information on the different stocks of Atlantic cod, yellowtail flounder, haddock, silver hake, red hake, and monkfish has been incorporated into Table 3.5.5-1 using data from NOAA Fisheries Stock SMART (NMFS 2024a).

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	using NOAA Fisheries' Stock SMART tool (https://apps-st.fisheries.noaa.gov/stocksmart?app=homepage) the same reference listed in the DEIS.	
BOEM-2023-0011-0185-0072	EIS Section: 3.5.5.1 PDF Page: 278 Comment: Essential Fish Habitat: This paragraph states "Evidence of cod spawning has been observed in an area known as Cox ledge which lies on the northwest corner of the Massachusetts and Rhode Island wind energy areas. Variations of this proposal would designate the area around Cox Ledge and parts of the wind energy area as an HAPC for cod spawning but would not overlap the Project area. An alternative variation of this proposal would extend the HAPC beyond Cox Ledge to cover all complex habitat in the southern New England wind energy area with a 10-km buffer around the wind energy area." This statement is incorrect and should be revised in the FEIS. 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 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	Final EIS Section 3.5.5.1 has been revised to include the Southern New England habitat area of particular concern (HAPC) specific to cod spawning in addition to the summer flounder HAPC and juvenile Atlantic cod HAPC. The paragraph discussing the Southern New England HAPC has been revised and the proposed alternatives as presented in the New England Fishery Management Council (NEFMC) (2023) document have been included. Reference to the Atlantic cod spawning dynamics study by Van Hoeck et al. (2023) has also been added.

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	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. Additionally it should be noted that data collected in adjacent lease areas and recently presented at the NYSERDA SOS workshop (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) indicated that spawning condition cod were captured in lease areas immediately adjacent to the project area during pre-construction fisheries surveys completed for other projects. 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. While surveys have not yet been conducted in this project area there is data to suggest spawning is occurring in adjacent areas and outside Cox Ledge.	
BOEM-2023-0011-0185-0073	EIS Section: 3.5.5.3 PDF Page: 280 Comment: The citation provided (NOAA 2019) does not appear to support the conclusion about which gear types are the major contributors of the identified bycatch.	The NOAA (2019) in-text citation has been removed and the sentence has been simplified to only include commonly impacted species from bycatch. The NOAA (2019) reference has been deleted from Appendix J as a global edit removing biological opinion references used as primary literature.
BOEM-2023-0011-0185-0074	EIS Section: 3.5.5.3 PDF Page: 282 Comment: Impacts to pelagic eggs should be added under adverse effects of accidental releases not just larvae.	Pelagic eggs have been added to the sensitive life stages that could experience potential lethal or sublethal effects from accidental releases.
BOEM-2023-0011-0185-0075	EIS Section: 3.5.5.3 PDF Page: 284 Comment: Clarify what species the distances of EMF detection are based on. Some elasmobranchs demonstrate sensitivity down to 0.5– 1000 mVm-1 (Kalmijn 1982; Kilfoyle et al 2018); EMFs of 0.5–100mVm-1 may attract some species whereas EMFs over 100 mVm-1 are generally avoided (Kalmijn 1982; Tricas and Gill	The statement, “an EMF that could elicit a behavioral response in an organism would likely extend less than 50 feet (15.2 meters) from each cable”, has been removed and replaced with text noting that the area around submarine power cables with elevated EMF levels extends less than approximately 33 feet (10 meters) around each cable.

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	2011). Good discussion in Horodysky et al 2022. 3.5.5.3 and 3.5.5.5	
BOEM-2023-0011-0185-0076	EIS Section: 284 and PDF Page: 302 Comment: Undersea cables have been shown to affect migratory routes of salmonids (Wyman et al 2018) and swimming rates of telemetered eels (Westerberg and Lagenfelt 2008). Overhead cables affect migratory behavior in Atlantic salmon and Russian sturgeon (Poddubny et al. 1979). Please consider incorporating these sources.	Neither Westerberg and Lagenfelt (2008) nor Wyman et al. (2018) suggest deleterious effects to the migration of the studied organisms. Westerberg and Lagenfelt (2008) ultimately conclude that the approximately 40 minute slow-down in the 7,000 kilometers migration of European eels was not significant from a fitness standpoint for European eels. Further, the cable studied was unburied and was AC. The cable under study in Wyman et al. (2018) was much more applicable to the cable used for Southcoast Wind, with an achieved burial depth of ~6 feet, and the cable was DC, however with less load than the proposed cables for Southcoast Wind 200 kilovolts (kv) versus 320 kv. While cables did appear to affect juvenile salmonid migration, these effects were minor and did not greatly reduce the ability of Juvenile salmonds to migrate along the cable route out into the Pacific Ocean. Other environmental factors further confound the ability to accurately predict the impact the cable had on migrating smolt, such as discharge, temperature, depth, and release location of tagged salmonids. Salmonids showed an attraction to the cable in all array locations, but this did not lead to an overall decrease in the ability of salmonids to migrate to the open ocean, compared to the two previous years when the cable was inactive. Poddubny et al. (1979) is about an overhead transmission line, which is not proposed for the SouthCoast Wind Project. The Wyman et al. (2018) source was added to Section 3.5.5, *Finfish, Invertebrates and Essential Fish Habitat*.
BOEM-2023-0011-0185-0077	EIS Section: 3.5.5.3 PDF Page: 286 Comment: Artificial light at night (ALAN) can alter migratory patterns and even food webs via point source (Cooke et al 2017) or general sky illumination (see Mazur and Beauchamp 2006). But shadows of overwater structures can also affect adult migration larval	Text added to Section 3.5.5.5 to incorporate additional information on impacts from artificial light, including impacts on larval and zooplankton diel migratory patterns. The overall impact conclusion is supported by the best available literature and is unchanged.

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	settlement feeding predation risk etc. (Ono and Simenstad 2014; Sabal et al 2021; O'Connor et al 2019). It doesn't take much light for hormonal changes (Kupprat et al 2020). And the effects can be seen across multiple trophic levels (Bolton et al 2017). Consider incorporating these references.	As stated in Section 3.5.5.5, the light from WTGs and OSPs would be intermittent flashes of red hues, and marine navigational lights, which are characterized by intermittent flashes of yellow hues, neither of which present a continuous light source. Additionally, red and yellow lights are among the shallowest penetrating lights on the ultraviolet (UV) spectrum due to light attenuation properties in seawater, meaning that the impact of these intermittent light sources would have very localized effects. After reviewing the cited literature in this response and further analysis, the cited impacts do not all necessarily apply. For example, Mazur and Beauchamp (2006) is a model of projected increased predation rates and foraging success of trout experiencing constant light pollution, which is not anticipated for the Proposed Action. Ono and Simenstad (2014), argue shading of structures effects on juvenile salmon; shading from a dock and a WTG are not equivalent. The findings in Kuppart et al. (2020) appear species dependent as Newman et al. (2015) and Szekeres et al. (2017) found conflicting results (no impact on stress levels in salmon; no behavioral impacts on bonefish). Largely, these studies revolve around coastal or inland species which would experience much more persistent and intense forms of artificial light at night than at offshore wind farms. Lastly, the description of artificial light impacts are consistent with other BOEM offshore wind EISs, including Ocean Wind 1 and Empire Wind EISs.
BOEM-2023-0011-0185-0078	EIS Section: 3.5.5.3 PDF Page: 289 Comment: Pile driving effects on flatfish and skates/rays is unknown but can be hypothesized as more extreme (they directly contact the benthos over a large surface area potentially transmitting shock to internal organs) unless they evacuate. Studies in Europe and NE USA show low probability of harm if pile driving is conducted when flatfish are at low abundance.	Flatfish including Winter Flounder and other elasmobranchs (e.g., rays, skates, and sharks) do not have swim bladders. As such, they are least susceptible to sound. COP Appendix N provides sound levels that would provide mortality, injury or avoidance behaviors for fishes (flatfishes and skates/rays) without swim bladders. The Underwater Acoustic Assessment (COP Appendix U2) provides the results of sound modeling associated with the foundation pile driving. Mortality or injury due to sound exposure would only occur in the

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		immediate vicinity of the pile driving. Behavioral disturbances may occur up to 10.6 miles (17 kilometers) away, depending on the jacket foundation/monopile size, hammer energy, and fish size (see Section 3.7 of COP Appendix U2 for detailed tables).
BOEM-2023-0011-0185-0079	EIS Section: 3.5.5.3 PDF Page: 291 Comment: Please provide a source for the information presented when describing noise impacts of HRG on finfish and invertebrates.	The citation in question (BOEM 2021) has been added to Section 3.5.5.3. Sound impacts on finfish and invertebrates, and avoidance behaviors are now also detailed in COP Appendices N and U2.
BOEM-2023-0011-0185-0080	EIS Section: 3.5.5.3 PDF Page: 294 Comment: Recommend reviewing Christiansen et al (2022) as this research suggests the potential for large-scale hydrodynamic effects.	The *presence of structures* IPF in Section 3.5.5.3 has been expanded with added discussion on hydrodynamic effects which also incorporates Christiansen et al. (2022) and other similar studies. BOEM has also partnered with NASEM for an independent peer review of potential hydrodynamic impacts of offshore wind facilities in the Nantucket Shoals region. Results of this study are reported in the *presence of structures* IPF in Section 3.5.5.5.
BOEM-2023-0011-0185-0081	EIS Section: 3.5.5.5 PDF Page: 298 Comment: Anchoring IPF: please include a discussion of spud can impacts to EFH unless listed elsewhere or not intended to be an anticipated impact. Use of spud cans for construction vessels could result in long-term impacts to EFH including the need for backfill and associated potential habitat conversion. If spud cans will be used for this project the impacts should be included in the EIS.	A reference to spud can impacts has been included in the *anchoring* IPF in Section 3.5.5.5. Spud can impacts are also discussed in the COP Volume 2, Section 6.6.2.2.2, and are incorporated into the overall acreage of *anchoring* IPFs in Section 3.4.1.1 of the COP Volume 1.
BOEM-2023-0011-0185-0082	EIS Section: 3.5.5.5 PDF Page: 299 Comment: Discharges/Intakes - Please provide more information on discharge and intake specifics of the project including where the outflow and inflow pipes will be located and at what depths.	Additional information has been added regarding the intake and discharge specifics of the converter station OSP cooling water intake system including the location of intake and discharge pipes relative to the converter station OSP design and the potential depths of seawater withdrawal in Section 3.5.5.5. Indicative geographic location of one of the converter station OSP is shown in Appendix B, Figure B-2.

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BOEM-2023-0011-0185-0083	EIS Section: 3.5.5.5 PDF Page: 299 Comment: Under discharges/intakes please differentiate hake species if possible and note that substantial annual removals of eggs and larvae of stocks in poor condition such as white hake Atlantic herring and Southern New England red hake could have long- term impacts to the long-term sustainability of the species and associated fishery. This should be noted here and in Section 3.6.1 of the DEIS (entrainment estimates were not discussed in this section or the potential impacts to individual species or fisheries).	"Hakes" referred to the unidentified hake species in data. These organisms were identified down to family or genus, so this is a catch all identification for potentially all species found in the area (red, white, and silver). The limitations of larval entrainment estimates associated with SouthCoast Wind's proposed HVDC converter OSP is described in a footnote in Section 3.5.5.5. SouthCoast Wind's NPDES permit application notes that fish larvae with the most relatively abundant species identified within 10 miles (16 kilometers) of the proposed intake location from 2010 through 2019 were unidentified hakes, summer flounder, and silver hake (*Merluccius bilinearis*).
BOEM-2023-0011-0185-0084	3.5.5.5 PDF Page: 300 Comment: (1) Clarify if SouthCoast Wind is proposing ventless trap surveys as part of their fisheries monitoring surveys. (2) Any capture/collection of listed species is generally not considered safe some methods/measures may reduce risk such as shorter tow times and handling times. However the text does not state what the proposed tow times or handling measures are. The text about trawl survey impacts on listed fish species should be revised to include relevant information about the survey and to accurately assess the risk and impact of the fisheries resource surveys. Additionally any analysis of impacts of listed fish should be moved to the Alternative B – Proposed Action on ESA-Listed Species subsection.	The *gear utilization* IPF in Section 3.5.5.5 has been updated to include details on the proposed fisheries and benthic habitat monitoring surveys that would be conducted in the Project area. Survey types include trawl, trap, camera, and acoustic surveys for fisheries monitoring, and remotely operated vessel (ROV) stereo-camera, sediment grab sampling, and SPI/PV for benthic monitoring. Details provided for the demersal otter trawl survey also include tow speed (3.0 knots) and tow time (20 minutes). An analysis of fisheries resource survey impacts on ESA-listed fish species has been added to the *Impacts of Alternative B – Proposed Action on ESA-Listed Species* subsection of Section 3.5.5.5.
BOEM-2023-0011-0185-0085	EIS Section: 3.5.5.5 PDF Page: 301 Comment: EMF IPF: This IPF should contain a discussion about the differences between direct current and alternating current relative to EMF. This is especially pertinent as an HVDC OSP is proposed.	Text has been added to Section 3.5.5.5 discussing the differences in EMFs produced by alternating current (AC) and direct current (DC) cables.
BOEM-2023-0011-0185-0086	EIS Section: 3.5.5.5 PDF Page: 301-302 Comment: EMF IPF: Saying that there is a lack of evidence for detrimental population-level effects suggests that such evidence has been sought and not found. In actuality there have been primarily lab based studies in controlled settings. However impacts on	The statement on population-level detrimental impacts has been removed and replaced with an evidence-based statement regarding the lack of EMF effects on the population health of some fish and invertebrate species. Results from additional EMF-effect studies by Hutchison et al.

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	larval stages suggests the potential for effects that are important to populations.	(2018) and Klimley et al. (2017) are provided in the preceding text.
BOEM-2023-0011-0185-0087	EIS Section: 3.5.5.5 PDF Page: 302 Comment: EMF IPF: The conclusion for EMF is that “BOEM expects localized and long-term though not measurable impacts on finfish invertebrates and EFH from EMFs from the Proposed Action.” However above there are citations for important effects on larval haddock and crustaceans (e.g. Cresci et al. 2022 and Harsangyi et al. 2022). Please reconcile these pieces of text.	The conclusions provided for EMF impacts in Section 3.5.5.5 have been revised to reflect findings of the studies referenced in this section.
BOEM-2023-0011-0185-0088	EIS Section: 3.5.5.5 PDF Page: 302 Comment: Lighting IPF: There is a lot of literature on how fish interact with artificial light sources. Please review this literature and incorporate it into the analysis. In particular search term ALAN (Artificial Light at Night).	The lighting subsection in Section 3.5.5.5 has been expanded to include more information on the effects of artificial light on finfish and invertebrates.
BOEM-2023-0011-0185-0089	EIS Section: 3.5.5.5 PDF Page: 302 Comment: Most NE region managed marine fishes do not see red (lack red photopigments); striped bass are a clear exception that does respond visually to red wavelengths (Horodysky et al 2010). Most managed NE region marine fishes that have been studied see yellow wavelengths extremely well (Horodysky et al 2008 2010 2013). Flash rates < 60 Hz will be seen by most species as individual flashes which could be attractive or distractive (Horodysky et al 2022). But lighting also creates shadows which may serve as movement barriers or obstacles for juvenile fishes (Ono and Simenstad 2014; Sabal et al 2021; O'Connor et al 2019). Consider incorporating this information and references into the analysis in the FEIS.	Text added to Section 3.5.5.5 to incorporate additional information on impacts from artificial light, including impacts on larval and zooplankton diel migratory patterns. The overall impact conclusion is supported by the best available literature and is unchanged. Please refer to response to comment BOEM-2023-0011-0185-0077 for additional information.
BOEM-2023-0011-0185-0090	EIS Section: 3.5.5.5 PDF Page: 303 Comment: Under cable emplacement and maintenance please provide an estimate of the scale location and timing of potential seabed preparation activities including how any boulders would be deposited and where. If such information is not currently available at this time please note that and caution that the full impacts cannot be accurately estimated until such	More detail has been added in the discussion of impacts from cable emplacement and maintenance in Section 3.5.5.5 including the scale and location of potential seabed preparation activities (boulder relocation; dredging; vessel anchoring), associated impacts to habitats, finfish, invertebrates, and EFH, and mitigation measures (micro-routing of cables). Additional information on impacts from

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	information becomes available. This information is necessary to fully evaluate the impacts of cable emplacement activities on EFH and marine species as the location scale duration and seasonality of such activities substantially affect the resulting impacts. For example the section suggests for both impacts would be negligible but that depends on where the entrainment occurs relative to spawning sites and whether such activities occur during spawning season for species in the affected area. Further text notes habitat loss and conversion yet still concludes that impacts are temporary and short-term which is incorrect without specifying how much habitat would be converted the type of habitats affected and where such impacts would occur. Finally please note any mitigation measures that would be employed to reduce impacts from cable emplacement.	cable installation methods has also been added along with associated impacts. More specific details on impacts on EFH are addressed in the SouthCoast Wind Project EFH Assessment.
BOEM-2023-0011-0185-0091	EIS Section: 3.5.5.5 PDF Page: 304-309 Comment: Noise IPF: Please clarify what the overall conclusion for the impact of noise is. This section ends with a conclusion regarding G&G surveys rather than noise overall.	The concluding sentence in the noise impacts under Section 3.5.5.5 has been revised to reflect the overall noise impact of all project activities that are expected to generate noise.
BOEM-2023-0011-0185-0092	EIS Section: 3.5.5.5 PDF Page: 304-309 Comment: Noise IPF: The analysis of noise lacks a discussion substrate vibration effects on early life stages. Also missing is a discussion of how noise interacts with behavior and communication (e.g. de Jong et al. 2020 https://doi.org/10.1007/s11160-020-09598-9 (Hyperlink: https://doi.org/10.1007/s11160-020-09598-9); Siddagangaiah et al. 2021 doi: 10.1002/rse2.231 (Hyperlink: https://zslpublications.onlinelibrary.wiley.com/doi/10.1002/rse2.231); Stanley et al. 2020 doi.org/10.1242/jeb.219683) (Hyperlink: https://journals.biologists.com/jeb/article/223/13/jeb219683/222906/Ontogenetic-variation-in-the-auditory-sensitivity). The discussion on particle motion should additionally include more recent work by Sigray et al. 2022 (doi.org/10.1016/j.marpolbul.2022.113734) (Hyperlink: https://www.sciencedirect.com/science/article/pii/S0025326	The *noise* IPF analysis has been expanded to include discussions on potential disruptions of communication and behavior in fish and invertebrates as well as an expanded discussion on particle motion effects in invertebrates, specifically, and cephalopods.

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	X22004167?via%3Dihub); Sole et al. 2022 (doi.org/10.1016/j.envpol.2022.119853) (Hyperlink: https://www.sciencedirect.com/science/article/pii/S0269749122010673?via%3Dihub); Hawkins 2022 (doi.org/10.1121/10.0013994) (Hyperlink: https://asa.scitation.org/doi/10.1121/10.0013994).	
BOEM-2023-0011-0185-0093	EIS Section: 3.5.5.5 PDF Page: 305 Comment: Please clarify why the acoustic radial distance at Location 1 is smaller for behavioral effects at 150 dB than small fish injury at 183 dB. This seems counterintuitive when the distance is larger at Location 2.	Table 3.5.5-8 showing acoustic radial distances for fish during pile driving has been revised to reflect results from updated underwater acoustic modeling scenarios in Limpert et al. (2023). For all pile-driving scenarios, acoustic radial distances are largest for the Behavioral (all fish) category, followed by the Injury over 24hr (fish < 2 grams) category, then the Injury over 24hr (fish ≥ 2 grams) category. The smallest acoustic radial distances are in the Single Strike Injury (all fish) category for all pile driving scenarios modeled.
BOEM-2023-0011-0185-0094	EIS Section: PDF Page: 306 Comment: Clarify what "small fish" and "large fish" refer to in Table 3.5.5-5. This information should be included below the table.	Table 3.5.5-8 for fish during pile driving under various scenarios, with 10-decibel noise attenuation from a noise-abatement system) has been updated and no longer includes the terms *small fish* and *large fish*.
BOEM-2023-0011-0185-0095	EIS Section: 3.5.5.5 PDF Page: 308 Comment: Noise IPF: Mooney et al. 2020 is incorrectly cited. The information attributed to this reference was cited by Mooney et al. 2020 but was not research conducted by them.	The Mooney et al. (2020) reference in Section 3.5.5.5 has been replaced with the appropriate citation: Westerberg (1994, as cited in Mooney et al. 2020).
BOEM-2023-0011-0185-0096	EIS Section: 3.5.5.5 PDF Page: 308 Comment: Noise IPF: Please include a full description of the potential impacts from noise and vibration associated with construction and operations. Operational noise as noted for marbled rockfish could also mask acoustic communication for other species such as cod that rely upon communication for spawning. This would occur for the duration of the project and would have a lingering effect unlike temporary masking from ship noise. Pile driving noise may produce a startle or avoidance response that may interrupt social spawning for species like cod and squid that exhibit elaborate spawning behavior.	Section 3.5.5.5 has been expanded to include discussions on the effects of noise on behavior, communication, and spawning of fish and invertebrate species.

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	Vibrations within the sediment has also been shown to affect shellfish respiration and feeding as noted in our comments for previous actions. This section should note these impacts.	
BOEM-2023-0011-0185-0097	EIS Section: 3.5.5.5 PDF Page: 308 Comment: Idealized propagation distances for reproductive vocal communications of sciaenid fishes (croakers and drums) are provided in Table 4 in Horodysky et al 2008. These species can hear each other's soniferous lekking from 8-128 m away absent any background noise. Some are offshore spawners in regions sited for wind and should be included herein as Atlantic croaker (and black drum) are moving north with climate change.	A description of the impacts to soniferous fish (mainly Atlantic cod) has been added to Final EIS, Section 3.5.5.5.
BOEM-2023-0011-0185-0098	EIS Section: 3.5.5.5 PDF Page: 309 Comment: It is unclear why seasonal restrictions of UXO detonations from December through April will eliminate exposure to Atlantic sturgeon when the species is generally in the ocean at this time. Adults may spawn in rivers from the spring into summer but not all adults move into the river system at this time. This assessment of UXO impacts on listed fish species should be revised to be more comprehensive. Additionally any analysis of impacts of listed fish should be moved to the Alternative B – Proposed Action on ESA-Listed Species subsection.	If Atlantic sturgeon are present in the Project area during December through April, they would benefit from seasonal restrictions on unexploded ordnance (UXO) detonation. More detail on the UXO desktop study and potential impacts from UXO detonation has been added to Section 3.5.5.5 under the *noise* IPF.
BOEM-2023-0011-0185-0099	EIS Section: 3.5.5.5 PDF Page: 309 Comment: The DEIS does not consider impacts to reproduction/spawning activity from UXO detonation. Specifically further analysis of impacts to finfish and invertebrate species particularly those that aggregate to spawn including Atlantic cod and longfin squid should be analyzed in the FEIS.	A discussion on impacts to reproduction/spawning activity for Atlantic cod and longfin squid has been added to the noise section in Alternative B.
BOEM-2023-0011-0185-0100	EIS Section: 3.5.5.5 PDF Page: 309 Comment: Presence of Structures IPF: Please note that predator-prey interactions may change due to increases to certain structure-affiliated species which may result in positive and negative impacts to various species. For example increased structure may attract black sea bass which could prey on younger lobster resulting	Text has been added to Section 3.5.5.5 regarding changes to trophic dynamics and predator–prey interactions, with specific mention of adverse impacts on some juvenile fishes and invertebrates due to the presence of structures.

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	in positive impacts for black sea bass but negative impacts to lobsters and other prey species.	
BOEM-2023-0011-0185-0101	EIS Section: 3.5.5.5 PDF Page: 309-310 Comment: Presence of Structures IPF: Analysis of the presence of structures is insufficient. This analysis should include a discussion of FAD (fish aggregating device) effects; artificial reef effects; modification of the prey field for upper level predators the potential for structures to facilitate the establishment and range expansion of non-native species; local hydrodynamic and broad scale wind-wake effects on larval transport primary and secondary production planktonic food availability etc. Please also include relevant supporting literature to support statements made. Other than the COP there is scant literature provided grey or peer- reviewed to support any of the statements made. There is a growing body of knowledge on these topics and the majority of this information is missing from the analysis.	The presence of structures IPF analysis in Sections 3.5.5.3 and 3.5.5.5 has been revised with added discussions on artificial reef effects, fish aggregation, altered trophic dynamics, invasive-species spread, changes in primary production, effects on larval transport, and localized and broad-scale atmospheric and hydrodynamic effects. The revised text is presented along with appropriate references.
BOEM-2023-0011-0185-0102	EIS Section: 3.5.5.5 PDF Page: 310 Comment: Please note that while net primary productivity in the entire North Atlantic may not be measurably affected by the presence of structures localized primary productivity would likely be affected at measurable levels based on the text included in this section and recent literature on this topic. This could have important localized effects on marine species that rely on primary and secondary productivity. Comparing project level effect to the entire North Atlantic due to the Gulf Stream artificially dilutes the potential impacts that may occur within the project area.	The *presence of structures* IPF in Section 3.5.5.5 has been revised to acknowledge that both localized and broad scale impacts can occur as a result of atmospheric and hydrodynamic effects from the presence of WTGs, which include changes in stratification and primary productivity. Section 3.5.5.3 has also been expanded with added discussions on this topic.
BOEM-2023-0011-0185-0103	EIS Section: 3.5.5.5 PDF Page: 312 Comment: The Impacts of Alternative B – Proposed Action on ESA-Listed Species subsection only briefly assesses noise and traffic impacts on listed fish however all other IPFs assessed for finfish in the greater section should also be assessed for listed fish in the subsection. This is especially pertinent for UXOs fisheries/marine resource surveys water	Section 3.5.5.5, *Impacts of Alternative B – Proposed Action on ESA-Listed Species*, has been revised to include additional information on impacts specific to ESA-listed fish species. Text relevant to all fish species is retained in the main analysis section to avoid repetition.

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	withdrawals/impingement and benthic impacts from habitat loss dredging and cable laying - both offshore and in nearshore habitats. This information should be consistent with the BA (see comment below). Additionally mentions to listed fish are intermingled throughout the analysis of IPFs on finfish inverts and EFH - to avoid confusion all IPF impacts on listed fish should be included in the Alternative B – Proposed Action on ESA-Listed Species subsection.	
BOEM-2023-0011-0185-0104	EIS Section: 3.5.5.5 PDF Page: 312 Comment: The EIS should contain a summary of the findings in the BA. The New England Wind DEIS (and our ensuing comments) can be used as a structure to follow for integrating this information. 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 SouthCoast webpage (not just on the ESA consultation page) so that the information can be easily referenced by the public.	Findings from the BA have been incorporated in various parts of Section 3.5.5, as well as other sections as appropriate, specifically in Section 3.5.6, *Marine Mammals*, and Section 3.5.7, *Sea Turtles*. The BA is publicly available on BOEM's website at https://www.boem.gov/renewable-energy/state-activities/nmfs-esa-consultations.
BOEM-2023-0011-0185-0105	EIS Section: 3.5.5.5 PDF Page: 312 Comment: The rationale for why Atlantic sturgeon will not suffer injury from pile driving even though the distance to injury thresholds are short is not provided in the text. The distance to LE is ~9km and it is unlikely that a sturgeon would stay within this proximity for 24 hours however Lpk is 0.14 km and thus a sturgeon could be within that range to pile driving to sustain injury. If information supports that injury will not occur the EIS should clearly state the rationale for why injury will not occur and include supporting information as part of this rationale.	Discussions on impacts of pile-driving noise on Atlantic sturgeon in the *Noise: Pile driving* and *Impacts of Alternative B – Proposed Action on ESA-Listed Species* IPF in Section 3.5.5.5 have been expanded to include a clear rationale on why injury due to pile driving noise is not expected.
BOEM-2023-0011-0185-0106	EIS Section: 3.5.5.6 PDF Page: 314 Comment: Because seabed preparation trenching and cable installation and operation would be fully avoided the Sakonnet River Alternative C would result in fewer impacts to EFH compared to the proposed action. This should be noted in this section. We disagree with BOEM's conclusion that the potential benefits of avoiding cable emplacement within the Sakonnet River	Section 3.5.5.6 has been updated to include specific details of the cable route deviations for Alternatives C-1 and C-2, including potential habitat features that may be affected by the alternative routes and the decrease in estuarine disturbance and EFH/HAPC. At BOEM's request, SouthCoast Wind commissioned a geohazard study of Alternatives C-1 and C-2 and a benthic desktop study of Alternative C-1, and

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	would not measurably reduce impacts on finfish invertebrates and EFH from both construction and operations/maintenance activities. This conclusion is also contrary to the analysis provided in the text.	the results of these analyses have been added to the Final EIS.
BOEM-2023-0011-0185-0107	EIS Section: 3.5.5.6 PDF Page: 315 Comment: The analysis in the DEIS should consider that shortnose sturgeon may occasionally be present in nearshore coastal waters such as the Sakonnet River as some individuals occasionally make coastal migrations.	Final EIS Section 3.5.5.6 has been edited to include the potential reduction of impacts on shortnose sturgeon under Alternative C. However, shortnose sturgeon are very unlikely to be in the Project area.
BOEM-2023-0011-0185-0108	EIS Section: 3.5.5.7 PDF Page: 316 Comment: Please note that Alternative D would also reduce impacts to longfin squid. Longfin squid EFH overlaps with the northern portions of the project area as noted in Guida et al 2017 (Guida V. A. Drohan H. Welch J. McHenry D. Johnson V. Kentner J. Brink D. Timmons E. Estela-Gomez. 2017. Habitat Mapping and Assessment of Northeast Wind Energy Areas. Sterling VA: US Department of the Interior Bureau of Ocean Energy Management. OCS Study BOEM 2017-088. 312 p.).	Final EIS Section 3.5.5.7 has been edited to include the Longfin inshore squid on the list of species with EFH for all life stages in the Lease Area.
BOEM-2023-0011-0185-0109	EIS Section: 3.5.5.7 PDF Page: 316 Comment: Please clarify the analysis on whether turbines would have substantial or localized effects on hydrodynamic and atmospheric effects in this section and throughout the DEIS. Reference to Christiansen et al. 2022 on page 3.5.5-55 suggests that hydrodynamic and atmospheric effects have been shown to extend for several 10s of kilometers beyond a wind farm. This contradicts discussions of such effects in other sections of the document (Executive Summary page ES-9) that suggest only localized effects in referencing Johnson et al. 2021 and North Sea studies (see page 3.4.2-13) and Li et al. 2014 (page 3.5.5-35) indicating impacts up to a kilometer from a monopile.	Revisions have been made to clarify that atmospheric and hydrodynamic effects can be both localized and broad scale as shown by the studies cited on the topic. While the Johnson et al. (2021) modeling focuses on the area near the Project area, Christiansen et al. (2022) conclude that the changes brought about by salinity and temperature from vertical structures is small compared to the long-term and interannual variability of temperature and salinity. Such changes may not be of a magnitude to be detectable because they may not differ significantly from natural variation. Despite the lack of evidence to support detectable changes in hydrodynamic patterns at such distances, the range of impacts has been updated to include ten of kilometers speculated from Christiansen et al. (2022). Revisions in Sections 3.4.2, 3.5.5.3, and 3.5.5.5 now indicate that the effect scale can range from hundreds of meters to tens of kilometers.

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BOEM-2023-0011-0185-0110	EIS Section: 3.5.5.8 PDF Page: 318 Comment: Alternative E-2 and E-3 would significantly increase the benthic disturbance and habitat loss of the proposed action. Given that Atlantic sturgeon forage benthically the impacts of this potential habitat loss should be assessed.	Text has been added in Section 3.5.5.8 stating that Alternatives E-2 and E-3 would have a larger impact on soft-bottom habitats, EFH species associated with these habitats, and ESA-listed species that forage in these habitats such as Atlantic sturgeon.
BOEM-2023-0011-0185-0111	EIS Section: 3.5.5.9 PDF Page: 318 Comment: Please be more clear about the trade-offs inherent under Alternative F in that reductions in area impacted by fewer cables may be at the cost of increased impacts to egg larvae and plankton through entrainment. Annual entrainment of millions of larvae for individual stocks of certain species in poor condition and with negative trends (cod white hake red hake and herring) due to HVDC converter stations could result in long-term impacts to those species since it will be operational during the life of the project. Additionally the trade-off of converter station operation and fewer cables will depend on the habitat type where cables are being installed. For example cables running through complex habitats are more likely to result in long-term to permanent impacts and elevated scour protection compared with cables that can be fully buried in softer sediments. These trade-off should be further discussed in the analysis.	The discussion in Section 3.5.5.9 has been expanded to include potential entrainment effects on fish with poor stock status, EMF effects from DC cables, and the reduction of impacts to complex habitats from cable emplacement activities with the reduction of the number of cables from five HVAC to three HVDC cables.
BOEM-2023-0011-0185-0112	EIS Section: 3.5.5.9 PDF Page: 319 Comment: (1) Exact terminology should be used to describe proposed project impacts suggest revising "slightly" to the extent of benthic impacts on ESA-listed fish species that will be reduced through Alternative F and what the impacts of that are. (2) An increase in HVDC converter stations poses potential risks to listed fish species and also prey of protected species those impacts should be described here.	Impacts of Alternative F on ESA-Listed Species in Section 3.5.5.9 have been revised to describe the extent of reduced benthic impact under this alternative and the potential added impact to prey of ESA-listed species due to a second converter OSP.

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BOEM-2023-0011-0185-0113	EIS Section: 3.5.5.9 PDF Page: 319 Comment: The increase in direct current cables and effects of EMF relative to alternating current cables should be discussed as part of this alternative. Fewer cables does not necessarily mean less impact the type of electrical current is also a factor. See Cresci et al. 2022.	Text has been added to section 3.5.5.9 discussing the difference in EMF amplitude produced by AC and DC cables and previous studies on DC EMF effects on fish and invertebrates.
BOEM-2023-0011-0185-0114	EIS Section: 3.5.5.9 PDF Page: 319 Comment: We recommend the lessee and BOEM consult available data and NMFS experts to determine the location of any HVDC converter station to avoid not just Nantucket Shoals but also other areas where spawning condition fish are detected and where larvae for specified stocks (see previous comments) are found. ECOmon survey data could be one source to help identify such areas. We also encourage the lessee to consult with NMFS experts about the location that would minimize impacts to such species.	The potential converter station location provided in Appendix B, Figure B-2 is the indicative location of the Project 1 HVDC converter OSP. The facility's design will implement mitigation measures to reduce impacts on fish stocks, as stated in the NPDES permit application. The HVDC converter station will not use traveling water screens, and the cold-water intake system will include a bar rack and inline pump filter screens. ECOmon survey data were assessed and used in the SouthCoast Wind NPDES permit application. SouthCoast Wind and the HVDC designers are also considering the available data in COP Appendix M, Benthic and Shellfish Resources Characterization Report, and COP Appendix E, MSIR, while working with the EPA through the NPDES permitting process to develop the HVDC design. The HVDC converter station will not be placed on any hard-bottom habitat and will be located outside of the Enhanced Mitigation Area defined in the EIS.
BOEM-2023-0011-0185-0115	Section 3.5.6: Marine Mammals EIS Section: 3.5.6 PDF Page: Global Comment: Overall there is very little mention of project decommissioning and how each of the impacts will affect marine mammals during that phase. Be sure to include this phase of the project under each IPF. As an example how will the amount of lighting change during decommissioning?	The EIS has been revised to include more detail on effects related to the Decommissioning Phase of the Project where applicable. Based on Section 3.5.6, *Marine Mammals*, BOEM anticipates that operational lighting effects on marine mammals would be negligible; thus, effects of lighting during the decommissioning phase of the Project would also be considered negligible.
BOEM-2023-0011-0185-0116	EIS Section: 3.5.6 PDF Page: Global Comment: As you are aware after independent review and a determination of sufficiency NOAA's National Marine Fisheries Service (NMFS) intends to adopt this FEIS for purposes of fulfilling our	Thank you for the suggested resource. Reusable content has already been developed with NMFS review and input, please coordinate within your agency accordingly for additional information. Accordingly, the SouthCoast Wind EIS has been

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	independent responsibilities under the National Environmental Policy Act (NEPA) to support our decision of whether to issue an incidental take authorization to SouthCoast Wind allowing the take of marine mammals. To improve the analysis directly related to our action NMFS recently provided BOEM extensive edits to the Marine Mammals section of Chapter 3 of the Ocean Wind draft PDEIS. NMFS requests all edits provided on the Ocean Wind draft FEIS be incorporated into the SouthCoast Wind FEIS. This includes an additional determination on the effects of the No Action Alternative (i.e. not approving the Construction and Operations Plan) on marine mammals that is comparable to the effect determinations for each Alternative. Further we recently learned BOEM is developing reusable content directly applicable to the acoustic analysis on the impacts of marine mammals. NMFS requests the opportunity to review this content and that any resulting analysis be incorporated into all FEISs including SouthCoast Wind. Given the substantial changes likely to occur we also request the opportunity to review the SouthCoast Wind FEIS again prior to it being published.	updated throughout based on the reusable content from NMFS to ensure that the discussions and analyses under *Alternative A – No Action Alternative* is presented more consistently and conforms with other BOEM EIS documents. Further, the sections under *Alternative B – Proposed Action* have also been revised extensively based on the recent acoustic modeling updates in the MMPA Incidental Take Authorization (ITA) (December 2023) and are in alignment with the analyses in the SouthCoast Wind BA.
BOEM-2023-0011-0185-0117	EIS Section: 3.5.6 PDF Page: 321 Comment: Please explain why the marine mammal geographic analysis area is limited to "the majority of movement ranges" and does not encompass all movement of all analyzed species. Because this GAA is the basis for the quantity and location of the activities listed in "Planned and ongoing activities" which is a major component of the cumulative effects analysis an explanation for this approach is important. NMFS has also identified this issue in other ongoing offshore wind EISs.	The use of the selected geographic analysis area is in keeping with the precedent set by previous offshore wind EISs. The current geographic analysis area sufficiently captures the majority of the movement range of the marine mammal species of focus, and a revision of the geographic analysis areas area is not expected to add additional impacts to the “planned and ongoing activities” that are not currently discussed in this EIS.
BOEM-2023-0011-0185-0118	EIS Section: 3.5.6.1 PDF Page: 323 Comment: The DEIS references Appendix B for "summary table of species included in the analysis" but the values in Table B-7 (Species information) are outdated based on Hayes et al. 2020 and 2021. The right whale abundance value in the table is 368	The population estimates for marine mammal species other than the NARW were not changed from the 2021 to the 2022 estimates, these figures are still accurate according to the best science. The NARW population estimate in the Appendix B table was updated to reflect the most recent (2022) search

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	which is inconsistent with the abundance values referenced elsewhere and the best available science. Please update Table B-7 with information from the publicly available draft 2022 SARs.	and rescue (SAR) efforts (published Hayes et al. 2023) and cited accordingly.
BOEM-2023-0011-0185-0119	EIS Section: 3.5.6.1 PDF Page: 323 Comment: Please indicate the species for which abundance and density values were derived from Palka et al. (2017). Abundance values are available in the draft 2022 SARs and density values are available using the Duke habitat-based cetacean density models. Please clarify why it was necessary to use Palka et al. (2017) values given the availability of these other data sources.	The results of the Atlantic Marine Assessment Program for Protected Species (AMAPPS) studies from the Palka et al. (2017) reference are being used to supplement information from SARs and density models in order to give a more holistic view of marine mammal populations. The Palka et al. (2017) information is not being used as a replacement for other data sources.
BOEM-2023-0011-0185-0120	EIS Section: 3.5.6.1 PDF Page: 323 Comment: At the end of the middle paragraph please note that the New England Aquarium aerial surveys have continued to the present day.	Text has been added to the paragraph to note that the New England Aquarium aerial surveys are currently ongoing.
BOEM-2023-0011-0185-0121	EIS Section: 3.5.6.1 PDF Page: 323 Comment: At the last paragraph on the page please correct the description of the AMAPPS survey coverage area. Most of the AMAPPS shipboard surveys have been concentrated further offshore but aerial surveys regularly cover that area with some shipboard surveys focused directly in the wind energy areas.	The text in the paragraph has been edited to note that aerials surveys regularly cover the project area, and that certain shipboard surveys focus on wind energy areas.
BOEM-2023-0011-0185-0122	EIS Section: 3.5.6.1 PDF Page: 323 Comment: Aside from the Duke University modeling the AMAPPS program AMAPPS has also conducted density models. Please cite the appropriate papers and website with regards to these efforts (for example https://apps-nefsc.fisheries.noaa.gov/AMAPPSviewer/ (Hyperlink: https://apps-nefsc.fisheries.noaa.gov/AMAPPSviewer/) could also cite Chavez et al 2019 DOI: 10.1038/s41598-019-42288-6) (Hyperlink: https://www.nature.com/articles/s41598-019-42288-6)	The AMAPPS Spatial density visualization tool has been cited as Palka et al. (2021). The habitat-density modeling done by Chavez-Rosales et al. (2019) has also been referenced.

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BOEM-2023-0011-0185-0123	EIS Section: 3.5.6.1 PDF Page: 324 Comment: Please clarify the difference between the modeled density peaks of sperm whales. Two different months/time frames are given with two different values. It is not clear if these were from the same time frame and there were two different peaks or if the second value was reporting on a different time frame or model.	This was an error; the first value is the density of sperm whales within the Lease Area. The second value is the density of sperm whales on Nantucket Shoals; however, the wrong value was recorded. This has been clarified in the text and the corrected values are now presented.
BOEM-2023-0011-0185-0124	EIS Section: 3.5.6.1 PDF Page: 324 Comment: Please update with more recent AMAPPS survey data (beyond 2010-2013) in the Threatened and Endangered Marine Mammals section. There have been several AMAPPS surveys since 2013. https://www.fisheries.noaa.gov/resource/publication-database/atlantic-marine-assessment-program-protected-species.	Sightings of blue, fin, sei, and sperm whales have been updated to reference data from the AMAPPS II surveys from 2015 to 2019. Referenced as Palka et al. (2021).
BOEM-2023-0011-0185-0125	EIS Section: 3.5.6.1 PDF Page: 324 Comment: Please consider including an explanation earlier in the text in this chapter about why Nantucket Shoals is important and how it relates to the project area (i.e. the lease area and ECCs) and GAA.	Discussion of Nantucket Shoals as an important habitat for marine species is discussed earlier in the EIS (Executive Summary Section ES.4.4, and Chapter 2, Section 2.1.4) as well as in the BA and EFH Assessment.
BOEM-2023-0011-0185-0126	EIS Section: 3.5.6.1 PDF Page: 325 Comment: Please revise the following text for clarity: "highest number of days of acoustic detections in the winter and spring; with 22 to 67 days of acoustic detections from November to February and again from March to April." It is not clear how "22 to 67" relates to the months in this text.	The number of days of acoustic detections were based off a range (1–3 days; 4–21 days; 22–67 days) captured during each season (Winter – November to February; Spring – March to April) when NARWs were detected at its highest peak. Please see Atlantic Marine Assessment Program for Protected Species: FY15–FY19 (noaa.gov), p. 189 for further clarification.
BOEM-2023-0011-0185-0127	EIS Section: 3.5.6.1 PDF Page: 325 Comment: The draft 2022 SARS (Hayes et al. 2023) provides a NARW abundance estimate of 338. Please correct the statement "2022). The draft 2022 NMFS stock assessment report gives a population estimate of 365 NARWs (Hayes et al. 2022)."	The statement in the FEIS has been revised with the updated NARW abundance estimate (365–338) based on the most recent 2022 Marine Mammals Stock Assessment Report (Hayes et al. 2023).
BOEM-2023-0011-0185-0128	EIS Section: 3.5.6.1 PDF Page: 325 Comment: Listed "NAWR UME up to 92 individuals." Please correct the acronym to NARW.	This typographical error has been corrected in the Final EIS.

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BOEM-2023-0011-0185-0129	EIS Section: 3.5.6.1 PDF Page: 325 Comment: Please update the NARW UME values to reflect the most current information immediately prior to publication of the FEIS.W	The Final EIS has been revised with the updated total number of NARW unusual mortality events (UMEs) based on the data reported in https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2024-north-atlantic-right-whale-unusual-mortality-event (accessed October 2024).
BOEM-2023-0011-0185-0130	EIS Section: 3.5.6.1 PDF Page: 325 Comment: The final sentence of the NARW population estimate paragraph states that NARW population size is fewer than 350 individuals and cites NOAA Fisheries. Earlier in the paragraph there are two models discussed one reporting a population estimate of 336 individuals and one reporting a population 365 the second being above 350. Please either remove the statement that there are fewer than 350 individuals or clearly state the number/estimate that you are moving forward with. This is repeated on PDF page 354.	These sections on the EIS have been revised with the appropriate NARW abundance estimate of 338 individuals based on the most recent 2022 Marine Mammals Stock Assessment Report (Hayes et al. 2023). Statements indicating a range “under/fewer than 350 individuals” rather than the actual abundance estimate have been removed for clarity.
BOEM-2023-0011-0185-0131	EIS Section: 3.5.6.1 PDF Page: 325-326 Comment: Consider different citation other than Palka et al. (2021) for acoustic detections.	Data from AMAPPS (Palka et al. 2017, 2021) are the best publicly available source that provides the most current density estimates (via acoustic detection) on NARW in the Atlantic Ocean. Along with AMAPPS data, density models reported by the Duke University Marine Geospatial Ecology Laboratory (Roberts et al. 2022a–m) are also used throughout the sections to provide modeled density estimates for marine mammals.
BOEM-2023-0011-0185-0132	EIS Section: 3.5.6.1 PDF Page: 326 Comment: Please specify whether the peak density value (NARW/nm^2) in November and December was the same as the density from January to May. If not provide the value.	Peak density values (NARW/nm^2) in November and December were the same as the density from January to May. The text in this section has been revised to reflect this.
BOEM-2023-0011-0185-0133	EIS Section: 3.5.6.1 PDF Page: 326 Comment: Please include the fact that NARW residency time in the MA and RI/MA WEAs from December through May tripled to 13 days during the two study periods 2011-2015 to 2017-2019 (Quintana-Rizzo et al. 2021).	The EIS has been revised to include the modeled residency time of NARWs in the Massachusetts and Rhode Island wind energy areas (WEAs) based on the Quintana-Rizzo et al. (2021) data.

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BOEM-2023-0011-0185-0134	EIS Section: 3.5.6.1 PDF Page: 326 Comment: At the end of the paragraph beginning "Thus NARW observations..." please add "Right whales have been observed feeding in this area in all seasons in southern New England."	The EIS has been revised to include the statement that NARWs have been observed feeding in all seasons in southern New England (O'Brien et al. 2022).
BOEM-2023-0011-0185-0135	EIS Section: 3.5.6.1 PDF Page: 326 Comment: In the last sentence of the first paragraph please remove reference to a spring breeding period which is incorrect.	The EIS has been revised and the statement alluding to foraging during spring breeding period at Brayton Point ECC has been removed.
BOEM-2023-0011-0185-0136	EIS Section: 3.5.6.1 PDF Page: 326 Comment: Please note that right whale critical habitat has not been updated since 2016 and right whale habitat use particularly in southern New England has shifted significantly in recent years.	This comment has been noted. The EIS and other submittals will be updated, wherever applicable, regarding NARW critical habitat and habitat use when new data/information become available.
BOEM-2023-0011-0185-0137	EIS Section: 3.5.6.1 PDF Page: 327 Comment: Please update the humpback whale and minke whale UME values to reflect the most current information immediately prior to publication of the FEIS.	The EIS has been revised with the updated total number of humpback whale and minke whale UMEs based on the data presented in https://www.fisheries.noaa.gov/national/marine-life-distress/2016-2024-humpback-whale-unusual-mortality-event-along-atlantic-coast (accessed October 2024).
BOEM-2023-0011-0185-0138	EIS Section: 3.5.6.1 PDF Page: 329 Comment: In the MMPA ITA application SouthCoast Wind did not include harp seals as a species likely to occur in the project area. Please consider removing references to harp seals.	The harp seal is an uncommon species in the Project area, which means it occurs in low numbers or on an irregular basis. While there are insufficient data to estimate the population size in U.S. waters, the whole population is estimated at 7.6 million, and harp seal occurrences have been increasing in the northeastern United States since the 1980s (CRMC 2010; Hayes et al. 2022). Harp seal was included in the noise modeling that went into the MMPA ITA application; thus, BOEM sees no reason to exclude this species' information from the EIS. Clarifications regarding its population distribution were added.
BOEM-2023-0011-0185-0139	EIS Section: 3.5.6.1 PDF Page: 331 Comment: Please remove the equations in Table 3.5.6-5 and references to the equations used to calculate thresholds based on effects observed in 50 percent of exposed animals. Neither NMFS nor SouthCoast consider these equations when estimating the number of animals that might be exposed to UXO	The Final EIS has been revised with the updated equation based on the more conservative 1 percent threshold. Any statements referring to the equation have also been updated.

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	detonations or any related mitigation. Retaining the equations in the DEIS may be confusing for readers. This is an example of the text that was revised for the Ocean Wind EIS which should be revised here based on those updates (see global comments for Section 3.5.6).	
BOEM-2023-0011-0185-0140	EIS Section: 3.5.6.3 PDF Page: 335 Comment: Please consider creating a bullet point that provides more detail about the site assessment surveys using HRG equipment. Simply saying "site assessments" does not provide enough information.	The statement in the EIS has been revised to include a bulleted list of site characterization activities that could potentially affect marine mammals.
BOEM-2023-0011-0185-0141	EIS Section: 3.5.6.3 PDF Page: 336 Comment: Please add UXO detonations to the list of offshore wind activities that could generate underwater noise and discuss the potential impacts of UXO detonations later in the text.	The statement in the EIS has been revised to include UXO detonations in the list of offshore wind activities that generate underwater noise. A more detailed discussion of UXO detonations is discussed in its own subsection under *Noise*.
BOEM-2023-0011-0185-0142	EIS Section: 3.5.6.3 PDF Page: 337 Comment: Please revise "This act" to say "The MMPA."	This statement has been corrected in the Final EIS for clarity.
BOEM-2023-0011-0185-0143	EIS Section: 3.5.6.3 PDF Page: 337 Comment: Need to add earlier that Level A harassment may also include "other non-auditory injury not leading to serious injury or mortality." This becomes important for the UXO discussion that needs to be added.	The sentence on Level A harassment has been updated to include the statement "other non-auditory injury not leading to serious injury or mortality."
BOEM-2023-0011-0185-0144	EIS Section: 3.5.6.3 PDF Page: 337 Comment: Need to revise text in parentheses to say "(and other non-auditory injury not leading to serious injury or mortality)." This parenthetical addition a response to a comment on the PDEIS presently makes is sound like this words in the parentheses are describing PTS but the correction is meant to indicate that UXO detonations part of offshore wind activities could cause different forms of Level A harassment including gastrointestinal or lung injury.	Please see response to comments BOEM-2023-0011-0185-0143 and BOEM-2023-0011-0185-0145.
BOEM-2023-0011-0185-0145	EIS Section: 3.5.6.3 PDF Page: 337 Comment: As commented on for the PDEIS we still suggest that it is important that the "Physiological effects" section include more extensive	Subsections under *Noise* have been added to include *Non-auditory injury*. The sections under *UXO Detonations* and *Summary Statement for Noise* have also been extensively

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	discussion on mortality serious injury and stress. Please include.	revised to include the physiological effects of *UXO detonation* to marine mammals.
BOEM-2023-0011-0185-0146	EIS Section: 3.5.6.3 PDF Page: 337 Comment: The following sentence should be edited: "While experiencing either TTS the hearing threshold rises and a sound must be louder to be detected." This also describes PTS so please add "or PTS" after TTS.	This statement in the EIS has been revised as requested.
BOEM-2023-0011-0185-0147	EIS Section: 3.5.6.3 PDF Page: 341 Comment: The concluding statement that "seals are likely to exhibit no detectable response or mild orientation responses to impact pile- driving activities" is not supported by the previous examples. All citations above show that seal abundance was greatly reduced during pile driving activities in radii up to tens of km. Seals were all were found to return after construction ceased but all exhibited a behavioral response to pile driving activities.	This statement in the EIS has been revised to say that seals generally exhibit moderate, but temporary behavioral responses to pile-driving activities.
BOEM-2023-0011-0185-0148	EIS Section: 3.5.6.3 PDF Page: 345 Comment: The potential for overlapping UXO detonations from nearby projects being unlikely is not a conclusion that can be drawn by the previous sentence stating that the number and location of detonations are unknown.	The section discussing UXO detonations in the No Action Alternative has been revised extensively in the Final EIS. The conclusions for UXO detonation under No Action have been revised to state that with mitigative measures in place, the impacts associated with UXO detonations would be minor and similar to those described for the Proposed Action.
BOEM-2023-0011-0185-0149	EIS Section: 3.5.6.3 PDF Page: 346 Comment: Please provide more detail as to why the impacts for NARW would be minor and impacts for all other marine mammals in the low-frequency hearing group would be moderate.	The section under No Action Alternative discussing the Summary Statement for Noise has been revised to provide clarity. The concluding statement on noise has been corrected to state that noise-generating sources would result in moderate, short-term impacts on low-frequency cetaceans (LFCs), mid-frequency cetaceans (MFCs), high-frequency cetaceans (HFCs) and pinnipeds. Similarly, while impacts would have population-level effects on the NARW, with implementation of minimization measures expected from ongoing offshore wind activities, impacts would likely be moderate.

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BOEM-2023-0011-0185-0150	EIS Section: 3.5.6.3 PDF Page: 346 Comment: This section is missing an assessment of entrainment risk of marine mammal prey from the HVDC OSP(s). Please add a section relative to this risk. Heated effluent is assessed under Accidental Releases though these releases are regular as opposed to accidental. Consider revising this.	The section on *Cumulative Impact of the No Action Alternative* under *Accidental Releases and Discharges* has been revised to include the entrainment risk of marine mammal prey from HVDC OSPs. Impacts from actions related to accidental release and discharges from offshore wind activities, such as entrainment of marine mammal prey, would likely be minor for marine mammals, and moderate for NARW; however, with the application of operational mitigative measures (e.g., flow reduction, physical barriers) that would be required from developers, impacts would be minimized and would be expected to be of low intensity and localized.
BOEM-2023-0011-0185-0151	EIS Section: 3.5.6.3 PDF Page: 346 Comment: The phrase "...the models would be distinguishable relative to natural variability in oceanographic conditions..." does not properly characterize the issue. There are cases where effects may be different than natural variability. Even if the magnitude is within the range of inter-annual variability the direction spatial changes and consistency of these changes may not be. Please revise	Text has been revised to clarify findings of Daewel et al. (2022) where primary production changes were recorded locally at the wind-farm scale, but region-wide averages in estimated annual primary productivity remained almost unchanged.
BOEM-2023-0011-0185-0152	EIS Section: 3.5.6.3 PDF Page: 347 Comment: Daewel et al. (2022) does not show that impacts on primary productivity are not expected to be different than natural variability and instead reports that spatial patterns are likely to change.	Text has been revised to clarify findings of Daewel et al. (2022) where primary production changes were recorded locally at the wind-farm scale, but region-wide averages in estimated annual primary productivity remained almost unchanged.
BOEM-2023-0011-0185-0153	EIS Section: 3.5.6.3 PDF Page: 347 Comment: The discussion of the Golbazi et al. 2022 paper is misleading please revise. When quoting that "...meteorological changes at the surface…will be nearly imperceptible…" this is primarily referencing the difference in air temperature just above the water's surface which was the primary focus of the paper. The focus of the paper is not on oceanographic impacts. These studies do not necessarily cast doubt on the oceanographic conclusions from Daewel et al. 2022 as stated in the draft BA because the Daewell study focuses on	Text has been revised to report the implications of the findings of Golbazi et al. (2022) specific to potential changes to near-surface atmospheric properties, without contrasting to the Daewel et al. (2022) study.

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	atmospheric effects rather than hydrodynamic or oceanographic effects.	
BOEM-2023-0011-0185-0154	EIS Section: 3.5.6.3 PDF Page: 347 Comment: In the last sentence on the page please note that primary productivity could decrease also.	Generally, primary production in the summer in this region is nutrient-limited, so increased mixing would be likely to bring nutrients to the surface and increase production.
BOEM-2023-0011-0185-0155	EIS Section: 3.5.6.3 PDF Page: 348 Comment: At the end of the first full paragraph the description of the scale of impacts could be appropriate if discussing the impacts of the turbine structures directly (not the extraction of wind energy from the system). The use of the term "hydrodynamic" is not always used consistently in the document as meaning impacts from a static feature (i.e. turbine structure) on water and currents.	Please see response to comment BOEM-2023-0011-0185-0002. Edits have been made to clarify use of "hydrodynamic."
BOEM-2023-0011-0185-0156	EIS Section: 3.5.6.3 PDF Page: 349 Comment: Please provide an updated source for percentage of NARW that show evidence of entanglement. One example would be the NOAA Fisheries North Atlantic Right Whale Page (https://www.fisheries.noaa.gov/species/north-atlantic-right-whale) that states "NOAA Fisheries and our partners estimate that over 85 percent of right whales have been entangled in fishing gear at least once."	The statement in the EIS that discusses NARW entanglement has been revised to include a more recent report based on the suggested source.
BOEM-2023-0011-0185-0157	EIS Section: 3.5.6.3 PDF Page: 350 Comment: Appendix D indicates that ongoing and planned offshore wind activities will likely include mitigation measures similar to those that have been proposed by this applicant and by the cooperating agencies. This includes vessel speed restriction. Please modify the analysis under the "Traffic" section to accurately represent the assumptions regarding mitigation made in Appendix D which are used to influence the impact determinations of Alternative A.	The sections under *Traffic (vessel strike*) under No Action Alternative in the EIS have been extensively revised, and analysis of Traffic has been updated to include examples of mitigative measures similar to those described in Appendix G, as would be required from developers for offshore wind activities.

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BOEM-2023-0011-0185-0158	EIS Section: 3.5.6.3 PDF Page: 353 Comment: When analyzing the potential impacts from Port Utilization it appears that this IPF is being conflated with Vessel Traffic (and Noise to some extent). Please clarify how port utilization itself excluding vessel traffic would impact marine mammals. If the actual IPF of concern regarding port utilization activities is vessel traffic then perhaps port utilization vessel traffic should be included in the Vessel Traffic IPF.	The section on *Port Utilization* under *No Action Alternative* has been revised in the Final EIS to discuss infrastructure upgrades and port expansions at larger ports such as those planned by the Port of Massachusetts and Port of Virginia (based on Appendix D, *Planned Activities Scenario*) and that offshore wind activities would only make up a small portion of the activities at these ports. Further clarification was made by stating that the realized impacts on marine mammals associated with port utilization would be through increased vessel interaction, exposure to noise, and localized turbidity plumes from dredging (and referred to those related sections for the IPF-specific discussions).
BOEM-2023-0011-0185-0159	EIS Section: 3.5.6.3 PDF Page: 354 Comment: The text: "From 2013 to 2017 the minimum rates of human-caused mortality for sei whales fin whales and NARWs were calculated at 1 2.35 and 6.9 individuals per year respectively" is outdated. Please revise with more recent information.	This section in the EIS has been updated to report the latest human-caused mortality rates for sei whales, fin whales (Hayes et al. 2022), and NARWs (Hayes et al. 2023) based on the most recent Marine Mammals Stock Assessment Reports. https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region
BOEM-2023-0011-0185-0160	EIS Section: 3.5.6.4 PDF Page: 356 Comment: Please explain how HRG surveys are considered a measure to minimize impacts on marine mammals. NMFS disagrees that this statement in the DEIS is true.	The statement was meant to say “HRG survey-specific mitigation measures” such as pre-start clearance and shutdown zones, as described in detail in Appendix G, *Mitigation and Monitoring*. The Final EIS has been revised to correct this statement.
BOEM-2023-0011-0185-0161	EIS Section: 3.5.6.4 PDF Page: 356 Comment: The phrase "until the PSO has reported no marine mammals in the respective shutdown zone" should be revised to say "until the PSO has reported no marine mammals in the respective clearance zone."	This statement in the Final EIS has been corrected and revised to say that “Ramp-up activities would not be activated until the PSO has reported no marine mammals in the respective clearance zone” consistent with the mitigation measures in Appendix G, *Mitigation and Monitoring*.

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BOEM-2023-0011-0185-0162	EIS Section: 3.5.6.4 PDF Page: 356 Comment: Please incorporate consideration of the proposed vessel speed rule when discussing vessel speed.	Thank you for the comment. No change is required at this time. BOEM has already proposed a 10-knot speed restriction for all vessel sizes operating port-to-port between November 1 and April 30, as well as additional conditions that go above and beyond what NMFS currently requires through regulation.
BOEM-2023-0011-0185-0163	EIS Section: 3.5.6.4 PDF Page: 357 Comment: NMFS and BOEM have yet to determine whether nighttime pile driving will be allowed. Please revise this phrase to account for the possibility that nighttime pile driving may not be approved by NMFS.	Thank you for the comment. No change is required at this time. BOEM and NMFS are assessing the proposed project presented by the lessee. Any decisions, including those regarding nighttime pile driving, are subject to the outcomes of consultations, incidental take regulations issued by NMFS under the MMPA, and ultimately BOEM decision-makers that will approve, disapprove, or approve the COP with conditions. NMFS is considering allowing nighttime pile driving under some circumstances, and BOEM acknowledges that this conversation would continue through consultation and between NMFS and the applicant that may affect the final conditions required for the Project.
BOEM-2023-0011-0185-0164	EIS Section: 3.5.6.4 PDF Page: 357 Comment: Please add "and UXO detonations" after "pile driving" in the phrase "avoiding pile driving activity between January 1 and April 30."	This statement has been revised in the EIS to include UXO detonations as one of the Project-related activities bound by a seasonal restriction.
BOEM-2023-0011-0185-0165	EIS Section: 3.5.6.5 PDF Page: 357 Comment: In the MMPA ITA application SouthCoast Wind proposed using vibratory pile driving to install most foundation piles. Please remove "if used."	The statement has been corrected and the phrase “if used” for vibratory pile driving has been removed with concurrence to Appendix C, *Project Design Envelope and Maximum-Case Scenario*.
BOEM-2023-0011-0185-0166	EIS Section: 3.5.6.5 PDF Page: 358 Comment: "Each WTG requires 1 monopile or 4 to 8 pin piles" does not align with what SouthCoast proposed. Each WTG foundation would require installation of 4 pin piles if piled jacket foundations are installed. OSP foundations may require more than 4 pin piles. Please correct this here and throughout as appropriate.	The Final EIS has been updated throughout to reflect the latest installation scenarios that were used for the noise modeling described in the December 2023 ITR application.
BOEM-2023-0011-0185-0167	EIS Section: 3.5.6.5 PDF Page: 358 Comment: Please correct the phrase "with each pin pile or monopile requiring 4 or 2 hours of driving to install respectively." This is not the timing	The section *Noise: Pile Driving* under *Alternative B - Proposed Action* has been updated throughout to reflect the latest installation parameters as outlined in the MMPA ITA

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	SouthCoast proposed in their MMPA ITA application. Instead SouthCoast assumed each monopile would require up to 20 minutes of vibratory pile driving and 4 hours of impact pile driving. Each pin pile would require up to 90 minutes of vibratory pile driving and 2 hours of impact pile driving. In addition there would be a 2-4 hour period after vibratory pile driving when the hammer would be changed from vibratory to impact.	(December 2023). The modeled parameters for foundation installation have been corrected and now states that each WTG requires one monopile or four pin piles for jacket foundation. Monopile installation requires 4 hours of piling (including 20 minutes of vibratory piling). Pin-pile installation requires 2 hours of piling (including 90 minutes of vibratory piling). Both monopile and pin pile installations would require an additional 1 hour of pre-start clearance period and 4 hours to move to the next piling location.
BOEM-2023-0011-0185-0168	EIS Section: 3.5.6.5 PDF Page: 358 Comment: SouthCoast is no longer considering potential installation of 11-m monopiles and 2.9-m pin piles (the "Realistic" scenario) in their MMPA ITA application but is still considering installation of 16-m monopile foundations and 4.5-pin piles for piled jacket foundations. Please update the DEIS to reflect the most current maximally impactful construction scenarios SouthCoast is considering (included in the MMPA ITA application).	The EIS has been updated throughout to reflect the latest installation scenarios that were used for the noise modeling described in the December 2023 ITR application. Information pertaining to the previously modeled scenarios with smaller-diameter piles has been removed.
BOEM-2023-0011-0185-0169	3.5.6.5 PDF Page: 358 Comment: Please specify that the phrase "where potential injurious" refers to PTS.	The section *Noise: Pile Driving* under Alternative B - Proposed Action has been updated throughout to reflect the latest installation scenarios in the December 2023 MMPA ITR application. Discussions regarding PTS and behavioral disturbance have been revised for clarity throughout.
BOEM-2023-0011-0185-0170	EIS Section: 3.5.6.5 PDF Page: 359 Comment: Please consider removing references to the results of modeling for the "Realistic" scenario (including Tables 3.5.6-11 and 3.5.6.- 12 and 3.5.6.-13) as it is no longer being considered by SouthCoast as a potential construction scenario.	The EIS has been updated throughout to reflect the latest installation scenarios that were used for the noise modeling described in the December 2023 MMPA ITR application.
BOEM-2023-0011-0185-0171	EIS Section: 3.5.6.5 PDF Page: 359 Comment: Please clarify if Tables 3.5.6-8 through 3.5.6-13 include Level B ER95% values to the behavioral threshold based on NOAA (2005) or Wood et al. (2012).	The section *Noise: Pile Driving* under Alternative B - Proposed Action has been updated throughout to reflect the latest installation scenarios as outlined in the MMPA ITR (December 2023). As such, the acoustic modeling scenarios and modeled values to Levels A and B thresholds have been updated and are reflected in the results in Tables 3.5.6-9–3.5.6-11. The

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		frequency weighted distances (ER95% for Level A and R95% for Level B) reported in the EIS were calculated using the NMFS 2018 Technical Guidance auditory weighting functions. This is stated in the paragraph below Table 3.5.6-7
BOEM-2023-0011-0185-0172	EIS Section: 3.5.6.5 PDF Page: 359-360 Comment: The title for Tables 3.5.6-8 through 3.5.6-13 are incorrect. Please revise. Level A values relate to PTS (injury) thresholds and Level B values relate to the behavioral threshold for impact pile driving. The tables present values for both thresholds but the table titles only mention behavioral thresholds.	The section *Noise: Pile Driving* under Alternative B - Proposed Action has been updated throughout to reflect the latest installation scenarios as outlined in the MMPA ITA (December 2023). The tables associated with the new modeling scenarios and calculations to exposure and acoustic ranges have been updated accordingly.
BOEM-2023-0011-0185-0173	EIS Section: 3.5.6.5 PDF Page: 361 Comment: Please discuss how it was determined that: "These effects are considered moderate for LFC HFC and pinnipeds and minor for MFC."	The section *Noise: Pile Driving* under Alternative B - Proposed Action has been updated throughout to reflect the latest installation scenarios in the MMPA ITA (December 2023). Based on the updated acoustic modeling calculations, the effects of pile driving leading to auditory injury (Level A) and behavioral disturbance (Level B) are considered moderate for all species groups (LFC, MFC, HFC, phocid pinnipeds)
BOEM-2023-0011-0185-0174	EIS Section: 3.5.6.5 PDF Page: 361 Comment: SouthCoast did not produce a "Protected Species Mitigation and Monitoring Plan" but did provide a "Marine Mammal and Sea Turtle Monitoring and Mitigation Plan." Please correct in text.	Thie statement has been corrected to state that a Marine Mammal and Sea Turtle Monitoring and Mitigation Plan was developed for the Proposed Action.
BOEM-2023-0011-0185-0175	EIS Section: 3.5.6.5 PDF Page: 361 Comment: This paragraph "Mayflower has proposed measures " is focused on mitigation and monitoring measures. Discussion of critical habitat does not belong here. In addition although the project area does not include critical habitat it does include core NARW core feeding habitat. In a separate paragraph please include a discussion of the possible avoidance and displacement of NARWs due to pile driving.	Text discussing critical habitat has been removed from this paragraph. Critical and core habitats related to the Project area are discussed in Section 3.5.6.1. Discussion on possible avoidance and displacement of NARWs and other marine mammals can be found in Section 3.5.6.3 – Pile Driving Noise.
BOEM-2023-0011-0185-0176	EIS Section: 3.5.6.5 PDF Page: 361 Comment: Please describe what conservative approach was implemented when determining the magnitude of effects.	For many marine mammal species, there are a lack of behavioral studies related to pile driving noise focused on that species. The conservative approach was to conclude that behavioral effects should be considered moderate for all species for which data are lacking. This is based on a study of

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		harbor porpoises, which found moderate behavioral effects in that species (Southall et al. 2021). These conclusions are being applied to species that have not yet been the subject of a behavioral study.
BOEM-2023-0011-0185-0177	EIS Section: 3.5.6.5 PDF Page: 362 Comment: Please clarify that SouthCoast would install Scenario 1 or Scenario 2 but not both.	While the exact installation scenario has not been identified, SouthCoast Wind intends to only select one type of installation scenario for Year 1 and Year 2. Based on the most recent MMPA ITA (December 2023), the foundation installation scenarios have been revised.
BOEM-2023-0011-0185-0178	EIS Section: 3.5.6.5 PDF Page: 362 Comment: Please specify size of WTG monopiles modeled for Scenario 1 (9/16-m).	The size of WTGs on all scenarios involving monopile foundation was modeled using a maximum tapered diameter of 9/16 meter to represent the largest potential foundation diameter in the PDE.
BOEM-2023-0011-0185-0179	EIS Section: 3.5.6.5 PDF Page: 362 Comment: The sentence beginning "Results of the modeling..." should either be added to the Scenario 1 bullet as well or moved out of the Scenario 2 bullet in to a separate sentences below the bullets for both Scenarios. In addition those results should also provide behavioral exposures not just PTS exposures. Please correct.	The section *Noise: Pile Driving* under Alternative B - Proposed Action has been updated throughout to reflect the latest installation scenarios in the MMPA ITA (December 2023). The entire section has been revised for clarity and now outlines the parameters for each scenario separately. The results of the modeled scenarios also show both Level A (PTS) and Level B (behavioral) exposures and are reflected in the results discussion and in Tables 3.5.6-9–3.5.6-11.
BOEM-2023-0011-0185-0180	EIS Section: 3.5.6.5 PDF Page: 362 Comment: Replace "takes" with "harassment" throughout the document. There is no term "Level A and Level B take" defined in the MMPA or implementing regulations.	The term *take* has been replaced in instances referring to level A or B harassment.
BOEM-2023-0011-0185-0181	EIS Section: 3.5.6.5 PDF Page: 362 Comment: SouthCoast is only requesting Level A harassment and Level B harassment for Scenario 1 which resulted in the larger exposure estimates (versus Scenario 2).	SouthCoast Wind has submitted a revised MMPA ITA Application, updated in December 2023, reflecting the latest installation scenarios occurring in construction periods Years 1 and 2. In the latest MMPA ITA, Level A and B harassment takes have been requested for installation scenarios occurring in both Years 1 and 2. The sentence in question has been revised reflect this change.

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BOEM-2023-0011-0185-0182	EIS Section: 3.5.6.5 PDF Page: 362 Comment: The sentence beginning "Level A takes" includes two different concepts that should be treated separately (i.e. implementation of mitigation/monitoring vs. distances to thresholds). Please revise.	The statement in question conflates two ideas in the same sentence and has been removed. Please note that the entire subsection for *Noise: Pile Driving* under Alternative B - Proposed Action has been updated based on the most recent acoustic modeling in the MMPA ITA (December 2023) and contains significant changes throughout.
BOEM-2023-0011-0185-0183	EIS Section: 3.5.6.5 PDF Page: 362 Comment: Level A harassment and Level B harassment exposures do account for a seasonal restriction on pile driving and UXO detonations from Jan 1 - April 30 so it not correct to say that Level A harassment or Level B harassment takes do not account for any mitigation.	Please refer to the response to comment BOEM-2023-0011-0185-0182. As was done for the section in *Noise: Pile Driving* under Alternative B - Proposed Action, significant updates have also been made in the subsection *Noise: UXO Detonation*. The discussions therein should provide more clarity on how Level A and B exposures have been defined and the associated exposure modeling for *noise* IPFs.
BOEM-2023-0011-0185-0184	EIS Section: 3.5.6.5 PDF Page: 362 Comment: The FEIS should provide ER95% values for impact and vibratory pile driving and animal exposure estimates for at least Scenario 1 which was deemed the most impactful in the MMPA ITA application. Ideally the DEIS should provide this information for both Scenarios included in the ITA application so the public can evaluate the data and clearly see which modeled Scenario is most impactful.	The subsection for *Noise: Pile Driving* under Alternative B - Proposed Action has been updated based on the most recent acoustic modeling in the MMPA ITA (December 2023) and contains significant changes throughout. The updated results in Table 3.5.6-9 show exposure ranges (ER95%) to Level A thresholds based on whether the scenario involved combined (impact and vibratory), concurrent or sequential (impact only) installation. These parameters are also reflected in the updated results in Table 3.5.6-10 for acoustic ranges (R95%) to Level B thresholds. Exposure estimates for Level A and B for each installation scenario are shown in Table 3.5.6-11.
BOEM-2023-0011-0185-0185	EIS Section: 3.5.6.5 PDF Page: 363 Comment: Disturbance from exposure to HRG equipment noise is expected to minimal because the ensonfied zones are small not just because the vessel and whale are moving in relation to each other. Please include the results of acoustic modeling and exposure estimates for HRG surveys.	Section 3.5.6.5, *HRG Surveys and Geotechnical Drilling Activities under the Proposed Action,* has been revised to include HRG survey acoustic modeling and exposure estimate results. Further, the determination of effects statement has been updated to clarify that the size of the ensonified area, the brief and temporary sound exposure to HRG equipment noise, and the implementation of mitigation measures would minimize noise exposure from HRG survey equipment.
BOEM-2023-0011-0185-0186	EIS Section: 3.5.6.5 PDF Page: 363 Comment: In the sentence beginning "UXOs have the potential " please revise to say	The sentence has been revised to clarify that PTS and serious injury are separate concepts.

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	behavioral disturbance injury (PTS) mortality and serious injury. PTS and serious injury are different concepts.	
BOEM-2023-0011-0185-0187	EIS Section: 3.5.6.5 PDF Page: 363 Comment: Please specify that a noise mitigation system will be used during pile driving and UXO detonation.	A 10-decibels (dB) attenuation from the use of a NAS would be implemented for pile driving, as well as for UXO detonations. Each noise IPF subsection has been revised to include details on the proposed mitigation measures, which includes noise attenuation systems.
BOEM-2023-0011-0185-0188	EIS Section: 3.5.6.5 PDF Page: 363 Comment: SouthCoast requested Level A harassment take of 3 species incidental to UXO detonation and 1 species incidental to pile driving. Please add "for some species" after "eliminate potential Level A harassment." Please include the results of acoustic modeling and exposure estimates for UXO detonations.	Please note that SouthCoast Wind has submitted a revised MMPA ITA Application, updated in December 2023, which includes updated takes for UXO detonation. Acoustic modeling has also been conducted for UXO detonations (Hannay and Zykov 2022) and the modeled results and discussions in *Noise: UXO Detonation* under the Proposed Action have been updated based on this report. This subsection includes an updated exposure estimate for each species considered (Table 3.5.6-16) and updated Level A and Level B exposure ranges for each hearing group (Table 3.5.6-15)
BOEM-2023-0011-0185-0189	EIS Section: 3.5.6.5 PDF Page: 364 Comment: Please remove references to bubble guns. SouthCoast did not propose to use this type of equipment.	References to bubble guns have been removed from sections regarding the Proposed Action, as they are not being proposed to be used.
BOEM-2023-0011-0185-0190	EIS Section: 3.5.6.5 PDF Page: 364 Comment: When discussing potential impacts from operational WTGs it's unclear if the "minor impacts" would be from masking (which would follow the topic in the previous paragraphs). Please specify how operational WTGs would impact marine mammals and identify which hearing group(s) would likely be most impacted and why.	The EIS has been revised and the section on Turbine Operation Noise under the Proposed Action has been expounded to provide clarity. LFCs and MFCs that communicate within the same sound frequencies as turbine noise may experience masking effects. However, source levels from operational WTGs are expected to be low and highly localized and anticipated to attenuate to ambient levels within close range to the WTGs. Thus, impacts from operational noise would constitute minor effects on marine mammals belonging to all hearing groups.

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BOEM-2023-0011-0185-0191	EIS Section: 3.5.6.5 PDF Page: 365 Comment: Clarify the amount of vessel traffic for each phase. For example will 15-35 vessels be transiting each day from regional ports to the lease area during the construction phase?	The number of vessels transiting each day is variable and dependent on multiple factors. SouthCoast is working with local stakeholders to manage and minimize vessel impact. It is expected that one to three vessel trips would be made per day between the Lease Area and utilized ports during operations and maintenance (O&M). An average of 1–15 vessel trips daily is expected for the entire Project lifetime (including construction activities, O&M, and decommissioning).
BOEM-2023-0011-0185-0192	EIS Section: 3.5.6.5 PDF Page: 365 Comment: Characterizing the proposed action vessel traffic relative to the GAA is an improper scale comparison. Proposed action vessel traffic should be compared relative to the Project Area (lease area cable route and main regional ports) where the majority of activity will occur.	The statement comparing the increase of vessel traffic, under the Proposed Action, relative to the geographic analysis area has been revised to instead provide emphasis on vessel traffic within the Project area.
BOEM-2023-0011-0185-0193	EIS Section: 3.5.6.5 PDF Page: 367 Comment: Regarding the uncertainty of oceanographic impacts BOEM and NOAA have contracted with the National Academy of Sciences to evaluate potential impacts on marine mammals from potential oceanographic changes particularly right whales. We recommend the findings of this study are incorporated into the FEIS if the timing aligns.	BOEM, in cooperation with NMFS, has requested this issue be reviewed by experts in the relevant fields of science. BOEM has partnered with the NASEM for an independent peer review of potential hydrodynamic impacts for offshore wind facilities on prey species. The report concluded that hydrodynamic impacts from offshore wind projects adjacent to Nantucket Shoals would likely be difficult to distinguish from the ongoing effects of climate change currently occurring in this region. Likewise, BOEM finds that measurable impacts of offshore wind farms to the foraging success of whales that would result in population-level effects are not reasonably likely to occur and that a recommended NARW conservation buffer is not warranted based on the review of best available information and expert opinion found in the report. Further monitoring studies will be needed to have the spatial and temporal coverage to adequately understand the impact of future wind farms and BOEM would continue to coordinate with partners to develop regional monitoring strategies to obtain scientific information on the potential hydrodynamic effects of WTGs. Based on the

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		current information available, including the initial meetings associated with the peer review, BOEM is of the position that our current NEPA and ESA analyses accurately reflect the expected impacts on NARWs from offshore wind projects, as well as provide an adequate suite of measures to avoid, minimize, or mitigate impacts on NARWs.
BOEM-2023-0011-0185-0194	EIS Section: 3.5.6.5 PDF Page: 367 Comment: Please change "prey aggregations" to "disruption of prey aggregation mechanisms."	The introductory paragraph in under the *presence of structure*s IPF under the Proposed Action – Alternative B has been revised for clarity.
BOEM-2023-0011-0185-0195	EIS Section: 3.5.6.5 PDF Page: 368 Comment: Baumgartner and Mate 2003 and Baumgartner et al. 2017 are cited incorrectly in the text and should be revised. These references support that copepods need to be organized into dense layers but they do not say that the Shoals prevents this nor can this be inferred due to it being a well-mixed environment. While it is true that Nantucket Shoals is generally well mixed the strong currents could also serve to aggregate prey along ephemeral frontal boundaries either on the Shoals themselves or along the edges of the tidal jet running along the western side of the Shoals.	This sentence has been revised to state that the well-mixed environment of Nantucket Shoals does not necessarily preclude copepod aggregation. Baumgartner and Mate (2003) and Baumgartner et al. (2017) are cited to note the NARW's need for dense layers of copepods for efficient feeding.
BOEM-2023-0011-0185-0196	EIS Section: 3.5.6.5 PDF Page: 368 Comment: Please clarify which studies are being referred to by the phrase "those studies." 3.5.6.5 PDF Page: 369 Comment: The gear utilization section does not reflect the fisheries survey plan developed for the project (i.e. pot/trap surveys are missing). This section should be updated to describe the surveys that will occur and risk to marine mammals. The use of PAM systems should also be assessed in the EIS and not refer readers to the BA.	The statement in question is referring to a study by van Berkel et al. (2020) in European offshore wind farms. However, the *presence of structures* IPF discussion under the Proposed Action of the Final EIS has been revised extensively and the statement in question has been removed as it no longer adds value to the discussion as it relates to NARW prey aggregation. To address the second comment: the *gear utilization* IPF discussion under the Proposed Action of the Final EIS has been revised extensively to provide additional details that include the Fisheries Monitoring Plan and other planned monitoring surveys and associated gear that may pose a risk to marine mammals. The use of PAM, as a monitoring equipment, has also been included in this section.

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BOEM-2023-0011-0185-0197	EIS Section: 3.5.6.5 PDF Page: 369 Comment: Please describe the proposed impact avoidance and minimization measures that would reduce entanglement and bycatch risks during trawl surveys.	Trawl surveys, as part of the Proposed Action, will typically be shorter in duration (20 minutes) and conducted less frequently than conventional commercial trawl tows. SMAST would comply with the LOA requirements submitted to GARFO and does not expect bycatch of or interaction with marine mammals, sea turtles, sturgeons, or other protected species based on best management practices (BMPs) implemented during surveys. While the risk of entanglement and capture is extremely rare and unlikely for marine mammals, applicant-proposed mitigation measures include the use of moorings with the shortest practicable line length, rubber sleeves, weak links, chains, cables, or similar equipment types that prevent lines from looping, wrapping, or entrapping species. Devices attached to the seafloor for continuous periods greater than 24 hours will use the best available mooring systems (vertical and float lines, swivels, shackles, and anchor designs) to minimize the risk of entanglement or entrainment of marine mammals. All of these measures are outlined in Appendix G and discussions have been included in the revised EIS in the under Section 3.5.6.6, *Gear Utilization,* under the Proposed Action.
BOEM-2023-0011-0185-0198	EIS Section: 3.5.6.5 PDF Page: 370 Comment: NMFS is not aware of a reference that supports the sentence stating that ESA-listed whales would have a disproportionate impact as a function of decreased genetic diversity. Please include a citation or delete this sentence.	This sentence has been deleted in the Final EIS.
BOEM-2023-0011-0185-0199	EIS Section: 3.5.6.5 PDF Page: 370 Comment: Suggest revising this section for clarity and accuracy relative to the ESA. The EIS should contain a summary of the findings in the BA. The New England Wind DEIS (and our ensuing comments) can be used as a structure to follow for integrating this information. 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 SouthCoast webpage (not just on the ESA	The discussion in the section *Impacts of Alternative B on ESA-Listed Species* under the *Proposed Action* has been revised in the Final EIS for clarity, updated with the assessments as presented in the SouthCoast Wind BA, and conforms to the discussions as written on other BOEM EIS documents. While this was not added as an appendix to the Final EIS, all referenced information from the SouthCoast BA will be uploaded to the BOEM ESA consultation page website once

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	consultation page) so that the information can be easily referenced by the public.	the final revisions have been reviewed by regulatory agencies.
BOEM-2023-0011-0185-0200	EIS Section: 3.5.6.5 PDF Page: 371 Comment: This conclusion says marine mammal vessel strikes will occur which is inconsistent with SouthCoast Wind's MMPA ITA application.	The reference to vessel strikes in Section 3.5.6.5, *Conclusions*, has been removed.
BOEM-2023-0011-0185-0201	EIS Section: 3.5.6.5 3.5.6.6 3.5.6.7 and 3.5.6.8 371 373 375 and PDF Page: 377 Comment: In the subsection entitled "Conclusions" ("Conclusions of Alternative D" and "Conclusions of Alternative E" for the latter two) it is stated that there are "potentially beneficial impacts." Please classify those impacts as negligible minor moderate or major. This comment has also been made on Table 2-4 in which the same language appears.	The statements in the Final EIS under the subsection *Conclusion* for Alternative D and Alternative E, as well as those in Chapter 2, Table 2-4 have been updated and any references to "beneficial impacts" have been reclassified as "minor beneficial impacts."
BOEM-2023-0011-0185-0202	EIS Section: 3.5.6.7 PDF Page: 373 Comment: Please clarify what scenario(s) these ranges (from 588–882 hours to 564–846 hours) are based on. In additional please account for the fact that SouthCoast intends to use both vibratory and impact pile driving.	The statement under Alternative D has been revised to clarify that the roughly 4 percent reduction in the number of WTGs for Alternative D would reduce the overall number of impact or vibratory pile-driving hours required for monopile and piled jacket installation from 588–882 hours to 564–846 hours.
BOEM-2023-0011-0185-0203	EIS Section: 3.5.6.7 PDF Page: 373 Comment: The analysis of impacts from the Presence of Structures for Alternative D is lacking. Please include discussion of additional literature beyond the Johnson et al. reference.	The additional citations of Daewel et al. (2022), Christiansen et al. (2022) and Floeter et al. (2022) have been referenced in the discussion of the hydrodynamic effects of wind farms. Degraer et al. (2020) was cited in the discussion of marine mammal presence around offshore wind structures. Hydrodynamic impacts are discussed extensively in the Proposed Action and would also apply to Alternative D, the only difference being that there would be six fewer WTGs under Alternative D. The analysis concludes that six fewer WTGs would not make a measurable difference in hydrodynamic impacts.
BOEM-2023-0011-0185-0204	EIS Section: 3.5.6.7 PDF Page: 375-378 Comment: The description of impacts in this section tend to focus on the reductions of turbines with respect to the whole rather than the specific turbine locations that are being removed. For	The description of impacts under Alternative D has been revised to state that potential impacts would be reduced in the northeastern edge of the Lease Area where these six WTGs are proposed to be removed. This would result in

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	example overall vessel traffic would not significantly decrease but vessels that do not have to travel to the specific locations closest to the Shoals during construction O&M and decommissioning would decrease the risk to NARW who are known to use the area. The same is true for reduction of pile driving noise. While the total hours of noise is not significantly decreased pile driving activities closest to the shoals will decrease removing what is likely to be the closest source of pile driving noise to the NARW and thus a higher risk. While a reduction of 6 turbines is important that is not the main focus of this alternative which is the specific location of the removed turbines. More detail is needed to accurately determine the level of change that this alternative is expected to have on impacts to marine mammals.	reduced disturbance footprint in WTG locations that are closest to Nantucket Shoals, which is noted as an important area. Further, there would be fewer construction vessels transiting to locations close to Nantucket Shoals and associated vessel-related impacts would be similarly reduced.
BOEM-2023-0011-0185-0205	EIS Section: 3.5.6.9 PDF Page: 378 Comment: Please correct the statement that: "NARW occurrence around Nantucket Shoals is greatest in the fall and winter." As noted previously NARW occurrence in that area is greatest in the winter and spring.	This section has been revised and this sentence is no longer included. References to NARWs seasonal abundances specifies winter and spring as the times with the greatest abundance, rather than fall and winter.
BOEM-2023-0011-0185-0206	EIS Section: 3.5.6.9 PDF Page: 378 Comment: Please revise the sentence about implementing a real-time monitoring system to make it clear that aerial imagery cannot detect and localize NARW calls.	This sentence has been revised to clarify that PAM would be used to detect and localize NARW calls while aerial imagery would be used to detect NARWs visually.
BOEM-2023-0011-0185-0207	EIS Section: 3.5.6.9 PDF Page: 378 Comment: NMFS recommends that BOEM consider NARW habitat-use data including sightings of 3 or more NARWs triggering Dynamic Management Areas when determining time/area closures (see Attachment B). Clapham and Pace (2001) indicate that NARWs in group sizes of 3 or more are apt to remain in an area for an extended period of time likely engaged in foraging behavior. Thus including this type of sighting data for the SouthCoast project area informs our understanding regarding the way NARWs are using the specified habitat.	BOEM believes sightings of three or more whales is a conservative measure to designate NMFS Dynamic Management Areas (DMAs) and Slow Zones on short-term time scales. However, short-term use of ephemeral habitat is not a reliable indicator of long-term habitat use patterns by NARWs. Long-term datasets and environmental parameters used to predict NARW densities are statistically rigorous and more reliable. DMAs and Slow Zones would continue to be an important management tool for NMFS to protect NARWs should they occur in the Project area in the future. BOEM intends to continue sharing all collected sightings data through its programs with NMFS.

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BOEM-2023-0011-0185-0208	Section 3.5.7: Sea Turtles EIS Section: 3.5.7 PDF Page: Global Comment: The EIS frequently says that impacts will be "temporary and localized" but does not provide any context of the extent and duration of offshore wind projects and associated activities. Without this context it is misleading and the greater detail should be provided to explain to the public what "temporary and localized" means in this context. This is especially problematic as project activities may occur 24/7 for a number of consecutive years as project construction starts for more and more projects. In general this section lacks any geographic consideration of where activities will occur relative to sea turtle habitat use.	*Localized* is referring to the scale at which construction activities would occur within the large habitat range of sea turtles and the geographic analysis area. With no nesting occurring in Massachusetts or Rhode Island, onshore and cable landfall areas would not affect sea turtles. The potentially affected pelagic and benthic habitats within the ECCs and Lease Area are small relative to the amount of habitat used by sea turtles.
BOEM-2023-0011-0185-0209	EIS Section: 3.5.7.1 PDF Page: 380 Comment: Please provide a citation for the following sentence: "The individual hawksbill sea turtles that have occasionally been documented in and near the southern New England area have been stunned by exposure to unusual cold water events and subsequently transported northward into the region by the Gulf Stream."	Information on hawksbill sea turtle cold stunning is found in Section 3.5.7.1 of the EIS and referenced from Lutz and Musick 1997 and NMFS and USFWS 1993.
BOEM-2023-0011-0185-0210	EIS Section: 3.5.7.1 PDF Page: 383 Comment: Winton et al. 2018 could also be included here (https://www.int-res.com/abstracts/meps/v586/p217-232/)	The Winton et al. (2018) reference has been cited in Section 3.5.7.1 to note the distribution of loggerhead sea turtles.
BOEM-2023-0011-0185-0211	EIS Section: 3.5.7.1 PDF Page: 383 Comment: Text from Dodge et al. 2014 should also be cited with Bailey et al. (https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0091726)	The Dodge et al. (2014) reference has been cited in Section 3.5.7.1 to note the median sea surface temperature of leatherback sea turtle habitat.
BOEM-2023-0011-0185-0212	EIS Section: 3.5.7.2 PDF Page: 386 Comment: Suggest including "habitat" in the impact level definitions so it would read "Impacts on sea turtles and their habitat..."	Impact definitions are related to sea turtles directly. This includes habitat impacts that in turn affect sea turtles but does not include impacts on habitat generally. The language remains unedited to follow precedent set by previous offshore wind EISs.
BOEM-2023-0011-0185-0213	EIS Section: 3.5.7.3 PDF Page: 386 Comment: Throughout this section please ensure to insert an impact conclusion consistent with the impact definitions in Table 3.5.7-2. It	This section has been reviewed and impact conclusions have been edited to reflect NEPA impact definitions where applicable.

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	appears ESA terminology is used sporadically throughout rather than the NEPA impact definitions.	
BOEM-2023-0011-0185-0214	EIS Section: 3.5.7.3 PDF Page: 388 Comment: Fisheries use is listed as an ongoing activity that contributes to impacts on sea turtles. Please provide information on how fishing activity is currently impacting sea turtles to present a full description of baseline conditions.	Text has been added to discuss the impact of fisheries interactions with sea turtles. A study by Finkbeiner et al. (2011) was included to provide an estimate of the frequency of interactions.
BOEM-2023-0011-0185-0215	EIS Section: 3.5.7.3 PDF Page: 388 Comment: Site assessment (geotechnical and HRG) should be added to the list of ongoing offshore wind activities.	Geotechnical and HRG surveys are now discussed in Section 3.5.7.3 under the *noise: G&G Surveys* IPF.
BOEM-2023-0011-0185-0216	EIS Section: 3.5.7.3 PDF Page: 389 Comment: The list of activities described as "planned activities other than offshore wind" are all offshore wind related IPFs (including accidental releases EMF light new cable emplacement and maintenance port utilization noise and the presence of structures). Please revise.	The list of IPFs discussed in the first paragraph under the heading of *Cumulative Impacts of the No Action Alternative* is accurately attributed to non-offshore wind activities. An additional sentence was added to refer the reader to Appendix D, Table D1-20 for a summary of potential impacts associated with planned non-offshore wind activities by IPF for sea turtles. IPFs associated with offshore wind activities are discussed following the discussion of non-offshore wind activity.
BOEM-2023-0011-0185-0217	EIS Section: 3.5.7.3 PDF Page: 389 Comment: A citation is needed for the following sentence: "The amount of trash and debris accidentally released during planned offshore wind activities would likely be miniscule compared to trash releases associated with ongoing activities including land-based activities and commercial and recreational fishing."	This section has undergone editing for clarity and accuracy. While editing, this sentence and references to trash releases compared to other activities were removed.
BOEM-2023-0011-0185-0218	EIS Section: 3.5.7.3 PDF Page: 390 Comment: EMF levels that cables give off should be cited here to add context to what sea turtles can detect. A difference should also be noted about the EMF levels relative to alternating current and direct current cables and how they may impact sea turtles differently.	The average EMF levels from ten offshore windfarms were added to provide context for sea turtle EMF sensitivity.
BOEM-2023-0011-0185-0219	EIS Section: 3.5.7.3 PDF Page: 391 Comment: It is not accurate to say that sea turtle nesting does not occur north of Virginia though rare there have been documented nests in	Text was revised to say that long-established nesting beaches do not occur north of Virginia.

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	New York. See https://www.nps.gov/gate/learn/news/rarest-sea-turtle-nests-on-queens-beach.htm	
BOEM-2023-0011-0185-0220	EIS Section: 3.5.7.3 PDF Page: 392 Comment: The statement that "Any behavioral responses to offshore lighting are expected to be localized and temporary" lacks context and is misleading. During construction project activities will occur 24/7 year-round for multiple years that will produce intense lighting that may attract or deter sea turtles at times when they are in their highest densities in the northeast. The text should be revised to accurately depict project activities.	The discussion on the cumulative effects of artificial light under the section *Impacts of the No Action Alternative* has been revised to include additional supporting information. The statement that behavioral responses to offshore lighting is expected to be short term and localized is supported by the fact that vessels associated with offshore wind activities, due to their transitory nature, would have localized and short term impacts on sea turtles that are also highly mobile. Lighting associated with offshore wind construction would also be considered temporary as lighting would only be required at night. Construction lighting would be localized to foundations and construction vessels. During operations, lighting from WTGs and OSPs would not be expected to have adverse effects on sea turtles as supported by a study by BOEM (Orr et al. 2013) that reports that lighting on WTGs flash intermittently and do not present as a continuous light source and are, thus, unlikely to disorient juvenile or adult sea turtles. However, it is acknowledged that sea turtles still do respond to light stimuli and as such, WTGs and OSPs in planned offshore wind development would be guided by the Federal Aviation Administration (FAA), U.S. Coast Guard (USCG), and BOEM lighting and marking regulations and would avoid direct and continuous light on the water surface to minimize impacts to sea turtles. As offshore development is not in the range of long-established nesting beaches, lighting is also not expected to affect nesting females and their hatchlings. Further, the statement in question is consistent with other BOEM offshore wind EIS documents.
BOEM-2023-0011-0185-0221	EIS Section: 3.5.7.3 PDF Page: 393 Comment: The approximate geographic extent of potential dredging should be included here and mention that dredging may occur inshore and offshore. A greater rationale is needed as to why entrainment will not occur. Additionally impacts to sea turtle	It has been noted that dredging may occur both offshore and inshore during ongoing and planned offshore wind construction. Details on dredging under the Proposed Action specifically are discussed in Section 3.5.7.5. A citation by the National Research Council on sea turtle entrainment was

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	prey are not considered and should be acknowledged given a few species forage benthically.	added to the discussion. The disturbance of foraging habitat for Kemp's Ridley sea turtles was noted, though the area of habitat impacted relative to the available foraging habitat is not expected to cause significant changes in habitat availability.
BOEM-2023-0011-0185-0222	EIS Section: 3.5.7.3 PDF Page: 394 Comment: NMFS has adopted the Navy thresholds as our own (see: https://www.fisheries.noaa.gov/s3/2023-02/ESA%20all%20 species%20threshold%20summary_508_OPR1.pdf). Thus it is inaccurate to indicate we (NMFS) have no thresholds. Please instead say "NMFS has adopted the U.S. Navy PTS and TTS thresholds " This should be revised throughout.	The sentence has been revised as suggested.
BOEM-2023-0011-0185-0223	EIS Section: 3.5.7.3 PDF Page: 395 Comment: A citation is needed to support the following sentence that energetic impacts will be small: "Foraging disruptions related to project installation would be temporary and localized to within the wind energy area during construction. This displacement would result in a relatively small energetic consequence that would not be expected to have long-term impacts on sea turtles." There is no consideration for the extent and duration of proposed project activities thus without this context the text is misleading. There is also no consideration of injury and the risk it may occur. This should be discussed in relation to the TTS and PTS thresholds and why BOEM does expected noise levels to remain less 204 dB re 1 µPa2 s in the context of exposure modeling. This section is also missing consideration of vibratory pile driving and should be included.	The section for noise under *Impacts of the No Action Alternative* has been extensively revised for better organization and clarity and now includes subsections of other noise-producing activities (e.g., pile driving, HRG surveys, UXO detonation, site preparation, vessels, turbine operation). Within the *Pile-Driving Noise* subsection, clarification has been given to support the statement in question. That is, physiological stress experienced by sea turtles that exhibit avoidance behavior would dissipate once it is outside of the ensonified area and affected individuals would be expected to resume normal behavioral patterns (i.e., foraging activity) in nearby, adjacent areas. It is acknowledged in the discussion that individuals that are repeatedly exposed to pile driving over a season, year, or life stage may incur energetic costs with long-term consequences. The discussion also includes effects leading to permanent threshold shift (PTS) and temporary threshold shift (TTS). Further discussion on the effects of noise from vibratory pile driving has also been added, as suggested.
BOEM-2023-0011-0185-0224	EIS Section: 3.5.7.3 PDF Page: 396 Comment: Section 3.5.7.5 states that the project area was screened for UXOs and the risk was determined to be low to moderate throughout all of the Lease Area and a relatively equal ratio between Low and	Lifting and detonation of UXO is listed in the *noise* IPF of the No Action Alternative A section. The level of detail is consistent with other Final EIS documents, which is discussed in Section 3.5.7.5. Impacts are expected to be minor due to

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	Moderate within the ECCs. Please provide the source for the conclusion that impacts for other planned project would be similar to those of the Proposed Action. Overall the UXO section is very sparse and does not contain any relevant information about the risk to sea turtles relative to UXO clearance activities. The range of UXO activities (lift and shift low order defralgation detonation etc.) should be included and the risk to turtles should be assessed for each one. Given that sea turtles spend much of their time submerged they are at greater risk of not being detected by PSOs than marine mammals.	the low number of expected UXO detonations and that they would be timed to not occur more than once per day.
BOEM-2023-0011-0185-0225	EIS Section: 3.5.7.3 PDF Page: 397 Comment: The operational noise section only considers WTGs at the turbine level scale and does not discuss wind farms or WEAs as a whole as low frequency point sources of continuous noise. The text should be included to assess this potential impact to sea turtles given the large geographic extent of planned projects and the operational lifespan. Additionally impacts relative to sea turtle habitat use in general should be considered not just impacts to prey. If prey is going to be mentioned it should be in the context of foraging. If entire wind farms deter sea turtles due to the low frequency noise they will not be able to just move to a different area given that many wind farms overlap with sea turtle habitat. 3.5.7.3 PDF Page: 398 Comment: Please add that the aforementioned shifts in vessel traffic have the potential to change the risk of vessel strike to sea turtles.	Due to the low source level of operational turbine noise and the relatively insensitive hearing of sea turtles in comparison to other species (i.e., hearing thresholds are high, meaning the sound must be relatively loud to hear it), underwater noise generated by operating WTGs is expected to be negligible (Section 3.5.7.3). BOEM has determined that the analysis provided is sufficient to support sound scientific judgments and informed decision-making about the proposed Project with respect to its impacts on sea turtles. Additionally, Section 3.5.7.3, *Cumulative Impacts of the No Action Alternative*, address the shifts and increase in vessel traffic near the lease area.
BOEM-2023-0011-0185-0226	EIS Section: 3.5.7.3 PDF Page: 399 Comment: The Port Utilization section is lacking information. Port expansions can disturb benthic habitat which would impact sea turtle foraging to a small degree. It could also require dredging which would lead to sedimentation and may also directly impact sea turtles with entrainment. Though port modifications may undergo their own NEPA analysis the impacts should still be considered and summarized here if	Additional information has been provided discussing port utilization. An increase in port utilization in relation to offshore wind project activities may necessitate the expansion of ports. Discussion of the impacts of port expansion (i.e. dredging, pile driving, noise) was added.

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	they are tied to the project and other reasonably foreseeable wind projects considered in this analysis.	
BOEM-2023-0011-0185-0227	EIS Section: 3.5.7.3 PDF Page: 399 Comment: The impact determination for gear utilization is inaccurate impacts would be detectable and measurable as turtles may be incidentally caught. This determination should be changed to minor.	The impact for gear utilization was changed to minor. The sentence was edited to note that although the potential extent and number of animals potentially exposed cannot be determined without Project-specific information, impacts of gear utilization on sea turtles are expected to be minor given the low risk of mortality, the minor risk of entanglement, and the negligible effect on sea turtle prey availability.
BOEM-2023-0011-0185-0228	EIS Section: 3.5.7.3 PDF Page: 401 Comment: (1) The characterization that "some authors have suggested..." is an inappropriate characterization of the best available science and should be revised. (2) While net primary productivity in the entire North Atlantic may not be measurably affected by the presence of structures localized primary productivity would likely be affected at measurable levels based on the text included in this section and European studies. This could have important localized effects on sea turtles that rely on primary and secondary productivity. Comparing project level effect to the entire North Atlantic due to the Gulf Stream artificially dilutes the potential impacts that may occur within the project area. (3) When quoting that "...meteorological changes at the surface…will be nearly imperceptible…" this is primarily referencing the difference in air temperature just above the water's surface which was the primary focus of the paper. The focus of the paper is not on oceanographic impacts.	The *presence of structures* IPF in Section 3.5.7.3 has been revised to clearly characterize what is known regarding the atmospheric and hydrodynamic effects caused by offshore wind structures. This includes an expanded discussion on changes in primary productivity as described in modeling studies, as well as potential impacts on sea turtle prey. A 2024 NASEM study modeled the effects of structures on hydrodynamic processes in the region. This study has been added to the discussion in the *presence of structures* IPF. While Golbazi et al. (2022) primarily focus on meteorological conditions induced by larger wind turbines, results from this study also include a determination that surface wind speed reduction caused by turbine wakes is much less in larger WTGs, like the types proposed for offshore wind projects on the U.S. Atlantic Coast. Please see Section 3.5.7.3 for further details.
BOEM-2023-0011-0185-0229	EIS Section: 3.5.7.4 PDF Page: 403 Comment: (1) OSPs/HVDC converter stations should be added to the list of variances. (2) Benthic impacts should also be added to the impacts under foundations.	OSP/HVDC converter stations were added to the list of variances. Benthic impacts was added to the foundation bullet.
BOEM-2023-0011-0185-0230	EIS Section: 3.5.7.4 PDF Page: 404 Comment: Many of the mitigation and monitoring measures proposed by SouthCoast are specific to marine mammals and may not be effective to	BOEM has proposed additional measures that are protective of sea turtles. Please see the additional measures proposed by BOEM that pertain to sea turtles in Appendix G, Table G-2.

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	sea turtles. Please revise this list with context about the effectiveness of measures for reducing risk to sea turtles.	
BOEM-2023-0011-0185-0231	EIS Section: 3.5.7.5 PDF Page: 404 Comment: This section is missing an assessment of entrainment risk of sea turtles and prey from the HVDC OSP(s). Please add a section relative to this risk. Heated effluent is assessed under Accidental Releases though these releases are regular as opposed to accidental. Consider revising this.	Sea turtles are at a low risk of entrainment due to their low abundances in the area, and due to the mitigation measures that SouthCoast Wind has put in place to reduce sea turtle entrainment. A limited intake velocity and appropriately sized bar racks will minimize the risk of sea turtle impingement. The small scale of the released effluent is not expected to have any impact on sea turtle prey availability. Impacts from HVDC converter OSPs has been added to a new *Discharges/Intakes* section.
BOEM-2023-0011-0185-0232	EIS Section: 3.5.7.5 PDF Page: 405 Comment: (1) Please provide a source to support the statement that there is no direct harm to sea turtles from heated effluent water or entrainment. The negligible determination needs to be supported. (2) Clarify at what scale prey would not be impacted.	A discussion has been added about thermal plume effects on sea turtles based on modeling information from SouthCoast Wind's NPDES permit application for a HVDC converter OSP for Project 1, which is also described in more in detail in the EFH Assessment.
BOEM-2023-0011-0185-0233	EIS Section: 3.5.7.5 PDF Page: 405 Comment: This section is missing project specific details. Please add specific fuels amounts and risk of accidental release added to the environment by the proposed project rather than referring to the COP. This can be a simple table of amounts per WTG and OSP.	Added a table with volumes of oils and chemical fluids in the Project area.
BOEM-2023-0011-0185-0234	EIS Section: 3.5.7.5 PDF Page: 405 Comment: (1) This section does not mention any possibility of cables that are not able to be buried to the proposed depth or what happens when cable crossings occur. Please provide an estimate for the amount of cable that will not be able to be buried to the proposed depth and what additional actions will be taken to minimize the impact of EMF to sea turtles in these sections. (2) The EMF levels that cables give off should be cited here to add context to what sea turtles can detect. A difference should also be noted about the EMF levels relative to	Percentages of the ECCs where target burial depth is not expected to be achieved were added to the text. Mitigation actions, such as adding concrete mattresses and rock piling to insufficiently buried cables, are discussed in the text. Expected EMF levels were added. The differences between AC and DC EMFs are now discussed in this section.

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	alternating current and direct current cables and how they may impact sea turtles differently.	
BOEM-2023-0011-0185-0235	EIS Section: 3.5.7.5 PDF Page: 405 Comment: The Lighting IPF section contains no mention of nighttime construction activities occurring and the light that will be produced as part of those activities. That risk should be acknowledged and any impacts should be assessed.	The *lighting* IPF discussion under the Proposed Action has been updated and acknowledges that nighttime operations may be necessary during construction and decommissioning. Additional details on Project lighting during all phases of the project have been included and the discussion on potential impacts on sea turtles have been expanded. The use, placement, and intensity of lighting would be done in accordance with FAA and USCG lighting standards and would be guided by BOEM best practices to minimize impacts on sea turtles.
BOEM-2023-0011-0185-0236	EIS Section: 3.5.7.5 PDF Page: 406 Comment: The primary prey species of leatherbacks are jellyfish and salps (soft-bodied open ocean species) not bottom dwelling crustaceans and mollusks. Please correct.	Leatherback turtle removed from the list of affected turtles from cable emplacement and maintenance as their primary diet are not benthic invertebrates and are mainly jellyfish.
BOEM-2023-0011-0185-0237	EIS Section: 3.5.7.5 PDF Page: 407-408 Comment: (1) Clarify if vibratory installation and removal of sheet piles for cofferdams is part of the proposed action. Vibratory installation of WTG foundations should also be mentioned here. (2) The information about bubble curtains and noise attenuation systems should be revised and Bellman et al. 2020 should be cited. The applicability of the studies to the proposed action should also be acknowledged (i.e. focus of study type of project location etc.). (3) Multiple models are mentioned in the last paragraph of page 3.5.7-29 please clarify what the proposed action is and suggest adding a table depicting the modeling scenario.	The sentence has been edited as installation and removal of sheet piles for cofferdams is not part of the Proposed Action. Citation of Bellmann et al. (2020) added to note that sound attenuation of 10 dB can be achieved using bubble curtains. Results of the modeling have been updated and expanded. Further details of the modeling are included in COP Appendix U2.
BOEM-2023-0011-0185-0238	EIS Section: 3.5.7.5 PDF Page: 409 Comment: Add a citation for what density inputs were used for the exposure modeling for both tables on this page.	Sea turtle density estimates were obtained from the U.S. Navy Operating Area Density Estimate (NODE) database on the Strategic Environmental Research and Development Program Spatial Decision Support System (SERDP-SDSS) portal (U.S. Navy 2012, 2017) and from the *Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for*

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		Large Whales and Sea Turtles (Kraus et al. 2016). These sources have been added under each exposure modeling table.
BOEM-2023-0011-0185-0239	EIS Section: 3.5.7.5 PDF Page: 409 Comment: Clarify what is meant by "due to the spacing between individual work areas." Suggest providing the spacing as sound propagates/radiates so it could travel to these areas between the distance. Overall this text lacks context and project specific information of the proposed action.	The *noise: Pile Driving* IPF discussion under Alternative B - Proposed Action has been updated throughout to reflect the latest installation parameters as outlined in the MMPA ITA (December 2023). The effects determination has been updated based on the new acoustic modeling parameters and has been clarified to state that sea turtle species that are more common to the Project area (leatherback and loggerhead sea turtles) would be subject to noise levels that could exceed behavioral thresholds and cumulative pile driving noise above PTS thresholds. However, the proper implementation of monitoring and mitigation measures should reduce the potential for stock- or population-level effects.
BOEM-2023-0011-0185-0240	EIS Section: 3.5.7.5 PDF Page: 410 Comment: (1) The following sentence is unclear please revise: "WTGs for the Proposed Action are considered minor but long-term for individual sea turtles that are exposed pile-driving noise that leads to PTS." (2) Please provide examples of and information on the behavioral changes that are expected from noise. The impact to sea turtles should be explained. (3) In regards to operational noise the wind farm as a low frequency point source should be considered in the context of sea turtles avoiding the entire area.	The *noise: pile driving* IPF discussion under Alternative B - Proposed Action has been updated throughout to reflect the latest installation parameters as outlined in the MMPA ITA (December 2023). Examples of behavioral effects from underwater noise is discussed in detail in the section *Impacts of Alternative A - No Action Action* under the *noise* IPF. Results expected from Project-specific noise-generating activities are discussed under *Impacts of Alternative B - Proposed Action* under the *noise* IPF with discussions specific to operational noise under the *noise: turbine operation* IPF discussion. The discussions in this subsection have been revised and includes a discussion on the potential for low-frequency sound, such as those generated by turbines, to result in behavioral effects such as avoidance and decreased foraging efficiency due to displacement.
BOEM-2023-0011-0185-0241	EIS Section: 3.5.7.5 PDF Page: 411 Comment: No project-specific UXO exposure modeling for sea turtles is reported. This is inconsistent with past projects. Please revise this section with project-specific exposure modeling. As	Results from Project-specific UXO exposure modeling have been added to Section 3.5.7.5.

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	presented it is unclear how applicable the references cited are to the proposed action.	
BOEM-2023-0011-0185-0242	EIS Section: 3.5.7.5 PDF Page: 411 Comment: (1) Sea turtles can only detect and flee from a vessel going less than 4 knots see Hazel et al. 2007. This paper should be cited and this caveat should be acknowledged. (2) Please provide the specific speed restrictions and also the speeds project vessels will travel to give context to the impact determination and how the mitigation measures reduce impacts (or not).	The Hazel et al. (2007) study is only relevant in shallow areas (<5 meters), where 97 percent of encounters where foraging or resting on the substrate and referred to as "benthic turtles." This reference could be used for nearshore cable landing sections. Also, the unit used in this study is kilometer h-1, and 4 kilometers h-1 converts to 2 knots instead of 4 knots mentioned in this comment.
BOEM-2023-0011-0185-0243	EIS Section: 3.5.7.5 PDF Page: 412 Comment: It should be noted that visual monitoring for sea turtles is difficult given their small size and limited time spent at the surface the implications of this should be noted relative to the effectiveness of mitigation measures.	BOEM concurs smaller body size and different dive profiles may affect the detectability of animals. However, the relative quantification of mitigation effectiveness based on species-specific size and behavior is difficult to ascertain for any species. The relative success at sighting sea turtles is based on many factors including the equipment used, observer height, sea conditions, size, behavior, season, and observer experience. Despite the difficulty in predicting the conditions under which monitoring would occur, PSO data indicate that sea turtles can be routinely detected. NMFS data show that the ability to detect sea turtles from vessels is high out to 492–656 feet (150–200 meters) after which sightings rates drop off with distance. Therefore, BOEM disagrees that monitoring of sea turtles is difficult at all distances, only at greater distances from an observer position depending on a number of factors. BOEM has considered these factors and requires qualified PSOs and alternative monitoring plans that require PSOs to be able to monitor the extent of shutdown zone or activities must cease until conditions improve. BOEM believes visual monitoring is an important part of the mitigation suite of measures and is effective at avoiding and minimizing any potential impacts.
BOEM-2023-0011-0185-0244	EIS Section: 3.5.7.5 PDF Page: 412 Comment: Clarify why vessels will travel at slow speeds in the lease area. The vessel speed(s) should also be noted here. While risk is lower within	Text has been revised to explain that SouthCoast Wind has committed to measures to avoid vessel strikes on sea turtles by reducing vessel speed and maintaining a distance of 164 feet (50 meters) or greater from sighted turtles. No specific

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	the lease area due to slower vessel speeds strike is still possible.	vessel speed was committed to by SouthCoast Wind in its COP. However, BOEM has proposed mitigation measures in Appendix G, Table G-2, that require vessels to slow down to 4 knots if a turtle is sighted within 328 feet (100 meters) of the operating vessel's forward path. From June 1–November 30, all vessels must avoid transiting through areas of visible jellyfish aggregations or floating vegetation, or slow down to 4 knots while transiting such areas.
BOEM-2023-0011-0185-0245	EIS Section: 3.5.7.5 PDF Page: 412 Comment: (1) Please provide more information about the proposed fisheries surveys including the frequency duration tow speed amount of gear soak time etc. (2) Clarify if any other surveys besides trawl surveys will occur. (3) The text states that trawl surveys could lead to potential capture of loggerhead and Kemp's Ridley. Leatherbacks and greens are not mentioned. Please provide a source that the survey has no risk to leatherback or green sea turtles or include them in the list of species that could be potentially captured as a result of project monitoring.	Demersal otter trawls would be conducted in the Lease Area. SMAST has submitted an LOA Application to NMFS states that it is not expecting bycatch of or interaction with marine mammals, sea turtles, sturgeons, or other protected species due to BMPs during surveys. The potential for minor impacts from gear utilization on leatherback and green sea turtles have been included as they had been observed in the Lease Area. Other non-extractive surveys of oceanography and pelagic fish surveys were added, as well as clam dredge surveys of short 120-second duration.
BOEM-2023-0011-0185-0246	EIS Section: 3.5.7.5 PDF Page: 412 Comment: (1) The text is missing an assessment of GBS/suction buckets and their impacts both benthic and pelagic. (2) The section ends with no impact determination and just says there is uncertainty. This uncertainty should be acknowledged and the range of impacts to sea turtles should be described relative to their habitat use in the project area and surrounding waters. This is especially pertinent to leatherbacks and their prey as noted previously. It is also unclear how the impacts to marine mammals applies to sea turtles as these species have different foraging strategies and prey.	Gravity-based structures have been removed from the PDE and are no longer being considered. Suction-bucket jackets are being considered for up to 85 foundations. Text has been added to this section discussing the larger footprint and area of seafloor disturbance of suction-bucket jackets compared to pin-piled jackets or monopiles. The impact of the presence of structures on sea turtles generally is discussed in greater detail in Section 3.5.7.3. The section refers to Section 3.5.6, *Marine Mammals*, for further analysis on the impact of the presence of structures on planktonic prey, of which the leatherback sea turtles preferred prey of jellyfish are included.
BOEM-2023-0011-0185-0247	EIS Section: 3.5.7.5 PDF Page: 413 Comment: Suggest revising this section for clarity and accuracy relative to the ESA. The EIS should contain a summary of the findings in the BA. The New England Wind DEIS (and our ensuing comments) can be	The discussion in the section *Impacts of Alternative B on ESA - Listed Species* under the Proposed Action has been revised to include additional information on ESA consultation and conforms to the discussions as written in other BOEM

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	used as a structure to follow for integrating this information. 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 BOEM SouthCoast project webpage (not just on the ESA consultation page) so that the information can be easily referenced by the public.	offshore wind EIS documents. While it was not added as an appendix to the Final EIS, all referenced information from the SouthCoast BA will be uploaded to the BOEM ESA consultation page website once the final revisions have been reviewed by regulatory agencies.
BOEM-2023-0011-0185-0248	EIS Section: 3.5.7.5 PDF Page: 414 Comment: (1) The text assumes all other wind farms are built. The proposed action should also be considered in context of the current installed/under construction projects and what the impacts of adding this project are. (2) Please include the cumulative impact of hydrodynamic effects on sea turtles.	The text appropriately describes the cumulative effects from the Proposed Action in combination with other ongoing and planned offshore wind projects and the contribution of the Proposed Action to those cumulative effects. A brief reference to the hydrodynamic effects on sea turtle prey has been added, which is discussed in greater detail under the *Cumulative Impacts of the No Action Alternative* in Section 3.5.7.3, *Presence of Structures*.
BOEM-2023-0011-0185-0249	EIS Section: 3.5.7.6 PDF Page: 415 Comment: (1) Clarify if the Sakonnet River is being referred to as the Project Area here or the actual Project Area the text is unclear and sea turtle sightings in the Project Area are not uncommon - "however sightings of sea turtles in the Project area are..." (2) It is unclear how this alternative is not different than the proposed action given that in-water (and thus sea turtle impacts) would be avoided under this alternative. The last sentence of the first paragraph should be revised. (3) The increase in direct current cables and effects of EMF relative to alternating current cables should be discussed as part of this alternative. Fewer cables does not necessarily mean less impact the type of electrical current is also a factor. See Cresci et al. 2022. (4) The increase in entrainment risk to sea turtles and their prey would increase under this alternative this should be discussed. It is also unclear how the impacts would be the same as the proposed action as more HVDCs would be operating thus risk would increase. (5) Overall the trade- offs of this alternative (less cables more HVDC OSPs) and their risk to sea turtles is unclear. Please clarify.	The text has been revised to clarify that it is referencing the Sakonnet River when stating that sightings of sea turtles are uncommon. The reduction of impacts involved in Alternative C is only relevant to the Sakonnet River and, thus, occur in an area not used by most sea turtle species. The only species that may potentially use the Sakonnet River is the Kemp's Ridley, but because sea turtle sightings are uncommon here, it is not expected to significantly benefit sea turtles. Entrainment of sea turtles in OSPs is expected to be unlikely, due to their low abundance in the OSP areas and mitigation measures in place to prevent entrapment. The addition of a second OSP is not expected to elevate the risk of sea turtle entrapment to a significant degree. Impacts on sea turtle prey are likewise expected to remain negligible with the addition of a second OSP. Text has been added to this section to clarify that the additional factors included in Alternative F do not make a measurable difference in the impact of sea turtles when compared to the Proposed Action.

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BOEM-2023-0011-0185-0250	EIS Section: 3.5.7.6 PDF Page: 416 Comment: Clarify how the impact would be the same as the proposed action when the text on the page above says some impacts would be reduced (also the number of HVDC converter stations would increase so not all impacts would be reduced).	While Alternatives C and F would reduce impacts, notably by reducing seabed disturbance, the impact of seabed disturbance on sea turtles from the Proposed Action was already expected to be minor. Alternatives C and F reduce these impacts, but not enough to make a significant difference with regards to the impact on sea turtles. The sentence has been clarified to note that there is not a significant difference, rather than no difference.
BOEM-2023-0011-0185-0251	EIS Section: 3.5.7.8 PDF Page: 417 Comment: There is no appreciable differentiation between the sub alternatives here. The lack of noise is significant in E-2 and E-3 due to less pile driving however the benthic (and foraging) impacts to some sea turtle species is greater. This should all be discussed and the trade-offs and associated risks analyzed. More detail is required in this section. The differences in the construction of each pile as well as their presence in the water column for each of these alternatives are large and would therefore create differences in the level of impact to sea turtles. Please expand on each type of pile to give a complete picture on how these impacts are not expected to have a measurable difference on impacts to sea turtles.	The text clearly explains that while Alternative E-1 would result in noise impacts related to pile driving, Alternatives E-2 and E-3 would avoid these effects entirely as no pile driving would occur. Additional text has been added about the foundation footprint size and effects on sea turtles from loss of soft bottom habitat in the Lease Area. The discussion addresses multiple aspects and tradeoffs associated with the different proposed foundation types including noise, habitat conversion, artificial reef effect, and entanglement risk. Given that Alternatives E-1, E-2, and E-3 include increases in both beneficial and adverse impacts, there is not expected to be a meaningful difference in impacts on sea turtles.
BOEM-2023-0011-0185-0252	Section 3.6.1: Commercial Fisheries and For-Hire Recreational Fishing EIS Section: 3.6.1 PDF Page: Global Comment: Whenever possible and relevant to the discussion please insert figures and tables from the COP instead of simply referencing them. This would enable the reader to more easily interpret the data and appreciate the implications and impacts of the proposed action. For example on page 3.6.1-32 of the DEIS the text references Figures 2-17 2-18 and 2-20 when discussing fishing activity along the export cable corridor and COP Figures 11-22 and Tables 11-16 through 11-18 regarding prime recreational fishing areas referenced on page 3.6.1-33. These images are important to the discussion	The analysis and data in Section 3.6.1 are commensurate with other BOEM offshore wind EISs.

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	of the proposed action and should be replicated in this document.	
BOEM-2023-0011-0185-0253	EIS Section: 3.6.1 PDF Page: Global Comment: Social and cultural impact assessments on fisheries and fishing communities are not included in any sections of the EIS including 3.6.2 Cultural Resources 3.6.1 Commercial & For Hire fishing or 3.6.4 EJ. Please include based on cooperating agency review comment with the resources and methodologies provided by NMFS.	BOEM has conducted an analysis in Section 3.6.4, *Environmental Justice*, that identifies communities based on NOAA's social indicator mapping for commercial and recreational fishing engagement and reliance.
BOEM-2023-0011-0185-0254	EIS Section: 3.6.1 PDF Page: Global Comment: Please include an evaluation of shoreside impacts. NMFS provided resources for a summary of shoreside businesses that could have impacts from the project and cumulative impacts. Please see prior comments from other project EIS reviews as well as the SouthCoast cooperating agency EIS review with these resources which include summaries by business type number of employees and revenue. See Gaichas et al. 2018 (https://www.frontiersin.org/articles/10.3389/fmars.2018.00442/fullMethodologies) Section 3.2.4 for methodologies and data sources that could be applied here.	Section 3.6.1.5 qualitatively assesses impacts on shoreside businesses, noting that the impacts on other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term and minor to major, depending on the fishery in question. Further analysis of the socioeconomic impacts on fishing support industries is included in Section 3.6.3, *Demographics, Employment, and Economics* and Section 3.6.4, *Environmental Justice*. Furthermore, BOEM is proposing a mitigation measure that would require SouthCoast Wind to conduct an analysis of impacts to shoreside seafood businesses and to develop a plan to compensate for losses to shoreside businesses. BOEM has added this measure to the Final EIS in Appendix G, Table G-2; see measure CF-5.
BOEM-2023-0011-0185-0255	EIS Section: 3.6.1.1 PDF Page: 434 and Global Comment: Please ensure that the most recent available data are used to evaluate fishery impacts consistent with our recommendations for fishery impact analysis (https://media.fisheries.noaa.gov/2022-02/Socioeconomic-InfoNeeds-OSW-GARFO.pdf). VMS data used in this DEIS dates to August 2019. More recent VMS data are available and data through 2022 should be used to inform the FEIS. Also please ensure the FEIS includes fishery data based on our January 2023 data request response and for vessels issued only state fishing permits or HMS permits (available from NMFS Southeast Fisheries Science Center). Outdated	As of May 2023, the most up-to-date VMS data on the Northeast Ocean Data Portal goes to 2019 for some fisheries and for others the most-up-to-date data goes to 2016. Further, the <4 knot modifier is not calculated for the 2019 data. The data from the January 2023 data request has been added, and the Lease Area information was updated (Tables 3.6.1-9 through 3.6.1-21). For the ECCs, a qualitative assessment was provided in the subsection *Commercial Fisheries in the Offshore Project Area*. Using NMFS data generated for a 1-nm buffer of the ECCs to calculate vessel revenue and landings would be an overestimate of affected fisheries along the ECC. Impacts within the ECCs would be

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	data from the COP are sometimes referenced instead of the more recent information available for GARFO permitted vessels. Further it is not enough to just note that state and HMS fishery data are not included in specific tables without making an effort to acquire and include such data (see footnote a in Table 3.6.1-9 and other similar tables). This is particularly important in assessing impacts to port communities (see Table 3.6.1-4 and 3.6.1-8). Without state data port landings and revenues are underrepresented which suggests that impacts would also be underestimated. Fishery data for vessels issued federal permits do not include all state waters fishing activity and would underrepresent the potential fishery impacts from the proposed action.	small and temporary in nature during cable installation activities, and secondary cable protection would only be used if cables cannot be buried to target depth and would be mobile bottom-tending gear friendly.
BOEM-2023-0011-0185-0256	EIS Section: 3.6.1.1 PDF Page: 441 Comment: Please insert a figure representing the Regional Fisheries Area identified on page 3.6.1-8. Consistent with the figure of the geographic analysis area a figure depicting this more focused area is needed to ensure the reader knows the smaller area used to contextualize analysis in this section.	The requested figure depicting the Regional Fisheries Area has been added to the Final EIS.
BOEM-2023-0011-0185-0257	EIS Section: 3.6.1.1 PDF Page: 441 Comment: Please define what the inshore waters of Southern New England and the Gulf of Maine represent. Please clarify if the term inshore is being used to describe specific GARFO statistical areas or distance from shore.	Section 3.6.1-1, *Commercial Fisheries in the Regional Fisheries Area*, has been updated to remove reference to inshore as it relates to the Regional Fisheries Area and to explain that most lobster landings in the Regional Fisheries Area occurs in Massachusetts State waters.
BOEM-2023-0011-0185-0258	EIS Section: 3.6.1.1 PDF Page: 446 Comment: Please discuss some of the limitations of relying solely on fishery revenue while analyzing the impacts of potential development. Particularly in Southern New England the interrelatedness and reliance of some fisheries on one another for bait such as the skate fishery and the mixed lobster/Jonah crab/rock crab fishery can conflate and amplify potential impacts for entities that rely on such fisheries. Some fisheries particularly skates and herring are low-value but high volume fisheries that are often left out when discussing fisheries based on revenue alone (e.g. over 600000 lb. of herring was landed from the	Please refer to Section 3.6.1.1, *Commercial Fisheries in the Offshore Project Area*, discussion of high volume/low value fisheries has been added.

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	lease area in 2010 (one of the highest totals in any year and in aggregate) but it does not appear in the top 10 fisheries impacted because of the low revenue associated with such landings.	
BOEM-2023-0011-0185-0259	EIS Section: 3.6.1.1 PDF Page: 449 Comment: Please remove the column describing the number of years a species appeared in the top ten species list based on revenue. As noted in the previous paragraphs the high value of scallops can affect the list of top species based on revenue. Revenue does not always represent significance of an impact as landings volume can produce additional revenue and benefits to communities through processing and other support services that is not reflected in this analysis. Therefore this column is misleading and could result in underestimating the importance of impacts to a particular fishery.	Table 3.6.1-12 shows the average annual revenue and landings as a percentage of the total landings in the geographic analysis area. The last column about years a species appeared as one of the top ten most impacted species by revenue helps to show the point made in this comment. Some species that ranked each year are less exposed than species that ranked in fewer years, this is due to the fluctuations in catch across the years analyzed. The table reinforces the idea that revenue is not the only metric considered for the ranking of importance. Further, the NMFS 2022 update to the socioeconomic data changed this trend.
BOEM-2023-0011-0185-0260	EIS Section: 3.6.1.1 PDF Page: 455 Comment: Please define what the level of revenue reliance of federal permit holders fishing in the Lease area constitutes significance.	The term significant has been changed to majority to reflect that the majority of fishermen do not derive a high level of revenue from the Lease Area.
BOEM-2023-0011-0185-0261	EIS Section: 3.6.1.1 PDF Page: 456 Comment: Please add a column listing the total number of federally permitted vessels fishing in the lease area annually to provide greater context to reviewers.	The number of federally permitted vessels fishing in the Lease Area annually is provided in Table 3.6.1-20.
BOEM-2023-0011-0185-0262	EIS Section: 3.6.1.1 PDF Page: 467 Comment: Please note that the landing and revenue data calculated for the export cable corridors only represents vessels issued a federal fishing permit and is therefore an underestimate of the likely fishery landings and revenue that could be affected along these cable corridors. State data should be included to more accurately and completely describe the potential impacts to fisheries along the export cable corridor.	The Final EIS has been updated to reflect the lack of state-permitted vessel data.
BOEM-2023-0011-0185-0263	EIS Section: 3.6.1.3 PDF Page: 468 Comment: Please insert a discussion of current regional trends referenced in the 2nd paragraph of this section as Section 3.6.1.1 did not discuss regional trends. Instead it presented historical landings and	Please refer to Section 3.6.1.1 under *Economic Value and Landings* for a description of the current trends in the fishing industry.

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	revenue data without evaluating why landings or revenue changed over time. If the analysis of the no action alternative presumes certain trends would continue the DEIS should explicitly discuss what trends would be expected to continue. This was an issue that the Technical Working Group advising BOEM's draft fishery mitigation guidance briefly discussed including suggestions for identifying trends in both landings and biomass as documented in Attachment A of the draft guidance (https://www.boem.gov/renewable-energy/reducing-or-avoiding-impacts- offshore-wind-energy-fisheries).	
BOEM-2023-0011-0185-0264	EIS Section: 3.6.1.3 PDF Page: 470 Comment: Under the Anchoring IPF please clarify if this includes the impacts of spud cans used to fix the position of construction vessels and the potential need to backfill holes left by such spud cans unless that is discussed under the presence of structures IPF. This could result in direct and indirect impacts to fishing operations through habitat conversion and gear snags.	The discussion under the *anchoring* IPF has been revised to discuss potential impacts from use of spud cans.
BOEM-2023-0011-0185-0265	EIS Section: 3.6.1.3 PDF Page: 470 Comment: Under the Cable Emplacement IPF please include a discussion of seabed preparation (leveling boulder clearance trenching and cable laying itself) which could result in fishery operational disturbance as such activities will occur over a prolonged period including several months between each activity. This would increase the scale and nature of the impacts and would likely result in overlapping construction impacts within areas of multiple adjacent wind projects such as NJ NY and RI/MA areas. Also sedimentation and smothering of sessile species will be an impact that should be mentioned here and in the evaluation of other project alternatives particularly for sessile organisms and those with benthic life stages (longfin squid egg mops). Finally the seasonal impact of such operations should be identified for species with social spawning behavior (cod squid etc.) that would have indirect impacts on fishing operations.	A discussion of seabed preparation (sand wave leveling boulder clearance, and cable laying) and sedimentation on fish species is provided the Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*. A cross reference has been added to Section 3.6.1.3 referring the reader to this analysis. Within Section 3.6.1.5, a discussion of cable laying and preparatory activities, including boulder and sand wave clearance, and sedimentation impacts was already included in the Draft EIS, but a specific reference to seabed preparation has been added to the Final EIS, including a cross reference to Section 3.5.5 where a new figure has been added showing the location of seabed preparation activities in both ECCs.

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BOEM-2023-0011-0185-0266	EIS Section: 3.6.1.3 PDF Page: 470 Comment: Under Noise please note that spawning activities may also be disturbed by noise associated with construction activities. Disruption of spawning due to startle or other behavioral responses (masking communication in cod) may have longer-term impacts for certain area-specific spawning aggregations (cod) or those with short lifespans that only spawn once (longfin squid). This section should summarize the geographic distance for which noise-induced mortality and behavioral changes would be observed even if contained in Section 3.5.5 for the reader to fully appreciate the broader geographic implications of noise impacts under the no action alternative.	Section 3.6.1-3 has been modified to note disruption of spawning activities. The extent to which injury or mortality occurs would vary based on ongoing/planned offshore wind project pile size, timing, noise mitigation measures in place, as well as species affected, which is detailed in Section 3.5.5.
BOEM-2023-0011-0185-0267	EIS Section: 3.6.1.3 PDF Page: 471 Comment: Under the Presence of Structures IPF please note that predator/prey relationships would change as a result of structures vessels may be displaced to other areas and clarify if vessels would be directly or implicitly excluded from operating in areas. A recent Notice for Mariners suggested that scour protection was being put in place for Vineyard Wind 1 area months in advance of the actual placement of turbines and that vessels should avoid fishing in those areas for an extended period of time. While this is not a formal exclusion zone it effectively becomes one if vessels are dissuaded from disturbing scour protection for months before cables are buried if they are buried at all (some projects indicated cables won't be buried and will allow for natural sedimentation to cover cables).	BOEM assumes that 100 percent displacement would occur in the Lease Area during construction and operations. Rolling construction zones would be used to minimize displacement along the submarine export cable corridor. Added text noting that highly migratory pelagic predators that are targeted in recreational fisheries (e.g., tuna, billfish, sharks) may also be attracted to the prey that aggregate around WTG foundations. Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, contains additional discussion on the potential for predator/prey dynamics to shift.
BOEM-2023-0011-0185-0268	EIS Section: 3.6.1.3 PDF Page: 476 Comment: Please insert an appropriate caveat regarding the completeness of HMS and state fishery landings/revenue in GARFO logbook data and provide more information about the methods used to derive exposure estimates in this table. As we have commented in previous project EISs GARFO logbook data the source for this table does not fully capture HMS lobster and state-managed fisheries (such as menhaden) and represents only a subset of catch/revenue data for each fishery. Please request	Greater detail has been added for HMS. Figure 3.6.1-14 and 3.6.1-15 show HMS logbook effort and HMS recreational hook effort. The HMS, lobster, and state-managed fisheries reflect a subset of the NMFS data. Greater detail has been added specifically for the lobster fishery, given the overwhelming prevalence of the lobster fishery in Maine state waters. Massachusetts state data suggest that landings of lobster are roughly split in half between federal and state waters. The caveat for the completeness of HMS and state

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	additional HMS data from the NMFS Southeast Fisheries Science Center and state data from relevant agencies to integrate such data into future tables. Additional detail regarding how this table was created would help readers understand how the estimates were calculated and enable validation by our fishery experts.	fishery landings/revenue in GARFO logbook data for calculating exposure is provided in the *presence of structures* IPF discussion of Section 3.6.1.3.
BOEM-2023-0011-0185-0269	EIS Section: 3.6.1.3 PDF Page: 478 Comment: Under Impacts of the No Action Alternative please add "other offshore development" to the last sentence describing the causes of the major impact conclusion. As noted in this section offshore wind projects may result in major impacts to fishing operations. This should be reflected in this conclusion as well.	Section 3.6.1.3, *Conclusions,* has been updated to reflect the requested addition of other offshore development.
BOEM-2023-0011-0185-0270	EIS Section: 3.6.1.5 PDF Page: 480 Comment: Under Cable emplacement and maintenance please revise impacts to long-term to permanent and describe any mitigation or proper remedial action that would be taken to ensure no measurable effects on commercial and for-hire fisheries consistent with a "moderate" impact as defined in Table 3.6.1-22 or revise the impact conclusions to major. Boulder relocation sand wave clearance and other activities would disturb measurable quantities of the bottom and could result in gear damage/loss and reduced fishery catch. Moving boulders grapnel runs through complex habitats and other seabed preparation activities including leveling and trenching that may be necessary to achieve target cable burial depth would result in long-term impacts not short-term impacts. The level of impacts will be reflective of the habitat present but that is not reflected in the document or the impact conclusion.	Additional text has been added explaining SouthCoast Wind's plans relative to boulder clearance and the methods to minimize impacts, including micro-routing cables to avoid boulders, using boulder grabs as the preferred method for boulder relocation, and informing NMFS and BOEM of the coordinates of the boulder being relocated before and after relocation. A new figure has been added to Section 3.5.5, with a cross reference to this figure added in Section 3.6.1.5, showing the location of seabed preparation within the ECCs. Because boulder relocation impacts would be minimized, sedimentation impacts from grapnel runs and sand waver clearance would be temporary, BOEM believes the moderate, short-term impact conclusion is appropriate.
BOEM-2023-0011-0185-0271	EIS Section: 3.6.1.5 PDF Page: 482 Comment: Under the Noise IPF please update references to behavioral and injury impacts to species based on more recent sources than Kirkpatrick et al. 2017 such as tables included in other project EISs and further discuss potential impacts on species that exhibit social spawning behavior that could be disturbed. Those	The noise section refers the reader to FEIS Section 3.5.5.3. This section provides citations for the distances at which behavioral changes are observed in fish from pile-driving (Hastings and Popper 2005). A short description of the potential for displacement has been included with more recent sources.

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	tables as referenced in our comments on those other projects indicate that noise from pile driving in particular could induce behavioral responses in individual species up to and potentially more than 11 km away from the source of the noise. This should be reflected in this section particularly considering that several adjacent projects could be conducting pile driving activities that may compound impacts to local and regional fisheries. Cod and squid have elaborate social spawning behavior (see previous EIS comments for citations) that could be disturbed by behavioral responses to pile driving noise. If disturbed spawning success could be reduced which would have indirect impacts to fishery operations. While this was briefly discussed for G&G surveys please note the potential noise impacts from pile driving on spawning behavior in this section.	
BOEM-2023-0011-0185-0272	EIS Section: 3.6.1.5 PDF Page: 485 Comment: In the first paragraph on this page please include reference to the fact that up to 50 vessels engaged with construction activities may be simultaneously operating in the project area during peak periods of construction as noted earlier under the Port Utilization IPF. This will negatively impact commercial fishery operations and exacerbate congestion and space use conflicts.	The information has been added to the Final EIS as requested.
BOEM-2023-0011-0185-0273	EIS Section: 3.6.1.5 PDF Page: 488 Comment: Under the Presence of Structures IPF please update the text to reflect the most recent data that are available from 2021 include an estimate of potential impacts to shoreside support services and communities due to changes in vessel landings patterns and update the party/charter analysis based on updated information. For example on page. 3.6.1-55 the text notes the highest percentage of total annual revenue attributable to the lease area was 20 percent in 2018. Updated data currently available indicates the highest percentage is 48 percent in 2020. Consistent with our "Information Needs to Assess Fisheries Socioeconomic Impacts from Offshore Wind	Section 3.6.1.5, *Presence of structures* has been updated to reflect more recent data on percentage of revenue attributable in the Lease Area. Section 3.6.1.5 qualitatively assesses impacts on shoreside businesses, noting that the impacts on other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term and minor to major, depending on the fishery in question. Further analysis of the socioeconomic impacts on fishing support industries is included in Section 3.6.3, *Demographics, Employment, and Economics* and Section 3.6.4, *Environmental Justice*. Furthermore, BOEM is proposing a mitigation measure that

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	Energy Projects" document (https://media.fisheries.noaa.gov/2022- 02/Socioeconomic-InfoNeeds-OSW-GARFO.pdf) please ensure the FEIS includes the most recent data available (2021) from our January 2023 data request response. Although this section notes qualitative impacts to seafood processors distributors and shoreside support services it does not attempt to estimate such impacts based on the potential for changes to fishery landings amounts or patterns. A quantitative analysis of shoreside/community impacts should be included in the DEIS and FEIS consistent with recommendations and methods outlined in BOEM's draft fishery mitigation guidance (see Appendix A of that document). Finally the text references analysis in Kirkpatrick et al. 2017 to assess party/charter vessel impacts. However that analysis was based on data from 2012. The FEIS should utilize the same approach using more recent data to characterize impacts to the party/charter fleet in the absence of non-confidential federal logbook data.	would require SouthCoast Wind to conduct an analysis of impacts to shoreside seafood businesses and to develop a plan to compensate for losses to shoreside businesses. BOEM believes the analysis by Kirkpatrick et al. (2017) provides useful information to support the analysis of recreational fishing in the area. Additional figures and explanation has been added to further characterize recreational fishing in the offshore project area. NMFS socioeconomic data for recreational fishing has been added.
BOEM-2023-0011-0185-0274	EIS Section: 3.6.1.5 PDF Page: 489 Comment: Please revise the impact conclusion at the bottom of the first full paragraph to moderate to be consistent with Table 3.6.1-22. As noted in this section gear damage/loss is expected along with potential displacement effects to those that operate in this area. Therefore measurable impacts would occur. The gear loss compensation policy would help offset but not eliminate such impacts which is consistent with "moderate" impacts under Table 3.6.1-22 not "minor" impacts which don't require mitigation measures. Finally although it is generally estimated that up to 10 percent of any offshore project's cables may require additional cable protection if target burial depth cannot be reached the DEIS notes that we will not know definitively how much cable protection is necessary or the extent and location of necessary seabed preparation activities until project-specific surveys are completed. Therefore there is still	Revised paragraph identified in the comment in Section 3.6.1.5 to remove the reference to minor impacts. The text notes that with applicant-committed mitigation measures, including SouthCoast Wind’s financial compensation policy regarding gear loss or damage, impacts on commercial fisheries may be reduced. Earlier in the discussion of the presence of structures IPF, BOEM acknowledges the potential for major impacts on commercial fishing. The text notes that the amount of cable protection anticipated is an estimate based on G&G surveys that have already been conducted. Regarding impacts associated with seabed preparation and boulder relocation, refer to response to comment BOEM-2023-0011-0185-0270, which describes additional discussion that has been added to the *cable emplacement and maintenance* IPF.

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	uncertainty as to the degree and nature of potential impacts from boulder relocation seabed preparation and cable protection measures. This should be noted in this section of the FEIS.	
BOEM-2023-0011-0185-0275	EIS Section: 3.6.1.5 PDF Page: 489 Comment: At the bottom of the last full paragraph on this page please note that while habitat conversion may not result in changes to species biomass significant enough to affect total quotas, the presence of structures will likely result in the exclusion of scientific research surveys that inform stock assessments for many of the fisheries affected by this project. This will result in increased uncertainty in survey indices and resulting stock assessment conclusions. Existing fishery management council risk policies and harvest control rules dictate that more conservative quotas be set if there is increased uncertainty in stock assessments. Therefore the presence of structures will likely affect fishery quotas for species reliant on existing fishery surveys resulting in indirect negative impacts to associated fisheries. This should be noted in the FEIS.	Section 3.6.1.5, *Presence of Structures*, has been revised as requested to explain that the presence of structures will likely result in the exclusion of scientific research surveys that inform stock assessments for many of the fisheries affected by the Proposed Action.
BOEM-2023-0011-0185-0276	EIS Section: 3.6.1.5 PDF Page: 490 Comment: Under the Traffic IPF please rectify different estimates of the number of construction vessels in the project area during peak operations. During previous discussions the DEIS notes that up to 50 vessels would be operating within the lease area during peak operations. This differs from the 35 maximum vessels listed here. Please correct either discussion with the correct estimate of traffic within the lease area.	Section 3.6.1.5 has been updated to state that 15–35 construction vessels may be operating at any given time with a maximum peak of 50 vessels in the Lease Area at one time. This text is derived from COP Volume 1 Section 3.3.14.1.
BOEM-2023-0011-0185-0277	EIS Section: 3.6.1.5 PDF Page: 491 Comment: In the discussion of the cumulative impacts please ensure that impact conclusions are consistent with the impact definitions listed in Table 3.6.1-22 and discussions in previous text in this section. Even though the project specific contributions to cumulative impacts of a particular IPF may be relatively small the EIS lists measurable impacts resulting from project activities due to listed IPFs. For example the text indicates	Impact conclusions have been updated throughout the cumulative impact sections for Alternative A and B.

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	port utilization impacts would be spread out along the entire Atlantic seaboard not recognizing that vessels affected by this project operate out of multiple ports and could be affected by multiple projects contributing to greater not fewer impacts to commercial fisheries coastwide. Therefore many of the cumulative impacts discussed here should be greater than the impact conclusions for the proposed action itself (i.e. more than minor and likely at least moderate for most IPFs) based on the definitions in Table 3.6.1-22. Otherwise the EIS would appear to be diluting the impacts of this action simply by comparing them to impacts within the region as a whole which is inappropriate for evaluating the impacts of this proposed action.	
BOEM-2023-0011-0185-0278	EIS Section: 3.6.1.5 PDF Page: 493 Comment: Please justify or remove conclusions that the major impact conclusion is primarily driven by climate change and regulated fishing effort. There is minimal discussion of such impacts in this section to support this conclusion.	The conclusion for the cumulative impacts of the Proposed Action was revised to focus on the impacts from the presence of structures from ongoing and planned offshore wind consistent with the analysis contained in Section 3.6.1.5, *Cumulative Impacts of the Proposed Action*.
BOEM-2023-0011-0185-0279	EIS Section: 3.6.1.6 PDF Page: 494 Comment: Please include estimates of aquaculture revenue and commercial and recreational fishing effort within state waters including trips landings and revenue that would be maintained by routing export cables onshore under Alternative C. This is needed to not only evaluate the potential impacts avoided (benefits) of this alternative but it could also serve as a means of estimating impacts from running the export cable up the Sakonnet River under Alternative B which was not included in Section 3.6.1.5.	Section 3.6.1.1 was revised to include estimates of aquaculture for both Rhode Island and Massachusetts. Aquaculture has been included in the discussion of impacts in Alternative B and Alternative C.
BOEM-2023-0011-0185-0280	EIS Section: 3.6.1.8 PDF Page: 495 Comment: In the analysis of Alternative E please provide or reference discussions of noise-induced behavioral effects from the use of smaller pin piles under Alternative E-2. This will help characterize the extent of potential behavioral effects to compare between the proposed action and Alternative E.	Alternative E-2 does not propose smaller pin piles; rather, Alternative E-2 proposes suction-bucket foundations which would not require pile driving. Alternative E-1 would involve the use of all piled foundations, which could include either monopile or pin piles, depending on the foundation selected. Alternative E-1 does not represent a choice between

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		monopile or pine piles; both are an option under this alternative, which is consistent with SouthCoast Wind's PDE.
BOEM-2023-0011-0185-0281	EIS Section: 3.6.1.9 PDF Page: 496 Comment: Please insert a discussion of the details of potential converter stations (location scale height in water column of intake/outlet pipes and flow rate) and associated impacts under Alternative F. Such converter stations would have direct long-term impacts on fishery resources in the form of entrainment and changes to local water temperature that will have indirect and long-term impacts on commercial and recreational fisheries. Entrainment in the converter stations will result in direct mortality to eggs and larvae and may reduce egg distribution and future recruitment to the fishery. While the relative impact may be localized and may not result in population level effects it could lead to less certain stock assessments by altering the stock-recruitment assumptions for certain species. These impacts should be noted here and not excluded from this discussion given these converter stations are not included under the proposed action.	A cross reference was added to Section 3.5.5.9, *Finfish, Invertebrates, and Essential Fish Habitat*, for a description of HVDC converter OSPs and their impacts on fishery resources. Also, it should be noted that HVDC converter OSPs are included as an OSP option under the Proposed Action. Alternative F is within SouthCoast Wind's PDE and represents a narrowing of the PDE from five cables to three cables and from HVAC or HVDC to HVDC only.
BOEM-2023-0011-0185-0282	EIS Section: 3.6.1.10 PDF Page: 497 Comment: Please summarize or replicate Tables 11-10 through 11-12 in Volume II of the COP in this section to enable the reader to understand the potential impacts to the commercial fishery including the inter-annual variability of fishery revenue. Please ensure that compensation amount used to support this mitigation measure is based on the most recent fisheries data available through 2021 that we provided in January 2023 and include impacted vessels fishing in state waters with state permits. Because the compensation amount listed in the COP tables does not reflect the latest data or state fishery operations that may be affected and that BOEM's draft fisheries mitigation guidance has not been finalized it is premature to conclude that the compensation measure would be sufficient to reduce impacts from major to moderate. Given that the text itself indicates the	BOEM believes that the buffer areas used to calculate revenue from each ECC overestimates the area/size of impact on fisheries landings/revenue. These tables have been replicated in the EIS but include data up to 2018. Additional detail on how BOEM has calculated exposure can be found in Appendix A, Data and Methodology for Developing Revenue Exposure Estimates in the Northeast Atlantic.

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	compensation scheme "could mitigate 'indefinite' impacts" it is not guaranteed that income losses would be mitigated as proposed. Therefore the original impact conclusions should remain as "minor to major." This is supported by conclusory text at the bottom of page 3.6.1-65.	
BOEM-2023-0011-0185-0283	Section 3.6.6: Navigation and Vessel Traffic EIS Section: 3.6.6.1 PDF Page: 616 Comment: Please use the more recent information available when evaluating fishing vessel traffic patterns using vessel monitoring system data. The DEIS notes the use of 2016 VMS data. Such data are outdated and do not fully reflect more recent data available from the NOAA Office of Law Enforcement. Further as we recommend in our fisheries socioeconomic impact analysis information needs document please use data for more than 1 year as fishing regulations market and fuel prices and other factors alter vessel operational and transit patterns.	The text referred to by the commenter is describing the Vessel Monitoring System (VMS) data used in the SouthCoast Wind Navigation Safety Risk Assessment (COP Appendix X). BOEM revised the text in Section 3.6.6 to "vessel monitoring system data from NMFS through 2016" to be consistent with the Navigation Safety Risk Assessment (NSRA), which included more than 1 year of data. In the EIS, this information was used to inform the impacts on navigation and vessel traffic, along with other information, and was not used to directly assess socioeconomic impacts on commercial fishing, which are described in Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*. Section 3.6.1 presents VMS data from multiple years.
BOEM-2023-0011-0185-0284	Section 3.6.7: Other Uses (Marine Minerals Military Use Aviation Scientific Research and Surveys) EIS Section: 3.6.7.9 PDF Page: 356 Comment: Thank you for referencing the NOAA and BOEM Federal Survey Mitigation Program throughout this section. Please add that individual survey mitigation plans have not been developed and funding is not currently available to support survey mitigation plans to date.	Thank you for your comment. The suggested text edit has been incorporated into Final EIS Section 3.6.7.10, *Proposed Mitigation Measures*.
BOEM-2023-0011-0185-0285	Section 3.6.8: Recreation and Tourism EIS Section: 3.6.8 PDF Page: 676 Comment: Please provide an up to date analysis based on Kirkpatrick's detailed methodology for recreational private angler exposure. The data reported in Kirkpatrick is outdated but can be replicated with updated data. Data is publicly available through MRIP. See section 3.1.4.2 and 3.1.4.2 for methodologies. https://espis.boem.gov/final%20reports/5580.pdf	The Kirkpatrick reference is used to characterize recreational private angler exposure as part of the analysis of cumulative impacts of the No Action Alternative (Section 3.6.8.3) and is appropriate as cited. An analysis of commercial fisheries and for-hire recreational fisheries exposure is included in Final EIS Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*.

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BOEM-2023-0011-0185-0286	Section 4.1: Unavoidable Adverse Impacts of the Proposed Action EIS Section: 4.1 PDF Page: 724 Comment: In the first line of the text the correct reference is 40 CFR 1502.16(a)(2).	The NEPA implementing regulatory citation in Section 4.1 was corrected in the Final EIS.
BOEM-2023-0011-0185-0287	Section 4.3: Relationship Between the Short-term Use of Man's Environment and the Maintenance and Enhancement of Long-term Productivity EIS Section: 4.3 PDF Page: 730 Comment: In the first line of the text the correct reference is 40 CFR 1502.16(a)(2).	The NEPA implementing regulatory citation in Section 4.3 was corrected in the Final EIS.
BOEM-2023-0011-0185-0288	Appendix B: Supplemental Information and Additional Figures and Tables B.3 PDF Page: 26 Comment: Please update the values in this table based on the draft 2020 NMFS SARs (Hayes et al. 2023) including NARW abundance.	NARW abundance value in this table has been updated to reflect the draft 2022 Sound Acoustics Report from Hayes et al. 2023.
BOEM-2023-0011-0185-0289	EIS Section: D PDF Page: Global Comment: NMFS has concerns about the structure content and usage of Appendix D. Please indicate whether the list of activities in Appendix D has been developed for this specific project or if this same list of activities was developed and is being included for all OSW projects in the Atlantic regardless of project location scale or project-specific details.	Appendix D, *Planned Activities Scenario*, was developed specifically for the SouthCoast Wind Project to describe ongoing and planned activities that could occur in the geographic analysis area for each resource. The geographic analysis area varies for each resource as described in the individual resource sections of Chapter 3, *Affected Environment and Environmental Consequences*, of the Final EIS. As such, there is overlap in the geographic analysis area for some resources between planned offshore wind projects in the Atlantic. The outline and general language in Appendix D are common to other offshore wind EISs but have been specifically tailored for the geographic analysis areas relevant to the SouthCoast Wind Project.
BOEM-2023-0011-0185-0290	EIS Section: Attachment 1 PDF Page: 138 Comment: Please remove the second sentence at the top of page D-33 that reads: "The content of these tables has been vetted by cooperating agencies to the EIS and therefore has been included in whole for their use in impact and cumulative analyses and for ease in reference by the reader." This language suggests that the exact content of the tables that now appear in Appendix D were copied in their entirety from another document which had been "vetted" by the	The language highlighted by the commenter has been deleted from Appendix D, *Planned Activities Scenario*, of the Final EIS.

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	cooperating agencies at some point. NMFS in its cooperating agency role has not vetted the content of these tables. While NMFS has approved of tables that appeared in previous EISs and follow a similar approach and contain similar elements (i.e. South Fork Wind and Vineyard Wind), the content and variables of the tables in Appendix E are different than what was "vetted" by NMFS in those previous instances. NMFS has identified this issue in other recent reviews of offshore wind EISs from BOEM and maintain our concern regarding the use of this language.	
BOEM-2023-0011-0185-0291	Appendix F: USACE 404(b)(1) Analysis EIS Section: F PDF Page: 211-220 Comment: Throughout Appendix F on the pages indicated in the headings text and tables Alternative C is referred to as the "Habitat Minimization Alternative." The correct name is the "Habitat Impact Minimization Alternative" and this should be corrected throughout Appendix F.	The name of Alternative C has been revised to “Fisheries Habitat Impact Minimization Alternative” in Appendix F of the Final EIS.
BOEM-2023-0011-0185-0292	Appendix G: Mitigation and Monitoring EIS Section: G PDF Page: 222 Comment: In the fourth paragraph after the conclusion of the first sentence please add the following sentence: "If a mitigation measure was analyzed in the impacts analysis for the selected alternative and that measure influenced the impact determination for a particular resource that measure will be included as a term and condition." NMFS maintains its position that any mitigation and monitoring terms that influence the impact conclusions need to be committed measures or proposed as part of the action in order for the assumptions and conclusions of the analysis to be accurate. This issue has been identified and commented on in other offshore wind EISs in development.	Appendix G of the Final EIS has been revised to incorporate language similar to the text suggested in the comment.
BOEM-2023-0011-0185-0293	EIS Section: G.1 PDF Page: 235 Comment: It is not clear what "limit duration of pile driving activities" means. Please clarify how SouthCoast would limit duration of pile driving activities.	Limiting the duration of pile-driving activities refers to commitments SouthCoast Wind has made to restrict when pile driving occurs to minimize impacts from the activity. SouthCoast Wind has committed to not conduct pile-driving activities from January 1–April 30. Additionally, SouthCoast

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		Wind has committed to only conducting pile-driving activities within the Enhanced Mitigation Area (as identified in Final EIS Appendix G) between June 1 and October 31. Furthermore, SouthCoast Wind has developed a *Supplemental North Atlantic Right Whale Monitoring and Mitigation Plan for Pile Driving*, included as Attachment G-3 in Appendix G, which describes additional commitments SouthCoast Wind has made to monitor for NARW during pile-driving activity.
BOEM-2023-0011-0185-0294	EIS Section: G.1 PDF Page: 236 Comment: Please replace 'clearance zone' with 'shutdown zone' in the measure "Mayflower Wind will employ shut-down procedure when protected species are detected in their respective clearance zones in the Project Area" here and throughout the document where appropriate.	SouthCoast Wind has modified its applicant-committed measures to replace “clearance zone” with “shutdown zone” as identified in the comment. Text in Appendix G, Table G-1 has been revised accordingly.
BOEM-2023-0011-0185-0295	EIS Section: G.1 PDF Page: 236 Comment: Suggest replacing "does not intend" with "would not" in the following measures: "Mayflower Wind does not intend to conduct pile-driving activities from January 1 through April 30."	The comment is in regard to an applicant-committed measure, which BOEM cannot revise unless revised by SouthCoast Wind. SouthCoast Wind has committed to the pile-driving time-of-year restriction of January 1–April 30 across the Lease Area.
BOEM-2023-0011-0185-0296	EIS Section: G.1 PDF Page: 236 Comment: If a vessel is stationary the vessel must not engage engines until the NARW has moved beyond 1640 ft. (500 meters) not 100 m. Please revise.	The comment is in regard to an applicant-committed measure, which BOEM cannot revise unless revised by SouthCoast Wind. However, BOEM has proposed mitigation measure BA-8 in Appendix G, Table G-2, which states in part, “If stationary, the vessel must not engage engines until the ESA-listed large whale has moved beyond 1,640 feet (500 meters).”
BOEM-2023-0011-0185-0296-1	G.1 PDF Page: 237 Comment: In their MMPA ITA application SouthCoast proposed that CTVs be exempt from the 10-knot speed restriction in a DMA which does not align with the measure in Table G-1. Please clarify if BOEM is requiring all SouthCoast vessels including CTVs to travel at 10 knots or less in a DMA.	Under *Vessel Strike Avoidance Measures* in Appendix G, the Applicant has proposed the following mitigation measures for crew transfer vessels (CTVs): • Except for CTVs, all vessels are required to comply with NMFS regulations and speed restrictions (≤10 knots) in NARW management areas including seasonal management areas (SMAs) and active DMAs during

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		migratory and calving periods from November 1 to April 30. • All vessels (including CTVs) will reduce speed to ≤10 knots when mother/calf pairs, pods, or large assemblages of marine mammals are observed. • A PAM system will be developed consisting of near real-time monitoring such that NARW or other large whale calls made in or near the transit corridor can be detected and transmitted to the transiting vessel and will also be used to facilitate the safe transit of CTVs in SMAs and DMAs. The detections will be used to determine areas along the transit corridor where the CTV would be allowed to travel at >10 knots if no detections had occurred in the previous 12 hours or required to transit at <10 knots if detections had been made in the previous 12 hours. In the event the system temporarily stops working, CTVs would then be required to reduce speed to <10 knots.
BOEM-2023-0011-0185-0297	EIS Section: G.1 PDF Page: 237 Comment: In the MMPA ITA application SouthCoast proposed a measure stating: "The PSO team and the APSO team will each have a lead observer (Lead PSO and Lead APSO) with prior experience working as a PSO and/or APSO in the northwestern Atlantic Ocean on similar projects." Please consider adding that here.	Measures proposed by SouthCoast Wind in its MMPA ITA Application are included in Appendix G, Attachment G-1 and are considered part of the Proposed Action. BOEM confirmed the measure referred to in the comment is in Attachment G-1.
BOEM-2023-0011-0185-0298	EIS Section: G.1 PDF Page: 261 Comment: When PSOs are monitoring at night the use of night-vision goggles with thermal clip-ons and a hand-held spotlight is only sufficient during HRG surveys given the very small Level B harassment zone. If this measure applies to nighttime pile driving the technology included in this measure insufficient. Please clarify to which activity this measure applies.	The comment is in regard to an applicant-committed measure, which BOEM cannot revise unless revised by SouthCoast Wind. However, As described in Section 11.2.4 of SouthCoast Wind's ITR Application, during nighttime operations, night vision equipment (night vision goggles) and infrared/thermal imaging technology will be used. SouthCoast Wind has committed to the following nighttime piling monitoring and mitigation methods: • During nighttime operations, visual PSOs on watch will rotate in pairs: one PSO observing with a night vision device (NVD) and one monitoring the infrared thermal

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		imaging camera system. There will also be an acoustic PSO on duty conducting acoustic monitoring in coordination with the visual PSOs. • The PSOs on duty will monitor for marine mammals and other protected species using night-vision goggles with thermal clip-ons, a hand-held spotlight (one set plus a backup set), and/or other electronic method(s), such that PSOs can focus observations in any direction. • If possible, deck lights will be extinguished or dimmed during night observations when using the NVDs (strong lights compromise the NVD detection abilities); alternatively, if the deck lights must remain on for safety reasons, the PSO will attempt to use the NVDs in areas away from potential interference by these lights. Because visual observations within the applicable shutdown zones can become impaired at night or during daylight hours due to fog, rain, or high sea states, visual monitoring with thermal and NVDs will be supplemented by PAM during these periods.
BOEM-2023-0011-0185-0299	EIS Section: G.1 PDF Page: 262 Comment: Please clarify whether or not BOEM intends to allow nighttime pile driving.	Yes, nighttime pile driving is part of the Proposed Action. There will be a nighttime pile driving plan that covers effective monitoring of the level A zone.
BOEM-2023-0011-0185-0300	EIS Section: G.1 PDF Page: 263 Comment: Please clarify how SFV results would be used to estimate effects in a post-construction monitoring report.	SouthCoast Wind has committed to preparing a detailed plan for Sound Source Verification that would be developed and submitted to NMFS prior to the planned start of pile driving and UXO detonations (Appendix G, Table G-1). In addition, BOEM has added mitigation measure MA-4 to Final EIS Appendix G, Table G-2, which requires SouthCoast Wind to develop a Sound Field Verification Plan for review and comment by BOEM and NMFS. The purpose of the plan is to ensure that the distance to injury and behavioral thresholds for marine mammals, sea turtles, and ESA-listed fish are no larger than those modeled assuming 10 dB noise attenuation by conducting field verification during pile driving.

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BOEM-2023-0011-0185-0301	EIS Section: G.1 PDF Page: 263 Comment: "Because of the low probability of a long-term exposure event and for practical implementation reasons. " does not seem like a necessary justification for the zone sizes. Please provide adequate justification for the zone sizes proposed.	SouthCoast Wind developed clearance zone sizes based on acoustic modeling results, as presented in Section 11.2.9 (see Final EIS Appendix G, Attachment G-1) of the ITR application. Noise abatement systems (NAS) will be implemented to achieve the modeled ranges associated within 10 dB of noise. If an NAS is not feasible, SouthCoast Wind will implement mitigation measures for the larger unmitigated zone sizes with deployment of PSO vessels adequate to cover the zones before construction activities commence.
BOEM-2023-0011-0185-0302	EIS Section: G.1 PDF Page: 263 Comment: Please consult the MMPA ITA application for the actual proposed clearance and shutdown zone sizes. There is a considerable disparity between the sizes included here and the application which were based on modeling results.	The comment is in regard to an applicant-committed measure, which BOEM cannot revise unless revised by SouthCoast Wind. However, the zone sizes included in the MMPA ITR application are correct and are the current zone sizes that SouthCoast Wind is proposing to adhere to, once approved by NMFS. Specific construction activity shutdown zones can be found in the MMPA ITA application in Section 11.2.9 (see Final EIS, Appendix G, Attachment G-1).
BOEM-2023-0011-0185-0303	EIS Section: G.1 PDF Page: 264 Comment: Pile driving would be shut down when a marine mammal enters the 'shutdown zone' not 'clearance zone.' Please correct the terminology here.	SouthCoast Wind has modified its applicant-committed measures to replace “clearance zone” with “shutdown zone” as identified in the comment. Text in Appendix G, Table G-1 has been revised accordingly.
BOEM-2023-0011-0185-0304	EIS Section: G.2 PDF Page: 270 Comment: Please clarify how measure NS-1 differs from the applicant proposed measure: "To minimize potential impacts on zooplankton from impingement and entrainment the northernmost HVDC converter OSP will be located outside of a 10 kilometer buffer of the 30-meter isobath from Nantucket Shoals."	SouthCoast Wind added the measure referenced in the comment to the COP based on its coordination with BOEM regarding the NS-1 mitigation measure. The measure is similar, except that NS-1 applies to the enhanced mitigation measure as mapped in Appendix G.
BOEM-2023-0011-0185-0305	EIS Section: G.2 PDF Page: 270 Comment: Please clarify if measure NS-3 is suggesting that PAM detections would be shared with NMFS in near real time. If that is not the case then please revise the sentence for clarity.	Agency-proposed measure NS-3 states that “The PAM system must operate in the enhanced mitigation area 24 hours per day. The system must be capable of detection of NARW vocalizations, report the detections to a PAM operator in near-real time, and share all detections with NMFS.” To rephrase the statement for clarity, it is to the PAM operator that the NARW detections will be reported in near-real time.

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		All detections will then be shared to NMFS following Section 11.1.7 of the MMPA ITA: "Any NARW sightings will be reported as soon as feasible and no later than within 24 hours to the NMFS Right Whale Sighting Advisory System (RWSAS) hotline (866-755-6622) or via the Whale Alert Application."
BOEM-2023-0011-0185-0306	EIS Section: G.2 PDF Page: 271 Comment: Please revise measure NS-3 to correctly state that NARW occurrence around Nantucket Shoals is highest in winter and spring.	BOEM has reviewed the information and does not believe the information is incorrect. NMFS has not provided any data to support this statement. BOEM has accurately characterized the months with the greatest densities of NARWs. Highest densities are not intended to capture the seasons of NARWs occurrence, only the months of greatest density. In terms of defining the enhanced mitigation area, this is a critically important distinction to conservatively predict the greatest occurrence of NARWs anywhere in the lease area. Based on Roberts et al. density models, highest densities do not occur evenly throughout the months or seasons. The BA has been revised to reflect that NARW occurrence, not greatest densities, is expected from late fall through spring based on Roberts et al. However, the enhanced mitigation area is still based on the greatest density; thus, this change is not global throughout the document.
BOEM-2023-0011-0185-0307	EIS Section: G.2 PDF Page: 291 Comment: Measure BA-15 states that pile driving can only commence 1 hour after civil sunrise and may not be initiated later than 1.5 hrs. prior to sunset. In addition the measure states that: "Pile driving may continue after dark only when the installation of the same pile began during daylight (1.5 hours before (civil) sunset) when clearance zones were fully visible for at least 30 minutes and must proceed for human safety or installation feasibility reasons." This is inconsistent with previous measures that address monitoring during nighttime pile driving. BOEM's position on nighttime pile driving is unclear; please specify whether or not BOEM is authorizing nighttime	BOEM confirms that nighttime pile driving is part of the Proposed Action. BOEM revised mitigation measure BA-15, which would require SouthCoast Wind submit a Nighttime Pile Driving Plan (NPDP) as part of the Alternative Monitoring Plan (AMP) to BOEM and NMFS for approval.

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	pile driving and present mitigation and monitoring measures that are consistent with BOEM's determination.	
BOEM-2023-0011-0185-0308	EIS Section: G.2 PDF Page: 294 Comment: Please verify that BOEM would require submission of the SFV and PDM plans 90 days prior to start of pile-driving activities. It is NMFS' understanding that these plans must be submitted 180 days prior to the start of pile driving.	BOEM revised BA-17 to state that SouthCoast Wind must submit a Pile-Driving Monitoring for review to BOEM and NMFS 180 calendar days, but no later than 120 days, before beginning the first pile-driving activities for the Project.
BOEM-2023-0011-0185-0309	EIS Section: G.2 PDF Page: 297 Comment: Any reduction in the size of the clearance and shutdown zones for each foundation type must be based on at least 3 measurements submitted to BOEM and NMFS for review. Please add "and NMFS" to this measure.	NMFS has been added as an enforcing agency to measure BA-21 in Appendix G, Table G-2.
BOEM-2023-0011-0185-0310	EIS Section: G.2 PDF Page: 299 Comment: Please consider requiring that PAM operators must review detections to verify if a NARW has been detected within 5 minutes rather than 15 minutes. If a NARW is detected within the shutdown zone an additional 10 minute delay in shutdown would lead to increased exposure time of NARWs to pile driving noise.	BOEM acknowledges this request.
BOEM-2023-0011-0185-0311	Appendix J: References Sited EIS Section: J.1 PDF Page: 477 Comment: There are references cited in the Executive Summary. Please add a new section J.1.1 for the Executive Summary and renumber the other sections.	References cited in the Executive Summary have been added to Appendix J, *References Cited*, in the Final EIS.
BOEM-2023-0011-0185-0312	Attachment B – North Atlantic Right Whale Habitat Use Data As part of our negligible impact determination analyses NMFS Office of Protected Resources evaluated North Atlantic right whale (NARW) densities (Roberts and Halpin 2022) and Dynamic Management Area (DMA) data to assess the potential impacts on NARWs from pile driving during the SouthCoast project. Using the complement of both datasets allowed us assess both NARW presence and infer behavioral state (e.g. foraging). We suggest that when developing proposed time/area closures BOEM utilize additional data (e.g. DMA or sightings data) beyond density to better define how NARWs are utilizing Southern New England and the	BOEM does not agree with using Dynamic Management Area (DMA) data as a predictor of NARW occurrence. NARW occurrences in DMAs in this area are associated with foraging and localized occurrence of prey that cannot be expected to predict the future aggregations of whales and should only be used retrospectively. The Duke density estimates provide the most robust and accepted data source to predict expected NARW occurrence.

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	SouthCoast Wind project area (i.e. what they are doing while they are there). This approach should be taken for all offshore wind projects in Southern New England.	
BOEM-2023-0011-0185-0313	Density We mapped the vibratory ensonified zone (for summer) assuming 1) full buildout (i.e the entire lease area) 2) a 10-km setback from the 30-m isobath and 3) a 20-km setback from the 30-m isobath (Figure 1). [Footnote 1: The difference in the area (km2) between full build out and the 10-km setback is less than the difference in area (km2) between the 10-km and 20-km set back due to the configuration of WTG positions on the northeast edge of the lease area as shown in Figure 1 (i.e. the blue and green lines are closer together than the green and red lines).] These latter two setback distances align with an alternative recommended by NMFS and an alternative considered by BOEM staff to reduce potential effects to NARW.We calculated monthly (May-Dec) average NARW densities in the impact and vibratory pile driving ensonified zones assuming full build out which demonstrate that NARW density remains high in May and December (Figure 2).[See original attachment for Figure 1. Density map for May with vibratory pile driving ensonified area overlaid for 1) full buildout (aqua) 1) 10-km setback (green) and 3) 20-km setback (red). The white WTG locations align with the 10-km setback. The red and white positions combined align with the 20-km setback.][See original attachment for Figure 2. Average densities within impact (blue line) and vibratory (red line) ensonified zones for full buildout (impact: 7.4 km summer; 8.6 km winter (Dec); vibratory pile driving: 42 km summer; 84.6 km winter (Dec))]	BOEM has not made edits to the FEIS. The proposed ITR is not a proposed alternative under NEPA; the ITR will prescribe mitigation.
BOEM-2023-0011-0185-0314	Dynamic Management Area (DMA) Sighting DataTo assess behavior within the project area specifically foraging we selected DMA sighting data where the DMA area overlaps with the project area that includes the lease area and extends 42-km from the edge of the lease area (representing the	BOEM does not agree with using DMA data as a predictor of NARW occurrence. NARW occurrences in DMAs in this area are associated with foraging and localized occurrence of prey that cannot be expected to predict the future aggregations of whales and should only be used retrospectively. The Duke

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	summer ensonified distance). We used the 2017-2022 data set which identifies date of sighting location and the number of whales in the sighting that triggered each DMA (Figure 3).DMAs in the project area have been established in every month of the year for the past 5 years (although not every month in every year) (Figure 3). A DMA is triggered when 3 or more whales are observed and this clustering of whales can be inferred as a proxy for foraging (Clapham and Pace 2001).Figure 3 and Table 1 provide information about the number of days on which sightings occurred and the number of animals that triggered each DMA in the analyses described above. We analyzed these data to determine which months had the highest and lowest number of days with sightings of three or more whales and to evaluate the associated group sizes for those sightings (recognizing that three is the minimum reported since that is what triggers a DMA).Although densities are lower in late summer/early fall (Figure 2) the number of days on which three or more whales were sighted and the number of animals sighted were higher in August through November and DMAs were recently in place for the entire months of August and September 2019; September October and November 2020 and 2021; and September 2022.[See original attachment for Figure 3. Number of animals/sighting per month (e.g. 5 = May 6 = June etc.) triggering a DMA in the SouthCoast Wind Project area (2017-2022). (Note that there were multiple sightings across years of the same number of animals: blue = 1 sighting; green = 2 sightings; orange = 3 sightings). Figure is not corrected for effort (effort is unknown). Note that because this is DMA data the number of animals/sighting is never less than 3.][See original attachment for Table 1. Number of animals and sightings by month (May-Dec) and year (2017-2022) based on DMA data.]	density estimates provide the most robust and accepted data source to predict expected NARW occurrence.

N.4.1.2 U.S. Environmental Protection Agency

Table N.4.1-2. Responses to comments from U.S. Environmental Protection Agency (BOEM-2023-0011-0056)

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BOEM-2023-0011-0056-0001	Section 3.4.1 Figure 3.4.1-1 of the DEIS indicates that the air quality geographic analysis area includes the airshed within 25 miles of the Lease Area and the airshed within 15.5 miles of onshore construction areas and ports that may be used for the project. EPA notes that according to the scale on Figure 3.4.1-1 and the description in section 3.4.1 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. Recommended Action: EPA understands that for offshore construction and operations emissions estimates many developers are aligning their anticipated emissions between their Construction and Operations Plan and their Clean Air Act (CAA) Outer Continental Shelf (OCS) permit application and within EPA's regulation at 40 CFR part 55 we interpret miles to be measured in nautical miles for the purpose of determining potential emissions from the source. As such EPA's permitting scope extends 25 nautical miles around the offshore wind development area. EPA recommends that the FEIS 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.?	The U.S. Environmental Protection Agency (USEPA) is correct that Figure 3.4.1-1 uses statute miles. However, the emissions analysis in the COP, which supplied the emissions data reported in the EIS, is based on nm consistent with USEPA's interpretation for the purpose of Outer Continental Shelf (OCS) permitting.
BOEM-2023-0011-0056-0002	Section 3.4.1 (page 3.4.1-5) of the DEIS states "The nearest Class I area is the Lye Brook Wilderness Vermont which is approximately 130 miles (210 kilometers) from the nearest Project component (the Brayton Point HVDC Converter Station). This distance is greater than the 100-kilometer distance within which USEPA recommends that the federal land manager of the Class I area be notified about a project that requires a federal air quality permit." On page 3.4.1-16	The requested clarification has been added to the Final EIS.

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	of the DEIS states "As shown in Table 3.4.1-7 the estimated impacts due to the Mayflower Wind Project are less than the USEPA Class I significant impact levels (SILs). USEPA considers that no further analysis is necessary for impacts that are less than the SILs." Recommended Action: Please revise the FEIS to clarify what components of the project underwent a Class I SILs analysis. As currently written a reader could be confused by BOEM's statements on pages 3.4.1-5 and 3.4.1-16.	
BOEM-2023-0011-0056-0003	Section 3.4.1.5 (page 3.4.1-17) of the DEIS states "Table 3.4.1-8 summarizes the visibility assessment results. Because short-term emission rates during construction would be less than during O&M visibility impacts during construction would be less than shown in Table 3.4.1-8 and would be less than the Class I impact criteria. USEPA considers that no further analysis is necessary for impacts that are less than the impact criteria." Table 3.4.1-8 indicates the modeled value for Perceptibility (ΔE) is 1.808 compared to the Class I criterion 2 90% of Class I criterion. Recommended Action: Further discussion on the visibility analysis in the FEIS would help clarify the sources of emissions included in the Class I area visibility assessment.	The requested information has been added to the Final EIS.
BOEM-2023-0011-0056-0004	Section 3.4.1.5 (page 3.4.1-13) of the DEIS states "The total estimated construction emissions of each pollutant are summarized in Table 3.4.1-4. BOEM anticipates that air quality impacts from construction of the Proposed Action would be minor." Table 3.4.1-4 indicates total VOC is "11589 tons." Recommended Action: Please correct the error in Table 3.4.1-4 for VOC emissions.	The emission totals for volatile organic compounds (VOCs) in Table 3.4.1-4 have been corrected in the Final EIS.
BOEM-2023-0011-0056-0005	Section 3.4.1.5 (page 3.4.1-13) of the DEIS states "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 Action may need emergency generators at times potentially resulting in	BOEM has added to the Final EIS proposed air quality mitigation measures AQ-1 through AQ-8 in Appendix G, *Mitigation and Monitoring*, Table G-2, which include measures to minimize emissions from vessel engines and other measures that would minimize air quality impacts.

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	increased emissions for limited periods. Mayflower Wind has proposed measures to reduce emissions including compliance with applicable fuel-efficiency fuel sulfur content and emissions standards." In past finalized offshore wind projects e.g. Vineyard Wind 1 and South Fork Wind EPA has previously 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: The FEIS should acknowledge past determinations made by EPA on previously finalized 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 EPA has required in past permits and consider adopting a similar structure into the FEIS.?? Furthermore EPA recommends that as an additional mitigation measure BOEM require SouthCoast 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 FEIS should provide a discussion of the various options that are available to reduce these emissions. The FEIS should consider options for reducing emissions from offshore activity such as the purchase of lower emitting or electrified crew vessels.??? 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 FEIS.?	These measures are similar to measures that BOEM has analyzed during the NEPA review for other offshore wind projects.
BOEM-2023-0011-0056-0006	Section 3.4.1 (page 3.4.1-4) of the DEIS states "Mayflower Wind is considering a number of ports for project construction the nearest being the Port of New Bedford Massachusetts and the Port of Providence Rhode Island and additional locations in New England. Mayflower Wind is	Please refer to response to comment BOEM-2023-0011-0056-0005.

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	considering the ports of New Bedford and Fall River Massachusetts for project operations and maintenance. More distant ports that could be used include Port of Virginia Virginia. The attainment status of these ports varies. The potential ports in the New England region are in attainment areas except for the Port of New London Connecticut which is in a nonattainment area for the ozone NAAQS." Many port communities are in areas that may have existing air quality issues and/or environmental justice concerns. Recommended Action: EPA recommends that the DEIS evaluate 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.??	
BOEM-2023-0011-0056-0007	Section 3.4.1-4 of the DEIS states: "All of southeastern Massachusetts is currently designated as unclassifiable or in attainment for all criteria pollutants except for Dukes County on Martha's Vineyard which is designated as marginally in nonattainment for the 2008 ozone NAAQS of 75 parts per billion (ppb). Though the 2008 NAAQS are still technically in effect Dukes County was designated in attainment in August 2018 against the current more stringent 2015 ozone NAAQS of 70 ppb. Thus though the 2008 designation has not yet been changed monitored values in Dukes County have significantly improved since 2011. Dukes County is in attainment with the 2015 ozone NAAQS standard; however its official designation is as a "marginal nonattainment area" based on the 2008 ozone standard.? Administratively USEPA must change this designation to attainment but has not yet done so." Recommended Action: EPA recommends that BOEM clarify the language in Section 3.4.1-4 of the DEIS to accurately reflect the Clean Air Act redesignation process.? Though the	The language regarding the attainment status of Dukes County has been clarified.

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	Dukes County area was designated unclassifiable/attainment for the more stringent 2015 ozone NAAQS the area remains designated as nonattainment for the 2008 ozone NAAQS.? The CAA does not grant EPA the authority to "administratively" redesignate a nonattainment area to attainment.? For an area to be redesignated to attainment the State must submit a request for redesignation accompanied by an approved maintenance plan that meets the requirements of section 175A of the CAA.? See CAA 107 (d)(3)(e) for further information on the redesignation process.	
BOEM-2023-0011-0056-0008	These comments and recommendations focus on Section 3.6.4 of the DEIS. The DEIS acknowledges that the preferred and alternative locations for the Falmouth MA onshore substation converter station and their landfalls are adjacent to neighborhoods that meet EJ criteria and that land use around the Falmouth onshore project area includes residential recreational and commercial uses. According to the DEIS BOEM anticipates that the Proposed Action and all alternatives would have overall negligible to minor impacts on communities with EJ concerns. In addition Fall River a community with a range of EJ concerns is adjacent to the proposed onshore substation converter station and their landfalls at the Brayton Point site. The DEIS also states that Mayflower Wind has committed to measures to minimize impacts on EJ communities which include but are not limited to maintaining a stakeholder engagement plan encouraging the hiring of skilled and unskilled labor in the Project region and developing a Traffic Management Plan to minimize disruptions to the communities in the vicinity of construction as well as committing to making at least 75% of the O&M workforce procurement and services local. Recommended Action: BOEM should develop a stakeholder outreach/EJ public engagement plan for areas that may be impacted by the proposed action and provide an opportunity for affected communities to inform the project's mitigation	BOEM has facilitated effective public outreach throughout the EIS process as demonstrated through broad participation in scoping meetings and public hearings and substantial public input received through comments submitted on regulations.gov or through verbal testimony at public meetings during scoping and the public review period for the Draft EIS. In addition, as noted in COP Volume I, Section 1.6, SouthCoast Wind executed targeted outreach to the communities and environmental justice populations that could be affected by the Proposed Action, including local Tribes, neighborhood associations, and environmental groups, many of which represent environmental justice communities. BOEM has not identified disproportionately high and adverse effects on environmental justice populations except for major disproportionate impacts related to Tribally important Traditional Cultural Places (TCPs). Targeted environmental justice outreach outside of the public involvement process undertaken for NEPA is not planned. Over the duration of BOEM's environmental review of the Project, BOEM has engaged with federally recognized Tribes through government-to-government and Section 106 of the National Historic Preservation Act (NHPA) consultations to identify and assess effects, mitigate impacts, and resolve adverse effects on TCPs (refer to Final EIS Section 3.6.2, *Cultural Resources,* and Appendix I, *Finding of Adverse*

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	measures. An effective stakeholder outreach and public engagement plan for areas that may be impacted by the proposed action including Falmouth MA Fall River MA and communities located near ports in the communities listed in the comment below should be incorporated in the FEIS and should include: • Identification of a single point of contact at BOEM to serve as a community liaison for communities affected by project construction and operation • detailed information on planned engagement milestones and commitments to meetings with potentially impacted communities and community organizations • communications written in plain language that can be understood by all affected community members • assessment of translation and interpretation needs through screening tools such as EPA's EJ Screen and outreach to people who live in impacted communities including local government officials and community-based non-governmental organizations public meetings accessible to all and scheduled at times that accommodate the greatest number of participants	*Effect for the SouthCoast Wind Construction and Operations Plan*). Adverse effects on historic properties, including TCPs that are listed or eligible for listing in the National Register of Historic Places (NRHP), will be resolved through the Memorandum of Agreement (MOA) developed through Section 106 consultations with Tribes and consulting parties (refer to Final EIS Appendix I, Attachment A for the MOA). As of the November 2022 release of Massachusetts Executive Office of Energy and Environmental Affairs environmental justice data, there are no environmental justice census blocks within 1 mile of the proposed Brayton Point area and one environmental justice census block intersected by the Falmouth onshore Project areas (refer to Figure 3.6.4-3 and Figure 3.6.4-4 of the Final EIS). Environmental justice communities at ports that would be used by the Project are also identified in Section 3.6.4, *Environmental Justice*.
BOEM-2023-0011-0056-0009	The DEIS states that this project may utilize ports in New London Connecticut Providence, Rhode Island, New Bedford and Salem, Massachusetts, Newport News and Portsmouth, Virginia and ports in Canada for berthing staging and loadout to support the construction and installation of offshore facilities. The DEIS also states that ports in New Bedford and Fall River Massachusetts would be the most likely ports for O&M activity. Recommended Action: Localized EJ impacts at the ports being considered for usage should be fully identified in the FEIS for the selected alternative and that affected communities including port communities be given an appropriate opportunity to comment based on targeted outreach from BOEM. Additionally port expansion and modifications to	Final EIS Section 3.6.4, *Environmental Justice*, describes potential impacts on environmental justice stemming from port utilization, including noise and temporarily increased air emissions. BOEM has not identified disproportionately high and adverse effects on environmental justice populations except for major disproportionate impacts related to Tribally important TCPs. BOEM has facilitated effective public outreach throughout the EIS process as demonstrated through broad participation in scoping meetings and public hearings and substantial public input received through comments submitted on regulations.gov or through verbal testimony at public meetings during scoping and the public review period for the Draft EIS.

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	support the development of offshore wind infrastructure that may lead to increased port utilization constitute a reasonably foreseeable indirect effect of the Proposed Action. Impacts to communities with EJ concerns adjacent to such ports should be considered and disclosed.	Potential impacts on environmental justice due to port expansion or modification associated with the offshore wind industry are identified under the No Action Alternative *port utilization* IPF. The Final EIS has been updated to include additional information about specific ports that are being modified to accommodate offshore wind activity that are near environmental justice communities. As stated in Section 3.6.4, *Environmental Justice,* in the *port utilization* IPF discussion, there are no port expansions or modifications included as part of the Proposed Action. Utilization of ports by SouthCoast Wind is analyzed in the EIS.
BOEM-2023-0011-0056-0010	While the DEIS 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." [Footnote 2: Interagency Working Group on Environmental Justice Promising Practices for Environmental Justice Methodologies in NEPA Reviews (2016) p. 39.] 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." [Footnote 3: Council on Environmental	The commenter is correct that the determination of disproportionately high and adverse impacts is made for the Proposed Action alone and not for cumulative impacts of the Proposed Action in combination with the planned activities scenario described in Appendix D, *Planned Activities Scenario*. However, BOEM's environmental justice analysis does consider the contribution of other environmental stressors in establishing the baseline condition in the affected environment, including analyzing the National Ambient Air Quality Standards (NAAQS) attainment status of the communities within the environmental justice geographic analysis area. BOEM's analysis found that all environmental justice communities within the Project area are in attainment for all NAAQS, except for the Port of New London and Dukes County, which are in nonattainment for one NAAQS, and Port of Sparrows Point, which is in nonattainment for two NAAQS. See Final EIS Section 3.6.4, *Environmental Justice*, and Section 3.4.1, *Air Quality*, for discussion of pollutants and their impacts on environmental justice. BOEM reviewed the Environmental Justice Screening and Mapping Tool (EJSCREEN) and has updated the No Action Alternative analysis in Final EIS Section 3.6.4 to include greater discussion of the baseline air quality conditions at each of the proposed onshore components and proposed ports using information on air quality indices from EJSCREEN.

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	Quality Environmental Justice: Guidance Under the National Environmental Policy Act (1997) p. 2.] Recommended Action: The FEIS 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 EPA's EJ Screen (https://www.epa.gov/ejscreen) and the Center for Disease Control and Prevention's Environmental Justice Index (https://www.atsdr.cdc.gov/placeandhealth/eji/index.html) to obtain information on pre-existing pollutant and health burdens that may inform the cumulative impacts analysis.	In addition, BOEM added a new subsection, *Pre-Existing Health Condition Considerations*, in Section 3.6.4.1, which describes pre-existing public health conditions in the geographic analysis area based on the Centers for Disease Control and Prevention Environmental Justice Index. BOEM has reviewed the environmental justice conclusions presented in the Draft EIS and additional context and confirms the earlier determination that impacts of the Proposed Action on environmental justice populations would not be disproportionately high and adverse.
BOEM-2023-0011-0056-0011	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: The FEIS should consider whether communities impacted by this project may already be experiencing existing pollution and social/health burdens. Additionally, the FEIS should further describe the health effects of impacts.	BOEM's environmental justice analysis considers the contribution of environmental stressors in establishing the baseline condition in the affected environment. Final EIS Section 3.6.4.6 discusses the health benefits that environmental justice communities may experience due to the Project, including long-term effects such as decreased air emissions due to a decreased dependency on fossil fuels. Section 3.4.1, *Air Quality*, describes baseline air quality conditions across the geographic analysis area for environmental justice. According to Section 3.4.1, all areas within the environmental justice geographic analysis area are in attainment of NAAQS, except for the Port of New London and Dukes County, which are in nonattainment for one NAAQS, and Port of Sparrows Point, which is in nonattainment for two NAAQS.
BOEM-2023-0011-0056-0012	EPA relies upon BOEM as the lead federal agency to consult on our behalf with the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). These consultations support our air water and ocean dumping permitting responsibilities for the project. Correspondence from the NMFS during the development of the DEIS noted the	BOEM determined an appropriate way to further address this issue was to seek input from NASEM. Specifically, to ensure offshore wind energy installations are being planned, constructed, and developed in an environmentally responsible way, BOEM asked NASEM to evaluate the potential for offshore wind farms in the Nantucket Shoals region to affect oceanic physical processes, and, in turn, how

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	potential for a jeopardy determination under the ESA and concerns whether a negligible impact determination could be reached under the MMPA for the proposed action. NMFS recommended evaluation of a habitat minimization alternative designed to avoid significant impacts to the critically endangered North Atlantic right whale (NARW). [Footnote 4: 10/27/22 letter from M. Pentony (NMFS) to K. Baker (BOEM)] Our comments on the PDEIS encouraged BOEM to provide information in the DEIS to address those concerns. The DEIS considers but eliminates two alternatives focused on this objective—one partially responsive to a specific request by the NMFS and one developed by BOEM as an alternate way to partially address the NMFS recommendations. The DEIS does not however consider in detail a viable project alternative (as suggested by NMFS and others) designed specifically to avoid impacts to the NARW. Such an alternative would provide a more meaningful contrast to the proposed action than Alternative D (which considers the removal of up to 6 WTGS) with respect to the potential to reduce impacts to the NARW. The DEIS states that alternatives more protective of NARWs are not economically viable but the analysis fails to fully contextualize the significance of MMPA and ESA issues that face the remaining alternatives. Recommended Action: We recommend that the FEIS include a roadmap to explain when and how outstanding MMPA and ESA issues will be addressed for the project. As part of this effort we encourage BOEM to provide a more meaningful	those hydrodynamic alterations might affect local to regional ecosystems. In light of the resulting Consensus Study Report and based on best available science, BOEM believes there is a lack of conclusive evidence that the proposed WTG locations in the Lease Area have the potential to result in hydrodynamic effects on NARW foraging in the vicinity of Nantucket Shoals.[2] The best available science suggests that effects are most likely to be localized to the immediate vicinity of the turbine array and to not extend to Nantucket Shoals. Primary studies supporting this position include modeling of the full build-out of the southern New England lease areas (Johnson et al. 2021), hydrodynamic studies of wind facilities in the North Sea (Christiansen et al. 2022), and recent comprehensive literature reviews (NASEM 2024). In particular, the NASEM study was commissioned 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 regional ecosystems." The study, titled *Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales,* concluded that "the impacts of offshore wind projects on the NARW and the availability of their prey in the Nantucket Shoals will likely be difficult to distinguish from the significant impacts of climate change and other influences on the ecosystem" (NASEM 2023). Furthermore, the key recommendation from the study is "while wind energy planning and development progresses, BOEM, NOAA, and

[2] Two of the primary conclusions from the NASEM report *Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales* (2024) demonstrate that it is not reasonable to conclude eliminating a large number of WTGs from SouthCoast Wind would have a significant beneficial effect. Specifically, "**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." and "**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."

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	consideration of suggested conservation actions (including project reconfiguration) to help the project meet the requirements of the ESA and the MMPA and avoid the need for additional analysis (and resulting schedule delays) to address outstanding questions or concerns after the close of the NEPA process. We continue to encourage BOEM to work closely with NMFS in advance of the publication of the FEIS to expand the analysis to address these issues.	others should promote observational studies and modeling that will advance understanding of potential hydrodynamic effects and their consequent impacts on ecology in the Nantucket Shoals region during all phases of wind energy development." BOEM is supporting additional research on this topic, in accordance with the NASEM recommendations. During the process of identifying the Massachusetts lease areas BOEM excluded certain areas identified as important habitats that could be affected if ultimately developed with the installation of WTGs. Nantucket Shoals was among the areas excluded from the subsequent commercial leasing. BOEM does not assert there are no effects from wind turbine wake and corresponding wind speed and clarifies that the effects will not likely have a detectable effect on foraging and will not have population-level impacts on important species including NARW. Without impacts on foraging and a reasonable causal connection to population impacts, NMFS's reasoning for this alternative is not justifiable or persuasive. NMFS has not demonstrated its 12-mile (20-kilometer) buffer alternative is warranted or provided any new information to support it, and current available peer-reviewed studies and data constituting best available science do not conclude that there will be a reasonable expectation of population-level impacts.
BOEM-2023-0011-0056-0013	The BOEM standard screening criteria for alternatives were established to support the development of project alternatives. The criteria are a helpful resource and the basis for our recommendation above that BOEM work to develop and consider an additional alternative as the NEPA process continues. For example the detailed consideration of a new alternative (in addition to Alternative D--which includes the removal of up to 6 WTGs) would provide BOEM the opportunity to more directly addresses substantive concerns documented by the NMFS to date. This alternative would differ from Alternative D in that it would not be "substantially similar" to the proposed action and would provide greater	Under NEPA, as amended by the Fiscal Responsibility Act, BOEM is obligated to analyze "a reasonable range of alternatives to the proposed agency action, including an analysis of any negative environmental impacts of not implementing the proposed agency action in the case of a no action alternative, that are technically and economically feasible, and meet the purpose and need of the proposal." Consequently, BOEM takes the technical and economic feasibility of a potential alternative into account when determining which alternatives to analyze in detail in an EIS.BOEM's detailed rationale for dismissing alternatives through application of the screening criteria is provided in

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	contrast with respect to significant environmental impacts than Alternative D. Such an alternative would be developed to meet screening criteria 2.b so that it meets the applicant's current contract obligations (PPAs)--as opposed to potential future obligations; and screening criteria 4 which is focused on a substantial reduction of a significant environmental impact. Recommended Action: The analysis would benefit from a fresh look at the criteria to address the concerns documented above.	Chapter 2, Table 2-3. The rationale for dismissing multiple alternatives under the subcategory of Wind Turbine Array Layout directly addresses the issues raised by this comment.
BOEM-2023-0011-0056-0014	Appendix E (E.1.2.2 Benthic Resources (p. E-2)): The DEIS acknowledges that "Surveys have not been completed for any of the alternative offshore export cable routes (Alternatives C-1 and C-2) where they diverge from the Proposed Action cable corridors. BOEM is relying on general information and the surveys of the Proposed Action cable corridors which are in close proximity to the alternative cable routes to characterize benthic habitat impacts." Recommended Action: According to the DEIS it is difficult to assess differences in impacts to benthic resources along two cable route options and recommend a preferred option without site- specific seafloor information including the possible presence of boulders and other complex habitat that is known to exist in Rhode Island waters. We agree. While the un-surveyed portions of the route alternatives are not extensive compared to the entire length of the cable corridor they nevertheless represent incomplete information needed for making an informed decision on which route is preferable for minimizing benthic impacts. EPA recommends this information be collected and made available in the FEIS.	Following the release of the Draft EIS, SouthCoast Wind, at BOEM's request, commissioned two desktop studies using existing site-specific and regional data to inform BOEM's assessment of the Alternative C cable routes: *SouthCoast Wind BOEM Alternative C Geohazard Desktop Study* (TetraTech 2023) and *SouthCoast Wind BOEM Alternative C-1 Benthic Desktop Study* (INSPIRE 2023). The findings from these desktop studies have been incorporated into the Final EIS (principally Section 3.5.2, *Benthic Resources,* and Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*) and support BOEM's analysis of the cable routes. BOEM believes the information contained in these desktop studies, along with existing information that BOEM and SouthCoast Wind have already gathered (including a terrestrial archaeological desktop study [PAL 2022] and a marine archaeological desktop study [Christopher Goodwin & Associates 2022]; refer to Section 3.6.2, *Cultural Resourc*es) provides adequate information for BOEM to make an informed decision regarding the alternatives.
BOEM-2023-0011-0056-0015	According to the DEIS (p. 3.5.2-8 (Section 3.5.2.3) nonnative or invasive species can be accidentally released through the discharge of ballast water and bilge water. The risk of accidental releases of invasive species could increase as vessel traffic increases throughout the construction phase of	Text has been added in Section 3.5.2.3 to address this comment. A reference to a study (De Mesel et al. 2015) of invasive species that have become established on European wind farm foundations has been added. This reference also adds documentation of range expansion of invasive species

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	offshore wind projects especially from foreign vessels. The DEIS points to state and federal regulations that are intended to prevent the introduction of nonnative species from ballast waters discharges and that all vessels involved with offshore wind-related activities are required to adhere to these regulations. The DEIS concludes that the risk of nonnative or invasives becoming established from offshore wind-related activities is low. The risk of nonnative or invasives becoming "established" is based on more than just the potential for this industry to introduce these organisms. It must also consider how these organisms will adapt to their new environment. While the risk of introduction from wind- related activities may be low the DEIS acknowledges that the impacts of invasive species could be "strongly adverse widespread and permanent if the species were to become established and out-compete native fauna." The DEIS further states "[i]ndirect impacts could result from competition with invasive species for food or habitat and/or loss of foraging opportunities if preferred prey is no longer available due to competition with invasive species. Such an outcome however is considered highly unlikely." Given that this new hard structure habitat will undoubtably be populated by fouling organisms including nonnative or invasives it's unclear how such a definitive conclusion can be reached. Recommended Action: BOEM should review the available literature for documented effects of invasives in other areas of the country or in other countries where these structures have been sited and provide additional information in the FEIS on the effects of invasives. Additionally BOEM should consider funding a study to look at such effects from sites being developed in New England given its expressed concern that impacts could potentially be strongly adverse widespread and permanent.	from this wind farm in the North Sea. Additionally, the text "Such an outcome however is considered highly unlikely" has been removed when discussing competition with native species. Further discussion on invasive species specific to offshore wind development in New England (i.e., Block Island Wind Farm) is provided in the Presence of Structures subsection in Section 3.5.2.5. Results from benthic monitoring at Block Island Wind Farm are provided along with information on nonnative benthic invertebrate species that colonize introduced hard substrates. Additionally, an ongoing study funded by BOEM is evaluating the positive and negative habitat promotion outcomes of offshore wind infrastructure materials being used in the United States. Furthermore, this study is also evaluating the use of various materials by non-native species (e.g., *Didemnum vexillum*) which are commonly found on the northeast shelf to better understand trade-offs of promoting habitat utilization. Results from this study will be incorporated into the Final EIS once available. Link to description of ongoing study: https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Evaluating%20Effectiveness%20of%20Nature%20Inclusive%20Design%20Materials.pdf.
BOEM-2023-0011-0056-0016	The DEIS continues to point to the paucity of research on impacts of EMF (including heat emission) to benthic organisms especially non-commercial species while acknowledging that "Effects of EMF may include interference	Information presented in the EIS indicates that there is a lack of evidence of effects and impacts from EMFs. Effects of EMFs are not specific to SouthCoast, and the burial of the

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	with navigation that relies on natural magnetic fields predator/prey interactions avoidance or attraction behaviors and physiological and developmental effects." (p. 3.5.2-21). With this project and others like it nearby and along the East Coast hundreds of miles of electric cable will be placed on the seafloor without a clear understanding of its effects on the biological community that will be within the influence of EMF 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 FEIS include a specific plan for addressing the research needs for this important issue.	majority of cables is expected to significantly reduce or eliminate risks to benthic species. Recent studies on EMF have shown that effects can be significantly minimized when BMPs such as cable burial and the use of cable protection are employed. A list of BOEM-funded EMF studies on both commercial and non-commercial marine species can be found here: https://esp-boem.hub.arcgis.com/apps/electro-magnetic-fields-emf-studies/explore.
BOEM-2023-0011-0056-0017	The DEIS (Page: 304 Section 3.5.5.5 Impacts of Alternative B – Proposed Action on Finfish Invertebrates and Essential Fish Habitat - Cable emplacement and maintenance) states that the proponent "…is considering benthic imagery surveys to monitor benthic habitats and invertebrate impacts and recovery during the construction O&M and decommissioning phases (COP Volume 2 Table 11-20; Mayflower Wind 2022). Such surveys would aid in evaluating the impacts from cable installation and maintenance." Recommended Action: We recommend that these benthic surveys be required by BOEM.	SouthCoast Wind has developed a benthic habitat monitoring plan that describes surveys and monitoring measures that will be conducted to quantify changes in benthic community composition from Project operations. Fisheries and benthic habitat monitoring surveys are included in agency proposed mitigation measure BA-3 in Appendix G, Table G-2.
BOEM-2023-0011-0056-0018	Noise Impact Mitigation EPA supports the use of bubble curtains and other mitigation measures such as soft starts (DEIS 3.5.5-47 and elsewhere) or other measures to reduce noise impacts associated with pile driving.	SouthCoast Wind has proposed various sound-attenuation measures including bubble curtains and soft starts to mitigate impacts from pile driving (refer to Appendix G, Table G-1 and Attachment G-1).
BOEM-2023-0011-0056-0019	The DEIS discusses the potential need to "lift and shift" unexploded ordinance (UXO) if it is found to be in the path of the subsea cables and cannot be avoided. The "lift and shift" process would involve lifting the UXO and transporting it to	"Lift and shift" of unexploded ordnance/munitions and explosives of concern is permitted through the Rivers and Harbors Act of 1899, which is under U.S. Army Corps of Engineers (USACE) jurisdictional authority and not through

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	another location on the sea floor. Should this become necessary the applicant would need to obtain an ocean dumping permit from EPA under the Marine Protection Research and Sanctuaries Act for the transportation and dumping of the UXO onto the sea floor. Recommended Action: Please revise the list of required permits in Appendix A (Table A-1. Required environmental permits and consultations for the proposed Project) to reflect that an EPA Ocean Dumping Permit could be indicated if the UXO is addressed through a “lift and shift” procedure.	USEPA. An Ocean Dumping Permit from USEPA is not required.
BOEM-2023-0011-0056-0020	The DEIS (Page: 153 Table 3.4.2-9. Results from thermal plume modeling conducted for Mayflower Wind HVDC OSP) states that four thermal plume scenarios were modeled to provide the expected maximum extent of the plume (maximum tidal velocities) and maximum concentrations of the plume (minimum tidal velocities). Recommended Action: We recommend that the FEIS explain the greater dilutions at edge of the near-field region (NFR) under the low velocity ambient conditions presented in the Table. Also the FEIS should explain the greater distance to edge of NFR under low velocity ambient conditions presented in the Table.	Section 3.4.2, *Water Quallity,* of the Final EIS has been updated to reflect the revised NPDES permit application results and provide explanation of dilution ratios at the edge of the near-field region and distance to the edge of the near-field region under minimum current conditions.
BOEM-2023-0011-0056-0021	EPA is concerned that the DEIS 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 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	BOEM believes the analysis in the Draft EIS provided appropriate level of detail and comparative analysis among alternatives in order for the public and decision maker to distinguish the impacts between alternatives. The level of analysis and detail by alternatives is commensurate with other BOEM offshore wind EISs. However, to improve the discussion and understanding of the differences between alternatives, BOEM has added a Comparison of Alternatives section to each Chapter 3 resource section that compares the impacts among alternatives. Additionally, BOEM added additional detail to various Chapter 3 sections where site specific information about the impact of an alternative was available.

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	impacts with broad metrics. These changes will benefit both the NEPA process and BOEM decision-making regarding alternatives.	
BOEM-2023-0011-0056-0022	EPA recognizes the long-term potential benefits of the proposed large-scale offshore wind renewable energy project with respect to reductions in the emissions of air pollutants. EPA acknowledges the importance of the project for meeting Massachusetts' Rhode Island's and Connecticut's renewable energy goals under their respective climate change and resiliency plans and policies as highlighted in Section 3.4.1: Cumulative Impacts of the No Action Alternative and Appendix D Table D-4 & D-5. Recommended Action: To better convey the potential GHG reduction benefits associated with the project EPA recommends that BOEM consider the specific contribution of the project towards meeting individual state emission reduction and clean energy goals. In COP Appendix G Table 6-1 BOEM provides the project's avoided emission factors for CO2 NOx and SO2 in New England. EPA recommends integrating this analysis into the FEIS to include the multi pollutant analysis for the project as compared to each affected state's emission reduction goals and policies. This analysis would better emphasize how and why the project is beneficial to the state and regional goals and standards. Furthermore EPA recommends that BOEM expand the discussion of avoided emissions to include an analysis of the avoided emissions benefits over the lifetime of the project as compared to the emissions generated during the construction phase. A comparison of the lifetime avoided CO2 NOx SO2 and PM emissions to those generated during the construction phase would better portray the long-term emissions benefits of the project. Additionally EPA recommends that BOEM consider a more robust consideration of climate change risks to the proposed action. This discussion should include the potential vulnerability of the project to future climate change scenarios	Information on the contribution of the Project toward meeting individual state goals has been added to the Final EIS. Avoided emissions are discussed in Section 3.4.1.5 of the EIS. Because the energy generated by the Project could displace energy from multiple fossil-fueled power plants in multiple states, but the specific plants that would be affected are not known, it would not be meaningful to assign a specific level of emission reduction to a specific state. Any level of avoided emissions would support state emission reduction goals and policies. A table of net carbon dioxide equivalent (CO_2e) emissions over the Project lifetime has been added to the EIS. Presentation of lifetime avoided nitrogen oxides (NO_X), sulfur dioxide (SO_2), and particulate matter emissions would not be meaningful because states do not plan on the basis of aggregated emissions totals of criteria pollutants over periods comparable to the Project lifetime. Rather, states plan for achieving and maintaining attainment with the NAAQS, which are defined in terms of time periods of a year or less (some with 3-year averaging). The U.S. Global Change Research Program's Fourth National Climate Assessment provides regional assessments of predicted climate impacts for 10 different geographic areas of the United States. Focusing on the existing and potential climate change risks that potentially could affect the Project, the Fourth National Climate Assessment notes the following climate-related impacts in the Northeast region of the United States: • Average annual temperatures in the Northeast are projected to rise between 4.0 degrees Fahrenheit (°F) and 5.1°F by 2050 relative to the near-present average, with

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	(including rising global temperatures more frequent and intense storm events storm surge changes in coastal currents and sea level rise). The design features of the facility must be able to withstand the long-term impacts of climate change to ensure the reliability of the project to deliver the expected energy output over its lifetime. In addition to assessing the potential vulnerabilities the analysis should include potential adaptation measures that could potentially be taken to mitigate those vulnerabilities.	an increase in the number and intensity of extreme heat events, especially in highly urbanized areas. • Rainfall intensity has increased, with monthly precipitation projected to be about 1 inch greater during December through April by the end of the century. • Sea level rise along the mid-Atlantic coast (from Cape Hatteras to Cape Cod) is occurring at three to four times the global average rate, due to land subsidence caused by rebound effects from the melting of glaciers after the last ice age, as well as shorter-term effects such as the recent slowing of the Gulf Stream current. • Average storm surge heights caused by hurricanes in the New York City area have increased by more than 3.9 feet over the last 1,000 years, which has coupled with sea level rise to contribute to storm surges that reach farther inland, as demonstrated by recent events such as Superstorm Sandy. • Many infrastructure systems in the Northeast, particularly drainage and sewer systems, flood and storm protection systems, transportation, and power supply systems, are either nearing their planned life expectancy or were not designed for projected climate variability, leading to increased risk of disruptions. Based on the regional climate-related impacts described above, the following potential impacts on Project infrastructure have been identified: • Project-related infrastructure at the O&M support facilities, onshore Points of Interconnection (POIs), onshore substations, and related facilities could be vulnerable to inundation during significant storm surge events. • Regional climate-related vulnerabilities in the electric transmission system potentially could have indirect impacts on the Project's ability to deliver electric power during system disruptions.

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		• Regional climate-related vulnerabilities in the transportation system could potentially have indirect impacts on the Project's ability to perform O&M tasks at either its onshore or offshore facilities. The Project itself has been designed to accommodate future climate risks. For example, the stormwater management system is being designed for extreme storm events considering climate trends. According to the COP Volume 2, Section 5.2.3, extreme storm effects and other climate effects are not anticipated to negatively affect the Project infrastructure or activities.
BOEM-2023-0011-0056-0023	Both the federal Clean Water Act (CWA) and the National Environmental Policy Act (NEPA) direct federal agencies to fully evaluate the impacts of a reasonable range of alternatives to meet the basic project purpose/purpose and need and to disclose those impacts to the public. When EPA evaluates the SouthCoast Wind application to the U.S. Army Corps of Engineers (USACE) for a federal permit under Section 404 of the Clean Water Act EPA focuses primarily on the aquatic environment subject to federal jurisdiction under the CWA that would be affected by the proposed project alternatives. Regulated activities in jurisdictional waters include cable installation work that occurs within three miles of the coastline. The USACE and EPA have a legal obligation to ensure that only the least environmentally damaging practicable alternative (LEDPA) be permitted and that no project be permitted that would result in significant adverse impacts to the aquatic environment. Appendix F of the DEIS provides information in support of the analysis of project compliance with EPA's Section 404(b)(1) guidelines (40 CFR 230)—guidelines which set forth the environmental standards which must be satisfied for a Section 404 permit to issue. Recommended Action: EPA recommends that the FEIS analysis of alternatives contain a more focused discussion of	Text in Appendix F was provided by SouthCoast Wind.

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	how the selected alternative is consistent with the CWA Section 404(b)(1) Guidelines to support permitting by the USACE. Such a discussion would demonstrate how the proposed/selected alternative qualifies as the LEDPA.	
BOEM-2023-0011-0056-0024	Page: 2 F.1 Falmouth Alternatives - Preferred Offshore Export Cable Route. We recommend that the discussion clarify the statement here and elsewhere in the analysis that there are "no anticipated impacts on tidal waters non-tidal waters wetlands or other protected resource areas anticipated." In other locations the DEIS describes anticipated impacts to tidal waters from cable installation.	Text in Appendix F, *Analysis of Alternatives,* was provided by SouthCoast Wind.
BOEM-2023-0011-0056-0025	Page: 6 Table F-1. Clean Water Act Section 404(b)(1) alternatives analysis table – Falmouth. We note that Table F-1 indicates that there is no fill associated with the alternatives. However as noted in the USACE public notice fill is placed when material is backfilled into trenches after cable installation. Because the cable installation area generally recovers over time the impacts associated with the backfill are generally considered to be temporary but it is not accurate to indicate that there is no fill being placed. We recommend that the narrative be revised to reflect this fill.	Change made. Table F-1 has been updated to include the amount of fill material associated with the alternatives, which is organized by total quantity (entire route), amount of fill material (state waters), seabed preparation (entire route) and seabed preparation (state waters).
BOEM-2023-0011-0056-0026	Page: 6 Table F-1. Clean Water Act Section 404(b)(1) alternatives analysis table – Falmouth. Table F-1 does not address cable protection. We recommend that the discussion describe the extent of cable protection that will be required for the Falmouth export cable. Any required protection should be indicated on table and included in the analysis.	Change made. Quantities for cable protection has been added to Table F-1 and the narrative of the appendix where appropriate.
BOEM-2023-0011-0056-0027	Page: 7 Proposed Action over Aquidneck Island via the Lee River (Western Route) with Point of Interest at Brayton Point with Portsmouth Route Options 1 2 2B and 3. The analysis states that under the proposed action “four onshore route variants are being considered.” The FEIS should clarify which Route Option is being incorporated into the preferred alternative.	A specific route will not be identified in the preferred alternative.

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BOEM-2023-0011-0056-0028	Page: 17 Table F-2. Clean Water Act Section 404(b)(1) alternatives analysis table – Brayton Point. As specified in the USACE public notice backfill of trenches during cable laying is considered a direct impact similar to the trench backfill in freshwater stream crossings. Because recovery of the resource is anticipated trench backfill impacts are generally considered temporary but the activity is still considered fill. Indicating the backfill amounts would better describe the temporary impacts to Sakonnet River that are avoided by upland routes.	Text in Appendix F, *Analysis of Alternatives,* was provided by SouthCoast Wind.
BOEM-2023-0011-0056-0029	Page: 17 Table F-2. Clean Water Act Section 404(b)(1) alternatives analysis table – Brayton Point. There is an asterisk in the Table heading Amount of Fill in Tidal Waters (Cable Protection). It is not clear what the asterisk references.	Change made. The asterisk has been deleted and notes to the table have been updated.
BOEM-2023-0011-0056-0031	ES-9 and 2-18: "Based on best available science BOEM believes there is a lack of conclusive evidence that the removal of proposed turbine locations in the northeastern portion of the Lease Area would measurably lessen these minor impacts on the hydrodynamic features." Recommended Action: Please provide a footnote with citations to document the best available science.	The reference to the best available science in Section 2.2.4 is referring to the study prepared by Johnson et al. (2021), which is cited immediately above the best available science reference. Furthermore, BOEM augmented the discussion in Final EIS Section 2.2.4 to describe the findings from the NASEM 2024 study on hydrodynamic impacts in the Nantucket Shoals region.
BOEM-2023-0011-0056-0032	3.4.2-15: "During decommissioning Mayflower Wind would drain all fluid chemicals from the WTGs and OSPs and dismantle and remove them. BOEM anticipates decommissioning to have temporary impacts on water quality with a return to baseline conditions." Recommended Action: The DEIS seems to suggest that fluid chemicals will be discharged to the ocean. The FEIS should describe whether this is the case and whether the need for any future discharge permits.	Final EIS Section 3.4.2 has been revised to clarify that no discharge of fluid chemicals is anticipated during decommissioning of offshore wind structures.
BOEM-2023-0011-0056-0033	3.4.2-22: "The WTGs and OSPs are generally self-contained and do not generate discharges under normal operating conditions." Recommended Action: The text in the FEIS should be revised to correct this statement as it is partially	Final EIS Section 3.4.2, *Water Quality,* has been revised to clarify that WTGs and OSPs do not generate "chemical" discharges under normal operating conditions.

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	incorrect. EPA has received a NPDES permit application for the continuous withdrawal and discharge from an OSP to be used as a HVDC converter station. We also recommend that the FEIS provide clarification of the number of and proposed use of each of the five proposed platforms.	As described in Chapter 2, *Alternatives,* SouthCoast Wind is proposing up to five OSPs, which could use HVAC) or HVDC technology. SouthCoast Wind has submitted an NPDES permit application for one HVDC converter OSP for Project 1. At this time, SouthCoast Wind has not selected the design or number of other OSPs. However, if HVDC is selected for Project 2, SouthCoast Wind anticipates one additional HVDC converter OSP would be installed in the southern portion of the Lease Area. Any future HVDC OSPs would require submittal of additional NPDES applications. Additional discussion of the potential for an additional HVDC converter OSP has been added to the discharges/intakes IPF discussion.
BOEM-2023-0011-0056-0035	3.5.2-20 "Based on the modeling results however the effluent discharges were found to be minimal. The maximum size of the thermal plume in winter and summer (defined as a 0.3°F water temperature differential from ambient) will have a near field release ranging from 272 to 306 feet (83 to 93 meters) respectively (TetraTech and Normandeau Associates Inc. 2022)."Recommended Action: This statement should be modified to reflect that the impact conclusions are based on time periods during maximum current speeds. In other parts of the discussion the DEIS reaches conclusions based on minimum current speeds.	The statement in the Final EIS was modified to represent that the modeling performed for the NPDES permit application for one HVDC converter OSP was under maximum current speeds. The values in the Final EIS were updated to reflect the updated 2023 NPDES permit application.
BOEM-2023-0011-0056-0036	3.4.2-24 "These generators are designed to achieve a hypochlorite solution flow rate of sufficient concentration corresponding with a 0 to 2 parts per million equivalent free chlorine concentration in the seawater intake lines … The impact on water quality from the discharge of warm seawater with small concentrations of bleach would be negligible. Impacts would be localized to the area immediately surrounding the outlet pipe." Recommended Action: The FEIS should explain the basis for this conclusion. Also we note that there is no mention of the concentration of total residual chlorine (TRC) at the discharge outfall. EPA's National Recommended Water Quality Criteria for aquatic life	The basis for this conclusion is stated that hypochlorite concentration are expected to be small (0.0002 percent per unit volume). Total residual chlorine is not identified in the NPDES permit application.

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	in saltwater for TRC are 7.5 micrograms per liter (µg/L) (0.0075 mg/L) (chronic) and 13 µg/L (0.013 mg/L) (acute).	
BOEM-2023-0011-0056-0039	It is very important that detailed maps indicating the various routes analyzed be included in the 404(b)(1) alternatives analysis for all routes under consideration. We recommend that these detailed maps include depictions of all resource areas considered in the analysis.	Change made. Figures have been updated and replaced in Appendix F, *Analysis of Alternatives,* to depicts all cable routes analyzed (Figures F-1, F-2, F-3, and F-4).

N.4.1.3 U.S. Coast Guard

Table N.4.1-3. Responses to comments from U.S. Coast Guard (BOEM-2023-0011-0062)

Comment No.	Comment	Response
BOEM-2023-0011-0062-0001	The DEIS resulted in an assessment ranging from negligible to moderate adverse impacts to Navigation and Vessel Traffic characteristics and moderate adverse impacts to Search and Rescue (SAR) activities. However previous DEIS's published for Massachusetts/Rhode Island (MA/RI) Wind Energy Area (WEA) projects adjacent to SouthCoast have resulted in assessments ranging from "minor to moderate." The USCG requests BOEM reexamine "negligible" adverse impacts to Navigation and Vessel Traffic and assess whether the negligible impacts identified should be considered as minor to align with similar studies conducted within adjacent WEA projects.	In the Draft EISs for the New England Wind Project and Sunrise Wind Project, both of which were released in December 2022 and are within the Massachusetts/Rhode Island WEA, BOEM concluded negligible to moderate impacts on navigation and vessel traffic from the Proposed Action. BOEM reexamined the impact conclusion for the SouthCoast Wind Project and determined the impact conclusion of negligible to moderate is appropriate and is consistent with other projects in the region.
BOEM-2023-0011-0062-0002	The USCG does not oppose either Alternative C-1 or C-2 which addresses the Project's export cable routing impacts to complex fisheries habitat. Alternative C-2 results in three routes across the Fall River Federal Channel increasing short-term and long-term navigation impacts. Approved cable routes must be coordinated with the USCG to mitigate impacts to Federal and Private Aids to Navigation (PATON) and to facilitate USCG asset operational support. The USCG recommends the Project coordinate approved cable routes with the First Coast Guard District and USCG Sector	BOEM acknowledges that USCG does not oppose either Alternative C-1 or C-2. BOEM has proposed a mitigation measure NAV-1 (refer to Appendix G, Table G-2), which would require SouthCoast Wind to consult with USCG regarding potential impacts on federal aids to navigation from cable installation and maintenance.

Comment No.	Comment	Response
	Southeastern New England to identify and mitigate potential conflicts to any Aid to Navigation.	
BOEM-2023-0011-0062-0003	The USCG recommends all Applicant-Proposed Measures (Table G-1) and Other Potential Mitigation Measures (Table G-2) of Appendix G be made mandatory especially measures that address impacts to USCG missions	Comment acknowledged. BOEM's proposed mitigation is identified in Final EIS Appendix G. USCG would be provided with an opportunity to review the measures in BOEM's ROD and Conditions of COP Approval.
BOEM-2023-0011-0062-0004	Any references to Local Notice to Mariners (LNM) and PATON should list the USCG as the anticipated enforcing agency.	USCG was listed as an enforcing agency for some mitigation measures referencing Local Notices to Mariners and private aids to navigation in the Draft EIS. BOEM has updated the Final EIS to list USCG as the enforcing agency for all other measures referencing Local Notices to Mariners and private aids to navigation.
BOEM-2023-0011-0062-0005	On page G-33 provide supplementary explanation for what is meant by coordinating directly with the USCG in response to search and rescue cases specifically as it relates to blade rotation and rotor shutdown.	A SouthCoast Wind Project WTG can be controlled and placed into a safe operational state by stopping the WTG from automatic operation and isolating the rotor to remain in a fixed position. This fixed position would allow a USCG helicopter to safely approach the WTG to assist and evacuate a person(s). A communication protocol would be established and practiced between SouthCoast Wind and USCG, as necessary.
BOEM-2023-0011-0062-0006	On page G-36 remove USCG from the anticipated enforcing agency for obstruction to air navigation and interference with radar systems and replace with the appropriate agency.	USCG was removed as the enforcing agency.
BOEM-2023-0011-0062-0007	On page G-51 provide supplementary explanation for NAV-2 of what is meant by direct communications with the USCG specifically during the use of cameras for monitoring the Project.	NAV-2 (see Appendix G, Table G-2, of the Draft EIS) would require SouthCoast Wind to operate a 24-hour operations center and be in communication with USCG. This measure is intended to ensure communication between SouthCoast Wind and USCG for purposes of navigational safety; the measure is not proposing to require the use of cameras. It should be noted that SouthCoast Wind has committed to operating an onshore control center that will monitor the Project 24 hours per day as noted in the COP NSRA (COP Appendix X). NAV-2 would provide the assurance that communication occurs with USCG as appropriate.

Comment No.	Comment	Response
BOEM-2023-0011-0062-0008	At the bottom of page 2-12 request the last sentence regarding reflective paint and lettering materials be changed from "would be used" to "may be used".	Final EIS Section 2.1.2.1 was revised to indicate reflective paint and lettering materials may be used.
BOEM-2023-0011-0062-0009	On page 3.6.1-44 request the second sentence in "Traffic" subheading be amended to reflect that off shore wind energy projects would request the establishment of safety zones around construction areas.	Section 3.6.1.3 was revised to state that offshore wind projects would request the establishment of safety zones around construction areas.
BOEM-2023-0011-0062-0010	On page 3.6.6-9 "First" is missing between USCG and District in the first paragraph.	“First” has been added between USCG and District.
BOEM-2023-0011-0062-0011	Safety Zones: The Commander First Coast Guard District may consider the establishment of limited access areas to include safety zones for Project construction on a case-by-case basis. Safety zones are not granted for the purpose of keeping construction on schedule and the authority should not be used as the primary mitigation measure for Project risks and impacts.	Draft EIS Section 3.6.6.5 acknowledges that safety zones may be established during construction and installation of the Project. BOEM recognizes the purpose of safety zones is not to maintain construction schedule and that safety zones should not be the only mitigation measure to minimize Project safety impacts. In addition to coordinating with USCG regarding the establishment of safety zones, SouthCoast Wind has committed to communicating with local mariners regarding upcoming and ongoing construction activities, to post Local Notices to Mariners on SouthCoast Wind’s website, to submit Local Notices to Mariners to USCG and Fleet Command prior to the commencement of offshore construction activities, and to coordinate directly with USCG in response to distress/SAR events (Appendix G, Table G-1).
BOEM-2023-0011-0062-0012	Amending Mitigations: 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.	BOEM acknowledges USCG’s request regarding amending mitigation measures and will continue to coordinate with USCG in this regard.
BOEM-2023-0011-0062-0013	Re-Evaluation: 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	BOEM acknowledges USCG’s request to reevaluate mitigation for the Project and will continue to coordinate with USCG in this regard.

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	Security and Military Activities Aviation and Air Traffic and Radar Systems	
BOEM-2023-0011-0062-0014	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 and 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 delays with planned activities.	The request for access to detailed construction plans is noted; BOEM would work with USCG and other cooperating agencies accordingly.
BOEM-2023-0011-0062-0015	The USCG does not oppose Alternative D - Nantucket Shoals. Although the intent is primarily to address potential impacts on protected species in the northeastern portion of the Project, eliminating up to six turbines could reduce the impact on navigation safety and USCG missions with proper lighting and marking.	BOEM acknowledges that USCG does not oppose Alternative D. Draft EIS Section 3.6.6.7 analyzes the impacts of Alternative D on navigation and vessel traffic and acknowledges that this alternative would incrementally decrease impacts on the resource.
BOEM-2023-0011-0062-0016	Alternative E - Foundation Structures and Alternative F - Muskegat Channel Cable Modification do not impact USCG authority and therefore the agency has no comment on the proposed actions.	Comment acknowledged.
BOEM-2023-0011-0062-0017	The USCG does not oppose the Proposed Action Alternative noting the Project would maintain an east west and north-south 1 x 1 nautical mile spacing between wind turbines and alignment with proposed adjacent wind farms. As concluded in the USCG's MA/RI Port Access Route Study a key means to mitigate adverse impacts to Navigation Vessel Traffic and USCG missions is for each wind farm across the entire MA/RI WEA to be organized in straight rows and columns creating a grid pattern consisting of at least three lines orientation. Common turbine spacing and layout help facilitate navigation safety consistent and continuous marking and lighting search and rescue and other uses such as commercial and recreational fishing.	Comment acknowledged.

N.4.1.4 U.S. Army Corps of Engineers

Table N.4.1-4. Responses to comments from U.S. Army Corps of Engineers (BOEM-2023-0011-0184)

Comment No.	Comment	Response
BOEM-2023-0011-0184-0001	The wetland impact amounts listed in the narrative and in the table do not match what is in Appendix F nor what is in the USACE public notice. In a meeting with SouthCoast Wind today the applicant stated that the numbers in the DEIS might no longer be accurate. USACE would like to set up a working group with BOEM and the applicant to go through the wetlands (and waters) impacts together to make sure they are accurate. USACE may need to do an updated public notice.	Pending information from SouthCoast Wind on EIS Appendix F, *Analysis of Alternatives to Inform the USACE's 404(b)(1) Alternatives Analysis*.
BOEM-2023-0011-0184-0002	Page 3.5.8-6:Text: "Wetlands have very specific water elevation tolerances and if water is not deep enough it is no longer a wetland." Comment: This is true but it is in a paragraph talking about wetlands becoming excessively inundated and being converted to open water. Suggest removal.	Final EIS Section 3.5.8 has been revised and this sentence has been deleted.
BOEM-2023-0011-0184-0003	Page 3.5.8-8:Text: "If impacts would not be avoided or minimized mitigation would be anticipated for projects to compensate for lost wetlands. Overall impacts from land disturbance on wetlands are anticipated to be moderate." Comment: Change "would" to "could".	Final EIS Section 3.5.8 has been revised and this edit has been made.
BOEM-2023-0011-0184-0004	Page 3.5.8-10:Text: "One isolated open water area is located in the Lawrence Lynch onshore substation site for Falmouth; this open water area would not be considered wetland due to lack of vegetation." Comment: Suggest not mentioning this waterbody as none of the other waters impacts from the project are mentioned nor are they listed in table 3.5.8-3.	Final EIS Section 3.5.8 has been revised and reference to this feature removed.
BOEM-2023-0011-0184-0005	Text: "As shown in Table 3.5.8-3 and Figure 3.5.8-2 Route Option 2a would result in the greatest amount of wetland impact (2.48 acres) followed by Route Option 2b and Route Option 3 (both 0.34 acre) with Route Option 1 having the least impact (0.15 acre). In addition, 2.1 acres of wetland impact would be avoided along Route Option 2a by using HDD and	Text has been clarified in Final EIS Section 3.5.8 to state that the acreages were calculated showing impacts assuming the use of HDD and the additional numbers about avoidance using HDD was to provide additional context. The numbers in the Draft EIS are correct.

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	0.1 acre of wetland would be avoided along Route Option 1 and Route Option 3 by using HDD. Approximately 0.3 acre of wetland would be avoided along Route Option 2b by using HDD. No permanent (e.g. permanent fill) or long-term wetland impacts are anticipated on affected wetlands on Aquidneck Island." Comment: If HDD is definitely going to be used which the applicant has indicated then shouldn't the wetland impacts in Table 3.5.8-3 for the Aquidneck Island routes be adjusted down to the lower numbers?	
BOEM-2023-0011-0184-0006	Table 3.5.8-3 Footnote b:Text: "Mayflower Wind could use one of the three route options with the Landing to Options Split segment common to all three. In addition any wetland area along the cable corridor after the cable enters the HDD site is not considered an impact because the cable would be installed underneath any wetlands that may be along the cable corridor."Comment: Based on this footnote the wetland impacts for the Aquidneck Island options should be lowered so that they reflect the wetland impacts with HDD being used.	Pending information from SCW on EIS Appendix F, *Analysis of Alternatives to Inform the USACE's 404(b)(1) Alternatives Analysis*.
BOEM-2023-0011-0184-0007	Figure 3.5.8-2:Suggest having applicant adjust the map to show where HDD will occur so you can put in the lower wetland impact numbers.	Pending information from SCW on EIS Appendix F, *Analysis of Alternatives to Inform the USACE's 404(b)(1) Alternatives Analysis*.
BOEM-2023-0011-0184-0008	Page 3.5.8-14:Text: "The types of impacts under Alternative C-1 and Alternative C-2 would be similar to those described for the Proposed Action but slightly greater due to the larger area of land disturbance. Alternative C-1 east variant and C-1 west variant could each result in an additional 1 acre of wetland impact compared to the Proposed Action. Alternative C-2 which does not go through Aquidneck Island would potentially result in 0.24 acre of wetland impact which would be slightly less than the Proposed Action for Route Option 2a Route Option 2b and Route Option 3 but a slightly greater wetland impact than the Proposed Action for Route Option 1 (Table 3.5.8-3). These impact estimates are based on wetland mapping within the onshore export cable corridor (using a 40-foot-wide corridor) and includes some small area (<0.1 acre	Pending information from SCW on EIS Appendix F, *Analysis of Alternatives to Inform the USACE's 404(b)(1) Alternatives Analysis*.

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	total) of forested/shrub wetland impacts along Alternative C-1 west variant and Alternative C-2 which would be considered a long-term impact if the wetlands needed to be cleared."Comment: The additional wetland impacts listed here for the C-1 alternatives (1 acre) and the C-2 alternative (0.24 acre) do not match up with the information in Table F-2 for those alternatives. We need a meeting with BOEM USACE and the applicant to make sure these numbers are clarified and accurate.	
BOEM-2023-0011-0184-0009	Appendix F: USACE 404(b)(1) Analysis Overall comments:• The wetlands and waters impact amounts in the tables do not match what is Chapter 3.5.8 of the DEIS nor what is in the USACE public notice. In a meeting with SouthCoast Wind today the applicant stated that some of the numbers in the DEIS might no longer be accurate. USACE would like to set up a working group with BOEM and the applicant to go through the wetlands and waters impacts together to make sure they are accurate as USACE may need to do an updated public notice.	Chapter 3.5.8, *Wetlands*, of the FEIS was revised to match Appendix F, Analysis of Alternatives *to Inform the USACE's 404(b)(1) Alternatives Analysis*.
BOEM-2023-0011-0184-0009	Appendix F: USACE 404(b)(1) Analysis Overall comments:• The wetlands and waters impact amounts in the tables do not match what is Chapter 3.5.8 of the DEIS nor what is in the USACE public notice. In a meeting with SouthCoast Wind today the applicant stated that some of the numbers in the DEIS might no longer be accurate. USACE would like to set up a working group with BOEM and the applicant to go through the wetlands and waters impacts together to make sure they are accurate as USACE may need to do an updated public notice.	Chapter 3.5.8, *Wetlands*, of the FEIS was revised to match Appendix F, Analysis of Alternatives *to Inform the USACE's 404(b)(1) Alternatives Analysis*.
BOEM-2023-0011-0184-0010	There needs to be a figure showing all of the Falmouth alternatives considered and a figure showing all of the Brayton Point alternatives considered.	Appendix F has been updated to depict all alternatives for Falmouth and Brayton Point ECCs (Figures F-1, F-2, F-3, and F-4).
BOEM-2023-0011-0184-0011	We may need to break out the alternatives differently. The Brayton Point ones are a bit confusing.	Appendix F has been revised per USACE's requested edits.

Comment No.	Comment	Response
BOEM-2023-0011-0184-0012	Parts of the analysis are currently written from the applicant's perspective. In order for USACE to use it to complete the 404(b)(1) analysis it needs to be written from USACE's perspective.	Appendix F has been revised per USACE's requested edits.
BOEM-2023-0011-0184-0013	This is currently written as if the proposed action will be chosen in the FEIS. If one of the habitat minimization alternatives is deemed the LEDPA/chosen alternative then this would change.	Appendix F has been revised per USACE's requested edits.
BOEM-2023-0011-0184-0014	Page F-2:Text: "This route would be 309,028 linear feet and there are no anticipated impacts on tidal waters non-tidal waters wetlands or other protected resource areas anticipated (Table F-1)."Comment: This is inaccurate and needs to be changed. I think we discussed this during the preliminary DEIS review but it was too late to get it into the DEIS. Need to count impacts in tidal waters from HDD pits cable protection disposal from sand wave dredging etc. Text: "This route would be 301027 linear feet and there are no impacts on tidal waters non-tidal waters wetlands or other protected resource areas anticipated (Table F-1)."Comment: Same as above. Page F-3:Text: "This route would be 308338 linear feet and there are no impacts on tidal waters non-tidal waters wetlands or other protected resource areas anticipated (Table F-1)."Comment: Same as above. Text: "This route would be 321925 linear feet and there are no impacts on tidal waters non-tidal waters wetlands or other protected resource areas anticipated (Table F-1)."Comment: Same as above.	Text has been revised.
BOEM-2023-0011-0184-0015	Text: "The preferred landfall would have no impacts on tidal waters. Due to HDD drilling activities there is 0.22 acre of anticipated wetland impacts. There are no anticipated impacts on non-tidal waters or other special aquatic sites. "Comment: There are impacts on tidal waters from the HDD pits. Not sure where the 0.22 acre of estimated wetland impact from HDD drilling is coming from? This wetland impact	This text and Table F-1 have been revised to remove this impact estimate to wetlands as USACE would not consider the coastal beach habitat a wetland.

Comment No.	Comment	Response
	was not listed in Table 3.5.8-3 in the Wetlands section of the main body of the DEIS.	
BOEM-2023-0011-0184-0016	Page F-4:Text: “The Central Park landing and onshore cable route to the substation would have no impacts on tidal waters non-tidal waters wetlands or other special aquatic sites (Table F-1).”Comment: This is inaccurate and needs to be changed. I think we discussed this during the preliminary DEIS review but it was too late to get it into the DEIS. Need to count impacts in tidal waters from HDD pits cable protection disposal from sand wave dredging etc.	Text has been revised.
BOEM-2023-0011-0184-0017	Text: “Mayflower Wind will utilize HDD for the sea-to-shore transition of export cables between the ocean and the land; therefore there are no anticipated impacts to tidal waters. Due to HDD drilling activities there is 0.26 acre of anticipated wetland impacts. There is 0.01 acre of potential impacts on non-tidal waters due to a small stream crossing. There are no anticipated impacts on other special aquatic sites.”Comment: There are impacts to tidal waters because of cable protection etc. within state waters associated with the export cables. Not sure why the HDD drilling would cause wetland impacts? This is not reflected in Chapter 3.5.8 of the DEIS.	Chapter 3.5.8, *Wetlands*, of the FEIS was revised to match Appendix F, Analysis of Alternatives *to Inform the USACE’s 404(b)(1) Alternatives Analysis*.
BOEM-2023-0011-0184-0018	Page F-6:Table F-1 needs to be updated to reflect tidal waters impacts. Need to double check on impact numbers so that the table in Chapter 3.5.8 this table and the USACE PN show the same amount of impacts. USACE would like to to set up a working group with BOEM and the applicant on this.	Chapter 3.5.8, *Wetlands*, of the FEIS was revised to match Appendix F, Analysis of Alternatives *to Inform the USACE’s 404(b)(1) Alternatives Analysis*.
BOEM-2023-0011-0184-0019	Page F-7:Text: “Proposed Action over Aquidneck Island via the Lee River (Western Route) with Point of Interest at Brayton Point with Portsmouth Route Options 1 2 2B and 3”Comment: Should “Interest” be “Intersection”? This also occurs on page F-8 to F- 15	Change made to POI.
BOEM-2023-0011-0184-0020	Route Option 1 Text: “Because the route in its entirety would be HDD there are no impacts on tidal waters non-tidal waters wetlands or other protected resource areas anticipated (Table	Appendix F has been revised per USACE’s requested edits.

Comment No.	Comment	Response
	F-2).”Comment: This doesn’t appear to match up with the impacts from other sources. USACE suggests forming a working group with BOEM and SouthCoast to iron these things out. This same occurrence is found on future pages of Appendix F when mentioning Route Option 1.	
BOEM-2023-0011-0184-0021	Route Option 2 Text: “There is 0.07 acre of impact anticipated due to a stream crossing along the route. There are also 1.12 acres of fill in wetlands anticipated due to construction and HDD activities through the Aquidneck Land Trust. There are no other anticipated impacts on protected resources. See Table F-2 for an impact summary. ”Comment: This doesn’t appear to match up with the impacts from other sources. USACE suggests forming a working group with BOEM and SouthCoast to iron these things out. This same occurrence is found on future pages of Appendix F when mentioning Route Option 2.	Appendix F has been revised per USACE’s requested edits.
BOEM-2023-0011-0184-0022	Route Option 2B Text: “There is 0.07 acre of impacts anticipated due to a stream crossing along the route. There is also 0.03 acre of fill in wetlands anticipated due to construction and HDD activities on the Roger Williams University property. There are no other anticipated impacts on protected resources. See Table F-2 for an impact summary. ”Comment: This doesn’t appear to match up with the impacts from other sources. USACE suggests forming a working group with BOEM and SouthCoast to iron these things out. This same occurrence is found on future pages of Appendix F when mentioning Route Option 2B.	Appendix F has been revised per USACE’s requested edits.
BOEM-2023-0011-0184-0023	Page F-8:Route Option 3 Text: “There is 0.07 acre of impacts anticipated due to a stream crossing along the route. There is also 0.03 acre of fill in wetlands anticipated due to construction and HDD activities on the Montaup Country Club property. There are no other anticipated impacts on protected resources. ”Comment: This doesn’t appear to match up with the impacts from other sources. USACE suggests forming a working group with BOEM and SouthCoast	Appendix F has been revised per USACE’s requested edits.

Comment No.	Comment	Response
	to iron these things out. This same occurrence is found on future pages of Appendix F when mentioning Route Option 3.	
BOEM-2023-0011-0184-0024	Page F-10:Text: “Mayflower Wind does not prefer this route due to the additional length and impacts on sensitive environmental resources. ”Comment: Analysis should not be from applicant’s point of view as this is a USACE analysis. Change to: “This route was not chosen due to the additional length and impacts on sensitive environmental resources.” This happens similarly on pages F- 11 F-12 F-14 and F-15 and should be changed.	Appendix F has been revised per USACE’s requested edits.
BOEM-2023-0011-0184-0025	Page F-14 and F-15:When talking about the issues with Habitat Alternative C-2 wording should be inserted about the route needing to cross the Fall River Harbor FNP three times and the logistical and permitting challenges this would pose.	Appendix F has been revised per USACE’s requested edits.

N.4.2 Cooperating State Agencies

N.4.2.1 The Massachusetts Office of Coastal Zone Management

Table N.4.2-1. Responses to comments from the Massachusetts Office of Coastal Zone Management (BOEM-2023-0011-0070)

Comment No.	Comment	Response
BOEM-2023-0011-0070-0006	The FEIS should include a calculation of equivalent adult losses of commercially important finfish species expected from this unavoidable entrainment. To ensure that these losses are and remain small through the operational lifetime of the project a monitoring plan should be developed and described in the FEIS. This should include a description of regular operational procedures to inspect the cooling water intake system its screens and other entrainment prevention apparatus and remediation measures that will be taken if intake velocity is found to be in excess of 0.5 fps or if impacts to target species are observed.	Entrainment estimates from the operation of an HVDC converter station presented in the EIS were based on calculations done in the NPDES permit application. The ichthyoplankton data used for the NPDES permitting process made use of available NOAA plankton survey data within a 10-mile (16-kilometer) radius of the potential converter station location in the Lease Area. Plankton survey data were taken from various depths, whereas the CWIS intake will withdraw water from a discrete depth in the water column: 81 feet (24.7 meters) above the seafloor and 74 feet (22.6 meters) below the surface. This would result in an overestimation of plankton entrainment estimates, as

Comment No.	Comment	Response
		individuals settling in demersal habitats or floating on the surface may not be susceptible to the CWIS intake flow. Based on CWIS design parameters outlined in the NPDES permit application Section 6.2, the calculated intake velocity is 0.458 feet/second, which is within the USEPA's 0.5 foot/second velocity requirement. Several design features such as single pump operation, circulating pumps with variable frequency drives, and the depth of withdrawal will be used to reduce mortality associated with entrainment. The NPDES permitting process is still underway, and a commitment to develop an impingement/entrainment monitoring plan for larvae of commercial fish species or other ichthyoplankton has not yet been determined.
BOEM-2023-0011-0070-0008	CZM is supportive of the enhanced mitigation area in the northeast portion of the lease that would impose additional mitigation measures to protect habitat in and adjacent to the highly productive Nantucket Shoals. As this area is a core habitat for NARW enhanced mitigation measures include longer time-of-year restrictions on pile-driving (November 1-May 31) and enhanced (e.g. 24- hr real-time) monitoring for pile-driving shutdowns and vessel-strike avoidance measures. As this is also an area of high productivity that supports commercially important fish species (and other consumers of zooplankton including NARW) other enhanced mitigation measures include limiting benthic disturbance area by requiring pile-driven foundations and limiting zooplankton entrainment by requiring open-loop cooling facilities be located outside of the enhanced mitigation area.	BOEM acknowledges the Massachusetts Office of Coastal Zone Management's support of the enhanced mitigation area.
BOEM-2023-0011-0070-0009	CZM is supportive of the mitigation measures described in Appendix G of the DEIS and recommends all measures be required in the ROD. As construction plans are finalized SCW should pursue the best available NAS technology including single or double bubble curtains or other technologies to minimize impacts on sensitive marine species. SCW should	BOEM acknowledges the Massachusetts Office of Coastal Zone Management's support of the mitigation measures proposed in Appendix G. As described in Attachment G-1, SouthCoast Wind is considering the use of various noise-attenuation measures, including single and double bubble curtains.

Comment No.	Comment	Response
	also assess the use of NAS during the controlled detonation of unexploded ordnance.	
BOEM-2023-0011-0070-0010	The DEIS and COP refer to several monitoring plans that will be (or may be) required during the permitting process. However only the Marine Mammal and Sea Turtle Monitoring and Mitigation plan was included as part of the COP and available for review. For the FEIS BOEM and SCW should make available all relevant monitoring plans so that CZM and other agencies can ensure monitoring efforts are sufficient to assess environmental impacts during all phases of the project. Specifically the FEIS should add at minimum a benthic habitat monitoring plan, a fisheries monitoring plan, plans to monitor piping plovers and other sensitive avian species, a plan to report boulder relocations, and a plan to ensure cables remain buried at the target depth.	SouthCoast Wind's Draft Post-Construction Avian and Bat Monitoring Framework has been included as Attachment G-2 in Appendix G of the Final EIS. SouthCoast Wind's Boulder Relocation Plan is still in development and is not available to be included in the Final EIS. The Benthic Habitat Monitoring Plan has been developed and will included in Appendix G of the Final EIS. SouthCoast Wind has developed a Rhode Island Fisheries Monitoring Plan, which has been submitted to the Rhode Island Department of Environmental Management (RIDEM) as part of SouthCoast Wind's Water Quality Certificate application. A Fisheries Monitoring Plan for Massachusetts and federal waters is included in Appendix G of the Final EIS. SouthCoast Wind's Boulder Relocation Plan is still in development and is not available to be included in the Final EIS. The final target burial depth(s) of the cables will be within the ranges presented (between 3.2 feet [1.0 meter] and 8.2 feet [2.5 meters] for interarray cables; between 3.2 feet [1.0 meter] and 13.1 feet [4.0 meters] for export cables). The Cable Burial Risk Assessment study to date has confirmed that this burial depth range is suitable for the Lease Area and both ECCs.
BOEM-2023-0011-0070-0011	As monitoring plans are developed, the proponents should continue to work with ROSA RWSC and other research groups and offshore wind developers to coordinate reporting of data generated. In particular SCW 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	BOEM acknowledges the Massachusetts Office of Coastal Zone Management's comment on data coordination and data sharing. This request has been shared with SouthCoast Wind. Regarding adaptive mitigation for bats and avifauna, SouthCoast Wind's Draft Post-Construction Avian and Bat Monitoring Framework has been included as Final EIS Appendix G, Attachment G-2. The monitoring framework includes approaches for adaptive monitoring. In addition,

Comment No.	Comment	Response
	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. CZM is supportive of the use of adaptive mitigation plans for bats and avifauna.	BOEM is proposing adaptive mitigation measure BRT-1 (Appendix G, Table G-2), which would require SouthCoast Wind to make recommendations for new mitigation measures or monitoring methods if bird and bat impacts deviate substantially from the impact analysis included in the EIS.
BOEM-2023-0011-0070-0012	As the lead agency for the administration of the Massachusetts Ocean Management Plan (OMP) and it's implementing regulations (301 CMR 28) CZM's review of filings in state waters includes the proposed project's conformance with the plan's siting and performance standards in the ocean planning area. Under the OMP the siting standard for a cable infrastructure project requires the proponent to demonstrate that no less environmentally damaging alternative is practicable or that the project will cause no significant alteration of Special Sensitive or Unique (SSU) resources. Cable projects in the planning area must avoid certain SSU areas including the North Atlantic right whale core habitat areas of hard/complex seafloor intertidal flats and eelgrass. The performance standard in the OMP requires that the proponent demonstrate that the public benefits of the project outweigh the potential detriments posed by impacts to SSU resources that all practicable steps have been taken to avoid damage to the SSU resources and that there will be no significant alteration of the SSU resource values or interests. For the proposed SCW project potentially impacted SSU resources include areas of eelgrass and hard/complex seafloor particularly in the Muskeget Channel close to Martha's Vineyard and off Falmouth within the Falmouth ECC. Areas of hard/complex seafloor are defined as 1) areas of exposed bedrock or concentrations of boulder cobble or other similar hard bottom distinguished from surrounding unconsolidated sediments; 2) a morphologically rugged seafloor characterized by high variability in bathymetric aspect and gradient; or 3) man-made structures such as artificial reefs wrecks or other functionally equivalent	The comment (from the Massachusetts Office of Coastal Zone Management) refers to its requirement and process for a Coastal Zone Management Act consistency determination. This determination is separate from the NEPA process and will entail further coordination between the Project developer and the state. The developer has applied to the Massachusetts Office of Coastal Zone Management to initiate the consistency determination process. Please refer to Appendix A of the EIS and COP Volume 1 for more information on this permitting requirement. The EIS includes analysis of coastal impacts throughout subsections of Chapter 3.

Comment No.	Comment	Response
	structures that provide additional suitable substrate for the development of hard bottom biological communities. Maps of hard/complex seafloor were developed for the OMP 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. SCW should consult with CZM regarding the conformance of the project with the siting and performance standards of the OMP.	
BOEM-2023-0011-0070-0013	Although not within the OMP Planning area the SCW lease area overlaps the NARW core habitat at its northeastern corner. Considering this as discussed above CZM supports 1) removing from consideration 6 WTG positions close to the Nantucket shoals as described for Alternative D and 2) applying enhanced mitigation measures in the northeast portion of the lease as described in Appendix G.	Comment acknowledged.
BOEM-2023-0011-0070-0014	This project plans to use DC cables for Brayton Point and may also use DC cables for Falmouth as described in Alternative F. While the safety of DC cables for human health and marine species is established they are likely not equivalent to AC cables in their environmental impact especially with respect to commercial fish species because DC cables create magnetic fields (MFs) that are static rather than alternating at 60 Hz like AC cables. The Earth's MF is static so animals attuned to using the Earth's MF to navigate will also be able to detect the static MFs created by DC cables while MFs from AC cables are largely undetectable or unremarkable to them. The magnitude of the MFs above buried DC cables can meet or exceed the magnitude of the Earth's MF creating the possibility for confusion for magneto-sensitive species during migration or other activities. Therefore statements in Table 2.4; column "Alternative F"; row "3.5.5 Finfish Invertebrates and Essential Fish Habitat" and rows "3.5.6 Marine Mammals"	Final EIS Section 3.5.5.5 (Proposed Action) and Section 3.5.5.9 (Alternative F) have been revised with additional discussion and references to studies regarding the differences in AC and DC cable EMFs and their effects on finfish and invertebrates. For example, Wyman et al. (2018) studied the impact that a DC cable had on migrating juvenile salmonids. The cable under study in Wyman et al. (2018) is applicable to the cable used for Southcoast Wind, with an achieved burial depth of ~6 feet (~2 meters), and the cable studied was DC, however with less load than the proposed cables for Southcoast Wind 200 kv versus 320 kv. While cables did appear to affect juvenile salmonid migration, these effects were minor and did not greatly reduce the ability of Juvenile salmonids to migrate along the cable route out into the Pacific Ocean. Other environmental factors further confound the ability to accurately predict the impact the cable had on migrating smolt, such as discharge,

Comment No.	Comment	Response
	and "3.5.7 Sea Turtles" and elsewhere in the DEIS which state EMF effects would be reduced compared to the Proposed Action are not correct. The nature of the MF impact of five AC vs three DC cables cannot be compared directly; five cables having little or no effect on magneto-sensitive species would be replaced by three that potentially do. The effects of DC cables on fishes at the population level are not well understood yet however there is sufficient evidence to indicate they cannot be assumed to be equal to the negligible effects of AC cables.	temperature, depth, and release location of tagged salmonids. Salmonids showed an attraction to the cable in all array locations, but this did not lead to an overall decrease in the ability of salmonids to migrate to the open ocean, compared to the two previous years when the cable was inactive.
BOEM-2023-0011-0070-0015	Appendix P2 of the COP addresses the EMF exposure from DC cables and acknowledges the difference in impacts associated with AC and DC cables. Notably BOEM commissioned a report in 2019 about the effects of EMF from offshore wind cables on commercial fish species. The conclusion of this report cited in Appendix P2 was that EMF was not likely to be harmful but a great many of the findings of no harm in this report hinged on the fact that as of 2019 nearly all offshore wind was using AC. This report concludes that AC undersea cables have negligible harm to commercially important species; this report did not adequately address the question of DC undersea cable impact and should not be cited in Appendix P2 as showing evidence of no harm from DC cables. BOEM should consider commissioning a report or an addendum to the 2019 report that addresses DC EMF effects since HVDC cables are expected to become more common especially as floating wind and other technological advancements allow offshore wind development further from shore.	Appendix P2 is part of the COP that was prepared by SouthCoast Wind. In the Final EIS, BOEM revised Section 3.5.5.5 (Proposed Action) and Section 3.5.5.9 (Alternative F) with additional discussion and references to studies regarding the differences in AC and DC cable EMFs and their effects on finfish and invertebrates. Refer also to response to comment BOEM-2023-0011-0070-0014. The EMF subsection of Section 3.5.5.3 introduces known impacts of DC cables from studies funded by BOEM (e.g., Hutchison et al. 2018) while the EMF subsection in Section 3.5.5.5 has been revised to include more information on the effects of DC cables on fish and invertebrates from recent studies.
BOEM-2023-0011-0070-0016	The FEIS should detail how SCW intends to monitor to minimize impacts from the entrainment of zooplankton (eggs and larval organisms) in the HVDC converter station cooling system(s). Due to the distance from the Lease area to the Points of Interconnection onshore SCW is proposing to transmit power via DC cables to Brayton Point and possibly to Falmouth as well. Transmission via HVDC requires the	Entrainment estimates from the operation of an HVDC converter station presented in the EIS were based on calculations done in the NPDES permit application. The ichthyoplankton data used for the NPDES permitting process made use of available NOAA plankton survey data within a 10-mile (16-kilometer) radius of the potential converter station location in the Lease Area. Plankton survey data was

Comment No.	Comment	Response
	construction and operation of a converter station within the lease area. The DEIS identifies that up to 10 million gallons per day of seawater would be withdrawn from the lease area to cool the converter station. The DEIS further describes how the intake velocity for the seawater cooling system will be kept below 0.5 feet per second (fps) to avoid impingement of juvenile and adult fish. However low flow rates do not avoid entrainment and mortality of eggs and larvae in the cooling system since these planktonic life stages cannot swim away. The DEIS lists the species with the highest expected larval entrainment and classifies the overall impact as long-term and moderate for finfish and invertebrates and long-term and minor for benthic resources and marine mammals.	taken from various depths, whereas the CWIS intake would withdraw water from a discrete depth in the water column: 81 feet (24.7 meters) above the seafloor and 74 feet (22.6 meters) below the surface. This would result in an overestimation of plankton entrainment estimates, as individuals settling in demersal habitats or floating on the surface may not be susceptible to the CWIS intake flow. Based on CWIS design parameters outlined in the NPDES permit application Section 6.2, the calculated intake velocity is 0.458 foot/second which is within the USEPA's 0.5 foot/second velocity requirement. Several design features such as single pump operation, circulating pumps with variable frequency drives, and the depth of withdrawal will be used to reduce mortality associated with entrainment. The NPDES permitting process is still underway, and a commitment to develop an impingement / entrainment monitoring plan for zooplankton has not yet been determined.

N.5 Responses to Lessee Comments on the Draft EIS

Table N.4.2-1. Responses to comments from the SouthCoast Wind Energy LLC (BOEM-2023-0011-0139)

Comment No.	Comment	Response
BOEM-2023-0011-0139-0009	Alternative C-1 presents a series of technical financial and legal challenges to the SouthCoast Wind Project. The route presented in Alternative C-1 would make landfall at a dynamic beach system with mobile sediments surrounded by wetlands parks and natural heritage areas. The Second Beach landfall site and routing from the landfall abuts the Norman Bird Sanctuary a 325-acre bird sanctuary nature preserve environmental education center and museum. To the east is Sachuest Point National Wildlife Refuge another nature preserve occupying 242 acres which serves as an important stopover and wintering area for migratory birds as well as a	

Comment No.	Comment	Response
	popular tourist destination for more than 65000 annual visitors. To the west is Newport a popular year-round tourist destination and a designated Rhode Island historic district. As BOEM correctly states in the DEIS the Alternative C-1 route would require export cable installation along predominately local two-lane roads without paved shoulders to get to Route 138 in Portsmouth RI. Once on Route 138 the onshore cable route would need to be installed along a four-lane road without paved shoulders which is abutted by commercial properties and residences. The roads are frequently abutted by old stone walls large trees with canopies overhanging the road and overhead utility poles and they pass through multiple residential areas. In a memo that was submitted to BOEM on September 28 2022 the Public Archaeology Laboratory Inc. (PAL) summarized the results of a cultural resource due diligence assessment that determined that a total of 71 cultural resources were identified within the Alternative C-1 proposed area of potential effect (PAPE); consisting of 15 aboveground resources (6 that are listed on the National Register) 6 historical cemeteries and 50 archaeological resources. Additional sensitive receptors abut the routes associated with Alternative C-1 including High Value / High Vulnerability Habitat and Natural Heritage Areas 216 and 209 according to RIDEM and Rhode Island Geographic Information System (RIGIS) wetlands parks reserves emergency and rescue service facilities churches schools and government facilities.	
BOEM-2023-0011-0139-0010	As previously stated Alternative C-1 would increase the total onshore export cable route by 9 miles (14 km). Limiting the onshore routing to a minimal distance is preferred as underground construction within public roadways can be disruptive and time consuming and underground construction and materials are very costly. Alternative C-1 would require a longer construction schedule due to the complexity of working in developed areas with local abutters traffic and existing infrastructure to navigate. The estimated	Please refer to response to comment BOEM-2023-0011-0139-0009.

Comment No.	Comment	Response
	rate of installation for the onshore export cable duct bank is approximately 50 - 100 ft per day depending on the number of active crews available workspace and the extent of existing underground utility congestion. Offshore cable installation would progress substantially faster at a rate of up to 1 mile per day for installation of one cable bundle under typical conditions. Additionally the multiple landowners along the route would create a legal patchwork with dozens of single points of failure that would create high risk and likely render the Project not investible. Alternative C-1 passes through coastal communities that are popular tourist destinations particularly in the summer months. Constructing exclusively in the off-season (Labor Day to Memorial Day) could be a requirement of any community agreement. In-water construction will also have seasonal construction limitations due to use conflicts and environmental considerations but because of the quicker progression of cable installation in water multiple construction seasons are likely not required. The combination of slower rate of progress and seasonal restrictions would result in a significantly longer construction period for onshore cable runs by additional years potentially resulting in increased environmental impacts negatively affecting the host communities and delaying delivery of much-needed renewable energy to the region.	
BOEM-2023-0011-0139-0011	Alternative C-2 presents a list of technical financial and legal challenges to the Project. The technical feasibility of the Alternative C-2 route through Little Compton and Tiverton is even lower than that of Alternative C-1. As BOEM pointed out in the DEIS the proposed landfall area on the ocean facing side of Breakwater Point is constrained with the parking lot separated from water by only a narrow strip of riprap coast. The surface grades may not allow for sufficient HDD burial depth in the approach to the onshore entry pit. Due to proximity to the marina and harbor vessel traffic in this area is expected to be high. After making landfall the onshore	Please refer to response to comment BOEM-2023-0011-0139-0009.

Comment No.	Comment	Response
	route would immediately pass by and temporarily restrict access to the public boat ramp. It also abuts the Haffenreffer Wildlife refuge which is a destination for birding. The onshore route would travel along busy two-lane roads with minimal paved shoulders and would pass a very high prevalence of protected natural historical and agricultural areas. In Tiverton Route 77 passes within 500 feet of Nonquit Pond and through the Tiverton Four Corners Historic District. The memo prepared by PAL which summarized the results of a cultural resource due diligence assessment determined that a total of 66 cultural resources were identified within the Alternative C-2 PAPE; consisting of 15 aboveground resources (4 of which are located on the National Register) 8 historical cemeteries and 43 archaeological resources.	
BOEM-2023-0011-0139-0012	Once on Schooner Drive for the HDD exit into Mount Hope Bay the route would impact the commercial operations of the Boat House Waterfront Dining Restaurant and the residential Village at Mount Hope Bay. Other sensitive receptors that would be impacted by Alternative C-2 include wetlands parks reserves emergency and rescue services facilities churches a yacht club a golf course schools and government facilities. Lastly once the export cables enter into Mount Hope Bay from the HDD area in Tiverton they would be forced to overlap with the U.S. Army Corps of Engineers (USACE) Fall River Harbor Channel Federal Navigation Project. As mentioned above Alternative C-2 would increase the total onshore export cable route by 13 miles (21 kilometers). Similar to Alternative C-1 the combination of slower rate of progress and seasonal restrictions for Alternative C-2 (less technically feasible than Alternative C-1) would result in a significantly longer construction period for onshore cable runs by additional years potentially resulting in increased environmental impacts negatively affecting the host communities and delaying delivery of much-needed renewable energy to the region. Also similar to Alternative C-1 the multiple landowners along the C-2 route would create a	Please refer to response to comment BOEM-2023-0011-0139-0009.

Comment No.	Comment	Response
	legal patchwork with dozens of single points of failure that would create high risk and likely render the Project not investible.	
BOEM-2023-0011-0139-0013	SouthCoast Wind evaluated multiple alternatives for both offshore and onshore components of the Project. Longer onshore crossings of Rhode Island (through Middletown Little Compton and Tiverton) are less feasible due to a variety of engineering construction environmental and other concerns and impacts. Based on the analysis performed SouthCoast Wind undertook a thorough route selection process for both offshore and onshore components of the Project to evaluate the environmental impacts social impacts costs and long-term maintainability to deliver renewable clean energy from the Lease Area to the regional transmission system. SouthCoast Wind determined that Alternative B (Proposed Action) would result in the least impacts to the social and natural environment and would allow for safe practical and long-term cable installation maintenance and operation as compared to both Alternative C-1 and Alternative C-2. The onshore routes of Alternative C-1 and Alternative C-2 would pass through sensitive environmental resources (multiple residential areas cultural resource areas and conservation areas) increase traffic congestion over a greater length of onshore routing and cost significantly more than equivalent distances of offshore cabling. Construction of Alternative B (Proposed Action) will cost-effectively provide access to a major renewable clean energy resource and will not cause unacceptable schedule delays of additional years and harm to the environment compared to Alternative C-1 and Alternative C-2.	Please refer to response to comment BOEM-2023-0011-0139-0009.
BOEM-2023-0011-0139-0014	Under Alternative D SouthCoast Wind would lose six WTGs in the northern portion of the Lease Area. Since SouthCoast Wind with the other MA/RI wind developers have committed to a fixed uniform grid layout across the Lease Area to allow commercial fishing vessels to traverse from their port(s)	BOEM acknowledges SouthCoast Wind's comment that removal of up to six WTG positions under Alternative D would not be recoverable elsewhere.

Comment No.	Comment	Response
	through the lease areas to fishing grounds all in a predictable and safe manner those six WTGs would not be recoverable elsewhere in the Lease Area.	
BOEM-2023-0011-0139-0015	SouthCoast Wind agrees with BOEM's statement in the DEIS that based on best available science there is a lack of conclusive evidence that the removal of the proposed WTGs in the Lease Area would measurably lessen the minor impacts on hydrodynamic features. Nonetheless SouthCoast Wind will continue to work collaboratively with BOEM NMFS and other relevant stakeholders to find ways to reduce potential impacts on NARW and other marine mammals that forage in the waters south of Nantucket Shoals. SouthCoast Wind has committed to additional mitigations measures in the northernmost portion of the Lease Area to reduce potential impacts to the NARW and other marine mammals during construction. SouthCoast Wind has committed to the following mitigation measures regardless of which NEPA Alternative is selected by BOEM: • No pile driving will be conducted within the Lease Area between January 1 - April 30 • Pile driving within the Enhanced Mitigation Area will occur only between June 1 to October 31 when NARW presence is at its lowest [Footnote 4: The Enhanced Mitigation Area as identified by BOEM in the DEIS in Appendix G Figure G-1 includes the first ~23 WTG positions in the northern portion of the Lease Area.] • To minimize potential impacts on zooplankton from impingement and entrainment no open-loop HVDC converter stations will be located within the Enhanced Mitigation Area of the Lease Area • Only monopile or piled jacket foundations will be installed within the Enhanced Mitigation Area which will minimize the overall structure impact on benthic prey species	BOEM acknowledges SouthCoast Wind's comment. These measures are included in Appendix G, Table G-1 and/or Table G-2 of Appendix G and are analyzed in Chapter 3.
BOEM-2023-0011-0139-0017	SouthCoast Wind included the less typically used substructure types of suction bucket jackets and GBS to	BOEM acknowledges SouthCoast Wind's comment regarding foundation selection.

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	ensure permitting was developed in the event there was an opportunity to utilize such foundation types from a technically and commercially beneficial prospective. As it currently stands implementation of suction bucket jackets and GBS foundations would have significantly higher technical risk as well as commercial and schedule impacts to the Project. All foundation types within the SouthCoast Wind PDE could be technically delivered for the Project. Under installation scenarios for suction buckets and GBS foundations however some grid locations would be at a very high risk of being lost due to soil conditions and there would be significant risk to the schedule and overall cost impacts to the Project. It is therefore recommended that the selection of foundation type between monopile piled jacket suction bucket jacket and GBS should be the decision of SouthCoast Wind.	
BOEM-2023-0011-0139-0018	SouthCoast Wind is currently on the fourth consecutive year of geotechnical investigations within the Lease Area to sample and analyze the soil properties at every WTG and OSP location within the 1X1 nm grid layout. The SouthCoast Wind Lease Area has a significant variability in soil properties within the depth of interest for a suction bucket foundation which leads to a highly variable risk of suitability of suction bucket jackets with some sites potentially being favorable while others are incredibly challenging and potentially not possible at all. The jacket lattice structure between a piled jacket and suction bucket jacket is relatively similar above and below water with the fundamental difference occurring at seabed where either piles or suction buckets are utilized. Preliminary design work has shown that the total mass of the suction buckets is between 50 - 100 percent heavier than the alternative required piles. In addition the fabrication complexity of the suction buckets is much greater than piles leading to cost per tonnage of more than double leading to an overall financial difference from the buckets to piles of 3-6 times the cost for supply.	BOEM acknowledges SouthCoast Wind's comment regarding foundation selection.

Comment No.	Comment	Response
BOEM-2023-0011-0139-0022	SouthCoast Wind conducted a market sounding for GBS compared to monopiles and piled jackets. The difference in cost showed up to 70 percent higher than traditional steel foundations. The primary driver of the increase in cost is due to the extensive materials and fabrication cost required to deliver the substructures. Additionally the GBS options also contain a very high-risk profile due to limited experience from fabricators executing such projects. One of the benefits of a GBS solution is the ability to have local fabrication however this comes with critical logistical and environmental challenges that must be addressed. With most typical GBS foundations having an integrated foundation up to interface the total height of such foundation is up to ~80 m. For GBS foundations that are transported by barges this results in only locations without bridge restrictions as being suitable. For ports that have deep channels and no air gap restrictions a significantly large port site is needed to complete the local fabrication. To effectively execute such a project 50 - 100 acres would be required. Combining all three requirements there are significant challenges in securing such a location to execute GBS foundations from. In addition geotechnical variability in the upper soil layers makes several locations unsuitable for GBS foundations. It would require significant dredging and seabed preparation for the GBS to be installed at these locations which would impact benthic habitat.	BOEM acknowledges SouthCoast Wind's comment regarding foundation selection.
BOEM-2023-0011-0139-0023	Under Alternative F only up to three export cables would be allowed in the Falmouth ECC in order to reduce environmental impacts in Muskeget Channel. SouthCoast Wind has assessed the ability to deliver up to 1200 MW of power to the Falmouth POI and would likely be able to do so in less than the required five export cables within the maximum case scenario in the COP PDE. Therefore, SouthCoast Wind is willing to work with BOEM on Alternative F and its implications to the overall Project and associated environmental impacts.	BOEM acknowledges SouthCoast Wind's comment regarding Alternative F.

Comment No.	Comment	Response
BOEM-2023-0011-0139-0037	Additionally with respect to Project's onshore infrastructure shown in mapped areas where environmental justice populations have been identified the EJ Mapper used in the DEIS was subsequently updated in November 2022 by the Massachusetts Executive Office of Energy and Environmental Affairs. The updated EJ Mapper based on the latest data made available by the U.S. Census Bureau shows that the Project mapping has materially changed because Edgartown and Swansea no longer contain any block groups that meet the EJ criteria although they did previously. Accordingly, SouthCoast Wind requests that BOEM reflect these updates in the FEIS.	BOEM has updated the discussion and maps of Massachusetts in Final EIS Section 3.6.4 with the November 2022 Massachusetts Executive Office of Energy and Environmental Affairs data and figures.
BOEM-2023-0011-0139-0039	Page 2-33 within Section 2.2 Table 2-3 states that "neither the Falmouth Tap nor the Brayton Point POIs have the capacity even after planned upgrades to receive all power generated from the Project at a single POI". Please note that new proposals for upgrades to the regional transmission system and normal turnover in the ISO-NE interconnection queue have made it possible for Brayton Point to handle the full generating capacity of the Lease Area as long as the capacity is interconnected in accordance with the ISO-NE "single-source contingency" reliability requirement. ISO-NE enforces this requirement so that the loss of a single piece of equipment does not result in a net loss of more than 1200 MW of energy resources from the regional system.	BOEM acknowledges SouthCoast Wind's comment regarding the ability of the Brayton Point POI to handle the full energy-generating capacity of the Project. Following the release of the Draft EIS, SouthCoast Wind revised its COP to identify Brayton Point as the preferred POI for both Project 1 and Project 2 and Falmouth as the variant POI for Project 2. As stated in the COP, due to uncertainty around ISO-NE grid capacity and the extent and timing of necessary grid upgrades on Cape Cod where the Falmouth POI is located, SouthCoast Wind's preferred POI for both Project 1 and Project 2 is Brayton Point. In the event that technical, logistical, grid interconnection, or other unforeseen challenges arise during the design and engineering phase that prevent Project 2 from making interconnection at Brayton Point, Project 2 will make landfall and interconnect in Falmouth, Massachusetts, under the Falmouth variant scenario. This change is reflected in the Final EIS.
BOEM-2023-0011-0139-0040	Page 2-34 within Section 2.2 Table 2-3 has a footnote stating "To distinguish between the portions of the Project interconnecting at the two POIs which would have different offtake agreements and associated timelines BOEM is using the terms Phase 1 and Phase 2. Phase 1 refers to development of the offshore portion of the Project	The table note under Final EIS Chapter 2, Table 2-3 in Chapter 2 has been removed. BOEM has incorporated a description of Project 1 and Project 2 based on the revised COP in the body of Chapter 2 in Section 2.1.2, which precedes Table 2-3.

Comment No.	Comment	Response
	connecting to the Falmouth POI. Phase 2 refers to development of the offshore portion of the Project connecting to the Brayton Point POI." Please note that as specified in Section 3.2 of the SouthCoast Wind COP Project 1 refers to Project components associated with the Brayton Point POI and will be built first and Project 2 refers to Project components associated with the Falmouth POI and will be built last. Based on this characterization SouthCoast Wind requests that BOEM swap the definition of "Phase 1" and "Phase 2" in the DEIS so Phase 1 aligns with SouthCoast Wind's Project 1 (Brayton Point) and Phase 2 aligns with SouthCoast Wind's Project 2 (Falmouth).	
BOEM-2023-0011-0139-0041	Page 3.4.1-13 within Section 3.4.1.5 Table 3.4.1-4 shows construction emissions starting in 2023. Please note that as shown in SouthCoast Wind indicative construction schedule (Section 3.2 of the COP) construction will commence no earlier than 2024.	The analysis in the Final EIS has been revised to reflect the new construction schedule for the Project based on SouthCoast Wind's revised COP.

N.6 Responses to Other Agency, Stakeholder, and Public Comments on the Draft EIS

N.6.1 Purpose and Need

Table N.6.1-1. Responses to comments on the purpose and need (Draft EIS Chapter 1)

Comment No.	Comment	Response
BOEM-2023-0011-0076-0003	This project has neither purpose or need to combat the climate crisis and will not increase resilience to the impacts of climate change; protect public health; conserve our lands waters and biodiversity or deliver environmental justice. It will in fact do the opposite of those requirements in Executive Order (EO) 14008 Tackling the Climate Crisis at Home and Abroad issued January 27 2021. The shared goals of the federal agencies to deploy 30 gigawatts (GW) of offshore wind energy capacity in the United States by 2030 is incompatible	As stated in Draft EIS Section 1.2, the project purpose is grounded in BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, EO 14008, the shared goals of the federal agencies to deploy 30 gigawatts (GW) of offshore wind energy capacity in the United States by 2030 while protecting biodiversity and promoting ocean co-use, and consideration of the goals of the Project applicant.

Comment No.	Comment	Response
	with protecting biodiversity and promoting ocean co-use and in consideration of the goals of the Applicant the purpose of BOEM's action should be to disapprove Mayflower Wind's COP. This is self evident in the request received by NMFS for authorization under the MMPA to take marine mammals incidental to construction activities related to the Project. This is also problematic because there is no way to prove that the developer is responsible for marine mammal deaths or harm. Until such time as there is to make such a determination no authorization should be allow. As in the current UME blame is shifted because of plausible deniability.	The comment that BOEM should disapprove the Project on the basis of potential take of marine mammals during Project construction is noted. Please refer to Draft EIS Appendix G, which identifies numerous mitigation measures that would avoid/minimize impacts on marine mammals during construction and operation.
BOEM-2023-0011-0088-0004	ISO-New England has said the grid in its current form cannot accept the power that would be generated by all the wind farms planned for the offshore lease areas. Massachusetts Gov. Maura Healey has recognized the haphazard approach of each offshore wind developer targeting their own landfall for onshoring is untenable and has called for a timeout to develop a more coordinated approach with other New England states. The outcome of this work would likely result in significant changes to Mayflower's plans, making the current plans moot. That is if the serious environmental concerns raised above allow any plan at all.	The comment is noted; however, BOEM has received no information from SouthCoast Wind that its proposed POIs, combined, are incapable of receiving the power that would be produced by the Project. However, due to uncertainty around ISO-NE grid capacity and the extent and timing of necessary grid upgrades on Cape Cod where the Falmouth POI is located, SouthCoast Wind revised its COP following the release of the Draft EIS to identify Brayton Point as the preferred POI for both Project 1 and Project 2 and Falmouth as the variant POI for Project 2. In the event that technical, logistical, grid interconnection, or other unforeseen challenges arise during the design and engineering phase that prevent Project 2 from making interconnection at Brayton Point, Project 2 would make landfall and interconnect in Falmouth, Massachusetts, under the Falmouth variant scenario. This change is reflected in the Final EIS. It should also be noted that in August 2023, the Massachusetts Department of Energy Resources and electric distribution companies issued a new request for proposal for 3,600 MW of offshore wind production.
BOEM-2023-0011-0089-0004	Massachusetts Governor Healey recently spoke about the New England grid infrastructure's lack of capacity to accept the proposed generated power as well as the lack of internal	Following the release of the Draft EIS, SouthCoast Wind revised its COP to identify Brayton Point as the preferred POI for both Project 1 and Project 2 and Falmouth as the

Comment No.	Comment	Response
	New England cooperation for transmission and distribution. When we look at the Brayton Point electric plant ability to accept merely one half of the power from one of possibly eight lease generators this is a huge limiting factor. The Brayton Point site choice is the safest appropriately suited site and it can accept one-sixteenth of the generated power. All the remaining landfalls must find suitable sites impacting residential and public spaces. A comprehensive multi –State offshore generator and inshore distribution integration plan needs to exist before any approvals are given	variant POI for Project 2. As stated in the COP, due to uncertainty around ISO-NE grid capacity and the extent and timing of necessary grid upgrades on Cape Cod where the Falmouth POI is located, SouthCoast Wind's preferred POI for both Project 1 and Project 2 is Brayton Point. In the event that technical, logistical, grid interconnection, or other unforeseen challenges arise during the design and engineering phase that prevent Project 2 from making interconnection at Brayton Point, Project 2 would make landfall and interconnect in Falmouth, Massachusetts, under the Falmouth variant scenario. This change is reflected in the Final EIS. Regarding the need for an offshore generator and inshore distribution integration plan, development of such a plan would need to be coordinated amongst state governments and is outside BOEM's purview and jurisdiction. It should also be noted that in August 2023, the Massachusetts Department of Energy Resources and electric distribution companies issued a new request for proposal for 3,600 MW of offshore wind production.
BOEM-2023-0011-0091-0012	This fact is further supported by the ISO-New England Power Grid which has stated recently that the existing grid cannot handle any significant addition of new power from the offshore sources. Therefore, they are holding any further additions in order to properly assess the multi-state regions grid modernization needs etc. Therefore, new wind projects and their elements need to be re-evaluated as to their design. This situation in turn means the basis contained represented and evaluated in this DEIS is will likely be subject to major changes and particularly so for the delineation of the best paths from the ocean windfarm location to the actual grid in its new form.	Please refer to response to comment BOEM-2023-0011-0089-0004.
BOEM-2023-0011-0091-0013	The prior paragraph's statements are emphasized by the recent action by the Governor of Massachusetts to pause and develop a New England statewide approach to new energy	Please refer to response to comment BOEM-2023-0011-0088-0004.

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	sources. She has created a new position in her administration to work with the US DOE and the representatives from other New England States in this effort. All of which indicate changes to the grid system from where it stands today are necessary and unavoidable. Therefore, the BOEM would be acting prematurely to accept and consider the proposed DEIS at this time.	
BOEM-2023-0011-0112-0004	Massachusetts has agreed to purchase a total of 1204 MW from this project through two procurements. However, the lease area could generate a total of 2400 MW and SouthCoast Wind is actively exploring additional offtake opportunities including upcoming state solicitations as well as contracts with private entities (page 1-5). We are concerned that SouthCoast Wind may pursue opportunities for offtake agreements with private entities. It is unclear how this process would differ from the state process and any terms and conditions and mitigation measures that can be required as part of the PPAs. The FEIS should provide more details about these types of contracts.	Prospective private offtake agreements were, as noted, acknowledged in the Draft EIS. Consistent with BOEM Guidance, a PDE concept has been proposed using a "maximum-case scenario." In the event a private or public offtake agreement should require substantial changes to the PDE concept that trigger adverse environmental effects, supplemental environmental review under NEPA could be required. Until any differences are identified, they would be considered speculative.
BOEM-2023-0011-0112-0006	The National Environmental Policy Act requires consideration of a range of alternatives which could meet the defined purpose and need for the action. The purpose and need section of the SouthCoast Wind DEIS (i.e. Section 1.2) is very ambiguous and does not provide clear criteria for determining which specific configurations of the project may meet the purpose and need of the action. Relevant criteria are listed in a subsequent section (i.e. Section 2.2: Alternatives Considered but Not Analyzed in Detail) which is not referenced in Section 1.2. This is confusing for readers of the DEIS and should be corrected in the FEIS.	Draft EIS Section 2.2 identifies the screening criteria that BOEM used in selecting the alternatives to be analyzed in the EIS. These screening criteria are consistent with BOEM's guidance, *Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the National Environmental Policy Act,* published June 22, 2022, and available at: https://www.boem.gov/sites/default/files/documents/renewable-energy/BOEM%20COP%20EIS%20Alternatives-2022-06-22.pdf. These criteria include meeting the purpose and need as identified in Section 1.2. Consistent with BOEM's screening criteria, an alternative would be considered but not analyzed in detail if it would not meet the primary goals of the applicant, including not satisfying existing contractual offtake obligations and not meeting a project's nameplate capacity required to be

Comment No.	Comment	Response
		eligible for future offtake award. Configurations of the Project that meet the purpose and need and the screening criteria have been analyzed as alternatives in the EIS.
BOEM-2023-0011-0112-0007	As we have stated in previous comment letters for other wind projects the implication that BOEM will not consider approval of projects smaller than proposed by the developer or necessary to meet existing procurements is very concerning as it limits BOEM's ability to consider ways to reduce the potential negative impacts including "protecting biodiversity and ocean co-use." The SouthCoast Wind FEIS and future DEIS and FEIS documents for other projects should indicate that "approve with modifications" could mean approving a smaller project than what is proposed in the COP or than would be necessary to meet existing procurements. We also suggest expanding on the terms biodiversity and ocean co-use 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.	BOEM's alternatives screening criteria for COP EISs are outlined in BOEM's *Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the National Environmental Policy Act,* published June 22, 2022, and available at: https://www.boem.gov/sites/default/files/documents/renewable-energy/BOEM%20COP%20EIS%20Alternatives-2022-06-22.pdf. Consistent with BOEM's screening criteria, an alternative would be considered but not analyzed in detail if it would not meet the primary goals of the applicant, including not satisfying existing contractual offtake obligations and not meeting a project's nameplate capacity required to be eligible for future offtake award. BOEM has analyzed several alternatives designed to minimize potential environmental impacts, including Alternative D, which would reduce the number of WTGs SouthCoast Wind could develop. The terms *biodiversity* and *ocean co-use* are used in reference to the Administration's goals for deploying 30 GW of offshore wind and are appropriate as referenced.
BOEM-2023-0011-0117-0002	Statement of Purpose: In the statement of purpose the DEIS justifies the project based on its ability "to address the needs identified by the Massachusetts EDCs for new sources of power generation that are cost-effective and reliable as well as to contribute to the Section 83C offshore wind mandate." Given that Massachusetts has mandated an energy transformation comparing the project to a "no-action" alternative is capricious and invalid.	NEPA analysis requires that an EIS include a no-action or no-build alternative as a basis for comparison with one or more action alternatives. To meet NEPA requirements, the Draft EIS includes a No Action Alternative.
BOEM-2023-0011-0136-0010	BOEM must clarify what is driving the purpose and need for the proposed action and consequently the framing of the NEPA analysis. For the SouthCoast Wind project the DEIS	As stated in Draft EIS Section 1.2, the Project purpose is grounded in BOEM's authority under the OCSLA to authorize renewable energy activities on the OCS, Executive

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	analyzes the entire project area despite the PPAs in place for only part of the anticipated energy offtake. As stated in previous RODA letters the purpose and need of the proposed action should be to fulfill the agency's purpose and need not solely that of a project applicant's objectives - including PPAs. [Footnote 12: RODA comments on Revolution Wind DEIS available at http://rodafisheries.org/wp-content/uploads/2022/11/221017-DEIS_Revolution_Wind.pdf] Yet the DEIS fails to provide a clear justification to develop the full 2400 MW project. [Bold: At a minimum BOEM must provide clear consistent and data-driven rationale for the purpose and need for offshore energy projects.] It is a disservice to the marine environment and industries reliant on the ocean to permit development without addressing this fundamental question. [Footnote 13: Again this reiterates the need for a cumulative and holistic approach to offshore energy development.]	Order 14008, the shared goals of the federal agencies to deploy 30 GW) of offshore wind energy capacity in the United States by 2030 while protecting biodiversity and promoting ocean co-use, and consideration of the goals of the Project applicant. BOEM's action is needed to fulfill its duties under the lease, which require BOEM to make a decision on the lessee's plans to construct and operate commercial-scale offshore wind energy facilities within the Lease Area (the Proposed Action) (30 CFR 585.628). Since the Draft EIS was released, the status of SouthCoast Wind's offtake agreements has changed, as acknowledged in SouthCoast Wind's revised COP and the Final EIS, Chapter 1, *Purpose and Need*. A project is not required to have PPAs established in order for BOEM to proceed with its environmental analysis. BOEM reviewed SouthCoast Wind's COP and determined the information was adequate to evaluate the Project under NEPA.

N.6.2 Proposed Action and Alternatives

Comment No.	Comment	Response
BOEM-2023-0011-0004-0005	The Falmouth Select Board has suggested the wind company find another alternate location to land its cables like the old Pilgrim Nuclear Power Plant.	BOEM considered alternatives to the Proposed Action that were identified through coordination with cooperating and participating agencies and through public comment received during the public scoping period for the EIS. Based on the criteria outlined in Section 2.2, *Alternatives Considered but Not Analyzed in Detail*, the old Pilgrim Nuclear Power Plant was not analyzed as an alternative. Making landfall in Plymouth, Massachusetts would require a longer combined offshore and onshore export cable route and the offshore cables would need to be routed northeast around Cape Cod before crossing through the Cape Cod Ocean Sanctuary and potentially through Stellwagen Bank National Marine Sanctuary to reach landfall. This is a highly sensitive environmental area. Environmental impacts would

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		be increased due to the increased length of the route and the sensitivity of the offshore route. This suggested route would not result in lesser impacts compared to the current proposed Falmouth export cable route. Should these and other proposed alternatives (see other yellow highlights below) also be added to the alternatives considered but dismissed in Table 2-3?
BOEM-2023-0011-0007-0002	Rather than each project laying their own offshore export cable the government should support efforts to lay a central trunk cable that each of the projects could tie into. Under the current cabling setup once all the leased projects become operational there may be close to 10 separate cables in MA waters. That is not efficient poses a cumulative impact on the seafloor and causes continuous disruption over a 10-15 year period.	BOEM considered but did not analyze in detail an alternative for a common cable corridor for nearby offshore wind projects. As further detailed in Chapter 2, Table 2-3, BOEM dismissed this alternative from detailed analysis as it cannot limit a lessee's right to a project easement when a shared cable corridor does not yet exist and there is no way of determining if the use of a future shared cable corridor would be a technically and economically practical and feasible. In addition, BOEM determined it would be impracticable for SouthCoast Wind to share a cable corridor with known corridors of other nearby projects because they would connect to the power grid via different onshore interconnection points. Cumulative impacts from cable installation of the Proposed Action and other offshore wind projects are analyzed in relevant sections of Chapter 3.
BOEM-2023-0011-0025-0002	The push back on this project is due to the onshore site selection for the wind power cables and substation. The site is one of the most heavily used recreational and beach areas in Falmouth and densely populated. I don't understand why the undersea cables cannot continue up Falmouth Harbor or the Cape Cod Canal to a substation resulting in a more efficient and delivery and less construction. Most area residents are in favor of wind and solar power; the request is to consider less disruptive and probably more efficient alternatives to the current site selection.	BOEM considered alternatives to the Proposed Action that were identified through coordination with cooperating and participating agencies and through public comment received during the public scoping period for the EIS. Based on the criteria outlined in Section 2.2, *Alternatives Considered but Not Analyzed in Detail*, the Falmouth Harbor and the Cape Cod Canal were not analyzed as an alternative. Falmouth Harbor is not a feasible alternative because the landfall sites would be space-constrained with the available area for HDD construction. Cape Cod Canal is not considered a feasible alternative from a safety, spatial, and burial risk point of view. The canal is a narrow channel (approximately 480 foot-wide corridor) and

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		would present a spatial constraint for cable installation, maintenance, and repair (if needed). This would introduce additional safety risks during the Project installation, and potential impact to marine navigation during construction.
BOEM-2023-0011-0029-0003	Clean Energy is a worthwhile pursuit but not at any cost. It's clear that Southcoast Wind (AKA Shell Oil which has approximately $400B in assets and $40B in cash) has chosen the lowest cost route that will maximize their return regardless of the impact on the Town of Falmouth and its residents. The health of all the Falmouth residents their children grandchildren and tourists who utilize the beach and park area and the preservation and quiet enjoyment of these recreational areas should be the overriding concerns. I would expect state and town officials who are elected to serve the best interests of their constituents to apply much broader and stricter criteria that would not "roll the dice" on these unfavorable consequences and would require Southcoast Wind to identify a commercial/industrial site like Brayton Point for this industrial size project. I understand the benefits of clean energy and the political momentum behind these efforts but it is critical to do it right and find a more appropriate site to onshore these cables. Let's preserve our current natural resources and green space in the pursuit of clean energy. Given the size of the planned offshore wind farm there should be a more thoughtful approach to the various onshore locations and transmission strategies.	BOEM evaluated and disclosed the impacts of the Falmouth landfall locations on the Town of Falmouth and its residents in various sections of Chapter 3, including Section 3.6.3, *Demographics, Employment, and Economics*, and Section 3.6.5, *Land Use and Coastal Infrastructure*. As described in responses to comments submitted by other commenters, including comments BOEM-2023-0011-0004-0005 and BOEM-2023-0011-0025-0002, BOEM evaluated additional alternative landfall locations suggested by comments on the Draft EIS and dismissed them from consideration as they were not feasible and did not meet BOEM's screening criteria. Following the release of the Draft EIS, SouthCoast Wind revised its COP to identify Brayton Point as the preferred POI for both Project 1 and Project 2 and Falmouth as the variant POI for Project 2. As stated in the COP, due to uncertainty around ISO-NE grid capacity and the extent and timing of necessary grid upgrades on Cape Cod where the Falmouth POI is located, SouthCoast Wind's preferred POI for both Project 1 and Project 2 is Brayton Point. In the event that technical, logistical, grid interconnection, or other unforeseen challenges arise during the design and engineering phase that prevent Project 2 from making interconnection at Brayton Point, Project 2 would make landfall and interconnect in Falmouth, Massachusetts, under the Falmouth variant scenario. This change is reflected in the Final EIS.
BOEM-2023-0011-0033-0001	Southcoast (Mayflower) has submitted a plan to make landfall of high voltage cables from their offshore windfarm through our residential neighborhood. The area is zoned residential and not industrial which their plan indicates based on size and	BOEM evaluated and disclosed the impacts of the Falmouth landfall locations on the Town of Falmouth and its residents in various sections of Chapter 3, including Section 3.6.3, *Demographics, Employment, and Economics*, and Section

Comment No.	Comment	Response
	complexity. Southcoast has gone to the state for exemption of zone laws and even Article 97 of the Massachusetts Constitution without the approval of residents and or Town Meeting. Furthermore Southcoast has been less than open in their communications to residents and our Selectmen. These cables are industrial and not an application through a densely populated residential area. The current plan is to traverse our public parks and ball fields too where children play. There are concerns of safety pollution substation noise and light pollution health related impacts loss of home values and the general right to our peaceful enjoyment. We request the BOEM to have Southcoast find a more reasonable alternatives that use industrial routes versus residential zoned areas for their onboard cables.	3.6.5, *Land Use and Coastal Infrastructure*. Section 3.6.5 acknowledges that SouthCoast Wind is seeking a comprehensive exemption from the operation of the zoning bylaws of the Town of Falmouth. If the SouthCoast Wind COP is approved, BOEM will include a condition that requires the developer to have all state and local permits in place before commencing operations. As described in responses to comments submitted by other commenters, including comments BOEM-2023-0011-0004-0005 and BOEM-2023-0011-0025-0002, BOEM evaluated additional alternative landfall locations suggested by comments on the Draft EIS and dismissed them from consideration as they were not feasible and did not meet BOEM's screening criteria.
BOEM-2023-0011-0034-0001	At the Falmouth Selectboard meeting in December several alternatives were mentioned that the developer has not considered including the existing power plant in Sandwich on the Cape Cod Canal which has new owners interested in working with wind farm companies. The Pilgrim plant and Waquoit Bay were also suggested. The Bay has some interesting potential as cables could follow Rt. 28 and when they are being installed a sewer line could be placed to accommodate the eventual sewer construction to serve impaired bay area. It would be also possible to come ashore near Trunk River and follow the bike path to Jones Road near the Hospital lights.	BOEM considered alternatives to the Proposed Action that were identified through coordination with cooperating and participating agencies and through public comment received during the public scoping period for the EIS. Based on the criteria outlined in Section 2.2, *Alternatives Considered but Not Analyzed in Detail*, the Cape Cod Canal, the Pilgrim plant, Waquoit Bay, and Trunk River were not analyzed as an alternative. Cape Cod Canal and Trunk River landfall locations are not considered a feasible alternative from a safety, spatial, and burial risk point of view. The canal is a narrow channel (approximately 480 foot-wide corridor) and would present a spatial constraint for cable installation, maintenance, and repair (if needed). This would introduce additional safety risks during the Project installation, and potential impact to marine navigation during construction. Making landfall at the Pilgrim plant would require a longer combined offshore and onshore export cable route and the offshore cables would need to be routed northeast around Cape Cod before crossing through the Cape Cod Ocean Sanctuary and potentially through Stellwagen Bank National Marine Sanctuary to reach landfall. This is a highly sensitive

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		environmental area. Environmental impacts would be increased due to the increased length of the route and the sensitivity of the offshore route. This suggested route would not result in lesser impacts compared to the current proposed Falmouth export cable route. Making landfall at Waquoit Bay would require interconnecting at the West Barnstable Substation in Hyannis, Massachusetts, that would be used as the interconnection for the Park City Wind project and the Commonwealth Wind project. Therefore, the POI was eliminated for further consideration.
BOEM-2023-0011-0043-0001	In particular I think the Canal Substation in Sandwich should be considered as an alternative to the Falmouth substation. A 2014 report entitled "Offshore Wind Transmission Study" was commissioned by the Massachusetts Clean Energy Center (www.masscec.com). Its evaluation identifies the Canal Substation as one of three best connection points along the south shore. Brayton Point is another of the three but not the Falmouth substation. I suspect the choice of Falmouth substation was influenced by an initial intention to use HVAC cable. With a change to now use HVDC cable a longer undersea route becomes more viable.A cable from the wind farm to the Canal Substation could take the following possible route. From the wind farm to the mouth of Buzzards Bay the cable would share a corridor with the cable for Brayton Point. The cable would then branch off through the middle of Buzzards Bay to the canal at the head of the bay. At that point one option would be for the cable to leave the seabed and be housed in a covered culvert along the eastern bank of the canal until reaching the Canal Substation. I suspect the BOEM jurisdiction would be mostly restricted to evaluating the tradeoff between having a cable traverse Buzzards Bay instead of passing to the east of Martha's Vineyard. But if the total environmental impact on both land and sea for the two alternative routes were to be compared I believe the route to the Canal Substation would prove to be far preferable.	BOEM considered alternatives to the Proposed Action that were identified through coordination with cooperating and participating agencies and through public comment received during the public scoping period for the EIS. Based on the criteria outlined in Section 2.2, *Alternatives Considered but Not Analyzed in Detail*, the Cape Cod Canal, the Pilgrim plant, Waquoit Bay, and Trunk River were not analyzed as an alternative. The Cape Cod Canal landfall location is not considered a feasible alternative from a safety, spatial, and burial risk point of view. The canal is a narrow channel (approximately 480 foot-wide corridor) and would present a spatial constraint for cable installation, maintenance, and repair (if needed). This would introduce additional safety risks during the Project installation, and potential impact on marine navigation during construction.

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BOEM-2023-0011-0043-0002	I don’t think that delaying the project altogether is warranted. If possible I think it would be a good idea to separate the project into stages. If Stage 1 were to be defined as all of the wind farm plus the route and grid connection at Brayton Point an approval of that would allow SouthCoast Wind to proceed without delaying revenue from the first half of the installation. And work on Stage 1 should allow sufficient time for a Stage 2 further evaluation of alternatives for the second route.	As described in Final EIS, Section 2.1.2, *Alternative B – Proposed Action*, SouthCoast Wind would develop the Project in two parts, referred to as Project 1 and Project 2. SouthCoast Wind proposed developing the entirety of Lease Area (including positions for Project 1 and Project 2) in its COP because the financing strategy depends on using economies of scale for major supplies and services; and the validity and competitiveness of their bid into the New England multi-state solicitation depends on being able to develop two projects. An alternative that only considered the construction and operations of Project 1 would be economically infeasible and equivalent to the No Action Alternative.
BOEM-2023-0011-0053-0001	We at the Town Dock support alternative 1: No Action. While reading through the different alternative’s impacts I noticed that the “No Action” alternative also includes “cumulative impacts of the no action alternative” where it assumes that all other offshore wind farms will be built out. The “No Action” alternative including a cumulative one in all DEIS’s should be a true no action as in no offshore wind construction is approved and carried out and construction is compared to the current non-developed state.	Under the No Action Alternative, BOEM would not approve the COP and the SouthCoast Wind Project would not be built. Ongoing activities that would contribute to baseline conditions, excluding the Proposed Action, are also described under the No Action Alternative. Offshore wind activities that have already been constructed or that have an approved COP are considered ongoing activities that have been included in the No Action Alternative. These offshore wind activities have completed the environmental review process and the public has had the opportunity to comment on them. The No Action Alternative does not include reasonably foreseeable planned activities, such as the build-out of other offshore wind projects within the region. The No Action Alternative acts as the baseline to evaluate potential impacts of the Proposed Action within the geographic analysis area for each Chapter 3 resource topic. The CEQ NEPA Implementing Regulations require a NEPA impact analysis to include cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to other past, present, and reasonably foreseeable actions. The cumulative impact analysis for the No Action Alternative considers the impacts of ongoing activities and other reasonably foreseeable

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		planned activities, excluding the Proposed Action, as described in Appendix D, *Planned Activities Scenario*. The cumulative impact analysis of the Proposed Action considers approval of the SouthCoast Wind Project in combination with other reasonably foreseeable planned activities within the geographic analysis area for each Chapter 3 resource topic.
BOEM-2023-0011-0065-0003	We continue to object to BOEM's conflation of a true No Action Alternative with a Cumulative Impacts Analysis. We continue to object to a cumulative impacts scenario being used as a baseline against which action alternatives are measured. This is not a baseline. It is a cumulative impacts scenario. They are not the same. Conflating the two downgrades impacts of the action alternatives. BOEM cannot deliberately and artificially minimize the impacts of its actions by essentially gerrymandering the parameters of its analysis.	Please refer to response to comment BOEM-2023-0011-0053-0001.
BOEM-2023-0011-0065-0007	Alternative D: The DEIS states that "Alternative D was developed through the scoping process" because "a commenter speculated" that turbines in the northeastern portion of the lease would alter the foraging habitat for critically endangered North Atlantic Right Whales. That was not a "commenter". It was a cooperating federal governmental agency namely NOAA the federal agency charged with protection of our nation's marine resources including marine mammals. The "comment" was from the Chief of NOAA's Northeast Fisheries Science Center's Protected Species Branch. We have attached that letter along with our comments.	Comment acknowledged. Please refer to responses to comments BOEM-2023-0011-0065-0008 through BOEM-2023-0011-0065-0015 regarding how BOEM considered alternatives to minimize impacts on wildlife near Nantucket Shoals, including NARW.
BOEM-2023-0011-0065-0008	BOEM asserts that "Based on best available science BOEM believes there is a lack of conclusive evidence that the removal of proposed turbine locations in the northeastern portion of the Lease Area would measurably lessen these minor impacts on the hydrodynamic features." First we do not agree that BOEM has the expertise to override a NOAA Chief of Protected Species when it comes to science impacting not	BOEM determined an appropriate way to further address this issue was to seek input from NASEM. Specifically, to ensure offshore wind energy installations are being planned, constructed, and developed in an environmentally responsible way, BOEM asked NASEM to evaluate the potential for offshore wind farms in the Nantucket Shoals region to affect oceanic physical processes, and, in turn, how

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	only protected species but in fact critically endangered species that NOAA is legislatively charged with protecting under the Endangered Species Act. BOEM alleges that the impacts noted by NOAA are not consistent with hydrodynamic studies of wind facilities in the North Sea. This is incorrect.	those hydrodynamic alterations might affect local to regional ecosystems. In light of the resulting Consensus Study Report and based on best available science, BOEM believes there is a lack of conclusive evidence that the proposed WTG locations in the Lease Area have the potential to result in hydrodynamic effects on NARW foraging in the vicinity of Nantucket Shoals.[3] The best available science suggests that effects are most likely to be localized to the immediate vicinity of the turbine array and to not extend to Nantucket Shoals. Primary studies supporting this position include modeling of the full build-out of the southern New England lease areas (Johnson et al. 2021), hydrodynamic studies of wind facilities in the North Sea (Christiansen et al. 2022), and recent comprehensive literature reviews (NASEM 2024). In particular, NASEM study was commissioned 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 regional ecosystems." The study, titled *Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales,* concluded that "the impacts of offshore wind projects on the NARW and the availability of their prey in the Nantucket Shoals will likely be difficult to distinguish from the significant impacts of climate change and other influences on the ecosystem" (NASEM 2023). Furthermore, the key recommendation from the study is "while wind energy planning and development progresses, the BOEM, NOAA,

[3] Two of the primary conclusions from the NASEM report *Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales* (2024) demonstrate that it is not reasonable to conclude eliminating a large number of WTGs from Beacon Wind would have a significant beneficial effect. Specifically, "**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." and "**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."

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		and others should promote observational studies and modeling that will advance understanding of potential hydrodynamic effects and their consequent impacts on ecology in the Nantucket Shoals region during all phases of wind energy development." BOEM is also supporting additional research on this topic, in accordance with the NASEM recommendations. During the process of identifying the Massachusetts lease areas BOEM excluded certain areas identified as important habitats that could be affected if ultimately developed with the installation of WTGs. Nantucket Shoals was among the areas excluded from the subsequent commercial leasing. BOEM does not assert there are no effects from wind turbine wake and corresponding wind speed and clarifies that the effects will not likely have a detectable effect on foraging and will not have population-level impacts on important species including NARW. Without impacts on foraging and a reasonable causal connection to population impacts, NMFS's reasoning for this alternative is not justifiable or persuasive. NMFS has not demonstrated its 12-4-mile (20-kilometer) buffer alternative is warranted or provided any new information to support it, and current available peer-reviewed studies and data constituting best available science do not conclude that there would be a reasonable expectation of population-level impacts.
BOEM-2023-0011-0065-0009	One European study "Accelerating deployment of offshore wind energy alter wind climate and reduce future power generation potentials" from 2021 notes the wind wake effect from large scale wind farms to extend 35-40 km downwind during prevailing wind. [Footnote 6: See Akhtar Naveed et. al. "Accelerating deployment of offshore wind energy alter wind climate and reduce future power generation potentials" Nature/Scientific Reports 2021 https://doi.org/10.1038/s41598-021-91283- 3.]This study noted that "the simulated wake affects of the wind turbine can be underestimated and thus the wake effects of wind	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	farms can be underestimated" and that "the development of massive clustered OWFs significantly impacts the wind climate". [Footnote 7: Ibid p. 5.] Mayflower/South Coast Wind is part of such a cluster namely the MA WEA which is over 1400 square miles of planned offshore wind turbines.A 2022 study "Emergence of Large-Scale Hydrodynamic Structures Due to Atmospheric Offshore Wind Farm Wakes" states that "simulations show the emergence of large-scale attenuation in the wind forcing and associated alterations in the local hydro- and thermodynamics" and that "[i]nduced changes in the vertical and lateral flow are sufficiently strong to influence the residual currents and entail alterations of the temperature and salinity distribution in areas of wind farm operation". [Footnote 8: Christiansen et al. "Emergence of Large-Scale Hydrodynamic Structures Due to Atmospheric Offshore Wind Farm Wakes" Frontiers in Marine Science 2022 doi: 10.3389/fmars.2022.818501.] This study demonstrated approximately 30 km of wake; however it was based off of estimates taken at hub height for existing offshore wind farms in the North Sea which have smaller turbines than the 1066 foot high turbines being planned for the Mayflower/South Coast project. [Footnote 9: Ibid p. 4.] [Footnote 10: Ibid p. 5.] [Footnote 11: See DEIS p. ES-7.] Therefore it is reasonable to assume that the wind wakes for the Mayflower/South Coast project will extend further than their European counterparts. This study concluded that the wake effects "indicate potential impact on marine ecosystem processes."This is not a new concept. In 2018 a study conducted for the Netherlands entitled "Assessment of system effects of large-scale implementation of offshore wind in the southern North Sea" identified that "impact of wakes (wind shadows) on wave generation may be significant and impact may still be present near the coast e.g. with respect to density driven transport of suspended matter and nutrients in coastal areas directly influenced" "Tidal current blockage may have repercussions for tidal dynamics in the southern North Sea" "Enhanced	

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	vertical mixing of the water column may lead to (local/regional and/or temporal) destratification and resuspension of SPM and nutrients and concurrent shifts in light climate" and "Feeding activities from epistructural fauna on the OWF foundations may significantly decrease phytoplankton densities around wind farms affecting in turn zooplankton densities." [Footnote 12: Boon et al. "Assessment of system effects of large-scale implementation of offshore wind in the southern North Sea" Wageningen University and Research Deltares 2018.] Zooplankton is what critically endangered North Atlantic right whales feed upon.	
BOEM-2023-0011-0065-0010	In 2022 a new study entitled "Offshore wind farms are projected to impact primary production and bottom water deoxygenation in the North Sea" stated "that the associated wind wakes in the North Sea provoke large-scale changes in annual primary production with local changes of up to ±10% not only at the offshore wind farm clusters but also distributed over a wider region. The model also projects an increase in sediment carbon in deeper areas of the southern North Sea due to reduced current velocities and decreased dissolved oxygen inside an area with already low oxygen concentration. Our results provide evidence that the ongoing offshore wind farm developments can have a substantial impact on the structuring of coastal marine ecosystems on basin scales." [Footnote 13: Daewel et al. "Offshore wind farms are projected to impact primary production and bottom water deoxygenation in the North Sea" Communications Earth and Environment 2022 https://doi.org/10.1038/s43247- 022-00625-0 | www.nature.com/commsenv. Emphasis ours.] The decrease in primary productivity including zooplankton can have an impact on ecosystems on basin scales well outside of the actual wind farm itself.This is larger area is consistent with data quoted by BOEM in its own documents such as those for the New York Bight leases. A report by ArcVera Renewables entitled "Estimating Long-Range External Wake Losses in Energy Yield and Operational Performance Assessments Using	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	the WRF Wind Farm Parameterization" specifically analyzed the potential for large project to project wake impacts for the NY Bight lease areas resulting in simulations depicting wind speed deficits of 7% up to 100 km away from the wind facility with a 28.9% loss of wind at the wind farm itself. [Footnote 14: Stoelinga et. al. "Estimating Long-Range External Wake Losses in Energy Yield and Operational Performance Assessments Using the WRF Wind Farm Parameterization" ArcVera Renewables 2022.] Larger projects and larger conglomerate lease areas such as the New York Bight and MA WEA leases will generate larger impacts than a single project on its own. If such conglomerate lease areas can create wind wake effects up to 100 km away then BOEM must seriously consider that cumulative impacts of the Mayflower/South Coast project along with the other RI/MA and MA WEA projects could extend to cover the entirety of Nantucket Shoals.	
BOEM-2023-0011-0065-0012	We disagree with and contest BOEM's conclusion that "there is a lack of conclusive evidence" of these impacts. Peer reviewed science and developer documents utilized by BOEM itself contradict this conclusion. In fact the expert analysis of NOAA's Chief of Protected Species Branch which recommended a 20 km or more "conservation buffer" from the 30 meter isobath of Nantucket Shoals that would be a no build zone for the project is likely on the lower end of impact estimates given the larger size of the Mayflower/South Coast turbines compared to their European counterparts. This is even acknowledged by NOAA: "A conservation buffer of 20 km also corresponds to the extent of the strongest impacts to depth-averaged velocity salinity and sea-surface elevation changes as observed in the North Sea where the largest impacts extended 20-30 km and where turbines both height and number were much smaller than planned development in southern New England (Christiansen et al. 2022)." [Footnote 15: See NOAA letter May 13 2022 attached.] Notably NOAA states that there are no mitigation measures that can change	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	or lessen the impact from building in this area: “unlike vessel traffic and noise which can be mitigated to some extent oceanographic impacts from installed and operating turbines cannot be mitigated for the 30- year lifespan of the project unless they are decommissioned.” The only way to avoid impacts is not to build.	
BOEM-2023-0011-0065-0013	This particular area is “a prime portion of their only winter foraging grounds” of the critically endangered North Atlantic right whale. [Footnote 16: Ibid and see density chart on attached NOAA GOM presentation.] “Disturbance to right whale foraging could have population-level effects on an already endangered and stressed species” and “[r]ight whales need dense aggregations of prey to make foraging energetically worthwhile and disruptions to prey aggregations in the only known winter foraging area for right whales could have significant energetic and population consequences.” [Footnote 17: Ibid.] For a species whose coastwide including Canada PBR is 0.7 this level of impact is unacceptable. [Footnote 18: See https://www.narwc.org/uploads/1/1/6/6/116623219/2021report_cardfinal.pdf.] BOEM must prevent threats to endangered species; it has a legislative mandate to do so. Any activity that cannot be mitigated which would have a potential population level impact on an endangered species simply must not be taken.And this impact does not even account for the entrainment of zooplankton the North Atlantic right whale’s only food source from the proposed project’s offshore open ocean cooling substations. NOAA also acknowledges this threat: “Additionally offshore substations pose an unknown risk related to water withdrawals and impingement/entrainment of zooplankton and other prey species.” [Footnote 19: See NOAA letter May 13 2022 attached.]	Please refer to response to comment BOEM-2023-0011-0056-0012.
BOEM-2023-0011-0065-0014	Interestingly BOEM acknowledged conflicts with this particular areas and North Atlantic right whales over a decade	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	ago. In both its 2012 and 2014 EAs for the MA WEA BOEM included an "Alternative B- North Atlantic Right Whale Area Exclusion" based on density estimates from that time which were lower than they are now as right whale use of the area has increased in recent years. This alternative was created "To reduce the likelihood of impacts on North Atlantic right whales" and "would exclude areas of the WEA (Alternative A) from leasing and site assessment activities where right whales are most likely to occur." [Footnote 20: BOEM 2014 MA WEA EA https://www.boem.gov/sites/default/files/renewable-energy-program/State- Activities/MA/Revised-MA-EA-2014.pdf p. 16 also attached.] We have reproduced the chart of Alternative B below which unsurprisingly seems to correspond significantly to NOAA's recommended conservation buffer zone for North Atlantic right whales:[See original attachment for Figure 2-2. Alternative B lease area]We request that BOEM provide a chart of Alternative D and that a side by side comparison of the DEIS Alternative D chart and the 2014 EA Alternative B chart be made publicly available for comment.	
BOEM-2023-0011-0065-0015	BOEM in 2014 decided to lease the entire WEA including the Alternative B lease area so as to collect more information and analysis over time. That time has come. Not only have North Atlantic right whales increased their presence in and reliance on that area but peer reviewed science showing the wind wake effects and associated hydrodynamic impacts and effects on primary productivity have been published and provided to BOEM. "Residency demographics and movement patterns of North Atlantic right whales Eubalaena glacialis in an offshore wind energy development area in southern New England USA" by Quintana-Rizzo et al published July 29 2021 in Endangered Species Research demonstrated that since 2017 North Atlantic right whales have significantly increased their reliance on and time spent in this area. BOEM cannot ignore these combinations of facts in order to move forward with offshore wind development regardless of the cost to	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	endangered species. BOEM must either choose Alternative D or Alternative A- No Action- as its preferred Alternative for this proposed Project.	
BOEM-2023-0011-0079-0004	According to the National Oceanic and Atmospheric Administration (NOAA) scientists investigating the impacts of offshore wind energy development on marine life found that construction and operation of wind turbines can change the behavior of aquatic species and alter existing habitats. Some of these specific impacts include increased ocean noise, introduced electro-magnetic fields, creation of a "reef-effect" impacting organism, life cycle stages altering species survival, and release of contaminants that can be consumed by aquatic life (NOAA Fisheries). We suggest that you perform more research into how much each of the impacts described by the NOAA would affect marine mammals in the area where you will build your wind farm. Then you must use this information to prepare a new alternative allowing for minimum effect on marine mammals.	Section 3.5.6, *Marine Mammals*, analyzes impacts from the Proposed Action and alternatives on marine mammals, including impacts from noise caused by pile driving and other sources, EMF exposure, presence of structures resulting in a reef-effect that aggregates prey species, effects on species at various life stages, and impacts from accidental releases of fuels, trash, and other contaminants from Project vessels and other equipment. As described in Chapter 2, BOEM analyzed a range of reasonable alternatives in the EIS to the Proposed Action, including several alternatives identified by NMFS with the purpose of minimizing impacts on marine mammals and other marine species. These include Alternative D, which would remove turbine positions near Nantucket Shoals, an important foraging area for marine mammals, and Alternative E, which analyzed installation of foundations without pile driving. In addition to these alternatives, BOEM identified several mitigation measures to avoid or minimize impacts on marine mammals, such as real-time detection and reporting PAM system and limiting the time of year pile driving can occur; these and other mitigation measures are listed in Appendix G.
BOEM-2023-0011-0079-0005	Even amongst the alternatives you have prepared we have concerns that the preferred alternative may not be the best alternative for marine mammals. Of the alternatives explored we believe that Alternative D: Nantucket Shoals is the best alternative for protecting marine mammals. In Table 2-4 section 3.5.6 you state that Alternative D has the potential to lessen the impact of offshore cables on the foraging habitats of marine mammals. You also state that the impacts from noise EMF and vessel traffic would be reduced by laying cables further from Nantucket Shoals. You claim these	BOEM analyzed impacts of Alternative D based on best available science and the professional judgment of BOEM subject matter experts. BOEM has reviewed its analysis and has confirmed that while impacts on marine mammals would be reduced, the difference in impacts would not be significant and would not be enough to result in a change in impact levels. Regarding the statement about BOEM's admittance that there is a lack of information about impacts on marine mammals, it is not clear what information the comment is referring to. Appendix E, *Analysis of Incomplete*

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	impacts are not large enough to be significant. However combined with your admittance that there is a lack of information regarding the effects of these impacts on marine mammals we are skeptical of your conclusion that the reduced impacts are not significant.	*and Unavailable Information*, identifies information that was incomplete or unavailable for the evaluation of reasonably foreseeable impacts in the Final EIS.
BOEM-2023-0011-0079-0006	We suggest that Alternative D be further considered since it is the best alternative for marine mammals according to your report. Most importantly you must further investigate and document the potential severe behavioral impacts on marine organisms in order to fully comply with the NEPA process and move forward.	BOEM acknowledges the commenters preference for Alternative D. BOEM has conducted an extensive analysis of impacts on marine species and has revised the analysis in the Final EIS in response to public comments received on the Draft EIS where appropriate.
BOEM-2023-0011-0080-0003	The proposed cable routing at sea and on land is premature in light of ISO New England's stated need to study potential grid connection points as the infrastructure on Cape Cod cannot support all the planned windfarm outputs. The Massachusetts government has started a state and regional review of how to consolidate all planned offshore power supplies to utilize existing grid and industrial sites to eliminate adverse impacts on residential areas. This basic planning must be completed before proceeding with approval of a project that will likely need a new point of connection on-shore.	Please refer to response to comment BOEM-2023-0011-0007-0002 regarding the consideration of consolidated offshore wind infrastructure. Regarding the need for a state and regional review of interconnection points, BOEM is in support of such efforts to occur at the state government level, but such planning efforts do not change BOEM's obligation to review and respond to the proposal submitted by SouthCoast Wind in its COP. BOEM cannot delay its review of the SouthCoast Wind COP because of ongoing state planning efforts as doing so may jeopardize SouthCoast Wind's ability compete in offtake agreements (refer to Final EIS Chapter 2, Table 2-3 for more information). In addition, BOEM has received no information from SouthCoast Wind that its proposed POIs are incapable of receiving the power that would be produced by the Project, nor has SouthCoast Wind proposed changes to its onshore interconnections.
BOEM-2023-0011-0091-0001	First it is our strong belief that a commercial industrial application such as these 320KV cables does not belong in a densely populated residentially zoned historic community. In conversing with multiple public utilities we have been informed that they would endeavor to avoid such communities. Under the circumstance that there are other	As described in responses to comments submitted by other commenters, including comments BOEM-2023-0011-0004-0005 and BOEM-2023-0011-0025-0002, BOEM evaluated additional alternative landfall locations suggested by comments on the Draft EIS and dismissed them from

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	industrial sites suitable for this project we have encouraged SouthCoast to make use of same.	consideration as they were not feasible and did not meet BOEM's screening criteria.
BOEM-2023-0011-0091-0004	We have on many occasions called for a regional planned approach to the routing of the export cables from the numerous wind farm lease areas. Numerous studies have cited the benefits of such a planned approach which would reduce the number of export cables needed reduce the environmental impact reduce the number of landing sites and would be more efficient and cost effective. As BOEM is no doubt aware four New England states with two others in support have filed a Joint State Innovative Partnership proposal to the Dept. of Energy which would exactly address this issue and coordinate the interconnection to the NE electric grid.	Please refer to response to comment BOEM-2023-0011-0080-0003.
BOEM-2023-0011-0091-0005	The DEIS and the COP conflict on numerous occasions as to the voltage of the export cables Intended for Falmouth "Alternative F" states five cables would be reduced to three at a voltage of +/-525kV HVDC whereas the COP states +/-320kV HVDC why the inconsistency and which is correct?	Alternative F in the EIS is a BOEM-proposed alternative and, therefore, represents a change from SouthCoast Wind's Proposed Action as described in the COP. However, Alternative F is within the range of parameters outlined in SouthCoast Wind's PDE. The reference to ±320 kV refers to the nominal cable voltage for the Brayton Point ECC and is not applicable to Alternative F. Alternative F addresses the change in the number of cables and voltage for the Falmouth ECC. The nominal cable voltage for Falmouth for Alternative F, and in the event HVDC is chosen under the Proposed Action's PDE is ±525 kV.
BOEM-2023-0011-0091-0014	In my experiences in developing and evaluating ambient monitoring data for use and evaluation in public proceedings for EIS's the DEIS also does not have sufficient baseline monitoring data on key resources that are directly going to be affected by this project. The first requirement for an EIS is to perform sufficient baseline monitoring activities for the EIS environment. In this case the lease area is located roughly 20 to 30 miles south of Nantucket and Martha's Vineyard - so baseline conditions are not sufficiently represented by other	SouthCoast Wind conducted cultural, biological, geophysical, and geotechnical site assessment surveys of the offshore export cable corridors and Lease Area beginning in October 2019 as described in its Site Assessment Plan. The information gathered as part of this baseline data collection was used to inform the COP and was included in COP appendices (for example, COP Appendix M, *Benthic and Shellfish Resources Characterization Report*). The analysis of resource specific impacts in the Final EIS incorporated

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	sources of representative data. Therefore, a sampling and analysis plan should have been developed and approved whose implementation and results would be a separate section of the EIS. This information is not included in the DEIS. So there are some basic issues in addition to the fact that significant elements of the proposed wind farm are under question.	baseline survey data from the COP to complement data found from other sources.
BOEM-2023-0011-0091-0017	An excellent example of the interconnection of these factors can be found in the Brattle Group's May 12, 2021 Presentation at the NYSERDA Offshore Wind Webinar on Transmission Options of Offshore Wind Generation (by Johannes Pfeifenberger). In this presentation the flaws and implied excessive environmental impacts are shown for the continued use of the existing grid tie-in approach (represented in the SouthCoast DEIS) versus a Planned Grid Approach. Indeed this is why the Southcoast/Mayflower project proposal includes the unnecessary impingement on local culture and social economic issues (required to be identified/mitigated in an EIS) with the spreading out of connection corridors through highly populated pristine beach locations like Falmouth Heights. The Southcoast/Mayflower Team has offensively identified their proposed access point of Worcester Avenue as a "previously disturbed off-road grassy median strip" known as "Worcester Park" on Page -2.5 of the DEIS. The Brattle Group's "Planned Approach" entirely avoids the Vineyard and Nantucket Sound areas and provides full access while reducing the offshore cable disturbances in New England by 50%! The Planned Approach is also more rational in its efficiency and directness to the larger population areas (i.e. target for largest electric needs). Perhaps more importantly it also exposes Southcoast/ Mayflower's obvious self-serving need to move their own project's timeline to positive-cashflow return time window as short as possible. This desire tries to utilize the negligible reduction relative to world-wide CO_2 emissions of this project and the political (not	Please refer to response to comment BOEM-2023-0011-0080-0003.

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	scientific) Climate Change support regardless of guaranteed negative impacts to the long-term health of the grid and sea-ecosystem.	
BOEM-2023-0011-0091-0022	Lastly I feel it is incumbent on the New England states to develop a region planned approach in coordination with ISO/NE to be able to accept the export cables from the multiple offshore windfarm developers. It would lessen the environmental impact be more financially economical and reduce the number of cables and landing locations needed. Others have cited studies conducted by the Boston based Brattle Group on the need for such a coordinated planned approach which I support completely.	Please refer to response to comment BOEM-2023-0011-0080-0003.
BOEM-2023-0011-0110-0002	Additionally I did not see any discussion in the EIS to other potential POI's (other than the three identified) whether in Falmouth or anywhere else on Cape Cod or the South Coast of MA. SCW has the entire South Coast of MA and the entire south side of Cape Cod as well as Buzzard's Bay/Cape Cod canal to locate its second POI rather than running it under an extremely popular beach and park in a heavily residential community. Why was this not considered and why doesn't BOEM or the USACE insist that SCW reconsider all alternatives especially in light of the significant impact to the Falmouth community if the POI is located there? To the extent that SCW has chosen Falmouth Heights beach as its "preferred" POI due strictly to economic concerns giving no regard to the potential harm to the town is inexcusable.	BOEM considered alternatives to the Proposed Action that were identified through coordination with cooperating and participating agencies and through public comment received during the public scoping period for the EIS. Based on the criteria outlined in Section 2.2, *Alternatives Considered but Not Analyzed in Detail*, the Cape Cod Canal, the Pilgrim plant, Waquoit Bay, and Trunk River were not analyzed as an alternative. The Cape Cod Canal landfall location is not considered a feasible alternative from a safety, spatial, and burial risk point of view. The canal is a narrow channel (approximately 480 foot-wide corridor) and would present a spatial constraint for cable installation, maintenance, and repair (if needed). This would introduce additional safety risks during the Project installation, and potential impact to marine navigation during construction.
BOEM-2023-0011-0112-0005	We are also concerned that this DEIS was published before key information regarding the project has been collected and made available. For example the rationale provided on pages 2-30 and 2-31 for not analyzing an alternative to "preclude the development of WTG within a 20-km buffer of the Nantucket Shoals 30-m isobath" provides many examples of why BOEM's approach to environmental analysis of this	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	project is problematic. This alternative was suggested by NMFS to reduce potential impacts on an important foraging area for the critically endangered North Atlantic right whale as well as other species such as sea ducks. The DEIS states that this alternative would allow SouthCoast to meet its existing procurements if most remaining turbine locations could be used; however this cannot be determined given that full geotechnical data has been analyzed for only about two thirds of the potential turbine locations throughout the lease area. In addition this alternative would only leave 162 MW of remaining nameplate capacity (assuming an 18 MW turbine) for future solicitations considering the 1204 MW already procured. This is described as economically infeasible and is presumed to be too low for upcoming state procurements and is therefore stated to be equivalent to a no action alternative for the entire project. However this capacity combined with procurements to date totals 1366 MW which is in the size range of other projects undergoing review. It is unfair to ask the public to comment on preferred alternatives when information is not available to determine which specific turbine locations are feasible and when the project must meet requirements for energy solicitations which have not yet occurred and are not clearly defined. Note that NEPA regulations do not say that incomplete information is justification for not analyzing a reasonable alternative; rather they say that the missing or incomplete information should be noted in the analyses (40 CFR 1502.21). This is a clear example of why BOEM should not release DEIS documents for public comment until all potentially relevant information can be provided for the public to make informed comments.	
BOEM-2023-0011-0112-0008	The DEIS indicates that the action alternatives are not mutually exclusive and BOEM may select a combination of alternatives that meet the purpose and need of the proposed project. We assume that any combination of Alternatives B-F would meet the purpose and need. If this is not the case the FEIS should clarify.	The statement in the comment is accurate. As indicated in Draft EIS Section 2.1, *Alternatives*, “BOEM may ‘mix and match’ multiple listed Draft EIS alternatives to result in a preferred alternative.” The preferred alternative must meet the purpose and need in order for it to be selected by BOEM.

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BOEM-2023-0011-0112-0011	Other projects along the Atlantic coast have used a phased approach for impacts analysis. It is unclear why the developer and BOEM did not take this approach here given the large size of the project and uncertainties regarding future procurements. To date procurements for SouthCoast Wind only amount to half the capacity of the proposed project (804 MW and 400 MW both to Massachusetts). In various sections of the EIS future procurements are described as essential to the success of the project. Different considerations including different mitigation measures may be relevant for different phases of the project. Therefore it is problematic to analyze the entire lease area as if it is one project. We recommend that the FEIS analyze the existing procurements as a single phase (or two phases given that there are two procurements) with future procurements analyzed as a separate phase. Additional supplemental analysis may be needed after additional details about future procurements are known. Note that project phasing is referred to in the context of the two offtake locations in a footnote to the alternatives considered but not analyzed in detail (page 2-35) but this phasing is not referenced under Alternative B.	Based on updates that SouthCoast Wind has made to its COP, BOEM has revised Final EIS, Section 2.1.2, *Alternative B – Proposed Action*, to further explain that SouthCoast Wind would develop the Project in two parts, referred to as Project 1 and Project 2. SouthCoast Wind proposed developing the entirety of Lease Area (including positions for Project 1 and Project 2) in its COP because their financing strategy depends on using economies of scale for major supplies and services; and the validity and competitiveness of their bid into the New England multi-state solicitation depends on being able to develop two projects. An alternative that only considered the construction and operations of Project 1 would be economically infeasible and equivalent to the No Action Alternative. The Draft EIS analyzed the entirety of the Project, including Project 1 and Project 2, and supplemental environmental analysis is not required. Since the Draft EIS was released, the status of SouthCoast Wind's offtake agreements have changed, as acknowledged in SouthCoast Wind's revised COP and the Final EIS, Chapter 1, *Purpose and Need*. A project is not required to have PPAs established for BOEM to conduct its environmental analysis. The change in offtake agreement status does not negate or substantively change the environmental analysis presented in the Draft EIS. Minor explanatory changes were made in the Final EIS to reflect the change in offtake agreement status and other changes in the COP since the Draft EIS was released.
BOEM-2023-0011-0112-0015	Alternative E indicates that "one or more foundation types" could be utilized (page 2-21). We recommend clarifying whether all four types could be combined or if one type would be used for turbines and another for substations or if foundations might vary with depth. It is difficult to estimate impacts at the scale of the project without this information since there are tradeoffs associated with each foundation type. BOEM's response to our question during the March 22	Alternative E analyzes the maximum use of each foundation type under separate sub-alternatives to determine the impacts from each foundation type. As it was analyzed in the Draft EIS, if Alternative E was selected, any one sub-alternative could be selected, which would have meant only one foundation type used in the Lease Area, or a combination of sub-alternatives could be selected, which would have meant multiple foundation types.

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	public meeting indicated that up to two types could be combined but this is not clear in the DEIS.	
BOEM-2023-0011-0112-0016	Appendix G states that only monopiles and piled jackets can be used in the "enhanced mitigation area" to minimize benthic impacts. This mitigation area and its relationship to Alternative E should be explained in the body of the FEIS. This choice of foundation type is in conflict with Alternative D which would remove turbines in that same part of the lease in part to reduce impacts on species including the North Atlantic Right Whale. Acoustic impacts are a major concern for this species and suction-bucket or gravity foundations would be much quieter to install; however these foundation types have larger footprints than piled foundations which would increase the impacts for other species and habitats.	The commenter is referring to the agency-proposed mitigation measure NS-1 (Appendix G, Table G-2), which would allow only monopiles and piled jackets in the enhanced mitigation area. BOEM may apply agency-proposed mitigation measures to any of the action alternatives. If BOEM selects NS-1 in the ROD, monopiles and piled jackets would not be allowed in the enhanced mitigation area regardless of alternative. BOEM has analyzed the impact of agency-proposed mitigation measures in each Chapter 3 section.
BOEM-2023-0011-0112-0020	Alternative F uses HVDC cables instead of HVAC cables for the Falmouth offtake. Section 3.4.2 notes that SouthCoast Wind developed a National Pollutant Discharge Elimination System (NPDES) permit application for one offshore HVDC conversion station. Would more than one converter station be needed if additional export cables are HVDC under Alternative F?	As described in Chapter 2, Section 2.1.6, there would be two HVDC converter OSPs under Alternative F: one HVDC converter OSP for Project 1 and one HVDC converter OSP for Project 2 if Falmouth is selected as the POI for Project 2. For the Proposed Action, SouthCoast Wind has applied for a NPDES permit application for one HVDC converter OSP for Project 1. SouthCoast Wind has not yet decided on a design for the OSP(s) for Project 2. If SouthCoast Wind selects an HVDC converter OSP design for Project 2 for the Proposed Action, or if Alternative F is selected, SouthCoast Wind would be required to apply for additional NPDES permit(s).
BOEM-2023-0011-0112-0021	Overall, the DEIS doesn't provide enough information for us to make more specific recommendations on the choice of foundation types foundation locations and other specific parameters. 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 number type and locations of turbines cables and offshore substations to minimize impacts to habitat and fisheries.	The EIS analyzes the full impacts of the SouthCoast Wind Project, which includes multiple WTG and OSP designs and foundation options, in Chapter 3. Impacts from each of the foundation options is analyzed in the EIS. The locations of the WTG positions are known, and the indicative location of one OSP site has been identified and analyzed in the EIS. BOEM has and will continue to coordinate with NOAA Fisheries in its capacity as a cooperating agency and as part of ESA Section 7 and EFH consultations.

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BOEM-2023-0011-0117-0003	Inadequate Alternatives Assessment: With respect to the DEIS's discussion of alternatives, BOEM must examine alternatives that also help meet the clean energy goals of Massachusetts. Without meaningful alternatives the document becomes meaningless and capricious. The comparison should include an alternative that avoids complex hard-bottom habitat and other renewable energy options such as small-scale nuclear and solar. Without such alternatives the DEIS does not offer a meaningful analysis.	As stated in Chapter 1, Section 1.2, *Purpose and Need of the Proposed Action*, the Project was developed to support federal and state clean energy goals by providing up to 2,400 MW of clean, renewable wind energy to the northeast United States, including Massachusetts, Connecticut, and/or Rhode Island, which each have existing state offshore wind procurement laws in place as well as decarbonization goals and targets. As described in Chapter 2, BOEM analyzed a range of alternatives based on issues that emerged from scoping, interagency coordination, and internal BOEM deliberations. BOEM evaluated all proposed alternatives using the screening criteria identified in Section 2.3. BOEM excluded alternatives from further consideration that did not meet the purpose and need or the screening criteria. An alternative that considers other renewable energy options such as small-scale nuclear and solar does not meet the purpose and need of the Proposed Action, as described in Chapter 1. BOEM considered but dismissed an alternative from detailed analysis (refer to Section 2.3) that would have evaluated other renewable offshore energy alternatives, including offshore floating solar and hydrokinetic energy. This alternative was dismissed because it did not meet the purpose and need and because the terms of SouthCoast Wind's lease only allow submission of a COP for offshore wind development. Alternative F analyzed in the EIS would reduce the number of cables proposed for the Falmouth interconnection in order to minimize impacts in the Muskeget Channel, which contains complex hardbottom habitats. Furthermore, during installation, cables would be micro-routed to avoid complex habitats.
BOEM-2023-0011-0123-0002	As presented it seems the 'No Action' Alternative assumes a scenario where this project does not move forward but that all others in the Planned Activities Scenario would. As stated in RIDEM's previous projects' DEIS comments this seems	Please refer to response to comment BOEM-2023-0011-0053-0001.

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	unrealistic and may distort one's interpretation of potential impacts from this individual project. As a result such a scenario may imply that the impacts of this project specifically could be negligible which would not be accurate.	
BOEM-2023-0011-0123-0024	The turbine foundations may increase hard substrate for recruitment following any disturbance during the construction phase (Petersen and Malm 2006). The reef effect can increase food availability (Degraer et al. 2020) and biodiversity and biomass (Inger et al. 2009; Gill 2005; Linley et al. 2007). However new habitat created by the turbine foundations may not benefit all species that utilized the local habitat prior to construction and may serve to attract biomass as opposed to result in increased ecosystem productivity. As such it is important that these elements be evaluated as possible throughout the project to best understand the long-term effects of the region.	Text has been added in Section 3.5.2.3 to address this comment based on review of Bray et al. 2017; Wilding et al. 2017; Adams et al. 2014; Causon and Gill 2018.
BOEM-2023-0011-0124-0005	The mitigation measures in the COP and DEIS are largely intended to minimize and mitigate effects of the project but the NEFSC letter raised concerns that show that the DEIS ignored the first and most important stage of the mitigation hierarchy: consider and avoid environmental effects. This is unacceptable and contrary to the text and purpose of the National Environmental Policy Act (NEPA) the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA).The NEFSC letter represents the scientific opinion of the agency charged with conservation and management of marine species protected by the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) and contained important information about the possible adverse effects of wind development in the region. BOEM has failed to meaningfully consider this advice and opinion with an inadequate explanation as to why the conclusions of the studies NEFSC relied on were rejected. BOEM must instead take the "hard look" required by NEPA at this science monitor the status of the upcoming NAS study and supplement the EIS	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	if necessary and include an analysis of the 20-km conservation buffer zone around Nantucket Shoals as an alternative that addresses the concerns and conservation recommendations raised by the NEFSC.Congress made clear through both the ESA and MMPA that agencies are to take a precautionary approach with endangered marine mammals like the NARW. In implementing a precautionary approach BOEM must not only consider the NEFSC letter and the science it relied on but must also adopt the recommendation of a 20-km conservation buffer as the preferred alternative.	
BOEM-2023-0011-0124-0010	Importantly the NEFSC notes that “unlike vessel traffic and noise which can be mitigated to some extent oceanographic impacts from installed and operating turbines cannot be mitigated for the 30- year lifespan of the project unless they are decommissioned.” [Footnote 27: Id.]To preclude these effects that cannot be mitigated the NEFSC describes an avoidance management strategy that uses a conservation buffer zone around Nantucket Shoals where offshore wind installation would be prohibited (Figure 1):We propose the buffer zone begin at the 30 m isobath which corresponds with the predicted location of tidal mixing fronts in this region (Simpson and Hunter 1974 Wilkin 2006). A conservation buffer of 20 km also corresponds to the extent of the strongest impacts to depth- averaged velocity salinity and sea-surface elevation changes as observed in the North Sea where the largest impacts extended 20-30 km and where turbines both height and number were much smaller than planned development in southern New England (Christiansen et al. 2022). [Footnote 28: Id.]The NEFSC letter supported this strategy by stating that “[c]oncentrating development to the southwest and creating a conservation buffer adjacent to the Shoals is expected to reduce risk by reducing overlap between high species distribution and concentrated areas of construction operations and maintenance activities including associated vessel traffic and potential changes in commercial and recreational fishing activity." [Footnote 29: May 5 2022	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	Letter from Sean Hayes Ph. D. Chief of Protected Resources Branch of the Resource Evaluation and Assessment Division at the Northeast Fisheries Science Center to Brian Hooker Lead Biologist at Bureau of Ocean Energy Management (attached)]	
BOEM-2023-0011-0124-0012	The SouthCoast Wind DEIS suffers from a number of weaknesses in its assessment and management of risks to critically endangered NARWs including failing to adequately analyze the leading science on oceanographic impacts from offshore wind turbines failing to consider the letter sent to BOEM by the NEFSC failing to fully analyze alternatives that include conservation buffer zones as recommended by the NEFSC and failing to select a conservation buffer zone as the preferred alternative despite being required to afford species the highest of protections under the ESA and MMPA.Without remedying its failure to comply with NEPA the ESA and the MMPA BOEM cannot use the SouthCoast Wind DEIS to authorize or permit the construction or operation of the proposed project.	Please refer to response to comment BOEM-2023-0011-0056-0012.
BOEM-2023-0011-0124-0026	According to BOEM the Fisheries Service "requested that BOEM consider an alternative that would prohibit installation of turbines within a 20-km buffer of the Nantucket Shoals 30-meter isobath to reduce potential impacts on this important foraging area for aquatic species such as the NARW and sea ducks." [Footnote 67: DEIS at 2-30.] Despite the role of the Fisheries Service to conserve protected species like the NARW the DEIS declined to even evaluate or analyze the use of conservation buffer zones to account for the environmental effects of WTG presence on oceanographic and hydrographic processes or the value of the area as NARW habitat.Instead of rigorously evaluating this management strategy BOEM dismissed the alternative stating without meaningful economic analysis that "(t)his alternative is not reasonable under NEPA because it is not consistent with the purpose and need nor Mayflower Wind's primary goals and is not economically feasible or practicable and would therefore be	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	equivalent to the No Action Alternative."68 Instead BOEM offered an alternative (Alternative D) that removed just 6 WTGs at the Northeast edge of the lease and "additional mitigation measures to reduce potential impacts on protected species" that are focused on mitigating effects of construction and noise rather than avoidance.BOEM is correct that a reasonable range of alternatives only needs to include alternatives that are technically or economically feasible but BOEM's dismissal of the 20-km conservation buffer is irrational because BOEM does not even state with certainty that the project would be economically infeasible if SouthCoast could not construct Phase 2. BOEM states that Phase 2 would be economically infeasible and that increased costs "may also render [Phase 1] infeasible." [Footnote 69: Id.] But if there is still the possibility that the project could be economically feasible with only Phase 1 then BOEM must include the conservation buffer zone within the reasonable range of alternatives. Even if BOEM were correct that the 20-km conservation buffer would render the project economically infeasible BOEM still has the discretion to include analysis of alternatives even when it does not consider them technically or economically feasible. Particularly in this case even if BOEM does believe as it states that the 20-km conservation buffer is not economically feasible it should still include it within the range of alternatives.	
BOEM-2023-0011-0124-0027	First including the conservation buffer zone as an alternative will allow BOEM to assess the impacts of the action more meaningfully in light of the concerns raised by NEFSC. This is particularly important for BOEM and SouthCoast since BOEM characterized the conservation buffer zone as being recommended by the Fisheries Service. Since the Fisheries Service has the authority and possibly duty to include the 20-km conservation buffer as a reasonable and prudent measure under the ESA it would be wise for BOEM to analyze the alternative in the DEIS.Second including the conservation	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	buffer zone as an alternative will allow the public to see a more robust consideration of the economics of the project which will increase its ability to comment on the EIS. Contrary to what BOEM seems to imply in the DEIS it is not required to approve the project simply because the developer has a Power Purchase Agreement. BOEM has other duties and responsibilities under OCSLA the ESA and the MMPA that demand a more meaningful consideration of an alternative that would avoid possible adverse effects on NARWs.BOEM failed to even fully explain why this alternative would not satisfy the goals of the project. BOEM does not detail the terms of the Power Purchase Agreement and whether those terms could be delayed or modified without or with limited penalty. Instead the DEIS simply states that the southern third of the lease area would not be ready for timely execution of the PPA.	
BOEM-2023-0011-0124-0029	Additionally BOEM's statement that the alternative is not consistent with the purpose and need of the action is not consistent with its statement in the "Purpose and Need for the Proposed Action." BOEM mistakes the economic goals of the developer for its own purpose in approving the project. As noted in the Purpose and Need section of the DEIS BOEM stated that the purpose of its action was to "determine whether to approve approve with modifications or disapprove Mayflower Wind's COP." [Footnote 70: DEIS at ES-2.] This purpose comes from the Biden Administration's goal of achieving 30 GW of offshore wind by 2030 while protecting biodiversity. [Footnote 71: Id.] BOEM makes clear that even with the conservation buffer SouthCoast would have sufficient turbine positions to meet its goal of 1275 MW in Phase 1 of the project. [Footnote 72: DEIS at 2-30.] As noted in the Appendix current offshore wind leases have a generating capacity of over 39 GW. [Footnote 73: DEIS at D-75 to D-77.] Even if a 20-km conservation buffer were used in all of the projects adjacent to Nantucket Shoals it is likely that there would still be sufficient generating capacity nationwide	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	to reach the 30 GW goal using modern turbine technology of up to 14MW per turbine. [Footnote 74: General Electric Haliade-X (https://www.ge.com/renewableenergy/wind-energy/offshore-wind/haliade-x-offshore- turbine) Last visited March 23 2023)]	
BOEM-2023-0011-0124-0030	The conservation buffer zone alternative also meets the piece of the Biden Administration's goals: meeting the 30 GW while protecting biodiversity. The conservation buffer zone is rooted in the clear advice of the NEFSC and its marine mammal conservation experts who have devoted their careers to this discipline many of whom are dedicated to the science supporting preventing NARW extinction. The NEFSC letter and the science underlying it expressed concerns with the ability to protect the NARW and therefore biodiversity if offshore wind is built out within the conservation buffer zone. Prematurely rejecting this concept without rigorously analyzing its merits and effects discounts this clear advice.The conservation buffer zone concept is not an extreme approach nor is it likely to have the disastrous effects on the project that are loosely discussed in the dismissed alternatives section. BOEM discusses the conservation buffer zone alternative as if it has no discretion to impose such a requirement but BOEM is not required to approve the Construction and Operations Plan as is. The lease notes that BOEM "retains the right to disapprove a SAP or COP based on [BOEM's] determination that the proposed activities would have unacceptable environmental consequences" among other reasons and that BOEM retains the right to approve a COP with modifications. [Footnote 75: Bureau of Ocean Energy Management Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0521) (Feb. 19 2019) https://www.boem.gov/sites/default/files/renewable-energy-p rogram/State-Activities/MA/Lease-OCS-A-0521.pdf.] Therefore BOEM cannot absolve itself of the need to analyze a reasonable alternative under NEPA and BOEM must	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	continue to meet its requirements under the ESA and the MMPA at every stage of the process.	
BOEM-2023-0011-0124-0031	BOEM's assertion that this strategy is "not reasonable under NEPA because it is not consistent with the purpose and need nor Mayflower (SouthCoast) Wind's primary goals" clearly shows BOEM's preference for meeting the desires of the developers regardless of the cost to the affect environment or a critically endangered species. By giving priority to the developer's economic interests BOEM entirely fails to meet its duty under OCSLA to ensure that activities carried out provide for "conservation of natural resources" or the goal of Biden Administration to deploy 30 GW of offshore wind "while protecting biodiversity." [Footnote 76: 43 U.S.C. § 1337(p)(4).] [Footnote 77: Tackling the Climate Crisis at Home and Abroad Exec. Order 14008 (Jan. 27 2021).] To meet its requirements under NEPA OCSLA and Executive Order 14008 BOEM must fully consider the 20-km conservation buffer zone as a reasonable alternative to the action.	Please refer to response to comment BOEM-2023-0011-0056-0012.
BOEM-2023-0011-0124-0034	Installation of utility scale offshore wind projects are likely to have local and broad oceanographic effects that may disrupt NARW zooplankton prey putting additional pressure on an already critically endangered species that uses the area near SouthCoast Wind as year round core feeding habitats. It is the responsibility of BOEM to heed the advice of the NEFSC relating to science and conservation of NARWs. For these reasons the FEIS for SouthCoast Wind must include the recommended conservation buffer zone proposed by the NEFSC in its preferred alternative. As discussed above including the conservation buffer zone will not impede on the economic viability of SouthCoast wind nor the 30 GW offshore wind goal set by the Biden Administration in Executive Order 14008. Including a conservation buffer zone will allow this project to achieve its goals fulfill its existing commitments and allow the Biden administration to move toward its renewable energy goals in a responsible way. To ignore the clear	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	scientific advice of marine mammal experts by failing to set a conservation buffer zone as the preferred alternative is illogical and contrary to BOEM's mandates under the ESA and OCSLA and the science-based management policies of the Biden administration.	
BOEM-2023-0011-0125-0001	Regarding the Alternatives outlined by BOEM in the DEIS, OW NA shares SouthCoast Wind's concerns with Alternative C-1 and Alternative C-2 and we agree that these two alternatives will not be feasible options for this project. We are particularly concerned that Alternative C-1 and Alternative C-2 will cause unnecessary and damaging impacts to local natural resources and historical sites while also creating significant technical and financial challenges for the SouthCoast Wind project impeding SouthCoast Wind's ability to provide substantial amounts of clean energy and the ensuing environmental benefits.	BOEM acknowledges Ocean Winds North America's comments regarding the concerns with Alternative C. BOEM has considered the information provided in the comment in the selection of the preferred alternative.
BOEM-2023-0011-0127-0005	Alternative F: Running an export cable through the Muskeget channel brings up concerns related to the fact that Vineyard Wind/Avangrid also has proposed export cable location in the same channel. We commend the developers for coordinating well to make a potential shared cable corridor work, but our concern is that if cable issues occur in a corridor that serves multiple projects the impact for clean energy production and delivery across the region could be substantial. Therefore, we encourage BOEM to reject alternative F.	As stated, SouthCoast Wind has worked extensively with other cable operators, including for the Vineyard Wind 1 and New England Wind projects, to site and design the cable layouts in the Muskeget Channel to minimize conflicts between existing and proposed cables in the area and reduce environmental effects. Various Chapter 3 resource sections in the EIS describe the impacts from installation of the Falmouth ECC cables, including Section 3.5.2, *Benthic Resources*, and Section 3.6.7, *Other Uses*. Alternative F proposes reducing the number of cables for the Falmouth ECC from five to three to reduce impacts in the area around Muskeget Channel. The analysis of Alternative F in Chapter 3 demonstrates that reducing the number of cables in the Falmouth ECC corridor would minimize impacts on seabed disturbance, navigation and vessel traffic, and other impacts in this area.
BOEM-2023-0011-0129-0004	In the interim while the NASEM conducts its evaluation of the hydrodynamic models being used by BOEM the Commission recommends that BOEM consider expanding Alternative D or	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	adding a new alternative to delay or avoid the installation of wind turbines in the eastern portion of the SouthCoast lease area until the NASEM study is completed and BOEM has updated its analyses and models regarding the cumulative effects of large-scale wind farms on the hydrodynamics of Nantucket Shoals and its implications for seasonal foraging habitat for North Atlantic right whales.	
BOEM-2023-0011-0132-0002	Section ES.4.1 States [Text in Blue: “Over the life of the proposed Project other reasonably foreseeable future impact-producing offshore wind and non-offshore wind activities are expected to occur which would cause changes to the existing baseline conditions even in the absence of the Proposed Action. The continuation of all other existing and reasonably foreseeable future activities described in Appendix D Planned Activities Scenario without the Proposed Action serves as the future baseline for the evaluation of cumulative impacts of all alternatives.”] A future baseline is not that same as the current ocean condition. Current conditions should be considered the baseline and future conditions considered separately. Therefore the proposed action alternative fails to analyze the impact of this project on the current ocean environment and the cumulative impacts are also not analyzed based on the current ocean environment. This is procedurally incorrect under NEPA. The public is not being given the opportunity to analyze the impacts of the project against a realistic baseline.	Please refer to response to comment BOEM-2023-0011-0053-0001.
BOEM-2023-0011-0132-0009	Section ES.4.4 Alternative D – Nantucket Shoals – That statement shows a complete disregard for the concerns of BOEM ‘s consulting agency the NMFS by dismissing the many concerns raised in the May 13, 2022 letter from Sean Hayes the Chief of Protected Species to Brian Hooker of BOEM. The “commenter” mentioned in the section of Alternative D appears to be a reference to this letter which lays out serious environmental concerns and impacts to NARWs There is no scientific data presented in the DEIS to support that the	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	impacts mentioned in the Hayes letter will not be realized. Mr. Hayes references 29 scientific studies to back up his concerns yet these concerns are dismissed in favor of “computer modeling” showing minor changes to the ecosystem from the full build out of the Mass/RI lease area. The model assumptions must be provided in a Draft EIS Supplement for the public to review and determine their reasonableness. This is too important of an ecological area especially as it pertains to NARW feeding and survival to leave out the details about the computer model and how it refutes the actual scientific concerns laid out by Hayes.	
BOEM-2023-0011-0132-0010	Restricting WTG development within 20-kilometer of the Nantucket Shoals 30-meter isobath was not carried forward. It is unacceptable under NEPA to dismiss alternatives that safeguard a federally endangered species. The reasons given for not considering these alternatives were due to timing power contracts and economic feasibility. This is unacceptable when the impacts on NARW could be mitigated.	Please refer to response to comment BOEM-2023-0011-0056-0012.
BOEM-2023-0011-0132-0011	Alternative D “Nantucket Shoals” shows no benefit in any area and should be discarded. Removing just 6 turbines does not address any concerns. The alternatives providing more of a buffer for NARW should be carried forward especially those providing a 20KM buffer from this important ecological area described by Hayes.- Clearly - the other alternatives that were dismissed should have been considered.- BOEM “believes” but no data regarding the computer model inputs are presented.- Hayes’s concerns needs to be considered and addressed. BOEM should not dismiss these concerns and has not provided the “model” inputs to substantiate their assumptions- This combined with the rational for dismissing the other alternatives shows BOEM is not taking the concerns of NMFS seriously.	Please refer to response to comment BOEM-2023-0011-0056-0012.
BOEM-2023-0011-0132-0012	In dismissing the alternatives that could protect the important Nantucket Shoals ecosystem and in turn the NARW BOEM gives the rationale that they would not allow the developer to	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	satisfy contractual offtake obligations. Under the CEQ NEPA rules instituted by President Biden an applicant's interest is no longer paramount. In this case the approval should be denied. If the alternative that protects the environment cannot be considered….then don't do it. Another reason given is "It is environmentally infeasible meaning implementation of the alternative would not be allowed by another agency from which a permit or approval is required or implementation results in an obvious and substantial increase in impacts on the human environment that outweighs potential benefits". This should be applied to all Wind Lease Areas in NARW habitat.E. 84 turbines were adequate for the Vineyard Wind 1 project so there is precedent that a smaller scale project is actually feasible	
BOEM-2023-0011-0132-0013	The DEIS states [Text in Blue: "First Mayflower Wind has collected and analyzed full geotechnical data on about two-thirds of their WTG positions all within the shallower northeast portion of the Lease Area to support the design and engineering of foundations and other components of their Phase I Project while meeting the schedule for power delivery under their PPAs with Massachusetts. If one-third of their WTG positions were not available for timely development and 53 out of approximately 100 WTG positions were eliminated by the alternative far fewer (around 50) WTG positions than the 85 WTG positions needed to produce 1200 MW would remain for the timely execution of the Massachusetts PPAs. While Mayflower Wind is currently finishing collecting the remaining geotechnical data for the other positions in the lease Mayflower Wind is not able to analyze and design foundations in time to meet the deadlines in their Massachusetts PPAs. Thus this alternative is unreasonable because it would be incompatible with the Massachusetts offtake awards which are integral to both the purpose and need for the Project and Mayflower Wind's primary goals"]. In this instance it appears the rationale is that there is no time to protect NARWs because MA contracted for the energy sooner	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	than whale protection would allow. This is un-acceptable under NEPA MMA and ESA. There is no basis under our federal system for federal decisions to be bound by state agreements.	
BOEM-2023-0011-0132-0014	Even eliminating 17 turbines was not carried forward with only economic reasons given. However other projects are proceeding with fewer turbines so it simply does makes sense that these alternatives were not carried forward. This is unacceptable under NEPA as the NARW would be afforded greater protections.	Please refer to response to comment BOEM-2023-0011-0056-0012.
BOEM-2023-0011-0132-0015	Common export cables were also not a considered alternative. This is problematic as greater protections would be given to sensitive marine environments especially the Muskegat Channel. The fact that the various projects are technically unable to share export cables makes it apparent that "the grid" is simply not ready for offshore wind.	As described in Table 2-3 of the Draft EIS, BOEM considered but did not analyze in detail an alternative that would use common cable corridors for adjacent offshore wind projects. BOEM dismissed the alternative as it cannot dictate that a lessee use a shared cable corridor and it would be impractical to share corridors with projects that have different interconnection points as further detailed in Table 2-3. BOEM did analyze in detail Alternative F, which would reduce the number of cables in the Falmouth ECC to minimize impacts in the Muskeget Channel.
BOEM-2023-0011-0132-0062	On page 3.5.2-14 it states that noise from G&G surveys will rarely overlap. This is simply false and this exact situation is currently happening in the NY/NJ area. No historical data for timing of surveys and whale deaths has been provided for the MA/RI lease area.	The text explains that detectable impacts of G&G noise on benthic resources would rarely, if ever, overlap from multiple sources. While G&G surveys from multiple projects could occur concurrently, detectable impacts within the geographic analysis area are not expected to occur. As explained in Section 3.5.2.3, should surveys overlap, multiple sound sources do not produce overall louder noises. The loudest one would prevail making the less intense harder to hear (see Section 3.5.2.3 *noise* IPF). Please refer to Section 3.5.6, *Marine Mammals*, regarding impacts on whales.
BOEM-2023-0011-0132-0070	This paragraph on page 3.4.2-14 is especially problematic: [Text in Blue: "Results from a recent Johnson et al. (2021) hydrodynamic model of four different WTG build-out scenarios of the offshore Rhode Island and Massachusetts	While the analysis notes that there may be alterations, the study referenced in this paragraph noted that the scale of change is approximately +-11% or less in the modeling domain (the vast majority is far less than 11%). This scale is

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	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 hydrodynamic model study show that introduction of the offshore wind structures into the offshore WEA modifies the oceanic responses of current magnitude temperature and wave heights by (1) reducing the current magnitude through added flow resistance (2) influencing the temperature stratification by introducing additional mixing and (3) reducing current magnitude and wave height by extracting of energy from the wind by the offshore wind turbines. Alterations in currents and mixing would affect water quality parameters such as temperature DO and salinity but would vary seasonally and regionally. WTGs and the OSPs associated with reasonably foreseeable offshore wind projects would be placed in average water depths of 100 to 200 feet (30 to 60 meters) where current speeds are relatively low and offshore cables would be buried where possible. Cable armoring would be used where burial is not possible such as in hard-bottomed areas. BOEM anticipates that developers would implement BMPs to minimize seabed disturbance from foundations scour and cable installation. Adverse impacts on offshore water quality would be localized short term and minor. Presence of structures would not be expected to appreciably contribute to overall impacts on water quality."] After acknowledging impacts to currents water temperature wave heights and mixing the conclusion is simply made that these impacts will be minor with no data to support that. These are in fact significant issues that will impact the water quality and food sources for the critically endangered NARW and have the potential to have ecosystem wide impacts including the water around Nantucket and Nantucket Harbor. More information is clearly needed here.	not anticipated to affect water quality parameters to an extent greater than natural variability ("vary seasonally and regionally"). The impact on food sources is not analyzed in the water quality section.

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BOEM-2023-0011-0132-0092	The no action alternative is described as [Text in Blue: “Development of future offshore wind projects would increase the amount of offshore anthropogenic light from vessels area lighting during construction and decommissioning of projects (to the degree that construction occurs at night) and use of aircraft and vessel hazard/warning lighting on WTGs and OSPs during operation. Up to 901 WTGs associated with other offshore wind projects excluding the Proposed Action with a maximum blade tip height of 1171 feet (357 meters) would be added within the geographic analysis area for cumulative visual effects on historic properties between 2023 and 2030 (Appendix D Table D2-1).”] Again these projects have for the most part not been approved. This is not an accurate picture of a “no action alternative”.	Please refer to response to comment BOEM-2023-0011-0053-0001.
BOEM-2023-0011-0136-0011	In the DEIS the No Action Alternative assumes only the Proposed Action will not occur. “[O]ther reasonably foreseeable future impact-producing offshore wind and non-offshore wind activities would be implemented.” [Footnote 14: See DEIS p. 2-3] This assumes full buildout of existing and foreseeable future activities - including other energy developments - without also providing information or comparison of alternatives against an undeveloped (no construction) region. As presented the DEIS presupposes the approval of future OSW projects that have not even begun an environmental assessment nor have the public had the opportunity to provide input to. This results in multiple issues:- The DEIS provides the public with misleading information as it presumes construction of OSW in all the leases in the region. Project approval must not be expected preemptively.- The public cannot reasonably differentiate and assess if a specific project and regional OSW development are worth the impacts they will cause; both known and unknown.- The impacts of these projects are diluted and obscured as they are only compared against regional buildout rather than no development.- Contribution of each project to cumulative	Please refer to response to comment BOEM-2023-0011-0053-0001.

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	impacts is minimized. One project may not seem “that bad” in comparison to the potential buildout of all leases and WEAs in the region but the cumulative impacts of all these projects will be the most harmful to the marine environment and ocean users.	
BOEM-2023-0011-0136-0012	At a minimum an additional alternative should be analyzed and compared against the design envelope of the project for which the DEIS has been prepared: a [Bold: No Development Alternative]. The No Action Alternative as presented should still be included in the DEIS 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.	Please refer to response to comment BOEM-2023-0011-0053-0001.
BOEM-2023-0011-0136-0013	The DEIS should explicitly include alternatives for analysis that serve to mitigate the project’s impacts to fishing including the specific requests above those raised during scoping and in previous comment letters and those listed on RODA’s website. [Footnote 15: See https://rodafisheries.org/offshore-wind/] The SouthCoast DEIS includes alternatives intended to minimize fisheries habitat impacts (Alternative C) foraging habitats associated with hydrodynamic features (Alternative D) and complex habitats from export cables through the Muskeget Channel (Alternative F). 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 communities. We recommend other habitat features important to fisheries in the lease area be afforded similar protection as well. This would ensure that disruptions to our nation’s food security is minimized and reduce the potential for negative impacts to shoreside business dependent upon the seafood harvested in the lease area.	BOEM reviewed all comments received during the scoping period for the SouthCoast Wind Project and evaluated potential alternatives that were identified during scoping, interagency coordination, and internal BOEM deliberations as described in Section 2.1. BOEM reviewed potential alternatives using BOEM’s screening criteria presented in Section 2.2 and carried forward (described in Section 2.1) or dismissed from detailed analysis (described in Section 2.2) alternatives based on that review. This includes dismissing an alternative from detailed analysis to establish transit lanes across the Lease Area to fishing grounds. BOEM analyzed Alternative C in detail, with the specific purpose of minimizing impacts on fisheries from the Project’s offshore export cables. In addition to these alternatives, BOEM has also identified several mitigation measures to minimize impacts on commercial and for-hire recreational fishing, which are identified in Appendix G, Table G-2. These include measures to compensate for lost income for commercial and recreational fishermen and other eligible fishing interests

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		and ensuring that cable protection measures should reflect the pre-existing conditions of the site.
BOEM-2023-0011-0136-0015	Since the scoping period for the DEIS, 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" [Footnote 16: See https://www.boem.gov/sites/default/files/documents/renewableenergy/BOEM%20COP%20EIS%20Alternatives- 2022-06-22.pdf] 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. [Footnote 17: This document was issued without any opportunity for the public to participate in or provide input on its development thus to our knowledge has not been the subject of any public comment.] Indeed it affords the terms of cost-competitive procurement agreements "more deference than a typical contract between two private for-profit entities" although such contracts are nearly entirely driven by profit and energy maximization and without environmental review. The document only references mitigation in the context of what should not be considered as a NEPA alternative; that is it suggests actions with "substantially similar effects" to other options should be considered outside of the range of alternatives. [Footnote 18: This statement contradicts NEPA's implementing regulations which specify the alternatives of an Environmental Analysis or Environmental Impact Statement must "include appropriate mitigation measures not already included in the proposed action or alternatives." 40 C.F.R. § 1502.14(e).][Bold: We urge 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	Comments on BOEM's "Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the NEPA" are outside the scope of the SouthCoast Wind Project review. However, it should be noted for the SouthCoast Wind Project that the selection of alternatives for analysis in the EIS was a collaborative process done in coordination with cooperating agencies. The screening criteria were used to determine if an alternative was feasible and should be carried forward for analysis in the EIS. The results of BOEM's evaluation of alternatives resulted in a range of reasonable alternatives that were analyzed in the EIS in compliance with NEPA and CEQ implementing regulations. Please refer to response to comment BOEM-2023-0011-0136-0013 regarding alternatives and mitigation that BOEM analyzed for the SouthCoast Wind Project.

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	solutions and afford these full neutral consideration.] Stand-alone alternatives will more clearly inform public comment and allow better evaluation of potential mutual benefits or tradeoffs. As a public agency BOEM's consideration of alternatives should include those that reasonably mitigate impacts to fishing and businesses dependent upon fishing whether or not a developer has voluntarily proposed to incorporate them in its Construction and Operations Plan (COP) and whether or not they could require reasonable modifications to private contracts.	
BOEM-2023-0011-0136-0016	It is imperative the public is able to differentiate impacts from the various alternatives presented in the DEIS to understand the suitability of prospective project alternatives. The Summary and comparison of impacts among alternatives with no mitigation measures (Table ES-2) provides limited information on how the alternatives differ and provides no information on how impacts sub-alternatives differ. For example the Alternatives with a habitat minimization intention (Alternatives C D and F) have no difference of impacts to the Benthic Resources Coastal Habitats or Essential Fish Habitat from the Proposed Action (Alternative B). It is unclear in the documents how impacts from the various alternatives differ from each other. Instead the impact analysis compares the collective back to the Proposed Action which the DEIS assumes would be the most likely "Alternative." 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.	Table ES-2 provides a high-level summary of the impact levels for each resource topic by alternative and is not intended to provide a detailed discussion of the differences between alternatives. A more detailed summary of impacts and comparison between alternatives is provided in Chapter 2, Table 2-4. The complete analysis of alternatives is included in each Chapter 3 resource section. To improve the discussion and understanding of the differences between alternatives, BOEM has added a Comparison of Alternatives section to each Chapter 3 resource section that compares the impacts among alternatives. Additionally, BOEM added additional detail to various Chapter 3 sections where site specific information about the impact of an alternative was available. The action alternatives are appropriately compared to the Proposed Action as the action alternatives were devised to reduce specific environmental impacts of the Proposed Action. Alternatives C through F address different aspects of the Project and comparing the impacts is not always appropriate as the impacts may not be comparable. For example, Alternative C was proposed to minimize habitat impacts in the Sakonnet River from cable installation while Alternative D was proposed to minimize impacts from foundations near Nantucket Shoals. A direct comparison of acreages of impacts or other effects is not appropriate as the alternatives deal with completely different geographies

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		(Sakonnet River versus Nantucket Shoals) and effects (cable installation versus foundation installation) and a direct comparison about the relative value of each alternative could therefore be misleading. As noted in Chapter 2, Section 2-1, *Alternatives*, BOEM can mix and match aspects of multiple alternatives to derive its Preferred Alternative. Impacts on commercial fisheries from each of the alternatives are disclosed in Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*, where the action alternatives vary from the Proposed Action. BOEM has revised Section 3.6.1 to include additional information about fishery impacts from Alternative C in the Final EIS.
BOEM-2023-0011-0136-0017	Some of the information on alternatives are poorly presented in the DEIS. For example under the Proposed Action (Alternative B) there are 3 options for OSP design: Option A - Modular Option B - Integrated Option C - HVDC Converter. These variations of the Proposed Action are all analyzed inclusively and yet the variation of substation design will likely have differing impacts.	The EIS assesses the impacts of the SouthCoast Wind PDE that are described in the COP using the "maximum-case scenario" process, which analyzes the aspects of each design parameter that would result in the greatest impact. As described in the COP Volume 1 and Draft EIS Chapter 2, Option A – Modular and Option B – Integrated would support AC design while Option C – HVDC Converter would support a DC design. The primary difference between the OSP designs that would affect environmental impacts is the amount of seabed disturbance, foundation types that would support them, and open loop cooling. The maximum seabed disturbance and impacts from foundation types (e.g., monopile and piled jacket) are analyzed as part of the presence of structures IPF in Chapter 3. The DC design would include the intake and discharge of ocean water required to cool the HVDC converter station. These impacts are described in the *discharges/intakes* IPF in relevant Chapter 3 sections.
BOEM-2023-0011-0136-0018	The DEIS provides an alternative aimed to address potential impact on protected species - Alternative D. And yet the DEIS states there is " a lack of conclusive evidence that removal of proposed turbine location… would measurably lessen these minor impacts on the hydrodynamic features." [Footnote 19:	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	See DEIS p. 2-18] It is unclear why BOEM does not fully analyze the alternative proposed by NMFS to "preclude the development of WTGs within a 20-km buffer of the Nantucket Shoals 30-meter isobath" the only rationale providing being "that it is inconsistent with Mayflower Wind's primary goals and the alternative is not economically feasible of practicable." [Footnote 20: See DEIS p. 2-31.] As stated above deference to the project applicant's needs should not supersede sound environmental analysis especially considering there is no clear directive or need for full buildout of the SouthCoast project. We urge BOEM to conduct a full analysis of an alternative that would protect the important high productivity and foraging grounds for North Atlantic Right Whale that is Nantucket Shoals. [Footnote 21: RODA submits by reference comments submitted by Seafreeze Ltd. on the SouthCoast DEIS for further explanation of hydrodynamic studies of wind facilities and importance of Nantucket Shoals as foraging habitat for endangered North Atlantic right whales.]	
BOEM-2023-0011-0136-0019	Confusion is further compounded as the different alternatives can be combined for the Final EIS. The alternatives listed in the DEIS 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.	Based on public input on the Draft EIS and the analysis of impacts of the alternatives, BOEM selected the Preferred Alternative, which is identified in the Final EIS. BOEM did not identify the preferred alternative in the Draft EIS, consistent with other offshore wind EISs BOEM has and is preparing and as allowed by NEPA implementing regulations, so that its selection could be informed by public input.
BOEM-2023-0011-0136-0022	BOEM's draft analyses recognize the potentially major impacts to fishing, marine mammals, and navigation of the	BOEM's Draft EIS identified negligible to major and minor beneficial impacts for marine mammals, negligible to

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	proposed projects and their respective alternatives. Yet, not all mitigation proposals offered by the fishing industry were evaluated as alternatives in the DEIS. These are summarized below; a full discussion is included in prior RODA's scoping comments on these and other projects.	moderate impacts on navigation, and minor to major impacts on commercial fishing depending on the fishery. The commenter is correct that not all mitigation proposals offered by the fishing industry were analyzed as EIS alternatives as the proposals may have been more appropriately considered as mitigation as opposed to an EIS alternative. NEPA alternatives that were identified through public comments during the EIS scoping process and that were not carried forward for detailed analysis in the EIS are identified in Chapter 2, Table 2-3. BOEM has proposed in the Final EIS mitigation to address impacts on commercial and for-hire recreational fishing and other resource conflicts as described in Chapter 3 resource sections and Appendix G.
	• Modifications in the project areas to preserve fishing access;	BOEM considered but dismissed an alternative from detailed analysis to establish transit lanes across the Lease Area to fishing grounds (Chapter 2, Table 2-3).
	• Immediate strategies to address impacts to protected resources during the length of the lease so they are ready to be implemented immediately once impacts are detected;	SouthCoast Wind has proposed a bird and bat monitoring plan, available in Appendix G, Attachment G-2, and has developed fisheries and benthic monitoring plans to be implemented during implementation of the Proposed Action.
	• Safe transit areas through the lease areas under consideration and those reasonably foreseeable analyzed and implemented using a cumulative effects approach;	Alternatives that would affect the layout of the turbine array in other offshore wind lease areas are outside the scope of the SouthCoast Wind COP EIS. BOEM's decision based on the findings of the SouthCoast Wind EIS would be to approve, approve with modifications, or disapprove SouthCoast Wind's COP, and the SouthCoast Wind EIS does not support decision-making related to COPs for other offshore wind leases.
	• Direct and transparent collaboration with the fishing industry on shoreside considerations including port infrastructure dock usage and economic impacts or opportunities; • Adequate independent processes for gear loss claims;	As described in Final EIS Section 3.6.1, mitigation measures analyzed for commercial fisheries and for-hire recreational fishing include compensation for gear loss or damage, compensation for lost fishing income (including related to shoreside services), and development of fisheries and benthic habitat monitoring plans.

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	• Adhere to a holistic approach to determining and awarding compensation from economic loss to fishing and fishing businesses; • Monitor fisheries impacts for the life of projects and utilize adaptive management;	
	• Improved federal environmental review analysis and clear identification of scientific unknowns;	BOEM's analysis of incomplete and unavailable information is included as EIS Appendix E.
	• Require deicing technology and practices;	Based on historical and site specific weather data, ice formation at the Project site is expected to be very limited and of brief duration. SouthCoast Wind will employ weather monitoring to assess the risk of icing and spray down iced surfaces that may need immediate access with water and/or de-icing fluids. In the event of ice accumulation on the WTG blades, the WTG has the capability to adapt its operation to these conditions. Therefore, no special measures are required or recommended to prevent icing.
	• Perform "micrositing" of turbines and cables with fishermen who know the areas and surrounding ecosystem; • Prohibit turbines foundations and cables in sensitive habitat including spawning areas and important fishing grounds;	BOEM considered specific recommendations for WTG and cable siting that were provided during public comment periods for scoping and the notice of availability of the Draft EIS, or that arose through interagency coordination with cooperating agencies, or through consultations with NMFS for EFH and the ESA. The Preferred Alternative reflects the alternative that BOEM believes would best accomplish the purpose and need of the Proposed Action while fulfilling its statutory mission and responsibilities, given consideration of economic, environmental, technical, and other factors.
	• Resolve impacts to National Marine Fisheries Service (NMFS) fishery-independent survey;	NOAA and BOEM developed a federal survey mitigation strategy that was published in December 2022 as NOAA Technical Memorandum NMFS-NE-292. The purpose of this strategy is to describe the approach NOAA Fisheries and BOEM will use to mitigate the impacts of offshore wind energy development on NOAA Fisheries surveys, with specific application to the Northeast U.S. Region (Maine to

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		North Carolina). This strategy calls for the development of a Northeast Federal Survey Mitigation Program as a specific action. The Mitigation Program will include Survey-Specific Mitigation Plans for each affected survey including both vessel and aerial surveys. This strategy is intended to guide implementation of the Mitigation Program through the duration of wind energy development in the Northeast United States.
	• Ensure that any economic benefits of offshore wind accrue to the U.S.—not at some undetermined point in the future but now.	The purpose of the EIS is to disclose the impact of approving SouthCoast Wind's COP. Directing the economic benefits of offshore wind to specific entities is outside the scope of the SouthCoast Wind EIS.
BOEM-2023-0011-0137-0001	BOEM's lease of this areas in this block [Footnote 10: block comprised of the OCS-A-0520 (Beacon) OCS-A-0521 (Mayflower/SouthCoast) OCS-A-0522 (Liberty) OCS-A-0487 (Sunrise) and OCS-A-0500 (Bay State) planned power plants]—without an Environmental Impact Statement (EIS) is based on the notion promulgated in case law [Fisheries Survival Fund v. Bernhardt Case No. 16-cv-2409 (TSC) 5 (D.D.C. Feb. 14 2020)] that the connection between the lease of such ocean areas and harm to marine life is too tenuous to require a full environmental review because BOEM still "retains authority to preclude construction". Indeed BOEM went ahead and leased this area and authorized SAP[Footnote 11: Site Assessment Plan] activities to be carried out in the lease area all without an EIS but now claims in environmental review of the COP plan to build the entire Mayflower lease area that it cannot preclude construction because the developer-lessee has already committed the area to Power Purchase and or Offtake agreements[Footnote 12: In the DEIS BOEM states that not building out the entire lease area was among the "Alternatives Considered but Not Analyzed in Detail" indicating it cannot preclude construction in any substantial part of the lease area because it can only select among	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	options that meet the developers needs to be able to fulfill power purchase agreements the developer had entered into]. This is in blatant contradiction to its assertion that the basis for not requiring an EIS for sale of lease (reasonably expected to lead to construction activity) is it can later upon environmental review of the COP preclude construction.	
BOEM-2023-0011-0137-0023	Putting all foundation type alternatives as one alternative "Alternative E" and having qualitative and superficial discussions about impacts is not helpful to fulfilling the mandate of NEPA that the impacts of projects on the environment be understood and that ways to mitigate of harm be reasonably fully considered.	As described in Chapter 2, Alternative E was developed through the scoping process in response to comments received from multiple commenters on construction noise related to foundation installation. Under Alternative E, BOEM analyzes three sub-alternatives, one for each foundation type (piled, suction-bucket, and GBS) that was originally included in SouthCoast Wind's PDE (including in the COP Version E, posted to BOEM's website on March 23, 2023, which was analyzed in the Draft EIS), two of which (suction-bucket and GBS) do not include pile driving noise impacts. In the analysis of resource impacts in Chapter 3, BOEM described the differences in impacts between these foundation types. Where appropriate, impacts based on seabed disturbance totals and noise impacts are discussed. Because many of the impacts are similar to the Proposed Action, BOEM has only identified where impacts between Alternative E and the Proposed Action differ substantively. BOEM has given equal consideration of each alternative in its analysis in the EIS based on available information.
BOEM-2023-0011-0137-0026	The estimated quantitative effect of the SouthWind power plant's contribution to a reduction in productivity via this "trophic footprint" of fouling heterotrophs when taken together with that of other wind-turbine power plant projects planned on the outer continental shelf (some of which are floating wind farms in which each turbine sits on a 2- acre shade-casting tethered platform) has not been estimated by BOEM in the DEIS with respect to mass quantity (tonnage) of excess dissolved carbon compounds that will result from the U.S. Atlantic Offshore wind program's impairment of primary	BOEM has considered primary production related to the addition of structures in more detail in Sections 3.5.5.3 and 3.5.5.5, including a reference to Dannheim et al. 2020 which considers that higher densities of filter feeders could consume much of the increased primary productivity around offshore wind turbines. Modeling in the North Sea has shown that only small changes to primary productivity around offshore wind farms changes are expected to occur, and overall trophic response difficult to project (Daewel et

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	productivity on the Outer Continental Shelf. These dissolved carbon compounds impair the ability of the ocean to serve as a carbon buffer to atmospheric carbon and contribute to ocean acidification. The authors conclude that "[e]very square meter of artificial structure cancels out the primary production of up to 130 square meters" of water "essentially robbing marine ecosystems of their productivity" [M.E. Malerba C.R. White and D.J. Marshall 2019. Frontiers in Ecology and the Environment Vol. 17 Issue7 September 2019 pp.400-406. https://doi.org/10.1002/fee.2074] a conservative estimate according to the researchers with the trophic footprint (net effect of alteration of the natural trophic pyramid) potentially having double that effect. Estimates by other researchers show a 1:8 ratio of square area of marine urbanization to area of primary production cancelled by its existence. SEE ORIGINAL ATTACHMENT FOR IMAGE OF Figure 13. Fouling on hard-surfaces that accompanies marine urbanization (construction in marine environments). Dense communities of filter-feeding sessile heterotrophs appear that reduce density of photosynthetic plankton responsible for removing dissolved inorganic carbon from ocean water and turning it into organic life forms. Knowing these "trophic footprint" effects of marine construction the conclusions of the Bureau in the DEIS—that concrete bottom scour pads surrounding wind energy structures and other structures that comprise the ocean power plants will be "beneficial" on account of the fact that they will serve as substrate that fosters growth of new communities of organisms built around sessile heterotroph organisms—is a conclusion that is very difficult to make rational sense of the DEIS does not attempt to quantify the effect of this marine urbanization on the trophic footprint (population explosion of sessile invertebrates causing decline in autotroph density and consequential reduction in ability of the waters over the outer continental shelf to reduce dissolved carbon thus reducing the ocean's ability to serve as a carbon buffer). Because this	al. 2022) even in much larger than planned wind farm development.

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	power plant cumulatively with the larger U.S. Offshore Wind Program contributes to marine urbanization which can have such an impact the DEIS is insufficient at fulfilling the requirements of NEPA to estimate impacts reasonably expected to occur.	
BOEM-2023-0011-0137-0030	In a letter dated May 13 2022 signed by Sean A. Hayes PhD Chief of Protected Species NOAA NEFSC Addressed to Brian R. Hooker Lead Biologist of the Bureau of Ocean Energy Management at the Office of Renewable Energy Management[Footnote 57: With cc to: CC: Diane Borggaard NOAA; Genevieve Brune BOEM Nicole Cabana NOAA; Julie Crocker NOAA ; Jaclyn Daly NOAA; Carter Esch NOAA; Jon Hare NOAA; Jill Lewandowski BOEM; Andrew Lipsky NOAA; Chris Orphanides NOAA; Desray Reeb BOEM; Nick Sisson NOAA; NOAA; Katie Varghese BOEM] the scientists at NOAA Fisheries (a.k.a. National Marine Fisheries Service or NMFS) and BOEM stated in part "Disturbance to [endangered] right whale foraging could have population- level effects on an already endangered and stressed species. The right whale population is food resource-limited … Right whales are chronically stressed from food limitations entanglement sub-lethal vessel strikes and noise. Displacement from a prime portion of their only winter foraging grounds due to disruptions in forage availability/distribution and/or exposure to other stressors (e.g. increased vessel traffic) could have extremely detrimental energetic effects resulting in reduced calving success … Additional noise vessel traffic and habitat modifications due to offshore wind development will likely cause added stress that could result in additional population consequences …"The letter went on "We anticipate that incremental [Underline: movement [by] 20 km or more from the edge of Nantucket Shoals 30 meter isobath for initial proposed development] inclusive of WTGs and DC-convertor OSSs [Underline: would reduce the potential for negative consequences to right whale prey and the NARW population.]"The letter recommended increasing turbine	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	density in the southwestern portions of the lease areas to spare the northeast areas where NARW feed.BOEM dismisses the federal government's own scientists' recommendation for the protection of an endangered species deciding not to evaluate it as a viable alternative because "this alternative [would have] a total of … 94 [turbines] and 2 [offshore platforms] …" short of what "would be needed for Phase 1…." Adding "Mayflower Wind needs the 85 [turbines] for Phase 1 to achieve the 1275 MW in existing offtake agreements that Mayflower Wind has."BOEM flatly admits that the reason this biodiversity-preserving proposition was rejected is because [[Underline: irretrievable commitments were already made in the form of Power Purchase Agreements or Offtake agreements for use of that area of OCS for power production]. This is in clear violation of Both NEPA and the ESA. The regulations implementing the Endangered Species Act (ESA). "Irreversible or irretrievable commitment of resources: After initiation or reinitiation of consultation required under section 7(a)(2) of the Act the Federal agency and any applicant shall make no irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives which would avoid violating section 7(a)(2). [50 CFR § 402.09 (emphasis added)]. Under Section 7(a)(2) of the ESA Federal agencies are required to ensure in consultation with the Services any actions authorized funded or carried out are not likely to jeopardize species or destroy or adversely modify critical habitat.This is also in violation of regulations implementing Section 101 of NEPA at 42 U.S.C. 4331(a) and (b). Numerous judicial decisions have made clear that environmental impact statements to satisfy requirements for NEPA analyses must occur prior to [Bold: not following] irretrievable commitment of resources.	
BOEM-2023-0011-0137-0033	The DEIS defines "Alternative D" as an alternative as removing out of 147 turbines only a handful of turbines: only four	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	turbines on the outer (east) periphery and two at the north of the bottom lip of the “cannoli shell”. This so-called mitigating alternative is so similar to the proposed action that it can hardly be called an alternative at all. Indeed it appears to differ so little from the proposed action as if it was specifically designed to be rejected for being ineffectual at mitigating any adverse impact of the proposed project. This is not the meaning of designing alternatives to the proposed action within the National Environmental Policy Act and therefore does not satisfy the requirements of the act that alternatives be considered.	
BOEM-2023-0011-0137-0034	Given the documented grave expected consequence to North Atlantic Right Whale feeding and of consequence to foraging commute of several species of waterfowl (see e.g. Fig. 24 Long-Tailed Duck Foraging Commute) and concomitant risks [Bold: an alternative which actually significantly lessens the expected harm must be formulated so that the environmental harm spared by the alternative proposal can be weighed against the differential between expected realized power generation between the harm-sparing alternative and the proposed action.] This is the purpose of the requirement for an alternative to the proposed action. The DEIS states that the purpose of making Alternative D is so that turbines “in the northeastern portion of the Lease Area would be [excluded] to reduce potential impacts on foraging habitat and potential displacement of wildlife from this habitat adjacent to Nantucket Shoals” yet chosen for exclusion are so few turbines as to have no practical effect. Electing to make [Bold: this] the impact-reducing alternative and then handily rejecting it for not reducing impact is an absurdity. BOEM must evaluate alternatives [40 CFR § 1502.14] to the proposed action. If alternatives do not differ in environmental consequences then it cannot be the case that “The environmental consequences section forms the scientific and analytic basis for the comparisons under § 1502.14”[Embedded hyperlink	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	https://www.ecfr.gov/current/title-40/section-1502.14] [See 40 CFR § 1502.16] and the requirements of NEPA are not satisfied by the DEIS.	
BOEM-2023-0011-0137-0038	The only "No-Action alternative" evaluated was energy production from the burning of fossil fuel to produce the energy that the Mayflower power plant would otherwise supply. There weren't any "No Action Alternatives" that involved the use of carbon capture implementation of energy conservation policy or other low-carbon forms of producing energy (either within[Footnote 61: BOEM does not in the DEIS consider purpose-satisfying alternatives within its statutory authority to implemenent for cumulative effects. For example Net average electrical power production from Ocean Thermal Energy Conversion exceeding 100 MW is calculated to be achievable off the southern coast of Florida per OTEC facility.	The No Action Alternative assumes that BOEM would not approve the SouthCoast Wind COP and that the SouthCoast Wind Project would not be built. Ongoing activities that contribute to existing baseline conditions are also described under the No Acton Alternative. Ongoing and reasonably foreseeable planned activities that could contribute to cumulative impacts of the No Action Alternative and cumulative impacts of the action alternatives are described in Appendix D, *Planned Activities Scenario*. Alternate technologies for energy generation or conservation would not meet BOEM's screening criteria for alternatives to be analyzed in detail[4] because it would not meet BOEM's purpose and need or the goal's of the applicant as described in EIS Chapter 1, Section 1.2, *Purpose of and Need of the Proposed Action*.
BOEM-2023-0011-0137-0048	Two DEIS statements first"[R]esults of benthic monitoring at European wind facilities and the Block Island Wind Farm in the United States provide general knowledge of the overall impacts of these IPFs combined if not individually. Therefore the analysis provided in this EIS is sufficient."and second the comment within the DEIS that assesses the project both individually and cumulatively to be of net benefit to the benthos are not supported and are contradicted by the available scientific data. Of the few studies were conducted at the Block Island Wind Farm to look for effects and cited some were commissioned by wind developers and written by their employees [Footnote 74: E.g. https://www.int-res.com/articles/meps_oa/m683p123.pdf]. We reiterate to	Cited article does not investigate impacts of EMF or noise at offshore wind farms. The commenter's cited article investigates the impact of prey availability and foraging habitat by flounder and Gadid fishes, which found that besides these fish incorporating some of the epibionts (mussels and mysid shrimps which are associated with mussel beds) into their diets the quality of foraging habitat was deemed similar at the wind farm and reference sites (without offshore wind farm). EMF and noise IPFs listed in both Section 3.5.2, *Benthic Resources,* and Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, include the best available data and scientific literature for offshore wind and is consistent with

[4] See BOEM's *Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the National Environmental Policy Act* published June 22, 2022, and available at https://www.boem.gov/sites/default/files/documents/renewable-energy/BOEM%20COP%20EIS%20Alternatives-2022-06-22.pdf.

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	the Bureau of Ocean Energy Management that there is a wealth of scientific information about how both noise and magnetic fields (that wind-turbine power plants and their transmission infrastructure expected to produce respectively) affects marine life including effects on the benthos in ways that has not received adequate consideration.	other offshore wind EIS documents including Ocean Wind 1 and Revolution Wind.
BOEM-2023-0011-0137-0049	Anticipated effects of the proposed activities on invertebrates are large potentially very large or are unknown (See Appendix A) [Footnote 75: The following were given less than due consideration in the DEIS or impacts to populations were downplayed or underestimated: Change in prey density or availability; modified feeding behavior; increased energetic expenditure (traversing extra distances to avoid areas of activity; increasing communication volume circuitous migratory paths); physiological effect of stress damage to ciliated structures (and the consequences for the organism); behavioral response to sound exposure interferes with necessary life functions; direct physiologic effect of exposure to sound; impairment of habitat selection capability based on sound cues habitat alteration from behavioral changes in animals that are ordinarily habitat manipulators; delayed or abnormal physiology or behavior in development; decreased sediment mixing (reduced locomotion increased recession); damage to statocysts and harm outcomes such as impacts to reproductive energy budgets brood success; missed mating opportunity impairment of ability to select mates from masking mating sounds and calls; changes to plankton (spatial distribution planktonic species composition); immunosuppression of coelomates depletion of antioxidant resources impaired gravitaxis shell dissolution (related to increased anaerobic metabolism from time spent with valves shut) reduced predator defenses (reduced predator detection impaired shoaling in fish inability to locomote and thus regulate internal conditions impaired escape from reduced condition postural and positional changes from physiological damage to "righting" organs) impaired migration and change	Text has been added to Section 3.5.2.3, *Cumulative Impacts of the No Action Alternative,* under the *noise* IPF that directly addresses some of the physiological impacts listed here. Additional physiological impacts are addressed in the Final EIS under the *EMFs* and *cable emplacement and maintenance* IPF discussions in Section 3.5.2.3. Invertebrate physiological sensitivities to sound are also described in the finfish, invertebrate, and EFH analysis, in Section 3.5.5.3.

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	in community structure and the ecological services communities and their component species provide.].	
BOEM-2023-0011-0137-0084	100-200 kHz sound elicited physiological stress response in echinoderm A. lixula and increased the cytotoxicity[Footnote 18: Vazzanaa Mauroa Ceraulob Dioguardia Papalec Mazzolab Arizzaa Beltramed Ingugliaa Buscainob 2020. Underwater high frequency noise: Biological responses in sea urchin Arbacia Lixula. J of Comparative Biochemistry and Physiology Part A. 2020. Comp Biochem Physiol A Mol Integr Physiol. 2020 Apr; 242:110650.] of its coelemic fluid confirming the vulnerability of this species to acoustic exposure. This is the frequency of sound emitted by the echosounders and side-scan sonar equipment expected to be used in site characterization. Impact on Echinoderms of operational noise was not given adequate treatment. The brown sea urchin Arbacia punctulate as well as remaining populations of sea stars of noise has not been assessed.	Due to the BOEM resolution requirements for the COP surveys, SouthCoast Wind was required to utilize side-scans and multibeam systems with higher frequency than 100–200 kHz. The following frequencies were used for the 2019, 2020, 2021, and 2023 G&G surveys. • Side-scan sonar frequency - 300kHz and 600 kHz • Multibeam echo sounder was above 200kHz (2020 and 2021 it was 400kHz, and 388 kHz in 2019, and the plan for 2023 is 350kHz to 360kHz) Therefore, no impacts are anticipated to echinoderms based on the mentioned study. Additional text has been incorporated into Final EIS Sections 3.5.2.3 and 3.5.5.3 addressing noise and vibration impacts on invertebrate species, including a citation from the Vazzana et al. (2020) paper cited in the comment.
BOEM-2023-0011-0137-0107	The DEIS concludes sediment disturbance will be easy to recover from. However studies in Europe have shown benthic communities simply do not appear to be as resilient as that and also show cable laying to have long term adverse impacts on biodiversity[Footnote 48: Haploop areas are rich benthic ecosystems and allow for the development of a benthic macrofauna and an interdependent pelagic fauna. French researchers showed that an electrical cable buried in 2012 adversely affected a Haploop field within the vicinity of the cable. The Haploops mud is characterized by a higher biodiversity in living benthic foraminifera in Haploop mats and by a good balance between major species of foraminifera. Two transects were sampled one close to and one far from the cable. Samples were also taken in between. A decreasing gradient of ecological health status (as measured by biodiversity) can be observed going from the bank to the midline of the electrical cable[Bold Underline: emphasizing that the area remains an adversely impacted environment	While the New England Mudpatch (NEM) has similar geological features (pockmarks) as the habitat described in the cited example, no evidence of extensive amphipod mats exists in the NEM. Goff (2019) states that calcareous deposits were found in the NEM from acoustic mapping which were indicative of biological origin as calcareous deposits would not be present from geological processes since the NEM is devoid of methane seeps. Foraminifera deposits, a calcifying planktonic species have been found in the NEM (Chaytor et al. 2021) but these Haploop amphipod mat are not likely present because Champilou et al. (2019) draws an association of these amphipod mats with the methane seeps and the nutrients that are dispelled from them. The NEM pockmarks are created from groundwater discharge and therefore the biological communities would vastly differ from those in this French study. From a literature search it was not clear that any biodiversity research has been done on the benthic and infaunal

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	even after 5 years from the cable installation.] Nearer the cable a dense unbalanced species assemblage was highly dominated by a single species. [Bold Underline: Biodiversity increased with distance away from the cable]. ["HOOPLA" case study on Haploops fields by WAMEC (West Atlantic Marine Energy Community); internet reference https://www.weamec.fr/en/publications/2018-champilou-j-b-foraminiferal-faunas- associated-to-haploops-spp-mats-on-the-atlantic-french-coast-and-effects-of-a-wind-farm-installation- on-the-area-weamec-project-hoopla/].] in the studied benthic animals which are substrate modifiers and which benefit other organisms.	communities. Therefore, please refer to Section 3.5.2.1 for reference on what the soft sediment biological communities could look like since the NEM and the Lease Area are somewhat close in proximity. Section 3.5.2.5 provides impacts assessments for soft sediment habitat in the Lease Area as well as outlines the likelihood of recovery.
BOEM-2023-0011-0137-0109	The DEIS does not give adequate treatment to Horseshoe Crabs magnetosensitive species which may be significantly affected by undersea cables within the lease areas once the sold lease areas are developed and within the cable routes to shore. Horseshoe crabs are ecologically important as some species of migratory birds depend on their eggs to fuel their flights and are important in human medicine. They are under immense harvest pressure for their blood which is sold for use in medicine. Formerly ubiquitous they are disappearing rapidly. The Bureau has been stating and restating the need to study the effects of undersea interturbine and high-voltage export cables on Horseshoe crabs since at least 2011. In a decade that has gone by the Bureau should state what it has learned or if no further effort was undertaken. If no commission sought to study them the Bureau must not continue to conclude no potential or potential for only negligible effects from absence of demonstrated harm (which is dissimilar to demonstrated absence of harm following study).	No EMF studies specifically on horseshoe crabs were found based on a review of the scientific literature. However, impacts of other magneto sensitive arthropods like the American Lobster and other bottom-dwelling invertebrates are outlined in Final EIS Section 3.5.2.3 and Section 3.5.5.5 under the *EMF*s IPF paragraph. The analysis of these species provides information on effects to magneto sensitive like horseshoe crabs.
BOEM-2023-0011-0137-0117	High density conditions foster the evolution of higher pathogenicity (parasites bacteria protozoa and viruses that cause rapid serious disease) because such restraints are absent. [New York State Department of Environmental	While the reef effect may attract fishes and invertebrates in high densities, these organisms are not confined in spaces or artificially fed like aquaculture where parasites and diseases are more prevalent. Additionally, the species that typically

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	Conservation Artificial Reef DEIS Attachment J page 20 Comment #23; https://www.dec.ny.gov/docs/fish_marine_pdf/dmrreeffinalappc.pdf]. In a wind turbine power plant the wind turbine foundation itself and the hard-surface scour pad[Footnote 60: A scour pad is a large hard-surface area usually made of concrete intended to prevent the flow of water current diverting around the mast from scraping large troughs into the ocean floor. Rip rap stones can also be used.] around the footprint can aggregate fish and other animals and once colonized is characterized by high densities of the organisms that inhabit them. High density means animals are in close proximity to one another and transmission is more likely. This poses the threat of relaxing natural selection against high pathogenicity and fosters evolution of more severe disease-causing organisms in the inhabiting species. In high density there is less consequence to the pathogenic organism of killing its host rapidly since the host is likely exposed to many others whom your offspring or replicates can infect even if the host deteriorates rapidly. Since there are many turbines each with associated high density area at its base the opportunity for evolution of pathogens that cause higher severity of disease is greatly increased. In absence of natural selection against them severe-disease-causing pathogens can evolve in rapid timescales spread and have population-level effects.	colonize these hard bottom substrates on the scour protection and WTGs are typically found in reef communities where high densities and competitive pressures are prevalent, but these species are adapted to be in close aggregation with one another compared to the sandy benthic habitat that would surround the WTGs in the Lease Area. For hydrodynamic impacts of scour protection and wind turbines please refer to the *presence of structures* IPF discussions in Section 3.5.5.3 () and Section 3.5.2.3.
BOEM-2023-0011-0140-0019	We note changes to hydrographic impacts are unlikely from the removal of only six turbines and urge BOEM to include additional analyses indicating what level of turbine removal would maximize environmental benefits to North Atlantic right whales without compromising project viability. BOEM should also present a significantly more robust discussion of the 20-km buffer area recommended by the NEFSC to reduce the potential for negative consequences for right whale prey and the population.[Footnote 25: Id.]	Please refer to response to comment BOEM-2023-0011-0056-0012.

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BOEM-2023-0011-0140-0020	We are encouraged that the DEIS and COP consider foundation alternatives that mitigate potential noise and urge the agency to also consider them as alternatives in projects going forward. We request BOEM choose an alternative with a quiet foundation – either Alternative E-2 or E-3 – to significantly lessen construction impacts on marine wildlife and habitats and particularly the North Atlantic right whale for all or as much of the Project as is feasible. Pending the findings of the aforementioned National Academies committee on the hydrodynamic effects of fixed foundation turbines one potential exception to this recommendation may be for the area within the 20-km buffer (beginning at the 30 meter isobath) for Nantucket Shoals identified by the NEFSC as particularly important foraging habitat for North Atlantic right whales and other species. [Footnote 26: May: 13 2022 letter from Sean Hayes to Brian Hooker available at https://drive.google.com/file/d/1V8RDtdVAAMWGjPMqb2s98C5HWppLkNEO/view?usp=sharing.] Given the elevated concern regarding potential hydrographic impacts near Nantucket Shoals we recommend BOEM undertake an analysis of the different hydrodynamic effects produced by different foundation types (i.e. monopile vs. gravity-based vs. suction jacket) and consider selecting the foundation type(s) with the least potential for hydrographic effects within the buffer area. If the outcome of this analysis indicates that monopiles have the least potential effect BOEM should adopt this technology but require the developer to make additional investments in noise reduction and attenuation technologies including low energy hammer technologies to minimize the impact of pile driving noise on foraging right whales.	BOEM acknowledges the commenter's preference for a quiet foundation and its support for Alternative E-2 and Alternative E-3. BOEM has added additional information to the Final EIS (including Section 3.4.2, *Water Quality*, Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, Section 3.5.6, *Marine Mammals*, and Section 3.5.7, *Sea Turtles*), to describe the findings from the 2024 NASEM study on hydrodynamic impacts in the Nantucket Shoals region. Regarding the request for BOEM to undertake an analysis of the different hydrodynamic effects produced by different foundation types (i.e. monopile vs. gravity-based versus suction jacket), to date there are no empirical studies that quantify differences in hydrodynamic impacts based on foundation types at the turbine scale. As noted in the 2024 NASEM study, "More hydrodynamic observations are available at the regional scale than at the wind farm and turbine scales." The study notes that "there are expected to be differences between monopile foundations and other foundation types in momentum extraction and turbulence production. These effects will enter through the changed frontal area of the structure. To properly account for these effects, specifically designed experiments or simulations must be performed." While differences can be expected at the turbine scale from different foundation types, the broader conclusion of the NASEM study is that the impacts on ecosystems from development and operation of offshore wind may be difficult to distinguish from natural and other anthropogenic variability (including climate change) in the Nantucket Shoals region. Based on this, the lack of existing observational data on effects of different turbine types, and the time and cost to conduct studies at this time given that no GBS or suction bucket foundations have been installed to date in U.S. waters, BOEM believes the information contained in the Final EIS is appropriate to support informed decision-making on the SouthCoast Wind Project. BOEM acknowledges the NASEM study's recommendations to

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		conduct observational studies at the relevant turbine to wind farm scales to isolate, quantify, and characterize the hydrodynamic effects, including based on foundation type, as offshore wind projects are installed on the OCS. BOEM agrees and will continue to work with partners to monitor and conduct further studies on this important topic.
BOEM-2023-0011-0140-0088	The conclusions in the SouthCoast Wind Farm Draft EIS that the overall impact to benthic resources from the Proposed Action would range from negligible to moderate and the long-term impact on benthic communities from construction and installation of the Proposed Action is expected to be minor as the resources would “likely recover naturally over time” is inconsistent with the findings in the Draft EIS that offshore wind activities may result in long-term or permanent impacts. [Footnote 321: SCW DEIS at 3.5.5-29.] Because both the Block Island Study and the SouthCoast Wind Draft EIS itself find the potential for long-term to permanent impacts on sensitive benthic habitats including complex and eelgrass habitats from offshore wind development BOEM should include more justification in the SouthCoast Wind Final EIS for why it expects that these potential impacts to sensitive benthic habitats will only be minor and 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 export cable corridors will traverse juvenile Atlantic cod HAPC as well as possible cod spawning grounds in the complex habitats of Muskeget Channel the Sakonnet River and Mount Hope Bay BOEM should analyze whether the potential long- term to permanent impacts from cable emplacement and anchoring activities in the export cable corridors could lead to population-level impacts on Atlantic cod in those areas.	Section 3.5.5.3 details how Atlantic Cod are among the fish species that are attracted to structures and have been found in higher concentrations around offshore wind farms than in surrounding habitat. COP Appendix K provides map of SAVs including eelgrass beds located in the nearshore environment for Brayton and Falmouth cable corridors (Figures 4-1, 4-2, 4-3, and 4-4). Section 5.2.3.1 Construction and Decommissioning in COP Appendix K also details the impact of cable emplacement on eelgrass beds which is nonexistent to indirect effects since there are no eelgrass beds on the Brayton Point and Aquidneck Island landfalls and the planned landfall of Falmouth are outside the mapped area of eelgrass habitat.
BOEM-2023-0011-0140-0092	In the Final EIS BOEM should provide a more detailed explanation for its conclusion that a closed loop cooling system is not commercially available. In particular given that	BOEM believes the justification for dismissing an alternative that would require the use of a closed loop cooling system for HVDC converter OSPs in Section 2.3 is still appropriate.

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	the second phase of the SouthCoast Wind Project may not be fully operational until 2030 BOEM should explain why it does not anticipate a closed loop cooling system becoming commercially available by then.	For Project 1, SouthCoast Wind has already selected an HVDC converter OSP design that would use open loop cooling and has applied for a NPDES permit for the system. The design of OSP(s) for Project 2 has not yet been selected. However, as stated in Section 2.3, based on BOEM's independent market research, a closed-loop cooling system for an offshore wind HVDC converter station has not been implemented in any operational projects to date and the technology is too speculative for BOEM to require. Delaying approval of the Project for the technology to allow closed loop cooling could jeopardize SouthCoast Wind's ability to compete for offtake agreements and make the Project uneconomical. BOEM's 2022 white paper, *Supporting National Environmental Policy Act Documentation for Offshore Wind Energy Development Related to High Voltage Direct Current Cooling System*, describes alternatives to open loop cooling, noting that the most common closed loop systems use air to cool the systems or require the use of freshwater, which would not be available at an offshore system. For the air-cooling systems, fans are used which require a large amount energy and are space and cost prohibitive for offshore platform facilities. BOEM is analyzing as part of the Proposed Action and other alternatives the use of HVAC technology, which do not require cooling systems that involve the intake and discharge of water.
BOEM-2023-0011-0140-0093	An alternative that eliminates additional WTG positions in the vicinity of Nantucket Shoals would likely reduce impacts to Nantucket Shoals even further and in contrast to Alternative D could potentially reduce the overall impact magnitude of the Project when compared to the Proposed Action.In the DEIS BOEM acknowledges that it considered and dismissed another alternative that would eliminate up to 17 WTGs in the northeastern portion of the lease area. This alternative would eliminate 17 WTGs to further reduce potential impacts to the 20-km buffer of the Nantucket Shoals 30-meter isobath. BOEM states that it concluded this alternative is unreasonable	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	"because it is inconsistent with [SouthCoast] Wind's primary goals and the alternative is not economically feasible or practicable and would be equivalent to the No Action Alternative." [Footnote 368: Id. at 2-31-32. BOEM states that removing 17 turbines would prevent SouthCoast Wind from developing Phase 2 of the Project so that it has a minimum capacity of 1000 MW which BOEM deems is essential to project viability. Id. We note however that (1) BOEM also recognizes that SouthCoast Wind could bid on individual projects in either Massachusetts or Rhode Island that are under 1000 MW; (2) the two PPAs that SouthCoast Wind has been awarded to date were each 800 MW or less; and (3) several other PPAs awarded in New England to date have totaled approximately 800 MW or less (See e.g. Vineyard Wind 1 Revolution Wind Park City Wind). Therefore additional information about why this is not a viable option should be provided by BOEM.]BOEM has provided several cogent reasons to explain its conclusion that a potential alternative that would eliminate up to 17 WTG positions is infeasible. [Footnote 369: See id.] Nevertheless we urge BOEM to reconsider whether it is feasible to remove more than the six WTG positions that would be eliminated under Alternative D–without compromising project viability–given the significant environmental benefits that could result from such an alternative.	
BOEM-2023-0011-0151-0001	I have to say quite frankly that the design of the program coming through our Falmouth Heights beach and canvassing down our Boulevard which was leased to our town for family enjoyment is very very disturbing and I get the importance of renewable energy and I get the importance of economic development but what is interesting to me is again as a resident in a densely populated area how they can drive the cable 87 miles worth of cable that they are only going to you know lay underground under three feet and we have trees here that will not be allowed to be within 100 feet of the cable. Again I -- alternatives have been raised to SouthCoast	BOEM considered alternatives to the Proposed Action that were identified through coordination with cooperating and participating agencies and through public comment received during the public scoping period for the EIS. Based on the criteria outlined in Section 2.2, *Alternatives Considered but Not Analyzed in Detail*, feasible alternatives were carried forward for analysis in the EIS.

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	by engineers in different locations and unfortunately it doesn't seem to be under consideration for them. So I have been keeping a tally I am noticing all the pros but I have to say that this is an absolute con and I am asking you to really reconsider redirecting the scope and the location of this project.	
BOEM-2023-0011-0156-0003	we support the process that is getting underway across the New England states on transmission planning which hopefully will include an offshore grid. We recognize that the timing to deploy this and other projects that are already in the pipeline will not provide for actual integration offshore of their transition but we hope that these projects can be designed in such a way that future interconnections between them may be possible. This will improve reliability and efficiency as well as reducing the amount of impact of new transition needed both offshore and on land.	Please refer to response to comment BOEM-2023-0011-0080-0003.
BOEM-2023-0011-0157-0001	But I guess one thing that I am struggling with that I would have as a concern that hopefully could be improved in the FEIS would be just explaining some of the details of the project especially for the alternatives that are different from the proposed action which is I think pretty well explained in the COP but some of the other ones thinking for example the alternative that talks about having you know fewer cables going through Muskeget Channel to reduce impacts to that area and then that would I think require HVDC cabling so it wasn't clear you know to me whether there was going to be another substation converter station required for that or if there would only be one used and where that would be located. I also think that as I understand it where the offshore substations and converter stations occur is going to determine the inner array layout cable layout and I wasn't seeing that anywhere in the draft EIS maybe it's in there and I just missed it so specifying those details are important to understand where benthic sea floor impacts might occur within the array.	As stated in Section 2.2.6, *Alternative F – Muskeget Channel Cable Modification*, Alternative F would result in the use of HVDC cables and the use of an HVDC converter OSP in the Lease Area. Alternative F is within SouthCoast Wind's PDE in its COP, meaning that the Proposed Action also includes the possibility of using HVDC cables and a HVDC converter OSP interconnecting at Falmouth, the difference being that Alternative F would require HVDC and fewer numbers of cables. Under both Alternative F and the Proposed Action, the location of the OSP(s) that would be used to interconnect at Falmouth for Project 2 (if Falmouth is selected as the POI for Project 2) is not yet known, nor is the final interarray cable layout. Final selection would be determined based on future offtake agreements and through SouthCoast Wind's supplier/equipment contracting process.

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BOEM-2023-0011-0157-0002	Also we sort of were wondering and I don't know if it's too late to add something like this to the FEIS in planning for that but a lot of the other projects that are and this is quite a large project and other projects that are of this size seem to use a phased approach to development in describing the development in both how the construction would be done and in describing the impacts so I was kind of interested to know why a phased approach wasn't considered here especially because the full size of the project capacity of the project hasn't been procured yet.	Please refer to response to comment BOEM-2023-0011-0112-0011.
BOEM-2023-0011-0160-0002	And one of the alternatives that was not in the original Mayflower Wind proposal was to go up to the Cape Cod power plant that has the industrial facility to terminate this kind of cable and there was recent discussion after three years SouthCoast Wind said they were in discussion with the new owners of that power plant who JERA who specifically are looking to make that power plant a termination point for offshore wind cables. So my concern is why not go to that industrial location versus a densely populated residential location and I wasn't sure how the U.S. Army Corps of Engineers or BOEM gets involved with that and has any overview or ability to intercede in that to try to facilitate the discussion between Mayflower Wind or SouthCoast Wind and the new owners of that plant JERA to make that happen.	Please see the response to comment BOEM-2023-0011-0043-0001.
BOEM-2023-0011-0163-0001	I want to mention that I read a report from the Brattle Group called A Better Planned Grid and in that report it suggested that rather than individual cables running from each of the potential wind farms to various undisclosed locations maybe a better approach would be to have a hub out in the ocean similar to maybe like an oil rig or something where the cables would all be combined and collectively brought to shore in maybe a few locations that were prime industrial sites.	Please refer to response to comment BOEM-2023-0011-0080-0003.
BOEM-2023-0011-0163-0002	And the second question is regarding the canal electric plant I read quite a long time ago that the canal plant was one of the top three sites including Somerset which would be prime	Please see the response to comment BOEM-2023-0011-0043-0001.

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	locations for cable landing and I wonder why that wasn't produced in the report by SouthCoast Wind and I'd like to see those negotiations more clearly defined.	
BOEM-2023-0011-0163-0006	I would suggest the Pilgram nuclear power plant as a landing site as well	Please see the response to comment BOEM-2023-0011-0004-0005.
BOEM-2023-0011-0166-0002	Especially since there are other sites as previous speakers have mentioned such as the canal power plant as long as these other industrial commercial sites exist we feel they should be employed before you impose it on a residential community.	Please see the response to comment BOEM-2023-0011-0043-0001.
BOEM-2023-0011-0166-0003	One of the other speakers Mr. Brown also mentioned the Brattle Group study which extolled the virtues of a coordinated planned approach to routing of the cables which would allow wind developers to perhaps share cable routing and reduce the number of landing sites needed which would be more economical and have less environmental impact.	Please refer to response to comment BOEM-2023-0011-0080-0003.
BOEM-2023-0011-0180-0001	I noticed in the DEIS that alternative D the exclusion zone for turbines adjacent to Nantucket Shoals it says that a commentor speculated that the presence of wind turbine generators in the northeastern portion of the lease area may alter the foraging habitat associated with et cetera et cetera et cetera with protected species essentially. That commentor is not a commentor. It is a cooperating agency in the BOEM process namely NOAA Office of Protected Resources. The allegations in the DEIS that the claims are unfounded that the hydrodynamic effects are not what that particular "commentor" alleged are incorrect. NOAA is the federal agency tasked by the Federal Government and Congress with managing and protecting our marine mammal protected resources. I would submit that BOEM does not have the expertise to override that agency on this issue which it does not and the allegations that the effects mentioned by NOAA are absolutely incorrect those are based on peer reviewed	Please refer to response to comment BOEM-2023-0011-0056-0012.

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	studies coming out of Europe. On May 13, 2022, NOAA's Office of Protected Resources sent BOEM a letter requesting a conservation buffer zone for a critically endangered species namely the North Atlantic Right Whale whose only known winter foraging habitat occurs on Nantucket Shoals adjacent to the project as well as in the project quite frankly. And the hydrodynamic effects that will happen as a result of the project will have negative effects on the food source of that animal again it is a critically endangered species and this is the only known winter foraging habitat of that animal. I do not believe that BOEM has the expertise to override a cooperating agency particularly an agency with the expertise in the subject matter	

N.6.3 Air Quality

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BOEM-2023-0011-0081-0001	This DEIS fails to consider emissions from the manufacturing, transportation, concrete production and mining that will occur outside of the local region for the project. The DEIS cannot ignore the emissions from these operations or the environmental costs of these activities.	A discussion regarding potential emissions from raw material extraction, materials processing, and manufacturing of components (i.e., full life-cycle analysis) has been added to Final EIS Section 3.4.1.5.
BOEM-2023-0011-0081-0002	The DEIS assumes the wind energy generated over the lifespan of the project will “likely” offset the carbon emissions resulting from construction installation maintenance and operations. Analysis of real-world data does not support this assumption. Studies demonstrate that wind-generated energy replaces less than one-tenth the amount of fossil-fuel-generated electricity (Jorgensen 2012; York 2012). If BOEM uses a 10% or less replacement value and includes foreign as well as domestic carbon emissions and environmental damage the project would likely add more to the climate problem than detract from it.	The emissions estimates in the EIS are based on the best available information, scientific and engineering data, and USEPA-approved models.

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BOEM-2023-0011-0081-0003	The project area is right smack in the middle of the Gulf Stream a MAJOR contributor to GLOBAL weather and wildlife. It is now a delicate and balanced ecosystem of it's own. Any decrease or change in the Gulfstream can have dramatic effects on temperatures in other countries especially the UK. This project will likely change water and air temperatures redistribute humidity and alter atmospheric flow thereby modifying local weather patterns regional climate ocean currents and vegetation.	Appendix B, Section B.2.6, provides information on potential impacts of offshore wind facilities on meteorological conditions.
BOEM-2023-0011-0081-0014	Assuming that climate change will do worse is not a valid justification for known and significant impacts. The entire DEIS justifies these adverse impacts based on broad and unproven anticipated future effects of climate change. Moreover the most recent literature does not support the projections in planetary temperature used by the DEIS. The impact assessments are not reasonable legal or scientifically defensible. Besides there will be significant UNKNOWN impacts as we have seen whenever an entity thinks they can mitigate their effects on Mother Nature as they go along. Science 101: for every action there is an equal and opposite reaction.	The impact assessments in the EIS are based on the best available scientific information and predictions, including recent reports by the Intergovernmental Panel on Climate Change and NOAA.
BOEM-2023-0011-0085-0007	Effects on weather. It has been shown that wind turbines affect wind speed and direction and hence weather systems. The effects of thousands of offshore towers cannot be known in advance.	Appendix B, Section B.2.6, provides information on potential impacts of offshore wind facilities on meteorological conditions.
BOEM-2023-0011-0086-0002	Has or will BOEM be determining that the DEIS shows that the wind energy generated over the useful life of this project will Absolutely offset the carbon emissions resulting from the construction installation O & M and decommissioning of this project? It seems that much of BOEM's research dates to the 2012 time period. Does analysis of real-world data (European installations) support this data?	Section 3.4.1.5 of the EIS discusses the emissions avoided with the Project and shows that the estimated net greenhouse gas (GHG) emissions over the Project lifetime are negative (i.e., net beneficial impact).
BOEM-2023-0011-0091-0018	Southcoast's DEIS even claims that the subject area for the windfarm will have negative air quality impacts if their project	The air quality impact rating of "moderate" for the No Action Alternative reflects existing and expected future activities

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	does not get approved (See DEIS Table ES-2). This is absolutely absurd and completely without any science-based foundation for the lease area ambient air quality. They further go on to make light of the nonattainment area on Nantucket Island even though these windfarms bring extensive activity and air emissions to a region just to the South of the Island. In the DEIS Air Quality section discussion of relevant regulatory decisions they completely leave out (perhaps they don't know) that Nantucket's ambient air quality issues with ozone are due to emissions in a region defined as the Ozone Transport Region and it has taken the combined efforts of the Northeast States and mid-Atlantic States to develop and implement control strategies to reduce these long-range transport emission sources to improve downstream air quality levels to meet NAAQS.	that produce emissions (e.g., industrial, commercial, residential, and transportation sources) and does not imply that existing air quality will decline if the Project is not approved. The discussion of the Dukes County nonattainment area in Final EIS Section 3.4.1.1 has been clarified. As noted in this section, ozone concentrations in the Dukes County nonattainment area have not violated the NAAQS since before 2018.
BOEM-2023-0011-0117-0008	Anticipated Unknown Impacts to Justify Known Project-specific Adverse Impacts: Without a rigorous scientific model poorly defined imagined adverse impacts cannot justify known impacts. The entire DEIS justifies their adverse impacts based on broad unproven anticipated future effects of climate change and increased development. Moreover the most recent literature does not support the projections in planetary temperature used by the DEIS. The impact assessments are not reasonable legal or scientifically defensible.	The impact assessments in the EIS are based on the best available scientific information and predictions, including recent reports by the Intergovernmental Panel on Climate Change and NOAA.
BOEM-2023-0011-0117-0031	Local Climate: Wind farms can increase local water and air temperatures redistribute humidity and alter atmospheric flow thereby modifying local weather patterns and regional climate (Miller 2018). Raising ambient water temperatures affects fish larvae (Moyano 2017) ocean currents (Christiansen 2022) and vegetation (Diffendorfer 2022). The BOEM DEIS fails to consider the latest scientific findings or to adequately address this issue. Restating the assumption that climate change will do worse damage is not a valid justification and examination of known and significant adverse environmental impacts.	Appendix B, Section B.2.6, provides information on potential impacts of offshore wind facilities on meteorological conditions.

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BOEM-2023-0011-0117-0032	Global Effects: Appendix G: Air Emissions Report is CONFIDENTIAL and not open to the public's perusal. Under no circumstances should BOEM grant any approvals until the public has the chance to evaluate these documents. The DEIS cites the Executive Order 14008 to justify the purpose and need for the project. This order specifically includes the necessity to tackle the climate crisis both at home and abroad. The DEIS does not comply with this executive order because it fails to consider the global (abroad) ramifications of the project.	Information on potential global (abroad) impacts (in the life-cycle analysis context) has been added to Final EIS Section 3.4.1.5. Regarding the redacted portions of documents received from applicants, BOEM would withhold trade secrets and commercial or financial information identified as privileged or confidential from public disclosure by the lessee in accordance with the terms of 30 CFR 585.113. Per 30 CFR 585.113, and subject to the limitations of the Freedom of Information Act (FOIA). Information about the relevant FOIA provision is also available on a U.S. Department of Justice (DOJ) website: https://www.justice.gov/oip/step-step-guide-determining-if-commercial-or-financial-information-obtained-person-confidential.
BOEM-2023-0011-0117-0033	Climate change is a global not a local problem. No DEIS should ignore the global environmental costs of a project. This DEIS fails to consider emissions from abroad including the manufacturing transportation concrete production (Miller 2020) and mining that will occur outside of the local region for the project. Given the executive order's specific inclusion of "abroad" the DEIS cannot ignore the emissions from these operations or the environmental costs of these activities.	Information on potential global (abroad) (in the life-cycle analysis context) has been added to the EIS.
BOEM-2023-0011-0117-0034	The DEIS assumes the wind energy generated over the lifespan of the project will "likely" offset the carbon emissions resulting from construction installation maintenance and operations. Analysis of real-world data does not support this assumption. Studies demonstrate that wind-generated energy replaces less than one-tenth the amount of fossil-fuel-generated electricity (Jorgensen 2012; York 2012). The real-world replacement value of wind energy for fossil-fuel-generated electricity undermines the assumption that this project will mitigate climate change.	The emissions estimates in the EIS are based on the best available information, scientific and engineering data, and USEPA-approved models.
BOEM-2023-0011-0117-0035	If BOEM uses a 10% or less replacement value and includes foreign as well as domestic carbon emissions and environmental damage the project would likely add more to	The emissions estimates in the EIS are based on the best available information, scientific and engineering data, and USEPA-approved models.

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	the climate problem than detract from it. This lack of climate change mitigation invalidates all of DEIS's subsequent environmental assessments that assume a net positive effect on GHG emissions.	
BOEM-2023-0011-0117-0036	Decommissioning: The DEIS claims to evaluate the impact of decommissioning and yet none of the studies do this. Please provide a full examination of the carbon emissions for decommissioning the cost and the environmental impacts. As stated in 30 CFR 585 decommissioning is a requirement. BOEM cannot approve a project state that it insists on decommissioning and then not include this in the DEIS. Because decommissioning might harm the environment and will cost an extraordinary amount of money it is crucial to include the specifics in the DEIS. Given that the impact assessments depend on decommissioning unless BOEM understands the environmental impact and is certain that decommissioning will take place from both a financial and environmental standpoint it cannot legally approve a project based on this DEIS.	As documented in the EIS, emissions from decommissioning were not quantified as part of the COP or the OCS air permit application. SouthCoast Wind anticipates pursuing a separate OCS air permit for decommissioning activities because it is assumed that marine vessels, equipment, and construction technology would change substantially in the next 35 years and in the future would have lower emissions than current vessels and equipment.
BOEM-2023-0011-0117-0037	Sulfur Hexafluoride (SF6): The COP (Volume 1 Table 3-26) indicates that significant amounts of SF6 will be housed in the gas-insulated equipment (over 16.5 tons) and that SF6 leaks during operations. Given that every molecule of SF6 contributes 23500 x more than CO2 to greenhouse warming and Scotland's disastrous leak of SF6 (Mavrokefaledis 2022) we should not tolerate the risk of contributing to GHG emissions in our effort to mitigate climate change particularly in the harsh ocean environment that increases the risk of accidental leakage. BOEM should insist that the developer eliminate all components with SF6.	BOEM has added mitigation measure AQ-8 to Final EIS Appendix G, Table G-2, which would require SouthCoast Wind to use sulfur hexafluoride (SF_6)-free switchgear to the extent feasible.
BOEM-2023-0011-0132-0016	The public has simply not been educated about the trade-offs and has been mis-led about the project(s) potential benefits regarding climate change. The Vineyard Wind Final EIS and the Ocean Wind Draft EIS say accurately that these projects will have no or negligible effect on climate change. Yet BOEM	An individual offshore wind project may appear to have no or negligible effect on climate change when its GHG emission reduction is compared to a much larger baseline (e.g., national GHG emissions). However, the 2023 Council on Environmental Quality (CEQ) guidance on GHGs under NEPA

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	continues to purport publicly that offshore wind is necessary to prevent damage from climate change. The public is being misled as none of the project documents to date support the claim.	specifically discourages this type of comparison because it implies that GHG benefits from an individual project are not worth achieving. In fact, just as global GHG emissions are the sum of the emissions from a myriad of sources, none of which is by itself large enough to affect climate change discernibly, so the GHG reductions needed to slow climate change must come from individual projects that in the aggregate can have a significant beneficial impact.
BOEM-2023-0011-0132-0018	Air emission data in the SouthCoast COP is redacted and no data is provided to prove a beneficial impact to net air emissions from the project.	Section 3.4.1.5 provides the estimated avoided emissions and net emissions associated with the Project. Regarding the redacted portions of documents received from applicants, BOEM would withhold trade secrets and commercial or financial information identified as privileged or confidential from public disclosure by the lessee in accordance with the terms of 30 CFR 585.113. Per 30 CFR 585.113, and subject to the limitations of the FOIA. Information about the relevant FOIA provision is also available on a DOJ website: https://www.justice.gov/oip/step-step-guide-determining-if-commercial-or-financial-information-obtained-person-confidential.
BOEM-2023-0011-0132-0019	The statement [Text in Blue: "1200 MW of electricity generated satisfies the need for cost effective and reliable energy in MA"] is not supported by any data pertaining to costs or reliability. In fact offshore wind has been widely shown to be more expensive and less reliable than natural gas.	NEPA does not require analysis of cost or reliability. The EIS does not analyze an alternative that would develop natural gas generation in place of the Project, as such an alternative would not meet BOEM's purpose and need as described in Chapter 1. Cost and reliability of generation sources would be considered in energy planning at the state level or by the relevant Independent System Operator.
BOEM-2023-0011-0132-0022	The following statement raises concerns about the validity of the emissions analysis " Some impacts of the Proposed Action may not be measurable at the project level such as the beneficial impacts on benthic resources due to artificial habitat or climate change due to a reduction in greenhouse gas emissions." This appears to state that there are no measurable project level benefits to GHG emissions. Given the	Climate impacts are the cumulative result of aggregate global emissions of GHGs. Therefore, project-level benefits of a specific action (such as the Proposed Action) may be too small to be measurable. However, the benefits of global GHG emissions reductions could, over time, slow the rate of climate change to a degree that could be measurable in the Project region.

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	overall increase in NOx and SF6 from the project this makes sense. What is being said here?	
BOEM-2023-0011-0132-0023	On page 3.4.1-6 there is no data to support this statement [Text in Blue: “Impacts from fossil-fueled power facilities are expected to be mitigated partially by implementation of other offshore wind projects near the geographic analysis area including in the regions off New England New York New Jersey Delaware Maryland and Virginia to the extent that these wind projects would result in a reduction in emissions from fossil-fueled power facilities” or this one “As wind energy projects come online power-generation emissions overall could decrease and the region as a whole could realize a net benefit to air quality.“] In fact regional emissions could increase if wind peaking power is not available to share with another ISO and that ISO needs to crank up fossil fuel sources.	Section 3.4.1.5 discusses the avoided emissions and the assumptions used in the analysis. The estimated avoided emissions, as with any prediction, are subject to uncertainty. Accordingly, the statements commented on are stated conditionally, e.g., “to the extent that” or “could.”
BOEM-2023-0011-0132-0025	3.4.1.8 This statement regarding air emissions is misleading [Text in Blue: “Offshore wind energy development could help displace emissions from fossil fuels potentially improving regional air quality and reducing GHG emissions. An analysis by Katzenstein and Apt (2009) for example estimates that CO2 emissions can be reduced by up to 80 percent and NOX emissions can be reduced up to 50 percent by implementing wind energy projects.2“]The previous statement should read that CO2 emissions can be reduced by up to 80 percent and NOX emissions can be reduced by up to 50 percent [Highlighted text: of the emissions generated by a natural gas plant]. The way the document states it the implication is up to 80 percent and up to 50 percent of regional emissions can be reduced. This is not the case especially since the wind energy projects will only produce a low percentage of the electricity needed in the region.The foot note (2) indicates [Text in Blue: “Katzenstein and Apt (2009) modeled a system of two types of natural gas generators four wind farms and one solar farm. The power output of wind and solar facilities can vary relatively rapidly as meteorological conditions change and the	Upon review of the Katzenstein and Apt (2009) reference, BOEM has determined that the commenter is correct. The Final EIS has been revised to correct the misleading passage.

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	natural gas generators vary their power output accordingly to meet electrical demand. When gas generators change their power output their emissions rates may increase above their steady-state levels. As a result the net emissions reductions realized from gas generators reducing their output in response to wind and solar power can be less than the reduction that would be expected based solely on the amount of wind and solar power. The study found that reductions in CO2 emissions would be about 80 percent and in NOX emissions about 30 to 50 percent of the emissions reductions expected if the power fluctuations caused no additional emissions."] It is not that CO2 and NOx are reduced by 80% and 50% by implementing wind; rather the expected reduction in emissions is lower due to the need for balancing power fluctuations with by natural gas.	
BOEM-2023-0011-0132-0026	In the conclusion on page 3.4.1.10 it states that [Text in Blue: "additional higher-emitting fossil-fueled power facilities could be built or could be kept in service to meet future power demand fired by natural gas oil or coal."] That is simply not the case as the region has easy access to natural gas and clean cycle natural gas is the only type of power plant that would likely be built in the short term. Nuclear is not discussed and if sufficient resources were allocated to this power source then GHG reductions would actually be significant enough to terminate fossil fuel burning facilities. It is concerning that the underlying analysis is not provided and that the air emissions section of the SouthCoast COP continues to be redacted.	The statement commented on is a general summary based on the potential grid mix under the No Action Alternative and is not a prediction that any specific combination of energy sources would be developed. As discussed in EIS Section 3.4.1.5, the analysis of avoided emissions used the USEPA Avoided Emissions and Generation Tool (AVERT) model, which assumed the 2018 grid mix for all alternatives. Regarding the redacted portions of documents received from applicants, BOEM would withhold trade secrets and commercial or financial information identified as privileged or confidential from public disclosure by the lessee in accordance with the terms of 30 CFR 585.113. Per 30 CFR 585.113, and subject to the limitations of the FOIA. Information about the relevant FOIA provision is also available on a DOJ website: https://www.justice.gov/oip/step-step-guide-determining-if-commercial-or-financial-information-obtained-person-confidential.
BOEM-2023-0011-0132-0027	On page 3.4.1.10-11 the document states: [Text in Blue: "Overall BOEM anticipates the cumulative impacts of the No	As discussed in EIS Section 3.4.1.5, the estimates of emissions from the grid are relative to the 2018 grid

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	Action Alternative on air quality from ongoing and planned activities would be moderate largely driven by emissions from fossil-fueled power facilities other ongoing and planned non-offshore wind emissions and emissions from construction and decommissioning of offshore wind projects. Because offshore wind projects likely would lead to reduced emissions from fossil-fueled power facilities BOEM also anticipates the cumulative impacts of the No Action Alternative would result in minor to moderate beneficial impacts on regional air quality".] First there is no data used to support these statements and second the emissions from fossil fuels in the New England Area ISO has been steadily declining as more electricity is sourced from clean cycle natural gas.	configuration, but the actual annual quantity of avoided emissions attributable to the Project (as well as the grid emissions under the No Action Alternative) is expected to diminish over time if the electric grid becomes lower-emitting due to the addition of other renewable energy facilities and retirement of high-emitting generators.
BOEM-2023-0011-0132-0028	Page 3.4.1-23 states [Text in Blue: "The Proposed Action would incrementally contribute to the cumulative air quality impacts from ongoing and planned activities associated with offshore construction which would be moderate during construction. The Proposed Action would add an average of approximately 22 percent of the total offshore wind project emissions that may generate impacts depending on pollutant due to construction activities occurring in the geographic analysis area. This suggests that most of the air quality impacts resulting from offshore wind development would not be due to the Proposed Action and the addition of the Proposed Action would yield a relatively small contribution to the total air quality impacts."] This statement is completely erroneous as no other projects have commenced building and 22% of project emissions is not a [Text in Blue: "relatively small contribution"]. It is almost of quarter of all the emissions from all the wind farms proposed in the area. That is significant.	The statement commented on is based on the sum of emissions from ongoing and planned offshore construction, aggregated over the entire period during which the construction would occur. The phrase "relatively small contribution" in the EIS has been replaced with a more specific description.
BOEM-2023-0011-0132-0029	Another erroneous statement can be found on page 3.4.1-24. It states [Text in Blue: "A net improvement in air quality is expected on a regional scale as wind projects begin operation and displace emissions from fossil-fueled sources"]. There is	As discussed in EIS Section 3.4.1.5, the analysis of avoided emissions used the USEPA AVERT model, which assumed the 2018 grid mix for all alternatives. The model assumes a grid-wide reduction in electrical output by power plants in

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	no back-up data given for this statement. The Air Emissions data in the COP remains redacted. Specifically what fossil fuel sources will be displaced. There are no plans in the New England ISO to remove gas fired plants from the grid. The wind power will continue to need to be balanced with the single combustion gas process which is less “clean” than dual combustion which is less responsive to power fluctuations and therefore cannot be used. No evidence is provided to support the claim made. This follows with a statement on page 3.4.1-25 [Text in Blue: “The Proposed Action would result in a net decrease in overall emissions over the region compared to the installation of a traditional fossil-fueled power facility.”] There is no support for this statement. The only fair comparison would be from a new dual cycle natural gas facility – however this analysis is not provided. On the same page this statement is also not supported with any facts: [Text in Blue: ”Considering all of the IPFs together minor air quality impacts would be anticipated for a limited time during construction maintenance and decommissioning but there would be a minor beneficial impact on air quality near the Wind Farm Area and the surrounding region overall to the extent that energy produced by the Proposed Action would displace energy produced by fossil- fueled power facilities”]. The what where and when for displacing fossil-fueled power are simply not shown in the DEIS or the COP.	response to the introduction of wind energy and does not make assumptions about the closure of any specific power plant. Similarly, the analysis does not make assumptions about potential plans by independent system operators to close power plants. Regarding the redacted portions of documents received from applicants, BOEM would withhold trade secrets and commercial or financial information identified as privileged or confidential from public disclosure by the lessee in accordance with the terms of 30 CFR 585.113. Per 30 CFR 585.113, and subject to the limitations of the FOIA. Information about the relevant FOIA provision is also available on a DOJ website: https://www.justice.gov/oip/step-step-guide-determining-if-commercial-or-financial-information-obtained-person-confidential.
BOEM-2023-0011-0132-0123	This statement is never backed up with data [Text in Blue: “To the extent that the Proposed Action displaces fossil-fuel energy generation overall improvement of air quality would be expected.”] Specifically which forms of fossil-fuel burning will be displaced? Are there any planned shutdowns of fossil fuel plants in the New England ISO?	As discussed in EIS Section 3.4.1.5, the analysis of avoided emissions used the USEPA AVERT model, which assumed the 2018 grid mix for all alternatives. The model assumes a grid-wide reduction in electrical output by power plants in response to the introduction of wind energy and does not make assumptions about the closure of any specific power plant. Similarly, the analysis does not make assumptions about potential plans by independent system operators to close power plants.

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BOEM-2023-0011-0137-0051	There needs to be a transparent accounting of the total project GHG (greenhouse gasses) expected to be emitted by the project including not only(1) construction but also (2) transport of both materials and prefabricated parts to the shore including intercontinental transportation if any (3) fabrication of parts (4) refinement of steel (with transparently-stated estimates of total weight of steel needed for the projectwith detail about per mast and per converter or other stations) (5) mining of ore to make the steel(6) methane release and diesel use during mining of coal that is needed for steel production. A large amount of material is required to make a wind turbine power plant. Indeed more material is required to build a wind- turbine power plant than most forms of power generation. The mining refinement and manufacture of raw materials and transport of raw materials and assembled parts should all be accounted for.Reduction in ocean productivityand consequential aqueous C02 rise must also be accounted for as an offset of any Carbon Dioxide emissions that has been spared by the plant's operations.	Information on impacts from activities that occur before on-site Project construction and operation has been added to the EIS.
BOEM-2023-0011-0137-0052	THERE APPEARS INSUFFICIENT DATA TO SUPPORT THE STATED CONCLUSION ABOUT TONS OF CARBON EMISSIONS SPAREDIn estimating tons of emissions spared by the proposed action the DEIS unreasonably compares the proposed action against equivalent power production from fossil fuel burning alone instead of against that produced by the extant weighted mix of energy sources used today. Given that the United States is making the much-needed move to low-carbon means of energy production a more reasonable way of quantifying the amount of emissions spared by the proposed project would be to compare the GHG resulting from the project undertaking to other low-carbon ways of producing energy most of which do not rely on fossil fuel burning to meet annual daily or seasonal peak demand. The occurrences during which wind power plants are unable to meet peak demand are greater than for types of low-carbon power plants other than wind. High levels of renewable	As discussed in EIS Section 3.4.1.5, the analysis of avoided emissions used the USEPA AVERT model, which assumed the 2018 grid mix for all alternatives. The model assumes a grid-wide reduction in electrical output by power plants in response to the introduction of wind energy. There are no energy storage facilities proposed in the COP. If energy storage were used, it would be developed by another party and would be subject to applicable federal, state, and local review and permitting.

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	penetration can impair grid reliability so grid operators are expected to need to rely on energy storage to shift energy to peak demand hours. For renewable energy to meaningfully displace baseload fossil fuel generation it must be deployed alongside storage. To our knowledge there is currently no solution for energy storage that can accommodate all the power that is expected to be produced by the power plants of the planned U.S. Offshore Wind Program. This means much of it will not be able to be stored and very much will be wasted if it is not used in real time.	
BOEM-2023-0011-0137-0053	If the power produced by wind turbine power plants cannot be stored fossil fuels will need to be burned to meet electricity demand. If they can be stored it is reasonable to incorporate the environmental harms and carbon emissions required to source materials for and install such systems in the energy grid and divide such impacts among the projects that require their installation. Unfortunately the carbon footprint of such large battery systems (which are required to utilize wind-derived power to avoid burning fossil fuels to meet peak electricity demand) have been ignored in almost all carbon footprint analyses of wind power projects and programs. We respectfully request that such footprint be accounted for or if and to the extent to which the energy storage systems are not yet in an implementable stage that any anticipated reliance on fossil fuels to meet peak be factored in so that the true effects of the proposed project and the cumulative effects of the program can realistically be estimated. Because climate change is a serious pressing issue there must be disclosure of whether or not the program anchors us to fossil fuel use as compared to other forms of low carbon energy production which do not rely on the burning of fossil fuels to for baseload generation stabilization.	There are no energy storage facilities proposed in the COP. If energy storage were used, it would be developed by another party and would be subject to applicable federal, state, and local review and permitting.
BOEM-2023-0011-0137-0054	The land required for storage facilities and proposed locations for these facilities should be disclosed in the COP and environmental impacts of the building of such facilities	There are no energy storage facilities proposed in the COP. If energy storage were used, it would be developed by another

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	analyzed in the EIS.SEE ORIGINAL ATTACHMENT FOR PICTURES OF Figure 26. Pillswood Battery facility in UK will help store part of the energy acquired from Dogger Bank Power PlantWe respectfully request to know what systems will be used to store energy acquired by the Mayflower Wind Project/ SouthCoast Power Plant where the systems will be located the cumulative land area they utilize and a very basic description of the materials expected to be used or alternatively if fossil fuels are expected to be relied upon so the environmental impact of the project can be stated in the EIS.	party and would be subject to applicable federal, state, and local review and permitting.
BOEM-2023-0011-0137-0056	Upon our review the DEIS does not quantitatively demonstrate the extent to which (or even whether) the proposed action or its alternatives serves the project purpose of mitigating climate change because:(1) the GHG emissions or carbon footprint of the proposed project as disclosed in the DEIS omitted GHG emissions during entire portions the lifecycle (resource extraction mining steel refinement and other materials formation estimates of trans-oceanic transportation of materials and assemblies assembly) and only accounted for construction operation/maintenance and decommissioning. Very much unlike other types of power plants wind turbine power plants require vast quantities of materials relative to power plants that utilize sources of energy other than wind. The emissions caused by the mining refinement and other processing and transport of these materials was left out of the DEIS.	Information on impacts from activities that occur before on-site Project construction and operation has been added to the EIS.
BOEM-2023-0011-0137-0058	The project's footprint is not limited to the lease area staging areas or U.S. ports likely to service the wind power plant during construction and operations. The air quality geographic analysis area (as shown on Figure 3.4.1-1 i.e. the airshed within 25 miles of the Lease Area and the airshed within 15.5 miles of onshore construction areas / main staging and in-state manufacture ports) is limited in the environmental analysis to the radius required by the Clean Air Act which	Information on impacts from activities that occur before on-site Project construction and operation has been added to the EIS.

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	leaves key information out of the EIS – information that is required to be tabulated in order to know whether the proposed action does or does not fulfill the purpose of the project. An 11 meter diameter monopole mast that is 150 mm thick requires approximately 2400 tons of steel [Source: Steelwind Nordenham FHI Corporation]. If there are 149 turbines this is 715 million pounds of steel. Turbines also require neodymium a rare earth metal. Rare earth metals are named such for a reason. To obtain the ore needed to produce 1 ton of rare earth mineral approximately 120-160 tons of earth need to be dug up and grinded. This requires burning diesel fuel. Refinement needs to occur which requires burning coal. Trans-oceanic transport which requires burning more diesel. Each of these contribute to GHG emissions which should be accounted for in the DEIS analysis.	
BOEM-2023-0011-0137-0060	Section 5.1.3.2 of the Construction and Operations Plan shows how greenhouse gas emissions (C02 CH4 N20) were estimated from commercial marine vessels and how carbon dioxide equivalent of greenhouse gas emissions were calculated. The developer did this for aviation use and for marine vessels cranes excavators generators and rigs involved in construction but left out steel production rare earth mining and refinement and other processes needed to supply and transport the materials essential for building the project's massive infrastructure. We review and estimate here the Carbon Emissions equivalent for this necessary mining and manufacture which is a necessary requisite to the project (without which it could not occur) is not insubstantial and is expected to be based upon the description of the proposed action in the COP and DEIS. We welcome any additional information by which the public and BOEM can gain transparency into the contribution of this project and cumulatively of the offshore wind program to atmospheric carbon dioxide and other GHGs.	Information on impacts from activities that occur before on-site Project construction and operation has been added to the EIS.

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BOEM-2023-0011-0139-0041	Page 3.4.1-13 within Section 3.4.1.5 Table 3.4.1-4 shows construction emissions starting in 2023. Please note that as shown in SouthCoast Wind indicative construction schedule (Section 3.2 of the COP) construction will commence no earlier than 2024.	The analysis in the Final EIS has been revised to reflect the new construction schedule for the Project based on SouthCoast Wind's revised COP.
BOEM-2023-0011-0158-0007	Finally the EIS does not really address in its calculations exactly how many fossil fuel plants are going to be eliminated because of this project. You can say that there is going to be X amount of greenhouse gases that are reduced if you just do a one for one substitution based on megawatt electricity generation but the fact is with any wind farm or solar battery you have to have a fossil fuel plant running in the background to cover periods of time when those things are not generating power. Those aren't adequately covered.	As discussed in EIS Section 3.4.1.5, the analysis of avoided emissions used the USEPA AVERT model, which assumed the 2018 grid mix for all alternatives. The model assumes a grid-wide reduction in electrical output by power plants in response to the introduction of wind energy, and does not make assumptions about the closure of any specific power plant.

N.6.4 Water Quality

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BOEM-2023-0011-0117-0012	Algal Bloom Alteration: Invasive species on the monopiles can decrease water oxygenation levels as demonstrated in the North Sea (Daewel 2022). Deoxygenation can cause fish die-offs and harmful algal blooms. The North Sea has experienced an increase in harmful and costly algal blooms in recent years. The timing coincides with offshore wind installations. Harmful algal blooms carry an approximate financial burden to the economy of over $8 billion per year (Brown 2019). A toxic algal bloom caused an unusual and "catastrophic" die-off of crabs and lobsters in the late fall/early winter of 2021 along England's North Sea coast (Beament 2022) soon after the construction of the largest offshore wind farm in the world Hornsea 1 and 2. Similarly in the year after the Block Island wind farm construction a harmful algal bloom contaminated shellfish in Narragansett Bay with the deadly neurotoxin domoic acid. Changes in nutrient levels correlated with toxicity (Sterling 2022). Although an association with the Block	Daewel et al. (2022) does not specifically relate low oxygen levels to invasive species on offshore wind monopiles. The largest decrease in oxygen level predicted by the model was within Oyster Grounds and attributed to the fact that it is a bathymetric depression. Bathymetric depressions limit the exchange with the surrounding water and allow the accumulation of organic material, resulting in higher rates of oxygen consumption. There has been no definitive correlation made between the construction of offshore wind facilities and increases in harmful algal blooms. There is evidence that the decrease in oceanic oxygen levels and increase in harmful algal blooms is likely a result of ocean warming caused by climate change (Mahaffey et al. 2020; Dai et al. 2023). Additionally, Sterling et al. (2022) suggest that a particularly toxic species of diatom (*Pseudo-nitzschia australis*) is not a resident species and was likely introduced from offshore in 2016. The same study (Sterling et al. 2022)

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	Island Wind Farm was not considered the timing and geographic pattern of the bloom suggest invasive filter feeders on the “artificial reefs” of the wind farm may have diminished the nutrients and prompted this harmful bloom. As a result of harmful algal blooms this project may violate the Seafood Safety Regulations (21 C.F.R. § 123). BOEM does not adequately consider the cost both financial and from a public health concern of the project’s propensity to induce harmful algal blooms.	indicates that the likely introduction of *P. australis* may have been driven by climate change along the Northwest Atlantic Shelf. Additional text has been included in Final EIS Section 3.4.2.5 summarizing this information.
BOEM-2023-0011-0117-0014	Sediment Plumes Toxic Compounds and Heavy Metals: During construction and installation jet plows impact pile driving and currents flowing across the underwater and benthic portion of the wind turbines resuspend toxic heavy metals (Chen 2022) re-introducing them into the food supply chain and threatening marine mammals (Huang 2022). Since the time of the industrial revolution toxic compounds and heavy metals have settled in the lease areas off Rhode Island and the West Passage where the cables will run to shore. Bioaccumulation and biomagnification can increase the potential harm these compounds can cause. As a result SouthCoast Wind May violate the Clean Water Act (33 U.S.C §§ 1251 et seq.) and Seafood Safety Regulations (21 C.F.R. § 123). The BOEM DEIS fails to adequately consider the implications or the significant health consequences of resuspending toxic compounds in this area or to incorporate the latest scientific findings.	SouthCoast Wind conducted sediment plume modeling (COP Appendices F1 and F3) from cable-laying activity, but no specific analysis was done regarding contaminated sediment. While there is the potential that sediment suspended during construction activities could contain toxic compounds and heavy metals, the sediment plume modeling indicates that any resuspension of contaminated sediment would be temporary and no long-term effects on water quality are expected. The modeling showed that maximum total suspended solid (TSS) levels dropped below 10 milligrams per liter (mg/L) (0.00008 pound per gallon [lb/gal]) in 2 hours and below 1 mg/L (0.000008 lb/gal) in 4 hours. In-water work for cable emplacement would require a USACE Department of the Army permit and a Rhode Island and Massachusetts 401 Water Quality Certification to ensure the in-water work complies with state water quality standards. The terms and conditions of the 401 Water Quality Certification would also include any requirements to comply with Total Maximum Daily Load plans, which is a water quality improvement plan for impaired 303(d)-listed surface waters; this would ensure all appropriate measure are taken for potential impacts on 303(d) impaired waters.
BOEM-2023-0011-0117-0015	Water Pollution: In addition to failing to consider the impacts of the resuspension of sediment toxic compounds and heavy metals the DEIS also does not consider the cumulative impact of other interactions between aspects of the project that may	Section 3.4.2.3 and Section 3.4.2.5 under the *presence of structures* IPF describes the potential impacts associated with corrosion of offshore wind infrastructure.

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	degrade water quality. The anti- corrosive coating on the wind turbines may leach significant levels of toxic heavy metals (lead and cadmium) (Reese 2020) into the water. Leading edge erosion emits microplastics containing Bisphenol A (BPA) and per- and polyfluoroalkyl substances (PFAS) known as "forever chemicals" into the water which can then contaminate the marine food chain. Contaminating water in an area essential to fishing may violate the Clean Water Act (33 U.S.C§§ 1251 et seq.) and Seafood Safety Regulations (21 C.F.R. § 123). The BOEM DEIS does not adequately address this significant impact on the marine environment and on human health.(https://docs.wind-watch.org/Leading-Edge-erosion-and-pollution-from-wind-turbine-blades_5_july_English.pdf)	BOEM is not currently aware of any study related to turbine erosion and forever chemicals. BOEM recognizes that the subject of forever chemical being emitted by wind turbines needs further study and analysis. USEPA is currently addressing polyfluoroalkyl substances (PFAS) through proposing and implementing numerous actions related to PFAS. A National PFAS Testing Strategy is being developed that will require PFAS manufacturers to provide toxicity data on PFAS to inform future regulations. USEPA is currently in the process of developing a rule that would designate PFAS as hazardous substances. Additionally, the creation of a new USEPA "Council on PFAS" will help to better understand and reduce the potential risks caused by these chemicals. Text has been added to Final EIS Section 3.4.2.5 summarizing this information.
BOEM-2023-0011-0117-0030	Ocean Currents: As mentioned above considering the Executive Order's dictum to tackle the climate crisis both at home and abroad the DEIS and COP does not adequately consider the global implications of the project's effect on ocean currents wave height and temperature stratification. BOEM knows that these offshore wind projects will decrease wave height diminish current strength and alter temperature stratification from its hydrodynamic modeling study (HDM BOEM_2021-049). These changes could alter both the Atlantic Meridional Overturning Circulation (AMOC) and the Gulfstream. Because any decrease in the Gulfstream or the AMOC can have dramatic effects on sea-level rises (Goddard 2015) and global weather patterns (Carrington 2021) BOEM should not accept the DEIS until these hydrodynamic changes are considered in a global context as the executive order implies.	Ocean temperature stratification at the local level is increased by rising atmospheric temperatures but decreased by wind-driven wave action. As discussed in Section 3.4.2.3, *Impacts of Alternative A – No Action on Water Quality*, hydrodynamic effects are mostly localized. Moreover, the Mid-Atlantic Bight is a region that is not directly connected to the major Gulf Stream flow, which separates off of North Carolina fairly distinctly and is roughly 200–300 miles offshore where it passes the Mid-Atlantic Bight. Wave heights should not affect the Gulf Stream flow given that it is more of a deeper geostrophic circulation. The strength of the Gulf Stream and Atlantic Meridional Overturning Circulation varies naturally over time and is continuing to be affected by climate trends. It is unlikely that any effects of wind energy development would be discernable from either this natural climate signal or the anthropogenic (GHG emissions) forcing signal.
BOEM-2023-0011-0118-0001	The sediment plume transport modeling is not adequate. It does not use the right modeling tools and does not resolve the right physical processes like the turbidity currents	COP Appendix F1 (Sediment Plume Impacts from Construction Activities) contains the results of sediment plume dispersion modeling from construction activities. The

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	expected during the cable laying operations. Additionally, the used model is not adequately resolved leading to unphysical results like the presence of isolated sediment particles which indicates that not enough Lagrangian tracers were input in the model. But the main problem is the fact that the relevant buoyancy-driven processes are not being properly modeled. The first stage of the model is not properly defined and does not correspond to what happens during the cable installation process.	modeling was conducted following established modeling methods used across various offshore industries such as dredging, and was calibrated and validated using data collected in the modeling areas (COP Appendix F1, Section 3.1). BOEM reviewed the modeling report and determined it was appropriate to support BOEM's environmental analysis.
BOEM-2023-0011-0118-0002	The second issue is the absence of a study (to the best of my knowledge) properly considering the dissolution of heavy metals from the anti-corrosion anodes installed underwater in the turbines. Zinc and Aluminum anodes are used at large quantities to prevent corrosion issues. However these anodes result in dissolved metals in the wake of the foundations that may have long-term impacts in the local ecosystems.	Section 3.4.2.3 under the *presence of structures* IPF describes the potential impacts associated with corrosion of offshore wind infrastructure.
BOEM-2023-0011-0118-0003	There is no proper consideration of the potential resuspension of sediment in the wake of the turbine foundation due to the increased turbulence levels. The increased turbulence levels may generate shear that can result in the long term resuspension of sediment (and scouring issues). The submitted report (Appendix H of the COP) does not attempt to quantify the sediment resuspension nor proposes monitoring of any kind.	COP Appendix F-2 (Scour Potential Impacts from Operational Phase and Post-Construction Infrastructure) contains analytical modeling and a qualitative assessment regarding the scour potential for the foundation types proposed in SouthCoast Wind's PDE. Section 4 of the appendix describes the potential for sediment mobility within the Lease Area. Section 5 of the appendix describes the quantitative modeling results for scour potential around foundations. In general, the study found that background sediment mobility potential across the Lease Area is very small but that there is the potential for scour, and resulting suspension of sediment, from all foundations. Scour protection is proposed around all foundations, which would minimize effects of sediment suspension due to the placement of structures in the seabed. SouthCoast Wind has committed to designing the scour protection system around foundations to reduce and minimize scour and sedimentation to the extent practicable (Appendix G, Table G-1). As described in COP Volume 1, Section 3.3.1.6, SouthCoast Wind will also

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		perform periodic inspections of the foundations, which would include inspection for seabed scour.
BOEM-2023-0011-0132-0064	The document describes using ocean water to cool the massive electric substations (OSP). This project will have up to 5 OSPs and other lease areas will have similar numbers. Yet 10 million gallons per day of ocean water from just one OSP that has been warmed to 90-degrees is dismissed as negligible. There is no analysis for the multitude of additional substations that are sure to be built for the various projects. The impacts from cooling water from the OSPs is not explained in a clear manner and does not account for all the OSPs in the lease area. How many total gallons of warm water are we to expect. How do we know this will not impact overall water temperature around Nantucket and through tidal activity in Nantucket Harbor. There is no analysis of the cumulative impact of this.	As described in Chapter 2, SouthCoast Wind is proposing up to five OSPs, which could use HVAC or HVDC technology. SouthCoast Wind has submitted an NPDES permit application for one HVDC converter OSP for Project 1. At this time, SouthCoast Wind has not selected the design or number of other OSPs. However, if HVDC is selected for Project 2, SouthCoast Wind anticipates one additional HVDC converter OSP would be installed in the southern portion of the Lease Area. SouthCoast Wind has informed BOEM that the parameters and modeling results from the NPDES permit application for Project 1 would be representative of a second HVDC converter OSP for Project 2 in the Lease Area. Additional discussion regarding the potential for multiple HVDC converter OSPs has been incorporated in Section 3.4.2.5 of the Final EIS. Based on the results of thermal plume modeling prepared for the NPDES permit application and summarized in the Final EIS, because the impacts from each OSP would be localized and minimal, the combined impacts from thermal plume discharges from multiple HVDC converter OSPs under the Proposed Action are anticipated to be minor.
BOEM-2023-0011-0132-0067	In section 3.4.2.1 the impacts on water quality are discussed. However there is no mention of the tidal nature of the water. The water in the Nantucket Shoals areas is transferred readily with each tide cycle through Nantucket Sound and through the Muskegat Channel. This tidal flow directly impacts the water in Nantucket Harbor. Yet there is not mention of how the changes to the stratifications of the water column and disbursement of phytoplankton and other microorganisms and nutrients will impact the waters around Nantucket especially Nantucket Harbor.	In Section 3.4.2.3, the Cumulative Impacts of the No Action Alternative section contains results of a recent hydrodynamic model conducted of four WTG build scenarios that describes how offshore wind projects have the potential to alter oceanic processes (e.g., currents, stratification). While the models are not specific to Nantucket Sound or Muskeget Channel, they represent best available science on the impacts of hydrodynamic changes from the presence of offshore wind structures. As described in the analysis, the observed changes in current speed and direction of 984 to 3,281 feet (300 to 1,000 meters) from monopiles demonstrate that effects would be largely localized to the

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		Lease Area and immediate surrounding area, and impacts are not expected to extend to the Muskeget Channel or Nantucket Sound. The effects on prey productivity are described in other sections of the EIS, including Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, and Section 3.5.6, *Marine Mammals*. Those sections also indicate that hydrodynamic changes would result in mostly minor impacts on marine wildlife. Furthermore, under the intakes/discharges IPF in Section 3.4.2.5, BOEM has summarized the thermal plume modeling results from one proposed HVDC converter OSP, which consider tidal currents at different times of year.
BOEM-2023-0011-0132-0068	In Figure 3.4.2-1. [Text in Blue: "Water Quality geographic analysis area"] the full area around Nantucket Shoals does not appear to be included. The full 20km buffer area suggested by Sean Hayes of NMFS should be considered. This figure also makes it clear that the tidal patterns around Nantucket have not been considered. In a 2005 report on the water movements in the area the Center for Coastal Studies provided a clear analysis that this DEIS should take into consideration.	BOEM identified the extent of the water quality geographic analysis area as a 10-mile (16-kilometer) buffer around the Offshore Project area, which was defined to account for transport of water masses due to ocean currents and includes portions of Nantucket Shoals. Refer also to response to comment BOEM-2023-0011-0132-0067, which describes the anticipated geographic extent of hydrodynamic impacts of offshore wind activities on oceanic processes based on recent modeling results. The 2005 Center for Coastal Studies report mentioned in the comment is not fully cited so it could not be located for review.
BOEM-2023-0011-0132-0069	On page 3.4.2-13 the impacts from the thousands of structures are dealt with. However the analysis is incomplete and favors computer modeling for which no inputs are explained over real world examples. Data from Europe is mentioned however there are not windfarms in Europe on the scale of what is being proposed here as these will be the largest and highest capacity turbines ever installed. This section does acknowledge the tidally dominant currents underscoring the fact that these currents were left out of the geographic analysis area.	The analysis uses computer modeling because there have not been any field measurement campaigns to collect this level of information at an offshore wind facility (the United States does not currently have any facilities to measure these impacts). All models used go through rigorous calibration and validation using data collected in the modeling areas. The EIS uses the best available science for this topic.

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BOEM-2023-0011-0132-0072	One maintenance trip per year per turbine is not enough to know if turbines are leaking oil in enough time to cure the situation.	Chapter 2 of the EIS describes that routine maintenance would serve to identify any signs of wear and tear, damage to the substructure, cracks at welds, excessive marine growth, and signs of corrosion that could lead to potential leaks during normal operations. Additionally, SouthCoast Wind would maintain an Oil Spill Response Plan (OSRP), an Incident Management Plan, and a Safety Management System. Section 3.4.2.5 of the Draft EIS under the Accidental Releases IPF details how accidental releases from structures would be minimized.
BOEM-2023-0011-0136-0042	Based on modeling the DEIS forecasts "impacts from the discharge are expected to be localized and minimal…". [Footnote 37: See SouthCoast DEIS p. 3.4.2-23] Without much analysis the DEIS concludes that impacts from the thermal plume (heated effluent) are expected to be minor. We recommend additional analysis and justifications for BOEM's finding of minor impacts from the thermal plume.	Section 3.4.2.5 of the Final EIS has been updated to reflect the revised NPDES permit application for one of SouthCoast Wind's HVDC converter OSPs. Additional discussion regarding the potential for multiple HVDC converter OSPs has also been added. Based on the results of thermal plume modeling prepared for the NPDES permit application as summarized in the Final EIS, because the impacts from each OSP would be localized and minimal, the combined impacts from thermal plume discharges from multiple HVDC converter OSPs under the Proposed Action are anticipated to be minor.
BOEM-2023-0011-0136-0043	DEIS glosses over the role bleach will play in the cooling process. "[T]he discharge of warm seawater with small concentrations of bleach would be negligible." [Footnote 38: See SouthCoast DEIS p. 3.4.2-24] This appears to be the only reference to bleach included in the DEIS and COP. If SouthCoast intends to mix bleach in the cooling water more details are necessary to effectively comment. For example: what levels of bleach are expected? What safeguards will be in place to contain bleach should it not dissipate prior to discharge?	Section 3.4.2.5 under the *discharges/intakes* IPF, which has been updated in the Final EIS to reflect the revised NPDES permit application for SouthCoast Wind's HVDC converter OSP, describes how sodium hypochlorite (bleach) would be generated and used in the OSP. Based on the low concentrations (between 0–2 parts per million or 0.0002% per unit volume), BOEM concluded impacts on water quality would be negligible.
BOEM-2023-0011-0137-0025	In table 2-4 titled Summary and comparison of impacts with no mitigation measures in row 2.4 titled Water Quality BOEM makes no distinction or even evaluation of E1-piled-mono versus E1-piled-jacket even though BOEM has recognized in	Section 3.4.2.6 has been revised in the Final EIS to include a discussion on the differing sedimentation effects by foundation type under Alternative E, citing the OCS Study BOEM 2020-041 *Comparison of Environmental Effects from*

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	the past that "[Underline: Compared to monopiles] tripod tri-pile and jack-up foundations are expected to have less suspended sediment and fewer effects from sediment deposition due to their relatively lower scour potential. [Underline: Jacket foundations are expected to have even fewer sediment effects due to lower scour potential and smaller wake effects"] [Footnote 53: OCS Study BOEM 2020-041 Comparison of Environmental Effects from Different Offshore Wind Turbine Foundations August 2020 Authors: Sarah Horwath Jason Hassrick Ralph Grismala Elizabeth Diller. Prepared under Contract 140M0118A0004 by ICF Incorporated L.L.C. 9300 Lee Highway Fairfax VA 22031 USA. Internet Source: https://www.boem.gov/sites/default/files/documents/environment/Wind-Turbine-Foundations- White%20Paper-Final-White-Paper.pdf]	*Different Offshore Wind Turbine Foundations*. Table 2-4 in Chapter 2 presents a high-level summary of impacts by alternative, which BOEM believes is an appropriate level of detail to compare and contrast the relative impacts of different foundation types.
BOEM-2023-0011-0137-0042	Oddly the DEIS concludes that if there is only a localized effect of turbulent wakes the impact will be minimal and that if turbulent wakes extend for tens of kms then reducing the number of turbines won't matter much. This conclusion is irrational since each additional turbine creates an additional wake and causes more cumulative turbulence over the leased area than would a reduced number.	Under the *presence of structures* IPF discussion in Section 3.4.2., BOEM presents a synthesis of the best available science on hydrodynamic and wake effects from the presence of structures. While there is uncertainty regarding these impacts, as there are no large-scale wind farms offshore of the United States from which to observe effects, the available literature and modeling show that hydrodynamic effects of offshore wind farms are largely localized. BOEM has added to the Final EIS a summary of the 2024 NASEM study, which found that the impacts on ecosystems from offshore wind projects may be difficult to distinguish from natural and other anthropogenic variability (including climate change) in the Nantucket Shoals region. Additional information on this topic is included in Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, Section 3.5.6, *Marine Mammals*, and Section 3.5.7, *Sea Turtles*.

N.6.5 Bats

Comment No.	Comment	Response
BOEM-2023-0011-0117-0021	Bats: Wind turbines kill significant numbers of bats (Voigt 2022) particularly during the autumn migratory season. One bat species native to Rhode Island the northern long-eared bat was recently listed as endangered and is now protected under the Endangered Species Act (16 U.S.C. §§1531-1544). In addition it is well-documented that bats control insect populations. Decreasing bat numbers allows mosquito populations to rise thereby increasing the prevalence of mosquito-borne diseases including Zika (Elrefaey 2021) West Nile (Ferraguti 2021) and Eastern Equine Encephalitis (Armstrong 2022) viruses. When nations have pledged to decrease insecticide use (Einhorn 2022) BOEM does not adequately incorporate the latest scientific findings acknowledging bat mortality associated with wind farms nor does it address the public health consequences of decreasing bat populations spread of mosquito-borne illnesses and subsequent rise in insecticide use.	Final EIS Section 3.5.1 analyzes the potential for offshore wind infrastructure to result in collisions with bats. The analysis considers both collisions with operating turbine blades as well as with non-operating structures. As set forth in the impact discussions within Final EIS Section 3.5.1, it is anticipated that the Proposed Action (as well as other nearby wind farms) would have overall minor impacts on bats, owing in part to the distance offshore. Additionally, neither referenced article directly mentions bats and there is no published correlation between the rise in mosquito-borne diseases and increased bat deaths. Based on this, there are no data indicating wind turbines would contribute to an increase in mosquito-borne illnesses. BOEM also notes that the Voight (2022) study looked at wind turbines in the onshore environment where bats are in much higher densities than the offshore environment.
BOEM-2023-0011-0140-0077	[Footnote 234: SCW DEIS and COP are both missing an extensive review of acoustic surveys from other offshore wind developments (see Sunrise Wind Revolution Wind and Empire Wind for more comprehensive reviews of acoustic data) including acoustic surveys in support of nearby South Fork Wind which detected northern long-eared bat calls offshore including in the Lease Area.]	Final EIS Section 3.5.1 includes the best available data regarding acoustic surveys for offshore wind and is consistent with other similar offshore wind EIS documents, including South Fork Wind.
BOEM-2023-0011-0140-0078	Although the COP acknowledges that "little is known about bat migration and movements over marine habitats" and notes that "[t]here is a growing body of evidence to indicate that bat migration and foraging over marine environments is a relatively common phenomenon and that certain behaviors may increase the risk of collision with turbine blades[]" the DEIS and COP nonetheless point to low bat detections (despite low survey effort) in the offshore environment to support a finding of minor impacts to bats. [Footnote 245:	The Final EIS uses the best available relevant information on bat presence. BOEM would continue to collect information on bat presence in the offshore environment to help inform the assessment of potential impacts on bats from construction and operation of offshore wind farms. As described in Final EIS Section 3.5.1, current information indicates that bat presence in the offshore environment is relatively low.

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	SCW COP Volume II at 6-58.] [Footnote 246: SCW COP Appendix I2 at 3-4.] [Footnote 247: E.g. SCW COP Appendix I2 at 5-7 ("…due to the relative infrequency of bat occurrence offshore the intensity of the effect and sensitivity to this hazard are likely to be low for bat populations both overall and locally.") SCW DEIS Appendix D at D-34 ("Bat use of offshore areas is very limited…Very few bats would be expected to encounter structures on the OCS") SCW DEIS at 3.5.1-8 ("these impacts are highly unlikely to occur as little use of the OCS [by bats] is expected") SCW DEIS at 3.5.1-11 ("Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration and given that cave bats do not typically occur on the OCS ongoing offshore wind activities would not appreciably contribute to impacts to bats.") SCW DEIS at 3.5.1-15 ("The cumulative impacts on bats would likely be minor because the occurrence of bats offshore is low").]The limited data analyzed to support BOEM's impact analysis were predominantly collected in the offshore environment in the absence of offshore wind turbine structures; these data are not appropriate for assessing bats' behavior in the presence of structures like wind turbines. The research presented in the COP supports this inadequacy noting that bats have a "pattern of attraction to novel anthropogenic structures" and that this pattern "has been observed in nearby offshore areas[.]"[Footnote 248: SCW COP Appendix I2 at 3-3.] [Footnote 249: Id.] The COP explains that the construction of new novel structures in the offshore environment can change bat behavior and plainly states that "[t]he Lease Area consists of open ocean and post-construction will contain WTGs and OSPs." [Footnote 250: SCW COP Appendix I2 at 3-4.] [Footnote 251: SCW COP Appendix I2 at 4-1.] Despite this the DEIS states that "relatively little bat activity has been documented over open water habitat similar to the conditions in the Project Wind Farm Area" and thus assumes minor impacts to bats even though the addition of "structures resulting from the	To support the advancement of the understanding of bat interactions with offshore wind farms, SouthCoast Wind has proposed an Avian and Bat Post-Construction Monitoring Framework (included in Final EIS Appendix G) that outlines an approach to post-construction monitoring. The scope of monitoring is designed to meet federal requirements (30 CFR 585.626(b)(15) and 585.622(b)) and is scaled to the size and risk profile of the SouthCoast Wind Project. Moreover, as noted in Final EIS Section 3.5.1.9, results of these monitoring efforts would form the basis of adaptive mitigation.

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	proposed Project where few currently exist.” [Footnote 252: SCW DEIS at 3.5.1-9 (emphasis added).] [Footnote 253: SCW DEIS at 3.5.1-13.] This means that this open water pre-construction data is unlikely to inform impacts post-construction.It is inappropriate to use information on bat presence in the absence of structures to determine post-construction fatality risk because bats are attracted to wind turbines a fact repeatedly acknowledged in the COP and DEIS yet largely ignored in BOEM’s impact conclusions. [Footnote 254: Cryan Paul M. P. Marcos Gorresen Cris D. Hein Michael R. Schirmacher Robert H. Diehl Manuela M. Huso David T. S. Hayman et al. 2014. “Behavior of Bats at Wind Turbines.” Proceedings of the National Academy of Sciences of the United States of America. National Academy of Sciences.] [Footnote 255: SCW COP Appendix I2 at 3-3 Appendix at 3-4 Volume II at 6-61 and SCW DEIS at 3.5.1-9 and 3.5.1-10.] The COP plainly states that “there is sufficient evidence from onshore and offshore facilities to suggest that bats may be attracted to WTGs and frequently interact with turbine blades in the RSZ [rotor-swept zone].” [Footnote 256: SCW COP Appendix I2 at 3-4. Emphasis added internal citations omitted.]At land-based wind facilities pre-construction bat activity does not correlate with post-construction fatalities likely due to bats’ attraction to turbine structures. [Footnote 257: Donald Solick et al. Bat activity rates do not predict bat fatality rates at wind energy facilities Acta Chiroptera (June 2020); Cris D. Hein et al. Relating pre-construction bat activity and post-construction bat fatality to predict risk at wind energy facilities: A synthesis Nat’l Renewable Energy Lab. (NREL) (Mar. 2013)] [Footnote 258: Additionally low levels of bat calls in acoustic surveys do not necessarily indicate that bats are not present. Aaron J. Corcoran et al. Inconspicuous echolocation in hoary bats (Lasiurus cinereus) Proceedings Royal Soc’y B (May 2 2018).] Furthermore recent research at buoys vessels and the two Coastal Virginia Offshore Wind pilot project wind turbines found considerable differences in	

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	bat activity in the presence of turbines as compared to open water. [Footnote 259: Clerc J. and J.R. Willmott. "Towards Understanding the Potential for Offshore Wind to Impact Bats." Normandeau Associates. Presentation at State of the Science Virtual Session 09/21/2022.] This once again underscores that BOEM should not draw conclusions about SouthCoast Wind's impacts on bats based on sparse offshore acoustic data collected over open water.Given the above and the in-depth discussion of bats' attraction to turbines and other structures in the COP it is particularly concerning that BOEM seems to be assuming that bats will avoid turbines thereby minimizing potential collision. Repeatedly BOEM claims that because SouthCoast Wind's turbines will be widely spaced or because structures are rare in the offshore environment bats can "avoid operating WTGs" or "easily fly around or over these sparsely distributed structures and no strikes would be expected." [Footnote 260: Two references at SCW DEIS at 3.5.1-10 ("With the proposed up to 1-nm (1.9-kilometer) spacing between structures associated with offshore wind development in the Massachusetts and Rhode Island lease areas and the distribution of anticipated projects individual bats migrating over the OCS within the RSZ of project WTGs would likely pass through projects with only slight course corrections if any to avoid operating WTGs" and "Given the rarity of tree bats in the offshore environment WTGs being widely spaced and the patchiness of projects the likelihood of collisions is expected to be low and impacts on bats would be negligible.") and two references at SCW DEIS Appendix D at D-34 ("There may be few structures scattered throughout the offshore bats geographic analysis area such as navigation and weather buoys and light towers. Migrating bats can easily fly around or over these sparsely distributed structures and no migration disturbance would be expected" and "There may be few structures in the offshore bats geographic analysis area such as navigation and weather buoys turbines and light towers. Migrating tree bats can easily	

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	fly around or over these sparsely distributed structures and no strikes would be expected.”)] [Footnote 261: SCW DEIS at 3.5.1-10.] [Footnote 262: SCW DEIS at SCW DEIS Appendix D at D-34.] These assertions are 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. [Footnote 263: As mentioned above BOEM is relying on information on collision risk to bats at land-based wind to overcome the lack of data for collision impacts at offshore wind facilities. SCW DEIS Appendix E at E-2 and SCW COP Appendix I2 at 3-1.] [Footnote 264: Cryan et al. 2014.] 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.	
BOEM-2023-0011-0140-0079	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 DEIS nevertheless concludes that exposure of cave bats to operating WTGs “is expected to be negligible if exposure occurs at all[.]”[Footnote 265: SCW DEIS at 3.5.1-4 3.5.1-13 Appendix E at E-2 SCW COP Appendix I2 at 3-1 and 3-3 SCW COP Volume II at 6-58.] [Footnote 266: SCW DEIS at 3.5.1-9. Other instances of downplaying cave bat exposure can be found at SCW DEIS at 3.5.1-4 (“exposure to the Wind Farm Area is very unlikely”) and SCW DEIS at 3.5.1-14 (“given that cave bats do not typically occur on the OCS”).] However cave-hibernating bats may be found offshore more frequently and at greater distance than the assessments in the COP and DEIS indicate. Although the DEIS cites a study claiming that Myotis bats have not been detected further offshore than 11.5 km other research cited in the COP and DEIS detected Myotis calls at several Mid-Atlantic sites further offshore than 11 km including at the Chesapeake Light Tower in Virginia 24.8 km	Final EIS Section 3.5.1 reflects additional information relative to the abundance of cave-hibernating bats offshore. The Final EIS uses the best available information, and thus complies with the procedural requirements of NEPA to predict potential impacts on bats from the Proposed Action.

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	from the mainland. [Footnote 267: SCW DEIS at 3.1.1-4 citing Sjollema et al. 2014. Sjollema Angela L. J. Edward Gates Robert H. Hilderbrand and John Sherwell. “Offshore Activity of Bats Along the Mid-Atlantic Coast.” Northeastern Naturalist vol. 21 no. 2 (2014): 154–63.] [Footnote 268: Peterson et al. 2016 Appendix A.] Additionally bat calls classified as high frequency unknown species were detected as far as 130 km offshore in the Mid-Atlantic. [Footnote 269: Peterson et al. 2016.] While it is not possible to attribute these unidentified calls to species high frequency unknown species calls can include calls from Myotis species. Furthermore the same study identified Myotis calls at 63 percent of sites surveyed in the Mid-Atlantic and Myotis species were present at 89 percent of sites surveyed across the Gulf of Maine Mid-Atlantic and Great Lakes indicating that cave bats may be more common offshore than characterized by the DEIS. [Footnote 270: Peterson Trevor S Steven K Pelletier and Matt Giovanni. 2016. “Long-Term Bat Monitoring on Islands Offshore Structures and Coastal Sites in the Gulf of Maine Mid-Atlantic and Great Lakes—Final Report.” Topsham ME USA. Prepared for the U.S. Department of Energy.]	
BOEM-2023-0011-0140-0080	Although the DEIS and COP both state that the federally endangered Indiana bat is not known to occur in eastern Massachusetts a tagged Indiana bat was detected north of the Project Area as discussed in Section IV.I.3 of our scoping comments. [Footnote 271: SCW COP Appendix I2 at 4-11 and Volume II at 6-56; SCW DEIS at 3.5.1-3.] [Footnote 272: Available at https://www.regulations.gov/comment/BOEM-2021-0062-0035] We refer BOEM back to those scoping comments.	The cited record of an Indiana bat detected on Nantucket is recorded in Motus at the following link: https://motus.org/data/track?tagDeploymentId=2403. It is important to note that the Motus site includes a proviso that “Individual tracks have not been inspected for accuracy.” BOEM consulted with USFWS as part of the ESA Section 7 requirements to address federally listed bats, and it was determined that Indiana bat does not occur or potentially occur in the Project area. This is why BOEM’s BA and the USFWS Biological Opinion (issued on September 1, 2023) addresses two bats: northern long-eared bat and tricolored bat.
BOEM-2023-0011-0140-0081	Although endangered northern long-eared bats are present onshore near the Project and on Cape Cod Nantucket and	SouthCoast Wind’s Draft Post-Construction Avian and Bat Monitoring Framework has been added as an attachment to

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	Martha's Vineyard offshore collision impacts are largely dismissed in the DEIS. [Footnote 273: SCW DEIS at 3.5.1-3 and 3.5.1-5.] [Footnote 274: SCW COP Volume II at 6-59.] [Footnote 275: SCW DEIS at 3.5.1-5-2.5.1-6 ("It is not expected that northern long-eared bats would be exposed to the offshore Wind Farm Area.") at 3.5.1-6 ("Given that there is little evidence of use of the offshore environment by northern long-eared bat exposure to the proposed Wind Farm Area if it occurs is anticipated to be minimal.") and at 3.5.1-11 ("northern long-eared bats are not expected to use the OCS in any significant numbers if at all.").] 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. [Footnote 276: Bird Studies Canada 2018.] Furthermore although this data is not included in the COP or DEIS a northern long-eared bat was acoustically detected northeast of the Lease Area 34 km offshore within the South Fork Wind Farm Project Area. [Footnote 277: Sunrise Wind Farm COP Appendix P1 at 60 and 62 Figure 2-3.] Moreover 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 Lease Area 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. [Footnote 278: SouthCoast Wind did not present a compilation of relevant bat acoustic data from the offshore environment but overviews of such surveys can be found at Sunrise Wind Farm COP Appendix P1 at 88 Table 2.15 and Empire Wind COP Appendix R at 12 Table R-2.] [Footnote 279: Id.]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	Appendix G; also refer to the mitigation measures at Final EIS Section 3.5.1.9. The Final EIS uses the best available information, and thus complies with the procedural requirements of NEPA to predict potential impacts on bats from the Proposed Action. In addition, BOEM concluded its ESA Section 7 obligations on September 1, 2023, when USFWS issued its Biological Opinion for the Project. As stated in USFWS's transmittal letter for the Biological Opinion, USFWS concurred with BOEM's determination of "not likely to adversely affect" for northern long-eared bat and tricolored bat.

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	other cave bats to be negligible. Instead as BOEM prepares its Biological Assessment and consults with the U.S. Fish and Wildlife Service BOEM should note that northern long-eared bats could be present in the offshore Project Area and that insufficient research exists to dismiss potential collision impacts from SouthCoast Wind's operations. [Footnote 280: SCW DEIS at 3.5.1-6.]BOEM should thus require SouthCoast Wind to conduct or support monitoring to better understand the potential presence of and collision risk to northern long-eared bats in the Lease Area.	
BOEM-2023-0011-0140-0082	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 SouthCoast Wind's operations. Unfortunately besides annual reporting of carcasses on vessels and structures no monitoring measures are included in either the COP or DEIS. [Footnote 281: SCW DEIS Appendix G at G-49 and G-56. SCW DEIS at 3.5.1-17.] [Footnote 282: The DEIS repeatedly cites SCW COP Volume II Table 16-2 as including monitoring measures (see SCW DEIS Appendix G at G- 48 G-56 and SCW DEIS at 3.5.1-17) no bat monitoring measures are included in SCW COP Volume II Table 16-2.] This deficiency is not present in other recent DEISs and BOEM should have included proposed post-construction monitoring information in SouthCoast Wind's DEIS. [Footnote 283: E.g. New England Wind DEIS at Appendix H Sunrise Wind COP at Appendix P2 Revolution Wind DEIS at Appendix G Coastal Virginia Offshore Wind DEIS at Appendix H.]We appreciate that BOEM included adaptive monitoring and mitigation for bats in the DEIS. [Footnote 284: SCW DEIS Appendix G at G-48 and G-56; SCW DEIS at 3.5.1-17.] We recommend that BOEM strengthen this requirement to require that SouthCoast Wind as new technologies become available for monitoring impacts at offshore wind facilities (e.g. offshore turbine strike detection technology) commit to deploying these technologies. We	Final EIS Sections 3.5.1.9 and 3.5.3.9 each reflect the inclusion of additional bat and bird mitigation measures. Additionally, refer to Final EIS Appendix G, Attachment G2, which includes a related Draft Post-Construction Avian and Bat Monitoring Framework.

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	support BOEM's proposal that if monitoring reveals that impacts to bats are greater than those discussed in the DEIS SouthCoast Wind must develop new mitigation measures. [Footnote 285: Id.]To inform the forthcoming Avian and Bat Post-Construction Monitoring Plan we provide the following monitoring and adaptive management recommendations. [Footnote 286: SCW DEIS Appendix G at G-6 SCW DEIS at 3.5.1-12 SCW COP Appendix I2 at 5-8 and 5-9.]	
BOEM-2023-0011-0140-0083	Because as discussed above 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. BOEM should require that data from all post-construction monitoring be made promptly accessible to both agencies and the public.	Please refer to Final EIS Section 3.5.1.9 and Appendix G, Attachment Appendix, which state that SouthCoast Wind will submit an annual Monitoring Report to BOEM summarizing post-construction monitoring activities, preliminary results as available, and any proposed changes in the monitoring program. SouthCoast Wind will consult with BOEM and agencies, as necessary, to discuss the report and adaptive changes to the Monitoring Plan.
BOEM-2023-0011-0140-0084	SouthCoast Wind should deploy acoustic monitors post-construction on turbines and install them at nacelle height (rather than on converter 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. SouthCoast 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 should be 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. [Footnote 287: https://sciencebase.usgs.gov/nabat/][Footnote 288: https://batamp.databasin.org/.]	As reflected in Final EIS Appendix G, Attachment G2, bat flight heights vary according to species and conditions. Similar to other offshore wind project proponents in the area, SouthCoast Wind is considering conducting a 1- to 2-year radar study to record the passage rates of migrants and their flight heights. The methodology would be determined in consultation with USFWS.
BOEM-2023-0011-0140-0085	SouthCoast Wind should install Motus towers in their Lease Area as well as support the upgrading of coastal Motus towers. Additionally we recommend that SouthCoast Wind support the tagging of bats which are underrepresented in Motus to support understanding of bat activity offshore. We	Please refer to Final EIS Appendix G, Attachment G2, which outlines the use and installation of Motus receivers in the Project area.

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	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 of new lessees in the New York Bight Carolina Long Bay and California. [Footnote 289: See Final Sale Notices for the New York Bight (86 Fed. Reg. 31524) and Carolina Long Bay (86 Fed. Reg. 60274) and lease stipulations in the New York Bight leases (OCS-A 0537 0538 0539 0541 0542 and 0544) Carolina Long Bay leases (OCS-A 0545 and 0546) and California leases (OCS-P 0561 0562 0563 0564 and 0565).]SouthCoast Wind should keep offshore 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 SouthCoast 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.	
BOEM-2023-0011-0140-0086	SouthCoast Wind plans to report dead or injured bats found on vessels and project structures. [Footnote 290: SCW DEIS Appendix G at G-49 and G-56.] 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. [Footnote 291: We recommend BOEM consult with Manuela Huso Research Statistician at United States Geological Survey Forest and Rangeland Ecosystem Science Center prior to making any inferences about total fatalities based on carcasses recovered from structures.]As new technologies become available for monitoring fatalities at offshore wind facilities such as strike detection technology BOEM should require SouthCoast Wind to commit to deploying these and if monitoring reveals that impacts to bats are significant BOEM should require	Final EIS Section 3.5.1.9 and Appendix G detail the mitigation and monitoring measures that would be implemented to avoid, minimize, and mitigate adverse impacts on bats. A framework for an avian and bat post-construction monitoring program would be developed and implemented in coordination with applicable federal and state resource agencies (Appendix G, Attachment G2). Additional mitigation and monitoring measures may arise from consultations and coordination with federal and state resource agencies. These additional mitigation measures could be considered by decision-makers and incorporated into the ROD.

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	SouthCoast Wind to employ minimization strategies and/or technologies.	
BOEM-2023-0011-0140-0087	We strongly support BOEM's proposed measure that SouthCoast Wind recommend new mitigation measures or monitoring measures "[i]f the reported post-construction bird and bat monitoring results…indicate that bird and bat impacts deviate substantially from the impact analysis included in this EIS[.]"[Footnote 292: SCW DEIS Appendix G at G-48 and G-56.] However there is a lack of clarity as to what would trigger this adaptive management. The post-construction monitoring measure for bats included in the COP and DEIS—carcass reports from vessels and structures—will not provide comprehensive information on bat collisions which are likely the greatest cause of bat fatalities 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. Once again we underscore the need for adaptive monitoring. Because the proposed monitoring method is unlikely to provide estimates of bat collisions from SouthCoast Wind's offshore operations but no collision detection technologies are validated and commercially available for use offshore BOEM should require SouthCoast Wind to commit to deploying collision detection technology once available. Strike detection technology is in development with one technology to be tested on an offshore wind turbine in 2023. [Footnote 293: Stucker J. Prebyl T. Bushey J. Good R. Roadman J. Ivanov H. Rooney S. Verhoef H. Kaandorp F. and Saraswati N. A Multi-Sensor Approach for Measuring Bird and Bat Collisions with Wind Turbines: Validation Results. 2022. Poster presentation for NYSERDA State of the Science.] SouthCoast 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.	BOEM and SouthCoast Wind have used the best available data and technology to draft the Post-Construction Avian and Bat Monitoring Framework (Final EIS Appendix G2). The document outlines triggers for adaptive management and will be determined in coordination with BOEM, USFWS, Massachusetts Division of Fisheries and Wildlife (MassWildlife), RIDEM, and other relevant regulatory agencies to determine the need for adjustments to monitoring approaches.

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BOEM-2023-0011-0140-0022	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 SouthCoast Wind for birds) 5 mi inland (SouthCoast Wind for bats and several other DEISs for both birds and bats) to 100 mi inland (Vineyard Wind 1 for both birds and bats). [Footnote 35: Sunrise Wind DEIS Appendix D at D-1 and D-2.] [Footnote 36: SCW Wind at Fig. 3.5.3-1 p. 3.5.3-2.] [Footnote 37: Id. at Fig. 3.5.1-2 p. 3.5.3-2.] [Footnote 38: Vineyard Wind Final EIS Table A-1 at A-10.] BOEM should improve their analyses to ensure a high standard and consistency for their cumulative impact analyses for offshore wind projects. We also urge BOEM to also ensure that in evaluating impacts to species the agency considers potential changes in range and seasonal use due to various anticipated levels of warming and climate change.	Geographic analysis areas are based on the geographic extent of potential impacts of the Proposed Action, either direct or interdependent or interrelated activities/effects, rather than the entire range of species that overlap or may overlap with onshore and offshore facilities and activities. The inclusion of all areas where individual species that cross the Proposed Action may migrate would quickly result in large areas that are impractical to incorporate into the geographic analysis. The bat (and bird) geographic analysis area for the Project is consistent with other more recent offshore wind EISs, including Empire Offshore Wind. The Final EIS includes discussions of the impacts of climate change as part of the No Action Alternative analysis of ongoing activities and environmental stressors (refer to Final EIS Chapter 3 resource sections where appropriate). Climate change is a consideration for baseline conditions and for cumulative impacts.
BOEM-2023-0011-0140-0124	Of particular concern for the accuracy of BOEM's cumulative impact analysis for bats is the geographic analysis area. BOEM defines the geographic analysis area as 100 mi offshore and 5 mi inland. [Footnote 236: SCW DEIS at 3.5.1-1.] This is at odds with the geographic analysis area used for bats for Vineyard Wind 1 where the area extended 100 mi inland. [Footnote 237: Vineyard Wind 1 Final EIS at A-10.] BOEM presents no research in the DEIS to support the assumption that bats found offshore exclusively use 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—including research presented in SouthCoast's COP— does not support BOEM's rationale for their limited inland geographic analysis area in SouthCoast Wind's DEIS. [Footnote 238: SCW COP Volume II at 6-67 and 6-68 discussing movements of tri-colored bats and little brown bats in excess of 300 miles and SCW COP Appendix I2 at 3-1 discussing hoary bats and eastern red bats cross-water	Please refer to the response to comment BOEM-2023-0011-0140-0022. The 5-mile inland boundary captures the bats near or in coastal habitats that may be affected by the Project.

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	movements in excess of 620 mi.]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 five miles. [Footnote 239: Norquay K. J. O. Martinez-Nuñez F. Dubois J. E. Monson K. M. & Willis C. K. R. (2013). Long-distance movements of little brown bats (Myotis lucifugus). Source: Journal of Mammalogy 94(2) 506–515. https://doi.org/10.1644/12-MAMM-A-065.1] [Footnote 240: Bird Studies Canada 2018. Note that little brown bat movements in excess of 300 mi are discussed in the COP. SCW COP Volume II at 6-67.] Hoary bats which are capable of long distance flights over water have been recorded traveling over 1000 km (621 mi) and are thought capable of migrations in excess of 2000 km (1243 mi). [Footnote 241: Hoary bats have colonized the Hawaiian Islands from the mainland multiple times. Russell A. L. Pinzari C. A. Vonhof M. J. Olival K. J. & Bonaccorso F. J. (2015). Two Tickets to Paradise: Multiple Dispersal Events in the Founding of Hoary Bat Populations in Hawai'i. PLOS ONE 10(6) e0127912. https://doi.org/10.1371/journal.pone.0127912] [Footnote 242: Weller T. J. Castle K. T. Liechti F. Hein C. D. Schirmacher M. R. & Cryan P. M. (2016). First Direct Evidence of Long- distance Seasonal Movements and Hibernation in a Migratory Bat. Scientific Reports 6(1) 1–7. https://doi.org/10.1038/srep34585] [Footnote 243: Cryan P. M. Bogan M. A. Rye R. O. Landis G. P. & Kester C. L. (2004). Stable Hydrogen Isotope Analysis of Bat Hair as Evidence for Seasonal Molt and Long-Distance Migration. In Source:	

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	Journal of Mammalogy (Vol. 85 Issue 5).] 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. [Footnote 244: Bird Studies Canada 2018.] 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 be exposed to multiple land-based wind energy projects as well as multiple offshore wind energy projects.	

N.6.6 Benthic Resources

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BOEM-2023-0011-0123-0024	The turbine foundations may increase hard substrate for recruitment following any disturbance during the construction phase (Petersen and Malm 2006). The reef effect can increase food availability (Degraer et al. 2020) and biodiversity and biomass (Inger et al. 2009; Gill 2005; Linley et al. 2007). However new habitat created by the turbine foundations may not benefit all species that utilized the local habitat prior to construction and may serve to attract biomass as opposed to result in increased ecosystem productivity. As such it is important that these elements be evaluated as possible throughout the project to best understand the long-term effects of the region.	Text has been added to Final EIS Section 3.5.2.3 to address this comment based on review of Bray et al. (2017), Wilding et al. (2017), Adams et al. (2014), Causon and Gill (2018).

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BOEM-2023-0011-0132-0062	On page 3.5.2-14 it states that noise from G&G surveys will rarely overlap. This is simply false and this exact situation is currently happening in the NY/NJ area. No historical data for timing of surveys and whale deaths has been provided for the MA/RI lease area.	The text explains that detectable impacts of G&G survey noise on benthic resources would rarely, if ever, overlap from multiple sources. While G&G surveys from multiple projects could occur concurrently, detectable impacts in the geographic analysis area are not expected to occur. As explained in Section 3.5.2.3, should surveys overlap, multiple sound sources do not produce overall louder noises. The loudest one would prevail making the less intense harder to hear (see the *noise* IPF discussion in Section 3.5.2.3). Please refer to Section 3.5.6, *Marine Mammals*, regarding impacts on whales.
BOEM-2023-0011-0137-0026	The estimated quantitative effect of the SouthWind power plant's contribution to a reduction in productivity via this "trophic footprint" of fouling heterotrophs when taken together with that of other wind-turbine power plant projects planned on the outer continental shelf (some of which are floating wind farms in which each turbine sits on a 2- acre shade-casting tethered platform) has not been estimated by BOEM in the DEIS with respect to mass quantity (tonnage) of excess dissolved carbon compounds that will result from the U.S. Atlantic Offshore wind program's impairment of primary productivity on the Outer Continental Shelf. These dissolved carbon compounds impair the ability of the ocean to serve as a carbon buffer to atmospheric carbon and contribute to ocean acidification.The authors conclude that "[e]very square meter of artificial structure cancels out the primary production of up to 130 square meters" of water "essentially robbing marine ecosystems of their productivity" [M.E. Malerba C.R. White and D.J. Marshall 2019. Frontiers in Ecology and the Environment Vol. 17 Issue7 September 2019 pp.400-406. https://doi.org/10.1002/fee.2074] a conservative estimate according to the researchers with the trophic footprint (net effect of alteration of the natural trophic pyramid) potentially having double that effect. Estimates by other researchers show a 1:8 ratio of square area of marine urbanization to area of primary production cancelled by its	BOEM has considered primary production related to the addition of structures in more detail in Sections 3.5.5.3 and 3.5.5.5, including a reference to Dannheim et al. (2020), which considers that higher densities of filter feeders could consume much of the increased primary productivity around offshore wind turbines. Modeling in the North Sea has shown that only small changes to primary productivity around offshore wind farms changes are expected to occur, and overall trophic response difficult to project (Daewel et al. 2022) even in much larger than planned wind farm development.

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	existence.SEE ORIGINAL ATTACHMENT FOR IMAGE OF Figure 13. Fouling on hard-surfaces that accompanies marine urbanization (construction in marine environments). Dense communities of filter-feeding sessile heterotrophs appear that reduce density of photosynthetic plankton responsible for removing dissolved inorganic carbon from ocean water and turning it into organic life formsKnowing these "trophic footprint" effects of marine construction the conclusions of the Bureau in the DEIS—that concrete bottom scour pads surrounding wind energy structures and other structures that comprise the ocean power plants will be "beneficial" on account of the fact that they will serve as substrate that fosters growth of new communities of organisms built around sessile heterotroph organisms—is a conclusion that is very difficult to make rational sense of the DEIS does not attempt to quantify the effect of this marine urbanization on the trophic footprint (population explosion of sessile invertebrates causing decline in autotroph density and consequential reduction in ability of the waters over the outer continental shelf to reduce dissolved carbon thus reducing the ocean's ability to serve as a carbon buffer). Because this power plant cumulatively with the larger U.S. Offshore Wind Program contributes to marine urbanization which can have such an impact the DEIS is insufficient at fulfilling the requirements of NEPA to estimate impacts reasonably expected to occur.	
BOEM-2023-0011-0137-0048	Two DEIS statements first"[R]esults of benthic monitoring at European wind facilities and the Block Island Wind Farm in the United States provide general knowledge of the overall impacts of these IPFs combined if not individually. Therefore the analysis provided in this EIS is sufficient."and second the comment within the DEIS that assesses the project both individually and cumulatively to be of net benefit to the benthos are not supported and are contradicted by the available scientific data. Of the few studies were conducted at the Block Island Wind Farm to look for effects and cited some	The cited article does not investigate impacts of EMFs or noise at offshore wind farms. The commenter's cited article investigates the impact of prey availability and foraging habitat by flounder and Gadid fishes, which found that besides these fish incorporating some of the epibionts (mussels and mysid shrimps which are associated with mussel beds) into their diets the quality of foraging habitat was deemed similar at the wind farm and reference sites (without offshore wind farm).

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	were commissioned by wind developers and written by their employees [Footnote 74: E.g. https://www.int-res.com/articles/meps_oa/m683p123.pdf]. We reiterate to the Bureau of Ocean Energy Management that there is a wealth of scientific information about how both noise and magnetic fields (that wind-turbine power plants and their transmission infrastructure expected to produce respectively) affects marine life including effects on the benthos in ways that has not received adequate consideration.	The *EMF* and *noise* IPFs listed in both Section 3.5.2, *Benthic Resources*, and Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat,* includes the best available data and scientific literature for offshore wind and is consistent with other offshore wind EISs including Ocean Wind 1 and Revolution Wind.
BOEM-2023-0011-0137-0049	Anticipated effects of the proposed activities on invertebrates are large potentially very large or are unknown (See Appendix A) [Footnote 75: The following were given less than due consideration in the DEIS or impacts to populations were downplayed or underestimated: Change in prey density or availability; modified feeding behavior; increased energetic expenditure (traversing extra distances to avoid areas of activity; increasing communication volume circuitous migratory paths); physiological effect of stress damage to ciliated structures (and the consequences for the organism); behavioral response to sound exposure interferes with necessary life functions; direct physiologic effect of exposure to sound; impairment of habitat selection capability based on sound cues habitat alteration from behavioral changes in animals that are ordinarily habitat manipulators; delayed or abnormal physiology or behavior in development; decreased sediment mixing (reduced locomotion increased recession); damage to statocysts and harm outcomes such as impacts to reproductive energy budgets brood success; missed mating opportunity impairment of ability to select mates from masking mating sounds and calls; changes to plankton (spatial distribution planktonic species composition); immunosuppression of coelomates depletion of antioxidant resources impaired gravitaxis shell dissolution (related to increased anaerobic metabolism from time spent with valves shut) reduced predator defenses (reduced predator detection impaired shoaling in fish inability to locomote and thus	Text has been added to Final EIS Section 3.5.2.3, *Cumulative Impacts of the No Action Alternative,* under the *noise* IPF paragraph that directly addresses some of the physiological impacts listed here. Additional physiological impacts are addressed in the Final EIS under the *EMFs* and the *cable emplacement and maintenance* IPFs in Section 3.5.2.3. Invertebrate physiological sensitivities to sound are also described in the finfish, invertebrate, and EFH analysis, in Section 3.5.5.3.

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	regulate internal conditions impaired escape from reduced condition postural and positional changes from physiological damage to "righting" organs) impaired migration and change in community structure and the ecological services communities and their component species provide.].	
BOEM-2023-0011-0137-0084	100-200 kHz sound elicited physiological stress response in echinoderm A. lixula and increased the cytotoxicity[Footnote 18: Vazzanaa Mauroa Ceraulob Dioguardia Papalec Mazzolab Arizzaa Beltramed Inguglia Buscainob 2020. Underwater high frequency noise: Biological responses in sea urchin Arbacia Lixula. J of Comparative Biochemistry and Physiology Part A. 2020. Comp Biochem Physiol A Mol Integr Physiol. 2020 Apr; 242:110650.] of its coelemic fluid confirming the vulnerability of this species to acoustic exposure. This is the frequency of sound emitted by the echosounders and side-scan sonar equipment expected to be used in site characterization. Impact on Echinoderms of operational noise was not given adequate treatment. The brown sea urchin Arbacia punctulate as well as remaining populations of sea stars of noise has not been assessed.	Due to the BOEM resolution requirements for the COP surveys, SouthCoast Wind was required to use side-scans and multibeam systems with higher frequency than 100 to 200 khz. The following frequencies were used for the 2019, 2020, 2021, and 2023 G&G surveys. • Side-scan sonar frequency – 300 kHz and 600 kHz. • Multibeam echo sounder was above 200 kHz (2020 and 2021 it was 400 kHz, and 388 kHz in 2019, and the plan for 2023 is 350–360 kHz). Therefore, no impacts are anticipated to echinoderms based on the mentioned study. Additional text has been incorporated into the Final EIS Sections 3.5.2.3, and 3.5.5.3 addressing noise and vibration impacts on invertebrate species, including a citation from the Vazzana et al. (2020) paper cited in the comment.
BOEM-2023-0011-0137-0107	The DEIS concludes sediment disturbance will be easy to recover from. However studies in Europe have shown benthic communities simply do not appear to be as resilient as that and also show cable laying to have long term adverse impacts on biodiversity[Footnote 48: Haploop areas are rich benthic ecosystems and allow for the development of a benthic macrofauna and an interdependent pelagic fauna. French researchers showed that an electrical cable buried in 2012 adversely affected a Haploop field within the vicinity of the cable. The Haploops mud is characterized by a higher biodiversity in living benthic foraminifera in Haploop mats and by a good balance between major species of foraminifera. Two transects were sampled one close to and one far from the cable. Samples were also taken in between. A decreasing gradient of ecological health status (as measured by	While the NEM has similar geological features (pockmarks) as the habitat described in the cited example, no evidence of extensive amphipod mats exists in the NEM. Goff (2019) states that calcareous deposits were found in the NEM from acoustic mapping, which were indicative of biological origin as calcareous deposits would not be present from geological processes since the NEM is devoid of methane seeps. Foraminifera deposits, a calcifying planktonic species have been found in the NEM (Chaytor et al. 2021) but these Haploop amphipod mat are not likely present because Champilou et al. (2019) draws an association of these amphipod mats with the methane seeps and the nutrients that are dispelled from them. The NEM pockmarks are created from groundwater discharge and therefore the biological communities would vastly differ from those in this

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	biodiversity) can be observed going from the bank to the midline of the electrical cable[Bold Underline: emphasizing that the area remains an adversely impacted environment even after 5 years from the cable installation.] Nearer the cable a dense unbalanced species assemblage was highly dominated by a single species. [Bold Underline: Biodiversity increased with distance away from the cable]. ["HOOPLA" case study on Haploops fields by WAMEC (West Atlantic Marine Energy Community); internet reference https://www.weamec.fr/en/publications/2018-champilou-j-b-foraminiferal-faunas- associated-to-haploops-spp-mats-on-the-atlantic-french-coast-and-effects-of-a-wind-farm-installation- on-the-area-weamec-project-hoopla/].] in the studied benthic animals which are substrate modifiers and which benefit other organisms.	French study. From a literature search it was not clear that any biodiversity research has been done on the benthic and infaunal communities. Therefore, please refer to Section 3.5.2.1 for reference on what the soft sediment biological communities could look like since the NEM and the Lease Area are somewhat close in proximity. Section 3.5.2.5 provides impacts assessments for soft sediment habitat in the Lease Area, as well as outlines the likelihood of recovery.
BOEM-2023-0011-0137-0109	The DEIS does not give adequate treatment to Horseshoe Crabs magnetosensitive species which may be significantly affected by undersea cables within the lease areas once the sold lease areas are developed and within the cable routes to shore. Horseshoe crabs are ecologically important as some species of migratory birds depend on their eggs to fuel their flights and are important in human medicine. They are under immense harvest pressure for their blood which is sold for use in medicine. Formerly ubiquitous they are disappearing rapidly. The Bureau has been stating and restating the need to study the effects of undersea interturbine and high-voltage export cables on Horseshoe crabs since at least 2011. In a decade that has gone by the Bureau should state what it has learned or if no further effort was undertaken. If no commission sought to study them the Bureau must not continue to conclude no potential or potential for only negligible effects from absence of demonstrated harm (which is dissimilar to demonstrated absence of harm following study).	No EMF studies specifically on horseshoe crabs were found based on a review of the scientific literature. However, impacts of other magneto sensitive arthropods like the American Lobster and other bottom-dwelling invertebrates are outlined in Benthic Resource FEIS Section 3.5.2.3 and Finfish, Invertebrate and EFH FEIS Section 3.5.5.5 under the *EMF* IPF. The analysis of these species provides information on effects on magneto sensitive species like horseshoe crabs.

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BOEM-2023-0011-0137-0117	High density conditions foster the evolution of higher pathogenicity (parasites bacteria protozoa and viruses that cause rapid serious disease) because such restraints are absent. [New York State Department of Environmental Conservation Artificial Reef DEIS Attachment J page 20 Comment #23; https://www.dec.ny.gov/docs/fish_marine_pdf/dmrreeffinalappc.pdf]. In a wind turbine power plant the wind turbine foundation itself and the hard-surface scour pad[Footnote 60: A scour pad is a large hard-surface area usually made of concrete intended to prevent the flow of water current diverting around the mast from scraping large troughs into the ocean floor. Rip rap stones can also be used.] around the footprint can aggregate fish and other animals and once colonized is characterized by high densities of the organisms that inhabit them. High density means animals are in close proximity to one another and transmission is more likely. This poses the threat of relaxing natural selection against high pathogenicity and fosters evolution of more severe disease-causing organisms in the inhabiting species. In high density there is less consequence to the pathogenic organism of killing its host rapidly since the host is likely exposed to many others whom your offspring or replicates can infect even if the host deteriorates rapidly. Since there are many turbines each with associated high density area at its base the opportunity for evolution of pathogens that cause higher severity of disease is greatly increased. In absence of natural selection against them severe-disease-causing pathogens can evolve in rapid timescales spread and have population-level effects.	While the reef effect may attract fishes and invertebrates in high densities, these organisms are not confined in spaces or artificially fed like aquaculture where parasites and diseases are more prevalent. Additionally, the species that typically colonize these hard-bottom substrates on the scour protection and WTGs are typically found in reef communities where high densities and competitive pressures are prevalent, but these species are adapted to be in close aggregation with one another compared to the sandy benthic habitat that would surround the WTGs in the Lease Area. For hydrodynamic impacts of scour protection and wind turbines refer to the *presence of structures* IPF discussions in Sections 3.5.5.3 and 3.5.2.3.
BOEM-2023-0011-0140-0088	The conclusions in the SouthCoast Wind Farm Draft EIS that the overall impact to benthic resources from the Proposed Action would range from negligible to moderate and the long-term impact on benthic communities from construction and installation of the Proposed Action is expected to be minor as the resources would "likely recover naturally over time" is inconsistent with the findings in the Draft EIS that offshore	Section 3.5.5.3 details how Atlantic cod are among the fish species attracted to structures and have been found in higher concentrations around offshore wind farms than in surrounding habitat. COP Appendix K provides map of SAVs including eelgrass beds located in the nearshore environment for Brayton and Falmouth ECCs (Figures 4-1, 4-2, 4-3, and 4-4). Section 5.2.3.1 Construction and

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	wind activities may result in long-term or permanent impacts. [Footnote 321: SCW DEIS at 3.5.5-29.] Because both the Block Island Study and the SouthCoast Wind Draft EIS itself find the potential for long-term to permanent impacts on sensitive benthic habitats including complex and eelgrass habitats from offshore wind development BOEM should include more justification in the SouthCoast Wind Final EIS for why it expects that these potential impacts to sensitive benthic habitats will only be minor and 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 export cable corridors will traverse juvenile Atlantic cod HAPC as well as possible cod spawning grounds in the complex habitats of Muskeget Channel the Sakonnet River and Mount Hope Bay BOEM should analyze whether the potential long- term to permanent impacts from cable emplacement and anchoring activities in the export cable corridors could lead to population-level impacts on Atlantic cod in those areas.	Decommissioning in COP Appendix K also details the impact of cable emplacement on eelgrass beds which is nonexistent to indirect effects since there are no eelgrass beds on the Brayton Point and Aquidneck Island landfalls and the planned landfall of Falmouth are outside the mapped area of eelgrass habitat.

N.6.7 Birds

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BOEM-2023-0011-0132-0006	In Table 2-4 impacts on birds are listed as moderate to major and then dismissed as the document suggests birds could be attracted to the area. Common sense would tell us that birds attracted to wind turbines most likely would end up dead. The document also does not say how this will be studied or mitigated. It just says these things will happen. This is not the full disclosure that the NEPA requires. If mitigation were to happen by turning turbines off at certain times when birds are present (as is the practice for onshore wind) then the air quality numbers are meaningless as less power would be created by the wind turbines and more single cycle natural	Impacts on bird collisions are addressed in Final EIS Section 3.5.3, including assessment of potential bird strikes. Based on the current understanding of bird presence in the offshore environment, BOEM anticipates that bird collisions with offshore wind infrastructure will be lower than with onshore wind infrastructure. This is because bird presence in the offshore environment is much lower than onshore. Within the Atlantic Flyway along the North American Atlantic Coast, much of the bird activity is concentrated along the coastline. 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

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	gas would need to be burned to balance the turning off the turbines in the presence of various bird species.	kilometers inland. While both groups may occur over land or water within the flyway and may extend considerable distances from shore, the highest diversity and density are centered on the shoreline (Final EIS Figure 3.5.3-1). Also refer to Final EIS Section 3.5.3.9, which includes a number of proposed mitigation measures, including deterrence, reporting, and adaptive mitigation measures.
BOEM-2023-0011-0132-0076	The impact to birds has simply not been laid out. The document makes many statements about potential peril to birds including those listed through the ESA such as Piping Plovers. We read that at nighttime some species use the aircraft lighting to avoid turbines however ADLS is proposed. We read that birds can be attracted to the turbine areas as more prey "may" be available. However collisions seem to be a bigger problem. This statement is particularly egregious [Text in Blue: "It is generally assumed that inclement weather and reduced visibility cause changes to migration altitudes (Ainley et al. 2015) and could potentially lead to large-scale mortality events."] The DEIS promises only to monitor for bird impacts providing very little detail on said monitoring or potential mitigation. Since mitigation procedures involve shutting off turbines when migrating birds are present the greenhouse gas analysis cannot possibly be correct or thorough.	The impacts of the Proposed Action on birds are detailed in the seven IPFs in Draft EIS Section 3.5.3.5, which include lighting and the presence of structures. Details on mitigation for potential bird impacts are described in Final EIS Table 3.5.3-4, and include a number of proposed measures (e.g., deterrence, reporting, adaptive mitigation). Furthermore, to support the advancement of the understanding of bird interactions with offshore wind farms, SouthCoast Wind has developed a Draft Avian and Bat Post-Constructing Monitoring Framework (Final EIS Appendix G, Attachment G-2) that outlines an approach to post-construction monitoring. BOEM addresses piping plover and other federally listed birds in detail in the USFWS BA that BOEM developed for ESA Section 7 compliance. Please refer to BOEM's ESA compliance documents at the following link: https://www.boem.gov/environmental-consultations.
BOEM-2023-0011-0132-0077	After explaining how the proposed action "B" would impact birds the document states [Text in Blue: "The cumulative impacts on birds would likely be moderate because although bird abundance on the OCS is low there could be unavoidable impacts offshore and onshore; however BOEM does not anticipate the impacts to result in population-level effects or threaten overall habitat function. In the context of reasonably foreseeable environmental trends the Proposed Action would contribute an undetectable increment to the cumulative impacts on birds."] This statement makes no sense. The	Throughout the Final EIS, cumulative and incremental impacts of the Proposed Action are separately addressed. This approach is necessary given the numerous on- and offshore activities that are expected to proceed even if the Proposed Action is not approved. As stated in Final EIS Section 3.5.3.5, BOEM anticipates that the cumulative impacts from the Proposed Action on birds in the geographic analysis area are moderate because, although bird abundance in the OCS is low, there could be unavoidable impacts offshore and onshore; however, BOEM does not anticipate the impacts to result in population-level

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	impact is moderate or undetectable - it can't be both and it seems moderate is the correct answer.	effects or threaten overall habitat function. Therefore, in the context of reasonably foreseeable environmental trends, the Proposed Action would contribute an undetectable increment to the cumulative impacts on birds.
BOEM-2023-0011-0132-0078	As far as birds covered by the ESA the DEIS states that the analysis for impacts to these three species has not yet been conducted. This is unacceptable and is in violation of NEPA and ESA.	BOEM has continually consulted with USFWS throughout the NEPA process to address the Proposed Action's impacts on federally species protected under the ESA. BOEM addresses federally listed birds in detail in the USFWS BA that BOEM developed for ESA Section 7 compliance. Please refer to BOEM's ESA compliance documents at the following link: https://www.boem.gov/environmental-consultations. BOEM concluded its ESA Section 7 obligations on September 1, 2023, when USFWS issued its Biological Opinion for the Project. As stated in the Biological Opinion, USFWS does not anticipate significant reduction in the reproduction, numbers, or distribution of piping plover and rufa red knot, and concluded that the Project is not likely to jeopardize the continued existence of the species. For roseate tern, USFWS concurred with BOEM's determination of "not likely to adversely affect."
BOEM-2023-0011-0137-0045	Storm cells produce infrasound. Large-size turbines produce high levels of infra sounds. The U.S. Offshore Wind program and the subject project is reasonably expected to interfere with the ability of migratory birds to avoid storms (and storm-caused mortality) and interferes with essential migration. Disruption in migratory bird's ability to use infrasound by operating thousands of large infrasound-generating machines over a vast expanse (millions of acres) of Outer Continental Shelf which serves as the Atlantic Flyway (in layman's terms a bird migration super highway) occurs from the profound disruption of essential behaviors and processes. Such impact of the U.S. Offshore Wind Program goes beyond habitat degradation to whole systems degradation for several orders and families of migratory aves which use infrasound to guide migration.	Noise impacts are covered in Final EIS Section 3.5.1, *Bats*, as well as Section 3.5.3, *Birds*. Best available information on bird presence in the geographic analysis area has been used to prepare the EIS. BOEM would continue to collect information on bird presence in the offshore environment to help inform the assessment of potential impacts on birds from construction and operation of offshore wind farms. Based on current information, bird presence in the offshore environment is relatively low (as described in Final EIS Section 3.5.3). To support the advancement of the understanding of bird interactions with offshore wind farms, SouthCoast Wind has developed a Draft Avian and Bat Post-Constructing Monitoring Framework (Final EIS Appendix G, Attachment G-

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		2) that outlines an approach to post-construction monitoring.
BOEM-2023-0011-0137-0046	Operating thousands of infrasound-generating turbines spanning the entire Outer Continental Shelf will disrupt natural migratory processes of millions of birds and is expected to cause mortality in millions of birds by interfering with their natural ability to detect storms. Large-rotor-diameter wind turbines are substantial infrasound generators. The effect of 147 turbines of the subject project as well as the cumulative effect of the U.S. Atlantic Offshore Wind Program build in the forseeable future constitutes a major systems disruptor for migrating birds.	As described in Draft EIS and Final EIS Section 3.5.3, bird presence in the offshore environment is relatively low. The effects of offshore wind farms on bird movement ultimately depends on bird species, size of the offshore wind farm, spacing of the turbines, and the extent of extra energy cost incurred by the displacement of the flying birds (relative to normal flight costs pre-construction) and their ability to compensate for this degree of added energy expenditure. Little quantitative information seems available on how offshore wind farms may act as a barrier to movement, but a modeling effort by Madsen et al. (2012) looked at bird movement through offshore wind farms based on bird movement data collected at the Nysted offshore wind farm in the western Baltic Sea. A summary of this study is included in Draft EIS Section 3.5.3, *Cumulative Impacts of the No Action Alternative*, under the *presence of structures* IPF. In short, the modeling effort indicates that Project turbine spacing would be wide enough to allow bird movement and would not act as an impediment to migration. BOEM notes that turbine spacing in offshore wind farms in Europe is generally more compressed than what is being proposed on the Atlantic OCS. For example, the distances between turbines for the Nysted and Horns Rev (North Sea) wind farms are shown below, which, based on the Madsen et al. (2012) modeling, indicates they would have some level of impediment to bird migration. These distances are much narrower than distances proposed between turbines on the Atlantic OCS. • Horns Rev 1: turbines are 560 meters (0.3 nm) from each other in both directions. • Horns Rev 2: turbine spacing is 500 meters (0.27 nm) in both directions.

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		• Nysted: turbine spacing 480 meters (0.26 nm) (east/west) and 900 meters (0.48 nm) (north/south). However, BOEM identified a newer study by Vattenfall (2023) that looked at meso- and micro-avoidance movements in an offshore wind farm off Scotland. The study concluded that, together with the recorded high levels of micro-avoidance in all species (>0.96), it is now evident that seabirds will be exposed to very low risks of collision in offshore wind farms during daylight hours. This was substantiated by the fact that no collisions or even narrow escapes were recorded in over 10,000 bird videos during the 2 years of monitoring covering the April–October period. The study's calculated micro-avoidance rate (>0.96) is similar to that of Skov et al. (2018), which is also mentioned in the Draft EIS and Final EIS. The Vattenfall (2023) information has been added to the Final EIS.
BOEM-2023-0011-0139-0024	SouthCoast Wind would like to highlight that to support the Avian Exposure Risk Assessment (Appendix I1 to the COP) SouthCoast Wind conducted Project-specific surveys of the Lease Area. These surveys included aerial high- definition surveys that were completed monthly from November 2019 through October 2020. Sampling effort was increased during the migratory period (e.g. April May and August 2020) for terns and other species of concern in coordination with the MassWildlife Natural Heritage and Endangered Species Program (NHESP).Survey methods consisted of flying an aircraft over the Lease Area and capturing digital still life imagery with a high-resolution camera using a grid-based survey design. A minimum of 40 percent coverage of the Lease Area was attained per survey. Third-party experts analyzed the images to enumerate birds and another third-party reviewer provided quality assurance of the data to identify any missed individuals. Third party experts were in most cases able to discern among tern species (e.g. roseate tern versus common tern) based on tail length wind structure	Thank you for your comment. BOEM has added to Final EIS Section 3.5.3.1 a reference to the Project-specific surveys that were conducted for the SouthCoast Wind Project and that are included in COP Appendix I1, Section 2.2.3.

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	and plumage. Additionally SouthCoast Wind employed an onboard professional avian observer who recorded all birds observed during geophysical and geotechnical surveys completed in the Lease Area between September and November 2019.SouthCoast Wind feels that it is important to highlight these site-specific Project surveys that were completed to support the COP Avian Exposure Risk Assessment and the findings of the impacts to birds in the DEIS in addition to the publicly available datasets listed by BOEM in the DEIS.	
BOEM-2023-0011-0140-0059	Unlike other nearby regional offshore projects (e.g. New England Wind) the SouthCoast COP makes no mention of adding Motus tagging for seabirds or nocturnal passerine migrants nor does the COP indicate that the operator intends to install Motus receivers on turbines as part of its post-construction monitoring plan. [Footnote 172: New England Wind (NEWP) DEIS Appendix H Minimization and Monitoring p. H-3.] We recommend optimizing the number and/or the dispersion of Motus stations at SouthCoast using a design tool being developed under a New York State Energy Research and Development Authority (NYSERDA) project. [Footnote 173: Sunrise Wind Farm COP Appendix P2: Post-construction Avian and Bat Monitoring Framework p. 3.]	SouthCoast Wind's Draft Post-Construction Avian and Bat Monitoring Framework Avian and Bat Monitoring Framework has been added to Final EIS Appendix G as Attachment G-2. This plan refers to Motus tracking. SouthCoast Wind plans to install Motus receivers within the Lease Area to determine the present/absence of ESA-listed species.
BOEM-2023-0011-0140-0060	Yet unlike other offshore wind energy projects in the region having robust monitoring protocols SouthCoast has only signaled intent to coordinate with Mass Wildlife RIDEM and USFWS to identify appropriate mitigation measures to avoid noise-related impacts to nesting Piping Plovers from activities such as ground disturbance avoidance and displacement that may occur during the construction phase for the Falmouth and Brayton Point export cable corridors. [Footnote 175: See the following: NEWP COP Volume III Appendix III-R Draft Piping Plover Protection Plan pp. 1–3.] SouthCoast must detail those measures that are to be taken to protect this state-listed species and its habitats during the nesting season (April	Onshore components of the Proposed Action are mostly within existing, highly disturbed industrial areas that are unlikely to provide important bird habitats. As outlined in the USFWS BA Section 4.4.2, piping plovers have been reported in the vicinity of the onshore Action Areas. The summary of the 2021 Massachusetts Piping Plover Census documented breeding piping plovers at 188 sites, with one pair recorded in the vicinity of the Shore Street (Falmouth, Massachusetts) landfall site under consideration for the Proposed Action. Please refer to BOEM's ESA compliance documents at the following link: https://www.boem.gov/environmental-consultations. In

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	1 – August 31). A contingency plan should be designed and implemented for any problems that arise during horizontal directional drilling cable installation. [Footnote 176: Id.] We strongly endorse plan monitoring by qualified biologists from an accredited organization or an individual with at least one year of experience at an accredited organization conducting shorebird monitoring for Piping Plovers. [Footnote 177: Id. at 2.] Monitoring and mitigation for listed birds should cover all aspects of the project throughout its operational life not just the cable installation near coastal waterbird breeding sites	addition, BOEM concluded its ESA Section 7 obligations on September 1, 2023, when USFWS issued its Biological Opinion for the Project. As stated in the Biological Opinion, "piping plovers are not likely to be adversely affected by onshore portions of the project due to lack of suitable habitat and avoidance of coastal habitat disturbance via HDD methods."
BOEM-2023-0011-0140-0061	We note that to date no bird species including any pelagic marine or ESA-listed species has been identified as the explicit subject in the SouthCoast monitoring framework. [Footnote 178: SCW COP Volume II at 16.4–16.6.] This lack of proposed monitoring measures for bird species around the offshore wind energy infrastructure is a serious deficiency in the DEIS and COP for this project. [Footnote 179: For example and in addition to other measures Dominion Power is sponsoring a study of Whimbrel a non-listed species at that wind energy area. See: CVOW-C COP at 4-202.] Besides better addressing the needs of listed species other species also should be a focus of this project's monitoring plan. Recent tracking studies of White-winged Scoters in southern New England for example have revealed frequent commuting flights between Nantucket Sound and Long Island Sound and medium-high relative use of offshore habitats in the Project Area. [Footnote 180: Figure 4 in Meattey DE McWilliams SR Paton PW et al. 2019. Resource selection and wintering phenology of White-winged Scoters in southern New England: Implications for offshore wind energy development. The Condor: Ornithological Applications 121: duy014.] Other candidates for monitoring purposes can be found among those species designated as having higher annual exposure scores (2-3) or species having higher annual exposure (moderate-high). [Footnote 181: Table 3-1 in SCW COP Appendix I1 at 87–89.]	As stated in Final EIS Section 3.5.3, *Birds*, SouthCoast Wind has developed a Draft Post-Construction Avian and Bat Monitoring Framework included in Final EIS Appendix G, Attachment G-2. As part of the framework, SouthCoast Wind is committing to an Adaptive Management approach in which ongoing bird and bat data collection in offshore wind lease areas will be used to inform Project operations and conservation mitigation strategies, as available and applicable. In addition, BOEM has included an adaptive management mitigation measures (Appendix G, Table G-2) to address potential future impacts during offshore operations. Furthermore, the USFWS Biological Opinion on ESA-listed species requires the aforementioned monitoring framework and adaptive management described in the Final EIS to be implemented.

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BOEM-2023-0011-0140-0062	The monitoring framework for SouthCoast does not address how acoustic disturbances from construction and related operations might cause harm to diving marine birds. [Footnote 185: Monitoring and mitigation for diving birds are not even mentioned in conjunction with acoustic disturbances e.g. SCW COP Appendix O. Marine Mammal and Sea Turtle Monitoring and Mitigation Plan.] 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 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 in this season. Capable of diving to 180 m depths Razorbills especially are already known to flush readily from loud noises they are prevalent during winter in waters of the Project Area and like other alcids they are vulnerable to displacement and macro-avoidance. [Footnote 186: Piatt JF Nettleship DN. 1985. Diving depths of four alcids. The Auk 102:293–297.] [Footnote 187: Lavers J Hipfner JM Chapdelaine G. 2009. Razorbill (Alca torda) version 2.0. In The Birds of North America (P.G. Rodewald editor). Cornell Lab of Ornithology Ithaca New York USA. https://doi.org/10.2173/bna.635.] [Footnote 188: Table 3-3 in SCW COP Appendix I1 at 90.] [Footnote 189: Robinson Willmott JC Forcey G Kent A. 2013. The Relative Vulnerability of Migratory Bird Species to Offshore Wind Energy Projects on the Atlantic Outer Continental Shelf: An Assessment Method and Database. Final Report to the U.S. Department of the Interior Bureau of Ocean Energy Management Office of Renewable Energy Programs. OCS Study BOEM 2013-207. 275 pp.]Densities of diving birds are typically highest during winter months on inner and middle shelf habitats at least in this portion of the Atlantic OCS. [Footnote 190: E.g. see Figure 4–2 p. 39 in Robinson Willmott J Forcey G Vukovich M McGovern S Clerc J Carter J. 2020. Ecological Baseline Studies of the US Outer Continental Shelf: Final Report. Gainesville FL. OCS	Disturbance impacts, including noise impacts, on diving birds from the Proposed Action as well as from other on- and offshore projects are addressed in Final EIS Sections 3.5.3.3 and 3.5.3.5, under the *noise* IPF. As described, 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. Because impacts would be temporary and birds would be able to avoid the disturbance, BOEM anticipates negligible impacts. Applicant-proposed measures to minimize impacts on marine life, such as soft-start procedures for pile driving, would also minimize the potential for noise exposure to diving birds, as they can depart the area when noisy activity begins.

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	Study BOEM 2021–079.] 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 marine bird flocks enter these zones (2) using noise reduction gear like bubble curtains around pile driving when diving marine birds are present and (3) deploying other noise-source modifications or changes to operational parameters such as soft starts (currently included in the DEIS). [Footnote 191: Erbe C Dunlop R Dolman S. 2018. Effects of noise on marine mammals. Pp. 277–309 in Effects of anthropogenic noise on animals. Springer New York NY.]Noise monitoring and abatement during impulsive pile driving operations for monopile installation has been an established practice in other Atlantic wind energy project areas. [Footnote 192: https://media.fisheries.noaa.gov/2021-01/Dominion_CVOW_2020IHA_MonRep_OPR1.pdf?null=] Distances to injury-causing sound levels measured in one study varied from 0.7 to 3.1 km for marine mammals during installation activities. [Footnote 193: Id. p. 32.] Consequently adequate spatial buffers or suitable observation distances may be required for incorporation into study designs that are used to monitor avian reactions to subsurface acoustic disturbance.	
BOEM-2023-0011-0140-0063	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 study is necessary.	Please refer to the response to comment BOEM-2023-0011-0137-0046.

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BOEM-2023-0011-0140-0064	The indirect effects to marine birds from redistribution of seabird forage fish populations after construction are not discussed. Installation of turbines at SouthCoast will likely affect forage fish 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 potential for such effects should be acknowledged and incorporated into adaptive monitoring frameworks.	Foraging and displacement impacts on birds are discussed in Draft EIS and Final EIS Section 3.5.3.5 under the *presence of structures* IPF. As stated, presence of birds with high displacement sensitivity around the Project is low. The effects of offshore wind farms on bird foraging ultimately depend on bird species, size of the offshore wind farm, spacing of the turbines, and foundation types. Mitigation measures used to avoid and reduce impacts on birds and their habitat can be found in Appendix G. Also refer to the response to comment BOEM-2023-0011-140-0061.
BOEM-2023-0011-0140-0065	SouthCoast "…will ensure that lighting on WTGs will be executed in accordance with FAA regulations" and "…minimized to that required for navigation safety to reduce potential attraction of birds to the extent practicable." [Footnote 194: Table 16-1 in SCW COP Volume II at 16.5.] To reduce long-term phototactic attraction SouthCoast must extend this approach to include use of minimal lighting intensity on vessels wind turbine generators and electric service platforms to permit safe construction operations and decommissioning activities while still reducing potential attraction of birds. In addition and conditional on U.S. Coast Guard approval the top of each light should be shielded to prevent upward illumination to minimize the potential of attracting migratory birds. [Footnote 195: See for example NEWP DEIS Appendix H p. H-7.] An Aircraft Detection Lighting System (ADLS) efficacy analysis reveals that an ADLS-controlled obstruction lighting system could result in over a 99% reduction in duration of system activation as compared to a traditional always-on obstruction lighting system. [Footnote 196: NEWP COP Appendix III-K Aircraft Detection Lighting System (ADLS) Efficacy Analysis p. 1.] Although reduced lighting practices might reduce potential impacts to avian species no provisions for studying avian response(s) to lights have been made in the SouthCoast monitoring framework. [Footnote 197: Table 16-1 in SCW COP Volume II	As described in Draft EIS and Final EIS, Section 3.5.3, *Birds,* bird presence in the offshore environment is relatively low. Final EIS Section 3.5.3.5 describes potential impacts on birds from artificial light from the Proposed Action. The analysis found that with SouthCoast Wind's commitments to minimizing lighting effects, including implementing an Aircraft Detection Lighting System (ADLS) on all offshore WTGs, the Proposed Action would result in long-term but negligible impacts from lighting. Furthermore, BOEM has identified multiple mitigation measures to minimize the impact of artificial lighting on birds, which are described Final EIS Section 3.5.3.9, including downshielding lights on WTGs and OSPs, using an FAA-approved vendor for the ADLS, and adaptive mitigation for birds, which would require SouthCoast Wind to make recommendations for new mitigation measures or monitoring methods if the reported post-construction bird and bat monitoring results indicate bird and bat impacts deviate substantially from the impact analysis included in this EIS.

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	at 16.5.]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 that are 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). [Footnote 198: Deakin Z Cook A Daunt F McCluskie A Morley N Witcutt E Wright L Bolton M. 2022. A review to inform the assessment of the risk of collision and displacement in petrels and shearwaters from offshore wind developments in Scotland. Scottish Government: Riaghaltas na h-Alba. ISBN: 978-1-80525-029-6 (web only) https://www.researchgate.net/profile/Zoe-Deakin-2/publication/366139542_A_review_to_inform_the_assessment_of_the_risk_of_collision_and_displacement_in_petrels_an d_shearwaters_from_offshore_wind_developments_in_Scotland/links/6393231e484e65005bf86842/A-review-to-inform-the-assessment-of-the-risk-of-collision-and-displacement-in-petrels-and-shearwaters-from-offshore-wind-developments-in- Scotland.pdf] In the context of collision with turbine blades the probability of collision is inflated by flux density as disoriented birds pass repeatedly through rotor swept areas. More research and monitoring is needed to measure distances at which this phototaxis operates in seabirds (especially the susceptible procellariiforms). [Footnote 199: At least 56 species of Procellariiformes more than one-third of them (24) threatened are vulnerable to grounding by lights. See the synthesis in: Rodríguez A Holmes ND Ryan PG Wilson KJ Faulquier L Murillo Y Raine AF Penniman JF Neves V Rodríguez B Negro JJ. 2017. Seabird mortality induced by land?based artificial lights. Conservation Biology 31:986–1001.] Neither the avian risk assessment nor avian monitoring framework for SouthCoast suitably address a potential of high flux density caused by turbine-associated phototaxis.Previous research indicates that spatial responses of marine birds to	

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	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. [Footnote 200: Marques AT Batalha H Bernardino J. 2021. Bird displacement by wind turbines: Assessing current knowledge and recommendations for future studies. Birds 2:460–475.] Across 71 peer-reviewed studies avian displacement distances from turbines (mean ± standard deviation) ranged from 116 ± 64 m in Anseriformes (ducks) 2517 ± 5560 m in Charadriiformes (gulls terns shorebirds) and 12062 ± 6911 m in Gaviiformes (loons). [Footnote 201: Id.]	
BOEM-2023-0011-0140-0066	The SouthCoast Mitigation and Monitoring plan fails to show how nocturnal bird or bat traffic will be monitored. 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 having similar calls. [Footnote 202: Sanders CE Menhill DJ. 2014. Acoustic monitoring of nocturnally migrating birds accurately assesses the timing and magnitude of migration through the Great Lakes. Condor 116:371–383.] Integrating acoustic data with camera technologies and/or radar systems is essential to fully measure migrant traffic and identify all species as well as provide valuable supplementary data on the number of individuals flight speed and flight height. [Footnote 203: Horton KG et al. 2015. A comparison of traffic estimates of nocturnal flying animals using radar thermal imaging and acoustic recording. Ecological Applications 25:390–401.]	SouthCoast Wind has developed a Draft Post-Construction Avian and Bat Monitoring Framework, included as Final EIS Appendix G, Attachment G-2, which includes a discussion of proposed bird acoustic monitoring and radar monitoring for nocturnal migrants. As noted in the framework, SouthCoast Wind is considering conducting acoustic monitoring with detectors to capture species-specific vocalizations to better understand bird presence offshore and the conditions under which they occur. SouthCoast Wind is also planning to conduct a 1- to 2-year radar study to detect nocturnal migrants; the specific radar system(s), location, time of year, and methodology will be determined in consultation with USFWS closer to the commencement of Project operations. In addition, BOEM has identified multiple mitigation measures to minimize the impact of artificial lighting on nocturnal birds, which are described Final EIS Section 3.5.3.9 (Table 3.5.3-4), including downshielding lights on WTGs and OSPs, using an FAA-approved vendor for the ADLS, and adaptive mitigation for birds, which would require SouthCoast Wind to make recommendations for new mitigation measures or monitoring methods if the reported post-construction bird and bat monitoring results indicate

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		bird and bat impacts deviate substantially from the impact analysis included in this EIS.
BOEM-2023-0011-0140-0067	The SouthCoast Mitigation and Monitoring plan fails to address how micro-scale collision or avoidance will be addressed. [Footnote 204: Everaert J. 2014. Collision risk and micro-avoidance rates of birds with wind turbines in Flanders. Bird Study 61:220–230.] The COP merely states "…Mayflower Wind will develop and implement a Post-Construction Monitoring Plan." Absolutely no details are given including whether anti-perching devices will be installed on offshore wind structures to reduce bird perching locations. [Footnote 205: In contrast to other offshore wind farm projects e.g. Measure #14 in NEW DEIS Appendix H at H-3.] Comprehensive collision monitoring is key to assessing effects of wind turbines yet here only annual fatality reporting of opportunistically found carcasses on platforms and vessels are included. [Footnote 206: SCW DEIS Appendix G at G-49 (Measure BRT-2).] Provision for an automated multi-sensory monitoring system should be required to evaluate avian and bat activity by tracking micro-avoidance or - attraction behaviors gauging species composition at the SouthCoast site (both diurnally and nocturnally) and detecting movement flux rates for individual aerial wildlife through at least some portion of the project site. [Footnote 207: Bird fluxes have been quantified continuously at risk heights in offshore wind farms over multiple years; see Fijn RC Krijgsveld KL Poot MJ Dirksen S. 2015. Bird movements at rotor heights measured continuously with vertical radar at a Dutch offshore wind farm. Ibis 157:558–566. Furthermore thermographic sensors an ambient light camera a VHF receiving station and improved acoustic sensors for birds and bats have been combined into a single automated continuous monitoring system able to sense a large portion of the rotor swept zone with thermal and ambient light cameras effectively recording micro-avoidance or collisions of flying animals. See: https://www.normandeau.com/news-blog-from-a-top-	SouthCoast Wind has developed a Draft Post-Construction Avian and Bat Monitoring Framework, included as Final EIS Appendix G, Attachment G-2, which presents a framework for how SouthCoast Wind will monitor bird and bat activities at the Project area during O&M. The framework proposes radar monitoring, which includes a proposed study on bird avoidance rates. As noted in the framework, details and specifics of the monitoring plan will be determined in consultation with USFWS, BOEM, and other regulatory agencies closer to the commencement of Project operations. In addition, BOEM has identified multiple mitigation measures to further minimize the potential for bird collision with WTGs, including requiring installation of bird deterrents on WTGs and OSPs. The location of bird-deterrent devices must be proposed by SouthCoast Wind based on BMPs applicable to the appropriate operation and safe installation of the devices. Furthermore, BOEM has identified an adaptive mitigation approach for birds, which would require SouthCoast Wind to make recommendations for new mitigation measures or monitoring methods if the reported post-construction bird and bat monitoring results indicate bird and bat impacts deviate substantially from the impact analysis included in the EIS.

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	environmental-consulting-firm-in-the-united-states/2021/06/01/normandeau-deploys-its-atomtm-system-technology-off- the-coast-of-virginia/]	
BOEM-2023-0011-0140-0068	The SouthCoast Mitigation and Monitoring plan fails to show how individual tracking data will be used to monitor mitigate and compensate for harms to ESA-listed species or track non-ESA listed species. There are important justifications for tracking non-listed avian species. In cases where welfare concerns or rarity preclude movement studies for listed birds non-listed species can substitute (e.g. Common Terns for Roseate Terns). [Footnote 208: Loring et al. 2019.] Certain marine bird species that are globally threatened or endangered under the IUCN Red List are not listed under the ESA because of listing delays or because they breed elsewhere. [Footnote 209: https://www.biologicaldiversity.org/species/birds/black-capped_petrel/index.html] Regardless of listing status species with high vulnerability to offshore wind or with uncertain population trends should be included in Motus and other tracking studies to better measure migratory connectivity and determine the appropriate locations for population monitoring.	SouthCoast Wind has developed a Draft Post-Construction Avian and Bat Monitoring Framework, included as Final EIS Appendix G, Attachment G-2, which includes measures for radar monitoring and Motus tracking to monitor for avian occurrence. The full scope of impacts from the Proposed Action is addressed in Final EIS Section 3.5.3, *Birds*. The IPFs analyzed in the Final EIS section address all birds, whether they are federally or state-listed as endangered or threatened, have some other special designation, or have no designation at all. The impact types and mechanisms apply to all bird species regardless of status. BOEM recognizes that species with special designations may be more sensitive to the impact types and mechanisms compared to those species with no special designations or protections. For federally listed threatened and endangered birds, BOEM developed a BA and is consulting with USFWS, as required under Section 7 of the ESA. Please refer to BOEM's ESA compliance documents at the following link: https://www.boem.gov/environmental-consultations. BOEM concluded its ESA Section 7 obligations on September 1, 2023, when USFWS issued its Biological Opinion for the Project. As stated in the Biological Opinion, USFWS does not anticipate significant reduction in the reproduction, numbers, or distribution of piping plover and rufa red knot, and concluded that the Project is not likely to jeopardize the continued existence of the species. For roseate tern, USFWS concurred with BOEM's determination of "not likely to adversely affect."
BOEM-2023-0011-0140-0069	The SouthCoast Mitigation and Monitoring plan does not identify acceptable levels of mortality or displacement or describe potential mitigation activities that could offset such	SouthCoast Wind has developed a Draft Post-Construction Avian and Bat Monitoring Framework, included as Final EIS Appendix G, Attachment G-2, which describes proposed bird

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	impacts when and where they were to occur to the most susceptible species. The lack of monitoring measures for offshore birds in the DEIS and COP precludes determining 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	and bat monitoring measures, including adaptive monitoring. It is outside the scope of the NEPA process for BOEM to establish acceptable levels of mortality or displacement for the Project. In the EIS, BOEM analyzes the potential impacts on birds from construction and O&M of the Project and proposes mitigation measures to minimize and mitigate those impacts. While BOEM has not identified specific levels of mortality or displacement, BOEM has identified an adaptive mitigation measure for birds (Final EIS Table 3.5.3-4), which would require SouthCoast Wind to make recommendations for new mitigation measures or monitoring methods if the reported post-construction bird and bat monitoring results indicate bird and bat impacts deviate substantially from the impact analysis included in this EIS.
BOEM-2023-0011-0140-0070	We recommend the following elements for inclusion in the SouthCoast monitoring framework for birds:1. Incorporate 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 an appropriate system to collect the information required. [Footnote 210: Suryan R. et al. 2016. A Synchronized Sensor Array for Remote Monitoring of Avian and Bat Interactions with Offshore Renewable Energy Facilities (No. DOE-OSU-EE0005363). Oregon State Univ. Corvallis OR; Lagerveld S. et al. 2020. Assessing fatality risk of bats at offshore wind turbines. (No. C025/20). Wageningen Marine Research.] [Footnote 211: https://www.normandeau.com/environmental-specialists-consultant-atom-technology/]	SouthCoast Wind has developed a Draft Post-Construction Avian and Bat Monitoring Framework, included as Final EIS Appendix G, Attachment G-2, which includes measures for acoustic monitoring, radar monitoring, and Motus tracking to monitor for avian occurrence. No thermal imaging is currently proposed by SouthCoast wind. Furthermore, BOEM has identified an adaptive mitigation approach for birds, which would require SouthCoast Wind to make recommendations for new mitigation measures or monitoring methods if the reported post-construction bird and bat monitoring results indicate bird and bat impacts deviate substantially from the impact analysis included in the EIS. BOEM and USFWS identified additional mitigation and monitoring measures in the Final EIS Appendix G and USFWS's Biological Opinion to monitor for and mitigate impacts on birds.

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BOEM-2023-0011-0140-0071	Use GPS tracking in addition to Motus tracking wherever possible. Satellite-uploading GPS transmitters weighing 4 g are now commercially available meaning that any individual bird or bat weighing ≥133 g could be tracked using GPS without exceeding the accepted 3% 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.	Please refer to SouthCoast Wind's Draft Post-Construction Avian and Bat Monitoring Framework, in Final EIS Appendix G, Attachment G-2, which includes radar and Motus tracking to capture bird occurrence in the Offshore Project area. Additional mitigation and monitoring measures were identified by BOEM and USFWS through agency consultations and are included in the Final EIS Appendix G.
BOEM-2023-0011-0140-0072	Evaluate non-ESA listed bird species as potential foci for tracking studies across multiple wind area projects to detect whether and how avoidance attraction collision risk and/or displacement may occur around SouthCoast 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 in the SouthCoast region. A cross-project tracking study could also build on previous studies that have identified the most susceptible species of marine birds. [Footnote 212: Marques AT Batalha H Bernardino J. 2021. Bird displacement by wind turbines: assessing current knowledge and recommendations for future studies. Birds 2:460–475.]	The bird assessment in Final EIS Section 3.5.3, *Birds,* is based, in part, on bird exposure assessment prepared for the Proposed Action. This assessment estimated risk of various offshore bird species that could be encountered in the Project area. Please refer to COP Volume II, Section 6.1, and Appendix I1 for the full assessment. As stated in the exposure assessment and in Final EIS Section 3.5.3, approximately 106 bird species have been identified as potentially occurring in the Project area through public databases and baseline studies (see Table 6-1 in COP Volume II for the full list of bird species). The 106 bird species are part of the various species groups that the exposure assessment analyzed. The exposure risk conclusions are summarized in Final EIS Section 3.5.3.5, *Impacts of Alternative B - Proposed Action on Birds*, where it states that most of the bird species have minimal to low overall exposure. A few species have low to medium. Overall, the results of the exposure assessment would not warrant a conclusion of a "major" impact because the exposure assessment indicates that population-level impacts would not occur. Given the detailed analysis of all bird species in the bird exposure assessment, providing an impact assessment for each individual bird species is not warranted given the assessment conclusions. As summarized in Final EIS Section 3.5.3, impacts on bird habitat in the onshore environment are anticipated to be limited given the nature of the existing habitat, abundance on the landscape, limited removal of habitat, temporary nature of construction, and

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		implementation of avoidance and minimization measures proposed by SouthCoast Wind.
BOEM-2023-0011-0140-0073	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. [Footnote 213: PSOs are NMFS-approved visual observers trained to monitor the area around a vessel or platform during project activities for the presence of protected species and implement appropriate mitigation as necessary e.g. see SCW COP Appendix O. Marine Mammal and Sea Turtle Monitoring and Mitigation Plan at. 2–3.] [Footnote 214: E.g. under those conditions in which PSOs are used during noise-generating construction activities.] Underwater acoustic disturbance to diving marine birds would be obviated however if pile-driving and other noisy activities are scheduled largely outside the winter and early spring months (November-April) when no or few such diving species are present in the wind farm area. [Footnote 215: See for example tabular seasonal densities for diving marine birds; Attachment C in SCW COP Appendix I1 at C.1–C.2.]	Please refer to the response to comment BOEM-2023-0011-0140-0062. Mitigation measures identified for birds were identified by BOEM and USFWS during consultation.
BOEM-2023-0011-0140-0074	Expand monitoring of avian displacement to include detecting avoidance at individual wind turbines across relevant spatial scales. [Footnote 216: May RF. 2015. A unifying framework for the underlying mechanisms of avian avoidance of wind turbines. Biological Conservation 90:179–187.] Meso- and macro-scale displacement can be studied with high-definition digital aerial surveys using established protocols and accepted survey designs. [Footnote 217: Thaxter CB Burton NH. 2009. High definition imagery for surveying seabirds and marine mammals: a review of recent trials and development of protocols. https://tethys.pnnl.gov/sites/default/files/publications/Thaxter-Burton-2009.pdf; Williams KA Stenhouse IJ Adams EM Connelly EE Gilbert AT Duron M. 2015. Integrating novel and	As stated in Final EIS Section 3.5.3.5, BOEM does not anticipate the impacts to result in population-level effects or threaten overall habitat function. BOEM identified one recent study by Vattenfall (2023) that looked at meso- and micro-avoidance movements in an offshore wind farm off Scotland. The study was robust in that seabirds were tracked inside the array with video cameras and radar tracks, which allowed for measuring avoidance movements (meso- and micro-avoidance) with high confidence and at the species level. The study concluded that, together with the recorded high levels of micro-avoidance in all species (>0.96), it is now evident that seabirds will be exposed to very low risks of collision in offshore wind farms during daylight hours. This was

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	historical survey methods: a comparison of standardized boat-based and digital video aerial surveys for marine wildlife in the United States https://briwildlife.org/wp-content/uploads/2021/08/MABS-Project-Chapter-13-Williams-et-al-2015.pdf.] [Footnote 218: Winiarski KJ Burt ML Rexstad E Miller DL Trocki CL Paton PW McWilliams SR. 2014. Integrating aerial and ship surveys of marine birds into a combined density surface model: A case study of wintering Common Loons. The Condor: Ornithological Applications 116:149–161.] Micro-scale displacement should be studied with automated remote instrumentation that quantifies continuous bird flux at collision risk heights but also (where feasible) detect and record the approach distances directional changes and collision impacts of individual birds and bats. [Footnote 219: Fijn et al. 2015.]	substantiated by the fact that no collisions or even narrow escapes were recorded in over 10,000 bird videos during the 2 years of monitoring covering the April–October period. The study's calculated micro-avoidance rate (>0.96) is similar to that of Skov et al. (2018), which is also mentioned in the Draft EIS and Final EIS. The Vattenfall (2023) information has been added to the Final EIS.
BOEM-2023-0011-0140-0075	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). [Footnote 220: For example see Measure #7 provided in NEWP DEIS Appendix H at H-7.] 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.	Thank you for your comment. Final EIS Section 3.5.3.9 and Appendix G, Attachment G-2 include a mitigation measure requiring annual mortality reporting as well as a related measure for adaptive measures as more information is developed over time.
BOEM-2023-0011-0140-0076	Describe acceptable levels of impact and specify mitigation to be taken. The Mitigation and Monitoring plan for SouthCoast only mentions annual reporting of dead or injured birds and bats that happen to be found on vessels and structures during construction operations and decommissioning. [Footnote 221: SCW DEIS Appendix G at G-49 (Measure BRT-2).] Effective monitoring and mitigation activity should also include describing justifying: (a) how carcass observations or other collision and displacement monitoring results can be	Thank you for your comment. Please refer to Final EIS Section 3.5.3.9 and Appendix G, Attachment G-2, which reflect additional mitigation measures related to birds.

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	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.	
BOEM-2023-0011-0156-0002	More specifically for this and other projects we would like to see a commitment to monitoring deployment of remote monitoring devices to document bird and bat impacts and then design appropriate mitigation as more experience is gained with these projects. Proactive conservation projects such as improving the habitat of coastal nesting water birds your use of quiet foundations rather than piling driving	Please refer to Final EIS Appendix G, Attachment G-, which outlines the use and installation of Motus receivers within the Offshore Project area. Furthermore, BOEM has identified an adaptive mitigation approach for birds, which would require SouthCoast Wind to make recommendations for new mitigation measures or monitoring methods if the reported post-construction bird and bat monitoring results indicate bird impacts deviate substantially from the impact analysis included in the EIS.

N.6.8 Coastal Habitat and Fauna

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BOEM-2023-0011-0117-0006	Conservation Status Must Be Considered: The DEIS fails to examine the direct indirect and cumulative impacts of SouthCoast Wind on individual species in light of the species' particular conservation statuses. Without this species-by-species analysis the DEIS cannot meaningfully consider the effects of SouthCoast Wind on the marine environment. BOEM must go back and actually examine the impacts of the wind farm on a species-by-species basis using the most up- to-date models and telemetry data. BOEM must also be transparent about uncertainties and gaps in the data and adopt a precautionary approach where endangered and protected species are at risk.	BOEM's Final EIS analyzes impacts on terrestrial and marine wildlife from the construction, O&M, and decommissioning of the SouthCoast Wind Project. Each of the relevant biological resource sections in Chapter 3 identifies the species present in the affected environment and then describes the types of impacts that would occur. Where impacts are similar, species are generally grouped to avoid redundant and repetitive discussions. For example, increased onshore construction traffic would result in similar types of impacts on terrestrial wildlife from collisions and avoidance behavior. A species-by-species analysis would result in significantly longer, redundant environmental analysis and is

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		not required by NEPA. Federally listed species are addressed in more detail in BOEM's BAs to USFWS and NMFS.
BOEM-2023-0011-0117-0010	Assumption of Habitat Replacement: BOEM minimizes the impacts of the project on marine life, birds, and bats by insisting that other habitats are available elsewhere; however this does not account for the fact that many species affected by SouthCoast Wind exhibit high site fidelity and as a result may be less likely to simply move elsewhere. It also fails to account for the cumulative impact of the other projects in the lease area and how interactions between stressors might preclude the species from utilizing the "replacement" habitat. BOEM must fully examine the impacts on wildlife that will occur from the loss of habitat particularly on those species that exhibit high site fidelity exhibit the location and availability of alternate habitats and offer concrete evidence to support its assumptions that the impacts will be "minor" due to the existence of other suitable habitats.	In the absence of references to specific text in the EIS or examples of species that may not be able to move to avoid Project impacts, it is unclear to BOEM what information the commenter believes is inaccurately described. Within the EIS, BOEM appropriately analyzed and disclosed the potential for wildlife to temporarily leave an area during construction activity. Following the conclusion of the activity, species may return to the area. For example, following HDD activities at landfall sites, the cable ducts will be buried and there will be limited permanent aboveground infrastructure that would prevent a species from returning to the area. In regard to cumulative impacts, BOEM analyzes cumulative impacts from the SouthCoast Wind Project in combination with other ongoing and planned activities, including other offshore wind projects, in each biological resource section. For example, in Section 3.5.1, BOEM describes how habitat removal from onshore infrastructure would cumulatively reduce potential habitat for bats but that the overall amount of disturbance would be minimal. Federally listed species are addressed in more detail in BOEM's BAs to USFWS and NMFS.

N.6.9 Finfish, Invertebrates, and Essential Fish Habitat

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BOEM-2023-0011-0038-0001	The BOEM Cumulative Environmental Impact Statement of these 27 wind farms acknowledged moderate effects on fisheries and marine mammals (especially North Atlantic Right whales) while ignoring recent scientific research and monitoring endeavors by other state/Federal agencies. For example the migration and proliferation of Black Sea Bass populations into southern New England is likely to be enhanced by the offshore wind farm infrastructure. This	The *presence of structures* IPFs in Sections 3.5.5.3 and 3.5.5.5 have been revised to include a more in-depth discussion on the potential effects of offshore wind farms on primary productivity. This includes findings from a recent (2024) report by NASEM, which evaluated the potential of offshore wind farms to alter the hydrodynamic processes and productivity in the Nantucket Shoals region of the North Atlantic. The report concluded that hydrodynamic impacts

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	species is a voracious pelagic predator which could alter other marine wildlife prey and the the overall pelagic food chain. The NOAA/NEFSC Population Dynamics Branch had to receive input last Summer from saltwater anglers and commercial fishermen on the abundance/distribution of this species north of Chesapeake Bay (since they are not adequately monitored by the Bottom Trawl Survey Program). North Atlantic right whale distribution in space and time in New England waters tends to follow their large zooplankton prey (Calanus finmarchicus) which are impacted by warming inshore waters. As the EMaX research project illustrated the grazing food chain is being replaced by the microbial food web in the Gulf of Maine which will reduce the yield of finfish and shellfish; marine mammals; seabirds and sea turtles.	from offshore wind projects adjacent to Nantucket Shoals will likely be difficult to distinguish from the ongoing effects of climate change currently occurring in this region. While it is possible that offshore wind farm infrastructure could provide suitable habitat for black sea bass and other structure-oriented finfish, more research is still needed to determine how the shift in fish distributions, caused by the offshore wind infrastructure reef effect, impacts trophic dynamics.
BOEM-2023-0011-0106-0004	All Offshore Service Platforms proposed not just the one modeled must be included in an evaluation of the effects of those systems upon the lease area and the zooplankton larvae young of the year and spawning stock biomasses of stocks within the lease area cumulatively for the life of the project. Releasing millions of gallons of seawater as 90 degree effluent is not benign to a fragile ecosystem that supports sustainable fisheries in the region. In addition all effects to the zooplankton that the North Atlantic Right Whale forages upon with the addition of five cooling water intake ESPs must be analyzed for the life of the project.	As stated in the EIS, SouthCoast Wind has selected an HVDC converter OSP design for Project 1. The EIS describes the effects from the HVDC converter OSP supported by modeling data from SouthCoast Wind's NPDES permit application. As noted in Section 3.5.5.5 (and other parts in the Final EIS), if additional HVDC converter OSP(s) are selected for Project 2, the parameters and impacts described for Project 1 are representative of those additional OSP(s) for Project 2. Therefore, the EIS captures the full extent of impacts if multiple HVDC converter OSPs are selected by SouthCoast Wind. Furthermore, if SouthCoast Wind selects HVDC as the technology for Project 2, they would be required to obtain a NPDES permit.
BOEM-2023-0011-0112-0024	The discussion of impacts of an HVDC converter station under Alternative B seems to hedge as to whether HVDC would be used (vs. HVAC) for export cabling. The proposed action clearly indicates that HVDC would be used for the Brayton Point offtake so this language in the fish invertebrates and EFH impacts analysis (page 3.5.5-40) should be more definitive.	Additional language has been added to Section 3.5.5 (discharges/intakes) and Section 3.5.5.9 explaining the selected design of HVDC converter OSP for Project 1 and the potential for HVDC converter OSP for Project 2.

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BOEM-2023-0011-0112-0025	The analysis for both Alternatives B and F includes very little discussion of the converter station locations and how different locations might reduce impacts due to entrainment and impingement beyond stating that these stations will be sited outside "an area of high productivity and foraging value for several marine species" (page 3.5.5-40). Also discussion related to avoidance of open loop cooling systems as a mitigation measure under Alternative F is confusing; our understanding is that at present there is not an economically or technologically feasible closed loop cooling system. The mitigation measure would more accurately be framed as no conversion stations can be located within the enhanced mitigation area near Nantucket Shoals.	SouthCoast Wind has committed to siting the northernmost HVDC converter OSP outside of a 6.2-mile (10-kilometer) buffer of the 30-meter isobath from Nantucket Shoals, which is an area of high productivity and foraging value for several marine species. The indicative location of the northernmost HVDC converter OSP (associated with Project 1) is presented in Appendix B, Figure B-2. As stated in Section 3.5.5.5, if SouthCoast Wind selects HVDC technology for Project 2, the parameters and modeling results from the NPDES permit application for Project 1, which are described in detail in the Final EIS, would be representative of a HVDC converter OSP for Project 2 located in the southern portion of the Lease Area (exact location to be determined). It is unclear what mitigation measure under Alternative F the commenter is referring to. The BOEM and agency-proposed mitigation measures for finfish, invertebrates, and EFH would be applicable to all alternatives and are described in Section 3.5.5.11.
BOEM-2023-0011-0112-0027	The fish invertebrates and EFH impacts analysis for Alternative E would benefit from a table comparing the acreage of installed structures habitat conversion and scour protection for each foundation type. Since our understanding is that up to two foundation types could be used together such a table could include calculations assuming two foundation types in equal proportions in addition to estimates for all of one foundation type. This same table could be used to show further reductions in acreage associated with Alternative D which removes foundations near Nantucket Shoals. These calculations must account for the range of turbine sizes being considered under the project design envelope.	A table showing the acreage of additional benthic disturbance for Alternatives E-1, E-2, and E-3 compared to the Proposed Action has been added to Final EIS Section 3.5.5.8, and text on benthic disturbance has been revised. Because Alternative E is specific to the scenarios where only one foundation type would be used throughout the Lease Area, the discussion in this section is presented as such.
BOEM-2023-0011-0112-0028	The fish invertebrates and EFH impacts analysis for Alternative F is extremely limited. The DEIS describes potential differences in EMF effects for HVAC and HVDC cables (page 3.5.5-25) but the analysis of Alternative F does not discuss the implications of switching from HVAC to HVDC cables on	Additional detail regarding benthic impacts, entrainment/impingement and thermal plume impacts from the HVDC converter OSP, and EMF impacts associated with AC versus DC cables for Alternative F have been added to Final EIS Section 3.5.5.9.

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	electrosensitive or larval fish. This analysis should provide more details on cable routes relative to habitat type in Muskeget Channel (text and maps) and describe specifically how changes to the export cable configuration will avoid impacts to certain habitat types.	
BOEM-2023-0011-0112-0029	The discussion of the NEFMC Habitat Area of Particular Concern (HAPC) is outdated and should be updated in the FEIS to reflect the NEFMC's selection of a preferred alternative during its June 2022 meeting. The DEIS states that "An HAPC designation has been proposed for complex habitat and Atlantic cod spawning which would expand existing Atlantic cod HAPC and could potentially overlap with the Project Area" (page 3.5.5- 19). The FEIS should also clarify that this new HAPC is not an extension of an existing HAPC for cod spawning rather a new designation and would directly overlap SouthCoast Wind's project area. Per the Southern New England HAPC Framework document (Hyperlink: https://www.nefmc.org/library/southern-new-england-habitat-area-of-particular-concern-hapc-framework) 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 NEFMC. We anticipate the HAPC may be approved in June or July 2023 by NOAA Fisheries and as a non- regulatory area the designation would take immediate effect.	Final EIS Section 3.5.5.1, *Essential Fish Habitat*, has been updated to describe the Southern New England HAPC as presented in NEFMC (2023). The discussion on HAPCs has been expanded to further describe the HAPCs potentially affected by Project activities.
BOEM-2023-0011-0112-0030	We are concerned that construction in this project area could impact spawning activity for Southern New England Atlantic cod. It is possible that cod will not aggregate due to construction activities and their vocalizations may therefore be reduced. Research by the Massachusetts Department of Marine Fisheries found that relatively minor disturbances from gillnet fishing interrupted the development of cod	A discussion on the potential impact of cod spawning has been added to Final EIS Section 3.5.5.5 under the *noise* IPF.

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	spawning aggregations (Dean et al. 2012); it is reasonable to expect construction activities may do so as well. [Footnote 5: Dean M. W. Hoffman and M. Armstrong (2012). "Disruption of an Atlantic Cod Spawning Aggregation Resulting from the Opening of a Directed Gillnet Fishery." North American Journal of Fisheries Management 32: 124-134.] A recently published BOEM-funded study indicates that cod spawning in Southern New England is concentrated during November and December (Van Hoeck et al 2023). [Footnote 6: Van Hoeck R.V. Rowell T.J. Dean M.J. Rice A.N. and Van Parijs S.M. (2023) Comparing Atlantic Cod Temporal Spawning Dynamics across a Biogeographic Boundary: Insights from Passive Acoustic Monitoring. Mar Coast Fish 15: e10226. https://doi.org/10.1002/mcf2.10226]While the analyses in this publication focused on areas on and around Cox Ledge our understanding is that more recent acoustic sampling for this ongoing project has included areas further east. The absence of published evidence for cod spawning activity within the SouthCoast lease does not preclude the possibility that cod spawn in the project area. In addition cod could be moving through the lease area as they approach spawning grounds on and around Cox Ledge or Nantucket Shoals. The FEIS should evaluate the potential impacts of this area on cod spawning activity using 2022-2023 data from this study if available. The DEIS describes acoustic impacts to fish of the proposed action in general but does not discuss cod spawning specifically.	
BOEM-2023-0011-0112-0042	The DEIS suggests that hydrodynamic effects and disturbances on benthic resources will result from the project mainly from wind wakes but also from the presence of structures in the water (page 3.4.2- 13); however we are concerned that their extent may be underestimated. For example the presence of structures could impact 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	A study by BOEM that included oceanographic sampling within the Lease Areas in the offshore waters of Massachusetts and Rhode Island (O'Brien et al. 2021) found no evidence that the cold pool feature occurred within this geographic region. "The seasonal evolution of temperature did not suggest the existence of a cold pool in the study area; the cold pool is a common feature of continental shelves in which very cold leftover winter water near the bottom becomes isolated from the surface due to surface warming

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	important fishery species. [Footnote 8: https://tethys.pnnl.gov/sites/default/files/publications/Assessing_potential_impacts_offshore_wind_sea_scallop_laval_juvenile_transports.pdf] This is an area of ongoing research. [Footnote 9: For example two reports on potential impacts of offshore wind energy development on the Cold Pool are available at the following links: https://scemfis.org/wp-content/uploads/2021/01/ColdPoolReview.pdf; https://rucool.marine.rutgers.edu/wp-content/uploads/2020/10/PartnersWorkshop_WhitePaper_Final.pdf] The FEIS should clearly document what is known about potential impacts to the Cold Pool and resulting potential impacts to marine species and fisheries. The FEIS 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.	and therefore remains cold. The bottom waters in the study area warmed from < 5°C in winter to > 10°C by the beginning of summer, suggesting that this area is either too shallow or advection from neighboring shallow areas (e.g., Nantucket Shoals) is too strong to support the formation or maintenance of a cold pool" (O'Brien et al. 2021).
BOEM-2023-0011-0112-0050	Impacts of electromagnetic fields (EMF) on fishery species are a concern to the fishing community. For example studies have suggested that EMF can result in changes in behavior movement and migration for some demersal and pelagic fish and shellfish species. [Footnote 11: https://greenfinstudio.com/wp-content/uploads/2017/10/GreenFinStudio_EMF_MarineFishes.pdf] The DEIS states that the project will "use cable shielding materials to minimize effects of EMFs" (page G-14) and "consider use of cable shielding materials to minimize potential but unlikely effects of EMF" (page G-30). The extent to which EMF may or may not impact marine species including the differences between alternatives that use different types and amounts of cables (Alternative F with HVDC cables routed to Falmouth vs. the proposed action Alternative B using HVAC cables) must be thoroughly described in the FEIS.	Final EIS Section 3.5.5.5 (Proposed Action) and Section 3.5.5.5 (Alternative F) have been revised with additional discussion and references to studies regarding the differences in AC and DC cable EMFs and their effects on finfish and invertebrates. Please refer to response to comment BOEM-2023-0011-0070-0014 for additional information.
BOEM-2023-0011-0117-0011	Plankton Bloom Alteration: Increased stratification and temperature changes described by the HDM studies will alter	Section 3.5.5.1 details zooplankton habitat within the Project area. Additionally, Sections 3.5.5.3 and 3.5.5.5 include

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	both the amount and the timing of plankton blooms. This can have downstream effects on migratory species that arrive in exquisite timing with seasonal blooms. Studies from both China and the North Sea demonstrate that offshore wind projects can reduce plankton counts (Daewel 2022) decrease biodiversity (Wang 2022) and alter the distribution of plankton blooms (Slavik 2018). A mere 1% decrease in phytoplankton will cause an increase in CO2 emissions that outweighs any possible benefit from renewable energy sources (Malerba 2019). The SouthCoast Wind DEIS calculates the construction and installation will kill billions of plankton. BOEM does not adequately consider the cumulative effect the interactions between primary production and other species the impact of primary production on CO2 emissions and O2 production (Falkowski 2012) nor does it incorporate the latest scientific findings from the North Sea and China. Please rectify this omission.	summaries of potential impacts on zooplankton, their habitats, and primary production during construction and installation, O&M, and conceptual decommissioning of the Project.
BOEM-2023-0011-0117-0013	Deoxygenation: Deoxygenation in the lower-level water layer occurs in wind farms (Daewel 2022). Deoxygenation can cause large-scale fish die-offs. BOEM does not adequately consider the impact of deoxygenation on fisheries. This project is not consistent with the conservation of biodiversity and marine life implied in the Executive Order.	Section 3.5.5.5 addresses the potential for lowered dissolved oxygen saturation levels as a result of increased water temperature due to the HVDC converter OSP. The analysis concludes the impact on fish would be minor.
BOEM-2023-0011-0117-0016	EMFs: The DEIS minimizes the impact of EMFs and only considers local impacts. EMF's could mask the ability for EMF-sensitive species to appreciate the earth's electromagnetic field. Sharks and other long-range migratory species use the earth's magnetic field to navigate. If local EMF's overwhelm the faint alterations in the earth's magnetic field that alert species to their location then the project could devastate their ability to navigate find found sources and procreate. BOEM needs to consider the EMFs from a more global perspective.	Final EIS Section 3.5.5.5 (Proposed Action) has been revised with additional discussion and references to studies regarding the impacts from AC and DC cable EMFs on finfish and invertebrates. Please refer to response to comment BOEM-2023-0011-0070-0014 for additional information.
BOEM-2023-0011-0123-0014	According to the NOAA Fisheries EFH mapper (available at https://www.habitat.noaa.gov/apps/efhmapper/?page=page_3) the Sakonnet River is documented as:	Text describing Alternative C in the Executive Summary, Chapter 2, and other relevant sections in the Final EIS has been revised to indicate that the Sakonnet River supports

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	• Juvenile Atlantic cod Habitat Area of Particular Concern (HAPC) under the New England Fishery Management Council's Omnibus Essential Fish Habitat Amendment 2 • Summer flounder HAPC (due to submerged aquatic vegetation) by the Mid-Atlantic Fishery Management council • Essential Fish Habitat (EFH) for the following 28 species' life history stages:[See original attachment for table of species life history stages]? The DEIS incorrectly states that the Sakonnet River supports EFH for only 16 species.	EFH for several fish and invertebrate species at varying life stages including HAPCs for summer flounder and Atlantic cod. BOEM has reviewed the latest information on EFH (Table 3.5.5-1) for the Sakonnet River, and the river supports EFH for 32 fish and invertebrate species.
BOEM-2023-0011-0123-0015	Furthermore a detailed analysis of potential impacts to all life history stages of Atlantic cod and winter flounder are not currently but should be included in the Final EIS. • Narragansett Bay has been identified as a settlement and nursery area for early stages of Atlantic cod until late spring temperatures increase. Southern New England Atlantic cod numbers appear to be increasing but may be limited due to warming water temperatures (Langan et al. 2020). Due to this project and others that may be permitted in Atlantic cod EFH minimizing impacts to Atlantic cod nursery grounds like Narragansett Bay is critical.	More detail on the potential impacts from cable emplacement and maintenance for Alternative B has been added to Section 3.5.5.5. This information provides more context regarding the impacts to which species within the Sakonnet River and Mount Hope Bay would be exposed.
BOEM-2023-0011-0123-0016	While winter flounder have been in decline in recent years Sakonnet River larval densities have been some of the highest sampled in Narragansett Bay (McManus et al. 2021). The DEIS states that winter flounder eggs are particularly sensitive to sedimentation as described by Berry et al. (2011). Further discussion on potential impacts to winter flounder life history stages should be presented within the document.	Please refer to response to comment BOEM-2023-0011-0123-0015.
BOEM-2023-0011-0123-0022	DC and AC cables should not be considered comparable when determining impacts as fish may perceive static and alternating magnetic fields differently (Rommel and McCleave 1973a).	Final EIS Section 3.5.5.5 (Proposed Action) has been revised with additional discussion and references to studies regarding the impacts from AC and DC cable EMFs on finfish

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	• Various elasmobranchs (e.g. smooth dogfish and blue sharks) and teleost fish (sea lamprey American eels and Atlantic salmon) are all thought to be able to sense electric fields at low levels (Heyer et al. 1981; Kalmijn 1982; Rommel and McCleave 1973b).However it is presently unknown whether behavioral changes will result from detected AC electromagnetic fields. Behavioral responses of American lobster and little skates have been documented in response to DC electromagnetic fields emitted by two high- voltage DC cables: increased foraging/exploratory behavior in skates and a subtler exploratory response in lobsters (Hutchison et al. 2018; Hutchison et al. 2020). • The impacts of induced electromagnetic fields are expected to be greater for cartilaginous fish because they use electromagnetic signals to detect their prey (Bailey et al. 2014; Gill 2005; Gill and Kimber 2005; Bergstrom et al. 2014). • Other fish may also be affected by interference with their capacity to orient in relation to the geomagnetic field potentially disturbing fish migration patterns (Metcalf et al. 2015) and ultimately disturbing their habitat.	and invertebrates. Please refer to response to comment BOEM-2023-0011-0070-0014 for additional information.
BOEM-2023-0011-0123-0023	RIDEM's Division of Marine Fisheries is conducting a study funded by Revolution Wind LLC on the Revolution Wind HVAC cables to be installed within Rhode Island state waters (Narragansett Bay's West Passage). Findings from this study will be informative with respect to HVAC cable impacts on American lobster and Jonah crab. However additional studies will be needed in the Sakonnet River on the HVDC cables to be installed as part of the SouthCoast Wind Farm to understand impacts to other species from the DC cables.	Please refer to response to comment BOEM-2023-0011-0070-0015.
BOEM-2023-0011-0136-0044	The entrainment of [Bold: almost 4 million] Atlantic herring larvae during a time the stock is under a rebuilding plan and biomass is showing a steady downward trajectory seems inappropriate. To the extent the diet of the adult Atlantic	Section 3.5.5.5, discharges/intakes has been included with additional data and information from the NPDES permit application for the SouthCoast Wind Project 1 HVDC

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	herring influences its fecundity potential impacts on zooplankton and other food sources needs to be accounted for as well. [Bold: We recommend additional analysis on entrainment potential and impacts to ALL stocks which may be entrained.] Analysis of stock level impacts resulting from entrainment can then inform potential fishery and ecosystem impacts from those impacts.	converter OSP, including estimates of entrainment for various stock.
BOEM-2023-0011-0137-0006	It is an insufficient inquiry to estimate the relation between sound pressure levels (noise intensity) emitted underwater by operational turbines and turbine size by the use of a least squares estimation on a data set whose representative “small” turbines have gear box drives and whose representative “larger” turbines have a different type of (quieter) drive called direct drives [as the DEIS has done pg. 3.5.5-48]. Using quieter direct drive to represent larger turbines and examining the relationship between turbine size and noise by comparing these to smaller turbines with a drive type known to generate higher noise level (relative to direct drive of the same size) obviously expected to result in gross error in the quantification of the relationship of noise to size underestimating it when a new size turbine is input to predict the noise. The DEIS appears to recognize the impropriety of this but includes the improper analysis anyway and then attempts to apply a “fix” by claiming its off by about 10 decibels (per micro pascal reference). As to the meaning of this for the turbine size(s) expected to be used in the subject project (which are 15 MW[Footnote 35: BOEM states in the DEIS “BOEM determined the use of a 15 MW [turbine] for Phase 1 is a reasonable assumption based on the PDE in the COP and RFI responses from Mayflower Wind.”] substantially larger than block island’s 6-MW turbines) is unclear BOEM not only does not support its position but does not have one.If there are turbines in use off the shores of other countries that are much closer in size (to the size proposed to be used in the subject project) then why has the sound pressure levels of such turbines not been empirically measured by the	Operating noise for WTGs installations with capacities of 10 MW or greater have yet to be studied. A full description of the best available information regarding current operational noise levels, and potential noise levels as WTGs are scaled up is provided in Final EIS Section 3.5.6.5. Measuring sound levels associated with operating turbines and other anthropogenic activities will be part of the monitoring required for the Project. See MA-2 in Appendix G.

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	SouthCoast/Mayflower developer who has submitted the COP or by the Bureau? Obtain empirical measurement of the actual sound signature profile (loudness v frequency) at various underwater distances from a turbine of like size and drive type to those planned for the subject project.	
BOEM-2023-0011-0137-0008	The conclusion in the Mayflower/SouthCoast DEIS that the combined noise of a few neighboring operating turbines "is lower than is generated by cargo ship" refers to a study concerning consideration of smaller turbines that have a 6 MW nameplate capacity not 15 MW-capacity turbines.The comparison is an invalid one. Even if—for argument's sake—the turbine size comparison were not invalid and the conclusion could be reached cargo ships come and go; They do not anchor in quantities of thousands 1 nm apart running their engines parked in a grid array formation over an expansive 826241-acre area[Footnote 36: See https://www.boem.gov/renewable-energy/state-activities/massachusetts-leases-ocs-0500-bay- state-wind-and-ocs-0501#:~:text=The%20Call%20Area%20was%20locatedwell%20as%2019%20partial%20blocks ; https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/Renewable_Energy_Program/State_Activities/MA_AreaID_Announcement_052412_Final.pdf for twenty four hours a day 365 days a year every year for 35 years.	Please see the response to comment BOEM-2023-0011-0137-0006.
BOEM-2023-0011-0137-0047	BOEM's position that because ocean itself generates and serves as a medium for infrasound the addition of mechanical infrasound-generators (many turbines) will not have significant advserse effect is a conclusory and not supported. Fish detect the relative velocity of layered ocean currents via their perception of infrasound. Hydrodynamic noise generated by swimming fishes is mainly in the infrasound range and may be important in courtship and in predator-prey interactions. Intense infrasound has a deterring effect on	BOEM acknowledges hearing sensitivity in fishes is generally considered to fall along a spectrum. While some species can detect ultrasonic (Mann et al. 2001), more fishes detect sound in the infrasound range (Enger et al. 1993), and most fishes in the audible range (Ladich and Fay 2013). The evaluation of potential impacts from noise in Section 3.5.5.5 was made based on the best available science. Based on this evaluation, a determination was made that the noise from

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	some species and is under commercial development for use as a “fish fence” an invisible acoustic barrier to fish passage. Acute sensitivity to infrasound is common in fish.	the proposed Project would have moderate adverse impacts on finfish, invertebrates, and EFH. The ability of marine invertebrates to detect particle motion and the impacts from the proposed Project are detailed in Sections 3.5.5.3 and 3.5.5.5 of the EIS.
BOEM-2023-0011-0137-0073	The DEIS fails to consider that both sound and substrate particle motion causes serious adverse effects to benthic invertebrates ignores many of the most likely mechanisms of serious adverse effects and instead quite oddly focuses its attention on minutial potential effects such as an anchor falling onto a benthic animal. The DEIS estimation on the effect of the proposed action on invertebrates is capricious using hearing damage thresholds for fishes and invertebrates from studies written before most of the studies demonstrating sound can damage hearing apparatus were conducted. Perhaps far more importantly the diversity of cilia-based mechanosensory systems and their functions in marine animal behavior is astounding [See Bezares-Calderón Berger and Jékely 2019. Diversity of cilia-based mechanosensory systems and their functions in marine animal behaviour. 30 December 2019. Royal Society Publ. https://doi.org/10.1098/rstb.2019.0376]. The potential for operational noise noise produced during pre-construction surveys and noise from pile driving to cause harm to cilia and ciliated structures as well as organs specific to invertebrates have not even been considered.[Underline: It is the ultimate in Anthropomorphosis to] in the consideration of impacts to other taxa of operation of the site characterization equipment expected to be operated on the proposed lease sites [Underline: focus on hearing and hearing apparati]. Like the hair cells in vertebrate hearing apparati and like the hair cells in lateral-line neuromasts in fishes a variety of ciliated cells in a wide range of aquatic organisms located in different parts of the bodies of organisms and their organs serving different purposes are structurally similar to the iconic vertebrate auditory hair cell and just as easily damaged by “sound”.	Please see the response to comment BOEM-2023-0011-0137-0047.

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BOEM-2023-0011-0137-0079	It should also have been explored what damage is expected to result from water-borne particle motion[Footnote 9: Discussion Paper on Particle Motion – Inch Cape Wind Farm by Graeme Cook October 13 2017] rather than sound pressure levels per se; Zhang et al. (2015) models the sensory capabilities of cephalopods and states that particle motion could cause irreparable damage to the statocyst. Particle motion levels exceeding 0.27 ms-2 were considered sufficient for such irreparable damage to potentially occur [Zhang 2015]. Zhang anticipated this to occur at short range. However seismic waves can be carried over the seabed. Near a seabed carrying seismic waves theoretically the evanescent component of the wave can induce high particle velocities in the overlying water without corresponding sizable rises in acoustic pressure. [Footnote 10: bottom of pg.8 §3.2.1. of Nedwell Edwards Turnpenny (Fawley Aquatic Research Laboratories) and Gordon (Ecologic) 2004. Fish and Marine Mammal Audiograms: A summary of available information Subacoustech Report ref: 534R0214. https://tethys.pnnl.gov/sites/default/files/publications/Nedwell-2004-Audiograms.pdf] The evanescent wave will only affect animals in contact with or near the seafloor since past one wavelength elevation from the seafloor they drop off profoundly but the internally reflecting waves in the substrate that generate them can propagate along (within) the seabed. Surface roughness and other characteristics of the seafloor would interfere with internal reflection.However that propagation of energy along the sea floor and translating into particle motion (of each substrate and water) affecting benthic animals should be a consideration for both use of site characterization equipment and for turbine operations. [Footnote 11: Pouliquen Lyons Pace 1998. Penetration of Acoustic Waves Into Sandy Seafloors at Low Grazing Angles: The Helmholtz-Kirchhoff Approach 1998. NATO SCALANT Undersea Resesarch Center. Report no. SR-290 formerly SR-290-UU revised March 2006.] Where the substrate is flexible	Additional text has been added to Final EIS Section 3.5.5.5 detailing cephalopod sensitivity to noise and potential damage to statocysts.

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	sholte waves propagate through the substrate and can produce small but powerful circular movement in the substrate[Footnote 12: Waves travelling within the substrate where the second (less dense) medium is liquid are called Sholte waves; the more commonly used name for them is Rayleigh waves appropriate when the second medium is a vaccum. [See e.g. Akal 2001. Acoustics in Marine Sediments: Seismo-acoustic Waves in the Vicinity of the Water– Sediment Interface in Encyclopedia of Ocean Sciences (Second Edition) John H. Steele Ed. 2001 ISBN 978-0- 12-374473-9]].	
BOEM-2023-0011-0137-0099	Substantial consideration needs to be given to particle acceleration values not simply sound pressure (Suga et al. 2005) in determining the impact of sound on bony fishes. Action potential responses need to be recorded from both auditory and lateral line inputs. The relative contributions of these two systems to whole-brain processing is expected to influenced the acceleration (but not the pressure) audiogram shape.The Lance can swim tail first and does so to shoot itself tail-first into the sand lodging there with its head and gills sticking out. It is dependent on soft ocean bottom. Unusually for marine organisms is a highly visual creature and is also a model for study of the lateral line. The Lance is a priori reasonably expected to be far more adversely impacted than other fishes (whose habitat is exclusively the water column) to particle motion transmission through the substrate which may propagate vibrations with less attenuation further than water-borne particle motion. Thus particle motions vibrations may be detectable over a greater distance and have greater biological meaning to the lance. The Mayflower (SouthCoast) Wind treatment of sand lance in the DEIS is inadequate.	BOEM acknowledges hearing sensitivity in fishes is generally considered to fall along a spectrum. While some species can detect ultrasonic (Mann et al. 2001), more fishes detect sound in the infrasound range (Enger et al. 1993), and most fishes detect sound in the audible range (Ladich and Fay 2013). The evaluation of potential impacts from noise, including particle motion, in Section 3.5.5.5 was made based on the best available science. Based on this evaluation, a determination was made that the noise from the Project would have moderate adverse impacts on finfish, invertebrates, and EFH. Text has been added in the *noise* IPF discussion of Section 3.5.5.5 stating how there is a lack of knowledge on the effects of substrate vibration and particle motion on fish and invertebrates that live close to or within the substrate (Hawkins et al. 2021), such as sand lances.
BOEM-2023-0011-0137-0101	Physiological and behavioral responses of these fishes to site characterization activities pile driving [Bold: and to habitat degradation from substrate vibration from operating turbines needs to be measured in empirical studies on sand lance]. Guesses at expected effects of sound based on audiograms	BOEM acknowledges that the effects of operating noise for WTGs installations with capacities of 10 MW or greater need to be researched further to address outstanding questions. Continuous low-frequency noise from operating WTGs would persist during the operational life of the proposed Project.

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	derived from SPL measurements only are grossly insufficient to conclude minor impacts.	The particle motion component of sound from operating WTGs could be below hearing thresholds for some fish species based on a study at the Block Island Wind Farm (Elliot et al. 2019). However, WTG sizes and capacities are expected increase to meet generation goals.
BOEM-2023-0011-0137-0102	Before large-scale wind turbine power plants are permitted to be developed in large areas of the OCS there needs to be a good understanding of distribution of Ammodytes and the factors influencing its distribution as well as experiments or empirical observations of physiological and behavioral responses of Ammodytes to the actual operational noise of wind turbines including both the effects of the unique sound signature produced (as measured by both SPL and particle acceleration measures) that is carried through water and also via transmission of vibrations through the mast and across the substrate which particle motion the lance could be particularly subject as it regularly partially is buried in soft substrate. The effect of stress on lance energy budgets should be examined. Energy budget for one species of lance established from data collected between 1977 and 1986 [Gilman S. L. 1994. An energy budget for northern sand lance Ammodytes dubius on Georges Bank 1977-1986. Fishery Bulletin 92(3) 647- 654. https://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1303&context=gsofacpubs]The sampling performed to establish Ammodytes density is very much appreciated and shows better due diligence in determining presence of ecologically important species than other developers and EISs in the offshore wind program. However due to the presence of Ammodytes in the lease area and landward areas near it and due to the unique relationship between Ammodytes and the substrate empirical studies on habitat loss and degradation from substrate vibration due to operating turbines should be performed as well as sholte wave modelling to get a clearer picture of effects on Ammodytes prior to project approval.	BOEM acknowledges that the effects of operating noise for WTGs installations with capacities of 10 MW or greater need to be researched further to address outstanding questions. Continuous low-frequency noise from operating WTGs would persist during the operational life of the proposed Project. The particle movement component of sound from operating WTGs could be below hearing thresholds for some fish species based on a study at the Block Island Wind Farm (Elliot et al. 2019). However, WTG sizes and capacities are expected increase to meet generation goals.

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BOEM-2023-0011-0137-0119	Evaluation of harm via noise often expresses the frequencies of sound emitted by the site- characterizing equipment or operating turbines as a single frequency or narrow band to characterize the dominant frequency. For example the operational frequency of an AA Duraspark Sparker dominant frequency may be 1.2 kHz but the operational frequency of sound emitted by this sparker is in the range of 0.3 kHz– 1.2 kHz[Footnote 8: The operational ranges for these devices were provided by NOAA [See FR Vol 86 No. 68 Pages 18943-1896]. It is not reasonable to limit the inquiry of evaluation of impacts to marine life from operation of this equipment to the frequency show in Table 6 of the DEA.]. Likewise noise in frequencies other than the dominant frequencies produced is typically disregarded. This causes expected effects of use of equipment or operation of turbines to be left unexplored in the DEIS. Even short exposure to relatively low-intensity sound of frequency 0.4 kHz (430 Hz) has been shown to be devastating to Cephalopods.	Additional text has been added to Final EIS Section 3.5.5.5 detailing cephalopod sensitivity to noise and potential damage to statocysts.
BOEM-2023-0011-0140-0090	BOEM has not conducted a separate analysis on the extent to which the noise generated by the Project's construction and operations activities would impact Atlantic cod and specifically spawning cod. In the Final EIS BOEM should include an analysis of the likely noise impacts from construction and operations on Atlantic cod including juvenile Atlantic cod HAPC and Atlantic cod reproduction in complex habitat areas of the Falmouth and Brayton Point export cable corridors. Additionally in the Final EIS BOEM should expand its analysis on the extent to which avoiding pile driving from January 1 to April 30 as proposed by SouthCoast Wind to mitigate impacts to North Atlantic right whales will mitigate noise impacts to spawning Atlantic cod which primarily spawn from December to May in southern New England. In Section IV of these Comments we recommend that BOEM extend the proposed seasonal restriction on pile driving to December to reduce impacts to North Atlantic right whales. BOEM should analyze the extent to which extending pile driving restrictions	Section 3.5.5.1 details Atlantic cod presence and spawning habitat in the offshore Project area. Additional detail has been added to Final EIS Section 3.5.5.5 of to include impacts of underwater noise on Atlantic cod.

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	to December will also mitigate impacts to spawning Atlantic cod. Finally BOEM should expand its analysis of the noise impacts from construction and operations to other spawning fish species in the lease area and export cable corridors.	
BOEM-2023-0011-0140-0126	BOEM has not analyzed the potential impacts of hydrodynamic effects on specific fish populations that spawn in the lease area and in the area of Nantucket Shoals adjacent to the lease area. The Final EIS for SouthCoast Wind should analyze any impacts to spawning fish populations from hydrodynamic turbulence including any particular fish stocks that are known to spawn in the lease area and its vicinity.	Findings from a BOEM study on the effects of hydrodynamic changes from offshore wind farm build-out scenarios in the MA-RI wind energy area on the larval dispersal of Atlantic sea scallop, silver hake, and summer flounder (Johnson et al. 2021) have been incorporated into the *presence of structures* IPF discussion in Section 3.5.5.5.

N.6.10 Marine Mammals

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BOEM-2023-0011-0026-0001	The construction of these projects is in the middle of whale migration and feeding habitats. We know that the testing construction and operation impacts the whales and much more marine life. The planned project violates the Endangered Species Act (16 U.S.C. §§1531-1544) the Marine Mammal Protection Act (16 U.S.C. §§ 1361 et seq.) the Endangered Bald and Golden Eagles Act (16 U.S.C. §§ 668-668d) and the Migratory Bird Treaty Act (16 U.S.C. §§ 703 et seq.) by threatening the existence of fourteen (14) endangered species: four (4) whale species two (2) turtle species one (1) fish species [26] four (4) bird species two eagle species and 1 bat species [27]. Three whale species began to suffer from unabated unusual mortality events (UME's) that began in 2016-2017 [282930]. The conduction of underwater seismic surveys in preparation of offshore wind farm construction coincides with the onset of these UMEs. The ESA and MMPA require agencies both to protect and to promote the recovery of the species. The BOEM DEIS does not adequately address the impact of offshore wind on endangered species mortality or recovery.	BOEM analyzed the potential impacts from the construction, O&M, and decommissioning of the Project on marine mammals in Section 3.5.6, on sea turtles in Section 3.5.7, birds in Section 3.5.3, bats in Section 3.5.1, and finfish in section 3.5.5. See the NMFS BA and USFWS BA for additional information on effects of the Project on ESA-listed species under the ESA and MMPA.

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BOEM-2023-0011-0065-0018	It is also extremely concerning that the effluent will be tainted by bleach. [Footnote 22: DEIS p. 3.4.2-23 24.] We do not agree that the discharge of hot seawater containing bleachL will be "negligible" or "short term". Discharge of an untold and as yet unanalyzed tens of millions of gallons of hot effluent as well as the entrainment of zooplankton fish larvae and other marine resources in the platforms over the life of the project is certainly not "short term". Nor can it be negligible. It is astonishing that BOEM can maintain that offshore wind industrialization is necessary to prevent climate change while its proposed infrastructure will increase water temperature of the ocean far faster than the climate change it is supposedly mitigating. The impacts of this effluent on the specific zooplankton necessary for North Atlantic right whale forage must also be analyzed.	Section 3.4.2 of the EIS states the concentration of sodium hypochlorite release into seawater is equivalent to 0.0002 percent per unit volume. The discharge of warm water with small concentrations of bleach would be negligible and would be oxidized in the water. This analysis is consistent with the NPDES permit application.
BOEM-2023-0011-0079-0002	One of the areas we found concerning was the apparent lack of information regarding the effects this project would have on marine mammals. In Table 4.2-1 from the DEIS for the proposed action regarding irreversible and irretrievable resources the explanation section for marine mammals states that no high-severity behavioral effects are anticipated but there is a lack of information in this field so effects are still possible. Therefore we students find this explanation insufficient and the NEPA process is not followed to satisfaction. How could this conclusion be reached if there is a clear lack of information?	The EIS provides detailed discussions of the Project activities, its potential impacts on marine mammals and its habitat, as analyzed in Sections 3.5.6.3 and 3.5.6.5. SouthCoast Wind is committed to implement several mitigation measures in Appendix G to ensure that Project activities are conducted in a safe and environmentally responsible manner, and that potential impacts on marine mammals, from all phases of the Project, are minimized to the greatest extent. BOEM's analysis of incomplete and unavailable information for each Chapter 3 resource section is presented in EIS Appendix E. When incomplete or unavailable information was identified, BOEM considered whether the information was relevant to the assessment of impacts and essential to its analysis of alternatives based upon the resource analyzed. If essential to a reasoned choice among the alternatives, BOEM determined that the overall costs of obtaining the missing information for or addressing these uncertainties are exorbitant, or the means to obtain it are not known. Therefore, to address these, BOEM extrapolated or drew assumptions from known information for similar species and studies using acceptable scientific methodologies to inform

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		the analysis in light of this incomplete or unavailable information, as presented in Chapter 3, Section 3.5.6.
BOEM-2023-0011-0079-0003	Furthermore we are also concerned regarding the section involving the region's finfish invertebrates and essential fish habitat resources as the explanation states that the populations would recover following decommissioning activities. Therefore this would seem to insinuate that the area around this project would be biologically unproductive while this project is commissioned. If this is true then that would mean the region's whales would lose a healthy swath of their prey's breeding grounds and thereby severely diminish their food resources (2023). In order to alleviate our concerns we ask that the committee in charge of carrying out the completion of the final EIS would look into these grievances and provide evidence to support the claim that the proposed action will have no high-severity behavioral effects on marine mammals and that the whales would also not lose a large portion of their food source.	The Offshore Project area does not occur in any designated critical foraging habitat areas for NARW. Because the proposed Project would not occur in critical foraging habitat, potential behavioral disturbances are not likely to disrupt feeding behaviors, particularly with the proposed seasonal restriction on this activity. Section 3.5.6.1 details the importance of prey distribution for marine mammals and are considered when assessing impacts on marine mammals. Impacts on prey items are considered in Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*.
BOEM-2023-0011-0081-0007	The area planned for construction is a critical habitat for the North Atlantic Right Whale (NARW) of which only 349 members are alive today on the brink of extinction. Deaths happen faster than births. Seismic surveys are associated with whale deaths and the unusual mortality event that began in 2017 has affected 20% of the population. And by the way whales sequester carbon so the loss of a single whale let alone an entire whale species will increase the carbon footprint of this project. This project will inevitably drive threatened whale species closer to extinction.	APMs and BOEM-proposed mitigation to reduce impacts associated with Project activities are described in EIS Appendix G, Attachment G-2. 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 effect to occur, this impact is considered moderate to major for NARW.
BOEM-2023-0011-0081-0008	High voltage boomers (3000 V) sparkers (20-200Hz) and multi-beam echo sounders side scan sonars (100-500 kHz) shallow and mid penetration sub-bottom profilers ultra short baseline positioning equipment and marine magnetometers will all be used during the construction project. These will likely cause maladies in whales and other marine animals such as disorientation hearing loss unconsciousness and death. Any of	Studies on noise included in Section 3.5.6.3 represent the best available science and information for evaluating impacts of wind noise on marine mammals. Cumulative noise of operating wind farms is evaluated in Section 3.5.6.3.

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	these symptoms can also increase a marine mammal's risk of ship strikes. BOEM minimizes the impacts of the project on animals by insisting that other habitats are available elsewhere. However this fails to account for the cumulative impact of the other projects in the area and how many species will die simply because they are creatures of habit and will have no other places to go.	
BOEM-2023-0011-0088-0002	One concern is that the acoustic impact on endangered species like North Atlantic right whales is overly focused on the construction phase rather than the O&M phase. Although the devastating acoustics of pile-driving and trenching cease after construction the noise of turbine operation coupled into the water is enduring. The DEIS attempts to downplay the impact of operational noise by comparing it to other anthropogenic sources of underwater noise as from vessels. But those anthropogenic sources are largely transient; passing ships continue on their way. But the underwater noise generated by WTG's is constant 24/7 static in location and the effects are cumulative. The very lives of whales and other marine mammal depend on their hearing which could be irreparably impaired by the noise of several hundred WTG's being injected into the waters they inhabit. Yet the "takes" requested seem to only consider the noise-intense phases of construction.	Studies on operational noise in existing wind farms, along with studies evaluating the relationship between sound levels and turbine power, represent the best available science and information for evaluating impacts of operational wind noise. These studies are summarized in Section 3.5.6.3. Operating wind turbine noise associated with the Proposed Action is evaluated in Sections 3.5.2, 3.5.5, 3.5.6, and 3.5.7.
BOEM-2023-0011-0117-0009	Biodiversity Threatened: Executive Order 14008 mandates that the federal government support renewable energy projects that "conserve our land waters and biodiversity." Mortality risk to endangered species potential introduction of invasive organisms and known anticipated degradation of coastal marine habitat from the Project will all threaten biodiversity violating Executive Order 14008's mandate. Moreover given the health consequences of biodiversity loss expansive wind farm installations could violate the internationally recognized Human Right to Health (UN 2000).	The introduction of invasive species as a consequence of ballast water and bilge water discharges from marine vessels is unlikely to occur under the Proposed Action. SouthCoast Wind would comply with several regulatory requirements, protocols, and applicant-proposed measures to prevent any accidental discharges and release of contaminants, and consequently, the loss of biodiversity from the introduction of invasive species. SouthCoast Winds' suite of applicant-proposed and agency-proposed mitigation measures (Appendix G) would be implemented to avoid, minimize, and

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	The federal government has an obligation under international human rights law to protect biodiversity as an important factor in human health (Hamley 2022). Wind energy has documented risks to biodiversity (Voigt 2019). The BOEM DEIS does not incorporate the latest scientific findings from the North Sea on biodiversity loss nor does it address the relationship between biodiversity loss and human health. The BOEM DEIS fails to consider biodiversity loss in evaluating the costs and benefits of the Project.	mitigate adverse impacts on marine mammals, as well as avoid direct loss or degradation of sensitive habitats. Conversely, the installation of turbine towers and scour protection may enhance diversity in areas with homogenous seabed as these structures can introduce hard substrate in the wind farm area leading to an artificial reef effect, which then leads to sheltering and foraging opportunities for marine species in the area (Raoux et al. 2017; Bennun et al. 2021). BOEM will continue to coordinate with federal agencies and state and local governments in accordance with requirements to ensure that renewable energy development occurs in a safe and environmentally responsible manner.
BOEM-2023-0011-0117-0018	Seismic Surveys: the Project like other offshore wind projects uses high voltage boomers (3000 V) sparkers (20-200Hz) and multibeam echo sounders side scan sonars (100-500 kHz) shallow and mid penetration sub-bottom profilers ultra short baseline positioning equipment and marine magnetometers to collect their high-resolution geophysical maps of the seabed.These mid-frequency seismic ranges can cause rectified diffusion which can initiate decompression sickness in marine mammals independent of any effect on the behavior of the animals. Decompression sickness can disorient cause hearing loss unconsciousness and death. Moreover all of these symptoms increase the risk of ship strikes. BOEM's DEIS fails to adequately address this issue. The correlation between the unprecedented numbers of coastal whale deaths (UMEs) and the increase in seismic survey activity suggests that the Project may violate the MMPA and the ESA and must be researched before any approvals are given.	Ongoing activities off Massachusetts are currently limited to HRG surveys. BOEM and NMFS have assessed the potential effects of HRG surveys associated with offshore wind development in the Atlantic. Following a rigorous assessment, NMFS has concluded that these types of surveys are not likely to harm whales or other endangered species. BOEM requires developers to use protective measures, such as protective species observers, exclusion zones, and independent reporting, to avoid whales during these survey activities. Both the Marine Mammal Commission and NJDEP have issued their independent statements on this topic making similar determinations. NMFS is the lead for determining causes of whale strandings and is working with its partnerships to continue to gather data to help determine the cause of death for these mortality events. BOEM would not speculate on the cause of death of these whales. More information regarding offshore wind and whales is provided by NMFS at https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-life-distress/frequent-questions-offshore-wind-and-whales and by BOEM at https://www.boem.gov/sites/default/files/documents/renewable-energy/state-

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		activities/Offshore%20Wind%20Activities%20and%20Marine%20Mammal%20Protection_1.pdf.
BOEM-2023-0011-0117-0019	North Atlantic Right Whales: The US has designated the area planned for construction as a critical habitat for the North Atlantic Right Whale (NARW). With approximately 334 members alive today the NARW faces extinction. The unusual mortality event (UME) that began in 2017 has affected 20% of the population. Deaths outpace births. Pre-construction seismic surveys and impact drilling within whale habitats coincided with the onset of their UME and the most recent NARW death today (02/14/2023) substantiates this association. BOEM and NOAA have a legal obligation to protect and promote the recovery of this species under the ESA and the MMPA. Absence of Evidence is NOT evidence of absence. Seismic surveys are associated with whale morbidity and mortality (Engel 2004). As evidenced by the most recent death BOEM's monitoring mitigation strategies cannot ensure the safety of the species. Because whales sequester carbon the loss of a single whale let alone an entire whale species will increase the carbon footprint of this project (Chami 2019). Moreover an alarming 224 Level B Incidental Harassment Authorizations for NARW's are active and an even more alarming 691 applications for Level B IHA's are in process. The eight (8) additional Level B IHA's SouthCoast has requested further endangers the precarious NARW population. These IHA's are in direct conflict with the mandate to protect and promote the recovery of the species. Offshore wind farms (OWFs) will inevitably drive threatened whale species closer to extinction (Seals 2017). The BOEM DEIS and COP violates the MMPA and the ESA.	Mitigation measures in the EIS include both PAM and visual monitoring, which would provide for detection of non-vocalizing marine mammals, as well as vessel strike avoidance measures. Impacts on marine mammals from underwater noise and vessel strike are analyzed under the noise and vessel traffic IPFs, respectively, in EIS Sections 3.15.3 and 3.15.5. Use of sound-attenuation devices such as bubble curtains are only one strategy within a layered mitigation strategy that includes measures for visual monitoring, use of soft-start methods, clearance and shutdown zones, sound field verification, and seasonal restrictions and BOEM-proposed measures for PAM and pile-driving monitoring plans, sufficient protected species observer coverage, notification, and reporting requirements. ESA consultation with NMFS is underway and findings of the Biological Opinion are not anticipated to be available until September 2023; however, a jeopardy decision is not expected for NARW or any other ESA-listed marine mammal.
BOEM-2023-0011-0124-0019	Several studies have been published in the last two years that represent the best available science on the oceanographic impacts of offshore wind and BOEM cannot discount the conclusions of these studies if it is to comply with its mandate under NEPA.BOEM included in the DEIS a lengthy discussion	BOEM input requested – NOAA letter and hydrodynamic BOEM has considered the best available information in its analysis of potential impacts to right whales. BOEM is not required to assess an implausible worst-case scenario if the best available information suggests that such impacts would

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	of the possible hydrographic effects of turbines on NARW forage in the region noting that "increased mixing may disperse aggregations and may decrease efficient foraging opportunities." [Footnote 44: DEIS at 3.5.6-29.] And BOEM concluded this discussion by stating that "BOEM cannot discount the possibility that the presence of structures could have long-term intermittent impacts on foraging migration and other normal behaviors." [Footnote 45: Id.] However BOEM ignores this clear acknowledgement of the possible effects on a critically endangered species that is reliant on sufficient quality quantity and density of food to efficiently feed in making the conclusions of the DEIS to justify the proposed action and the effects on North Atlantic right whales.BOEM dismisses the conclusions of studies finding possible hydrographic oceanographic and primary productivity impacts by stating that "conclusions are difficult to draw because those studies are based in different geographic regions use differing offshore wind development scenarios and the individual studies use varying methodology and models." [Footnote 46: DEIS at 3.5.6-48.] But BOEM does not rationalize why the agency could not draw conclusions from the science when the science expert for protected species in the Northeast at the National Marine Fisheries Service was able to draw conclusions.	be implausible. The analysis in the EIS (and in the SouthCoast Wind BA) does not conclude such impacts are plausible. To solicit independent expert opinion to address the NARW concerns raised by NMFS, BOEM has partnered with NASEM for an independent peer review of potential hydrodynamic impacts for offshore wind facilities on prey species. The report concluded that hydrodynamic impacts from offshore wind projects adjacent to Nantucket Shoals will likely be difficult to distinguish from the ongoing effects of climate change currently occurring in this region. Likewise, BOEM finds that measurable impacts of offshore wind farms to the foraging success of whales that would result in population-level effects are not reasonably likely to occur and that a recommended NARW conservation buffer is not warranted based on the review of best available information and expert opinion found in the report. Further monitoring studies will be needed to have the spatial and temporal coverage to adequately understand the impact of future wind farms and BOEM will continue to coordinate with partners to develop regional monitoring strategies to obtain scientific information on the potential hydrodynamic effects of WTGs. BOEM does not conclude the impacts of wake effects or foundation presence on hydrodynamic processes are anywhere near a magnitude that translate to a reduction in prey availability and reduced foraging success of whales that would lead to increased mortality or a reduced birth rate in the population. Additionally, the spatiotemporal nature of plankton blooms means opportunistic feeding could occur anywhere on the OCS. While NARW habitat shifts have been observed over the past three decades, moving south and west towards SNE (Meyer-Gutbrod et al. 2021), this shifted habitat still encompasses a large area where high densities of zooplankton occur outside of the Lease Area and surrounding area.

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BOEM-2023-0011-0124-0020	BOEM's dismissal of the same concerns raised by the NEFSC may be the result of two studies that were released after the letter from NEFSC was sent a North Sea study (Daewel et al.) and one focused on effects of wind turbines in the US (Golbazi et al.). But BOEM's conclusions on many of the studies cited in the DEIS misrepresent the conclusions and miss important pieces of information.For example when discussing the impacts from the presence of structures BOEM cites to the Dorrell study to say that "[w]akes from individual structures may persist for 100 meters to 1 kilometer downstream." [Footnote 47: DEIS at 3.5.6-28.] But that was not the conclusion drawn from the Dorrell study. The Dorrell study observed wakes "at least 1 km in length" making no conclusion of the full distance of the wakes. [Footnote 48: Dorrell et al. Anthropogenic Mixing in Seasonally Stratified Shelf Seas by Offshore Wind Farm Infrastructure Front. Mar. Sci. (March 22 2022)]	Section 3.5.6.3 of the EIS has been revised to clarify the results of the Dorrell study.
BOEM-2023-0011-0124-0021	But to the extent that BOEM is relying on the Golbazi study to discount the anticipated effects based on other North Sea studies it is mistaken for at least two reasons. First the Golbazi study discusses meteorological and wind wake effects of turbines not the oceanographic or hydrographic effects like in the North Sea studies. BOEM does not discuss why the study's findings on meteorological impacts discount instead just jumping to its conclusion that this study introduces uncertainty about the effects discussed in Daewel. [Footnote 55: Id.] If BOEM is going to use the Golbazi study to discount the concerns raised in other studies it must include more detailed analysis of how the findings in Golbazi on meteorological impacts translate to oceanographic and hydrographic impacts.Second the Golbazi study looked at next-gen turbines with hub height exceeding 100 meters but while BOEM has given a maximum hub height in the project design envelope it has not given a minimum height. BOEM needs to more clearly delineate why based on the project design envelope this study creates the uncertainty BOEM	Based on reviews of recent projects by NMFS OPR and BOEM, and BOEM's partnership with the National Academies of Science Engineering and Math for an independent peer review of potential hydrodynamic impacts for offshore wind facilities on prey species, updated analysis for this section has been completed and has been incorporated in the FEIS.

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	claims it does. And if BOEM is going to discount the concerns raised in other studies by looking at the Golbazi study it must exclude the possibility of turbines smaller than those looked at in the Golbazi study in the project design envelope.For these reasons BOEM cannot discount potential effects of turbine presence based on the Golbazi study.	
BOEM-2023-0011-0124-0022	The analysis and opinion in the NEFSC letter provides explicit and clear guidance on the risk to NARWs posed by offshore wind development in the waters adjacent to Nantucket Shoals. However BOEM made no mention of the NEFSC's analysis synthesis and opinion in the DEIS and dismissed the science relied upon by the NEFSC as uncertain. The NEFSC's opinions must be treated as expert opinion and BOEM must vigorously explore and discuss their assessment in the context of best available science. BOEM's dismissal of the relevant science and the NEFSC's assessment violates its mandate under NEPA to take a hard look at the effects of the project and the DEIS for SouthCoast Wind must be amended to reflect the guidance and incorporate the cited literature.	BOEM has provided a more robust analysis of the potential hydrodynamic impacts based on the best available information compiled since receiving the NOAA recommendations. BOEM has considered the NOAA comments on that more recent analysis and made any necessary edits.
BOEM-2023-0011-0129-0003	The Commission is concerned that BOEM may be discounting prematurely the potential for hydrodynamic changes from the installation and operation of wind turbines in southern New England the potential effects on primary productivity and in turn the availability of prey species (Calanus spp.) for right whales. More research is needed on the hydrodynamic changes expected to result from the installation of large turbines in southern New England and how these changes may affect the distribution and/or availability of Calanus spp. The Commission understands that the National Academies of Sciences Engineering and Medicine (NASEM) has undertaken an "Evaluation of Hydrodynamic Modeling and Implications for Offshore Wind Development: Nantucket Shoals" to "assess potential impacts from offshore windfarms in the Nantucket Shoals region on marine hydrodynamics and resulting impacts on marine mammals specifically on the availability of North	BOEM, in cooperation with the National Marine Fisheries Service, has requested this issue be reviewed by experts in the relevant fields of science. BOEM has partnered with the National Academies of Science Engineering and Math for an independent peer review of potential hydrodynamic impacts for offshore wind facilities on prey species. The report concluded that hydrodynamic impacts from offshore wind projects adjacent to Nantucket Shoals will likely be difficult to distinguish from the ongoing effects of climate change currently occurring in this region. Likewise, BOEM finds that measurable impacts of offshore wind farms on the foraging success of whales that would result in population-level effects are not reasonably likely to occur and that a recommended NARW conservation buffer is not warranted based on the review of best available information and expert opinion found in the report. Further monitoring studies

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	Atlantic right whale prey." [Footnote 4: https://www.nationalacademies.org/our-work/evaluation-of-hydrodynamic-modeling-and-implications-for-offshore- wind-development-nantucket-shoals] The Commission fully supports such an evaluation as a means for reviewing the available literature on hydrodynamic effects determining whether the models being used by BOEM to assess such effects are appropriate and whether other models should be considered. The Commission recommends that BOEM continue to work with NMFS and other partners to conduct research and modeling to investigate the hydrodynamic effects of wind turbine installation in southern New England and other Atlantic Ocean WEAs and particularly the question of cumulative effects of large-scale wind farms on primary productivity and in turn the availability of prey to North Atlantic right whales and other marine species.	would be needed to have the spatial and temporal coverage to adequately understand the impact of future wind farms, and BOEM would continue to coordinate with partners to develop regional monitoring strategies to obtain scientific information on the potential hydrodynamic effects of WTGs. Based on the current information available, including the initial meetings associated with the peer review, BOEM is of the position that that our current NEPA and ESA analyses accurately reflect the expected impacts on NARWs from offshore wind projects, as well as provide an adequate suite of measures to avoid, minimize, or mitigate impacts on NARWs.
BOEM-2023-0011-0132-0045	While the DEIS seems to imply that NARW are newly spending time in the waters south of Nantucket historically this is incorrect. "The earliest English settlers observed that every autumn hundreds of right whales converged to the south of the island and remained until the early spring. Right whales—so named because they were "the right whale to kill"—grazed the waters off Nantucket as if they were seagoing cattle straining the nutrient-rich surface of the ocean through the bushy plates of baleen in their perpetually grinning mouths. This is how whaling on Nantucket an integral part of the island's history began. As early as the 1690s whales were hunted in small boats launched from Nantucket's south shores." The MA/RI wind lease area has been home to the NARW for hundreds of years. While they may have been observed here more frequently in recent years their presence is not new.	Final EIS Section 3.5.6.1 has been updated to include reference to the historical presence of NARWs in New England.
BOEM-2023-0011-0132-0046	The follow paragraph on page 3.5.6-14: [Text in Blue: "Global climate change is an ongoing risk for marine mammal species in the geographic analysis area. Warming and sea level rise	Impacts of the No Action Alternative presented in Section 3.5.6.3 includes the impacts of existing environmental trends, including climate change.

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	could affect marine mammals through increased storm frequency and severity altered habitat/ecology altered migration patterns increased disease incidence and increased erosion and sediment deposition (Evans and Bjørge 2013; Evans and Waggitt 2020; Learmonth et al. 2006). Increased temperatures can alter habitat modify species' use of existing habitats change precipitation patterns and increase storm intensity (USEPA 2016; NASA 2019; Love et al. 2013). Increase of the ocean's acidity has numerous effects on ecosystems including reducing available carbon that organisms use to build shells and causing a shift in food webs offshore (USEPA 2016; NASA 2019; Love et al. 2013). This has the potential to affect the distribution and abundance of marine mammal prey. Warming is also expected to influence the frequency of marine mammal diseases particularly for pinnipeds. Warming and sea level rise with their associated consequences and ocean acidification could lead to long-term high-consequence population-level impacts on marine mammals especially mammal populations already stressed by other factors (e.g. NARWs).”] These statements are not related to the current conditions being described. Climate change is not an immediate threat to the marine mammals in the wind lease area although it may be a longer-term threat. Further the role that large whales play in moderating CO2 in the atmosphere and acidity in the ocean is not described. Whales are known to play a vital role in ocean health and biodiversity. They sequester carbon in their large bodies they release fecal plumes that are rich in nutrients that phytoplankton need to grow and through their migrations from nutrient-rich feeding grounds to nutrient-poor breeding grounds they move nutrients around the ocean. The presence of whales in the proposed project area and in the broader wind lease areas is more scientifically important and concrete than the idea that the project may have a minor benefit to carbon emissions. In addition the DEIS never shows data explaining how the	

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	presence of wind turbines will moderate the climate or improve ocean acidification in the near or long term.	
BOEM-2023-0011-0132-0047	The second paragraph on page 3.5.6-15 goes on to state that vessel collisions have been a risk factor for whales. However G&G survey work has been ongoing since 2016. The ITAs issued for this work certainly allow for whales to become disoriented. There is no mention or explanation for how the increased noise could make it more likely for disoriented whales to be victims of vessel strikes.	Available information suggests that there are no mortal injuries that would likely occur due to vessel noise given the non-impulsive nature of these sources, and behavioral responses that do occur in response to these would not result in removal of any individuals from a population. Sources in Section 3.5.6 support this conclusion.
BOEM-2023-0011-0132-0049	This paragraph on page 3.5.6-15 illustrates the confusion and misrepresentation created by the document structure. [Text in Blue: "Ongoing offshore wind activities including site assessments for future offshore wind projects would affect marine mammals primarily through the IPFs of noise presence of structures and vessel traffic. Ongoing offshore wind activities would have the same types of impacts that are described in Cumulative Impacts of the No Action Alternative for ongoing and planned offshore wind activities but the impacts would be of lower intensity."] That whales are already being harmed (as evidenced by increase mortality of humpback whales in Massachusetts since G&G survey work began) from existing project activity is not the correct analysis for which to gauge this project's impact on whales and especially NARWs. It seems that the format is intended to sow confusion. However the fact remains that NARWs will be put in harm's way and no mitigation measures have been put forth that can prevent that.	The cumulative impact analysis for the No Action Alternative considers the impacts of ongoing activities and other reasonably foreseeable planned activities, excluding the Proposed Action, as described in Final EIS Appendix D, *Planned Activities Scenario*. The cumulative impact analysis of the Proposed Action considers approval of the SouthCoast Wind Project in combination with other reasonably foreseeable planned activities, including planned offshore wind activities, within the geographic analysis area for marine mammals, which is the entire east coast. The purpose is to capture the cumulative impacts on marine mammals that would be affected by the Proposed Action, as well as the impacts that would still occur under the No Action Alternative.
BOEM-2023-0011-0132-0051	The document describes level B harassment as [Text in Blue: "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 a disruption of behavioral patterns including but not limited to migration breathing nursing breeding feeding or sheltering but that does not have the potential to injure a marine mammal or marine mammal stock in the wild (16 USC 1362)."] To date dozens of level B	The most recent UME information available at the time of preparing the EIS have been incorporated, and the critical status of the NARW and humpback whale populations is considered throughout the EIS impact decisions.

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	ITA have been issued to developers of the east coast wind lease areas. These ITAs directly overlap the unusual mortality event for both NARW and Humpback Whales. However no analysis is provided for how this extensive survey work has affected marine mammals' ability to navigate and stay safely away from vessels. The data exists and should be provided as part of the DEIS. That these ITAs have been issued since beginning in at least 2017 and that they coincide with the UMEs is contrary to NOAAs public statements on the unusual number of whales and dolphins washing ashore in the NY/NJ area this winter. In 2020 for instance Massachusetts saw 34 dead whales at a time when survey work for Vineyard Wind and other projects was active. Data for timing of surveys and whale deaths has not been provided for the MA/RI lease area. How can the public believe that BOEM NOAA and NMFS will stop work or change course to protect NARWs and other whale species if they have not done so to date and have not been forthcoming with data regarding the G&G survey work to date.	
BOEM-2023-0011-0132-0053	The document describes pile driving activities taking place over a period of 8 years often for multiple days. The impacts to marine mammals are described as [Text in Blue: "The short-term consequences of masking from pile-driving activities range from temporary changes in vocal patterns to avoidance of important areas. Longer-term consequences include permanent changes to vocal patterns; reductions in fitness survivorship and recruitment; and abandonment of important habitat areas."] With regard to the NARW an 8 year construction period is not "short-term" and will lead to the extinction of this important species.	Section 3.3 of the EIS defines *short-term effects* as effects that occur during construction and may extend beyond construction, potentially lasting for months or years.
BOEM-2023-0011-0132-0055	Regarding noise from turbine operations the document states that [Text in Blue: "Mechanical noise associated with the operating WTG is transmitted into the water as vibration through the foundation and subsea cable. Both airfoil sound and mechanical vibration may result in long-term continuous	BOEM has considered the best available information in the analysis of potential impacts from WTG operational noise. While no comparable studies are available, Tougaard et al. (2020) and Stöber and Thomsen (2021) provide modeled analyses of noise that could occur if the source levels and the

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	noise in the offshore environment.”] It then goes on the refer to studies of turbines that are not close to the 14MW size being proposed for either the SouthCoast wind or other projects in the MA/RI wind lease area. The DEIS does not disclose the underwater noise impacts of the much higher operational noise levels from the proposed larger turbines. It has been shown that elevated noise levels will extend many miles from the turbines disturbing NARW and other marine mammal behavior potentially disrupting its feeding and essential migration. This is a fatal and seeming intentional omission by BOEM to downplay a very serious problem because it would expose BOEM’s flawed decision to site this project in this area to begin with. It must address this in a draft supplement to the DEIS.	number of turbines were scaled up, of which are considered appropriate for assessing the Proposed Action. Studies on operational noise in existing wind farms, along with studies evaluating the relationship between sound levels and turbine power, represent the best available science and information for evaluating impacts of operational wind noise.
BOEM-2023-0011-0132-0056	The conclusion that [Text in Blue: “Based on the current available data underwater noise from turbine operations is unlikely to cause PTS or TTS in marine mammals but could cause behavioral and masking effects.”] does not address the effects of that behavior disturbance which is the key impact. Given the size of the turbines and the vast area encompassing the MA/RI wind lease area that conclusion itself is not supported by the current science. Should the NARW be displaced from its only known year-round foraging ground the consequences could be extinction. A supplemental DEIS is needed before proceeding with any further offshore wind projects in NARW habitat.	Section 3.5.6.3 of the EIS address the impact of observed behavioral responses including displacement on marine mammals.
BOEM-2023-0011-0132-0057	The following summary statement on noise is troubling [Text in Blue: “If marine mammal populations are subjected to multiple anthropogenic noise stressors throughout their lifetimes that disrupt critical life stages (e.g. feeding breeding calving) and throughout their ranges then additional impacts from noise from ongoing non-offshore wind activities could be major. However there is no evidence ocean noise would result in population declines in the geographic analysis area for any marine mammal species. Additionally all projects are	Mitigation measures in Appendix G of the EIS include both PAM and visual monitoring, which would provide for detection of non-vocalizing marine mammals, as well as vessel strike avoidance measures. These measures have been reviewed by BOEM, in coordination with NMFS, as part of the ESA consultation.

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	expected to comply with a suite of mitigation measures (e.g. exclusion zones protected species observers) that would avoid and minimize underwater noise impacts on marine mammals.”] No mitigation measures have been proposed that will eliminate the presence of NARW or other whales during construction activities or turbines operation. The whales are often under water and silent. If they are encouraged to vacate the area with soft starts they will use valuable energy to find a safe area. The correct conclusion is that the impacts from projects activities could be major. Therefore unless proven mitigation procedures can be implemented the project should not be approved.	
BOEM-2023-0011-0132-0060	Page 3.5.6-50 states [Text in Blue: “The incremental impacts from vessel traffic and accidental releases contributed by the Proposed Action would be small when compared to the number of vessel trips associated with offshore wind development and existing vessel traffic in the region”.] In essence the document is making the argument that there will be increased vessel traffic from other projects and therefore there is only a little impact from the SouthCoast project. This makes no sense and again illustrates that the structure of the document which tries to say that significant offshore wind development is happening anyway so this project will not incrementally add to stresses on the environment is flawed. The increased vessel traffic is problematic across the MA/RI and entire east coast wind lease areas.	Section 3.5.6.3 of the EIS discusses the cumulative impacts of vessel traffic risks to marine mammals.
BOEM-2023-0011-0132-0061	The conclusion of the marine mammal section on the proposed action indicated the project cannot be safely implemented with regards to NARW. It states [Text in Blue: “Cumulative Impacts of the Proposed Action: Considering all of the IPFs together the cumulative impact on marine mammals would range from negligible to major and could include minor beneficial impacts. BOEM anticipates that the overall impacts from the Proposed Action when combined with ongoing and planned activities would be moderate on	SouthCoast Wind is requesting Level A and Level B harassment from Scenarios 1 and 2. Take estimates under Scenarios 1 and 2 are in the Request for Incidental Take Regulations for the Construction and Operations of the SouthCoast Wind Project (September 2022) can be found in Final EIS Table 3.5.6-13 and Table 3.5.6-14, respectively. ESA consultation with NMFS is underway and findings of the Biological Opinion are incorporated into the Final EIS.

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	marine mammals in the geographic analysis area [Highlighted text: with the exception of NARW on which impacts could be major. Impacts are magnified in severity for NARW due to low population numbers and the potential to compromise the viability of the species from the loss of a single individual.] Although a measurable impact is anticipated most other marine mammals would likely recover completely when IPF stressors are removed or remedial or mitigating actions are taken."] The purpose of an EIS is to present environmental impacts not conclusions especially unsupported ones. The DEIS presents no marine mammal "take" assessments to support these conclusions. It should secure such from the NMFS and place them in a draft supplement to the DEIS for public review.	
BOEM-2023-0011-0132-0063	The pages 3.5.6-5&6 indicate that [Text in Blue: "the physical oceanographic and bathymetric features provide for year-round high phytoplankton biomass likely contributing to increased availability of zooplankton prey for NARWs (Quintana-Rizzo et al. 2021). Waters from the Gulf of Maine the Great South Channel and Nantucket Sound mix in the shallow dune- like Nantucket Shoals. The convergence of these waters creates a well-mixed water column throughout the year (Limeburner and Beardsley 1982) making the Nantucket Shoals the only known winter foraging ground for NARWs."] This same water is carried into Nantucket Sound and thus Nantucket Harbor with each tide cycle. The water then washes around Nantucket and thru Muskegat Channel. The hydrodynamic effects of thousands of wind turbines on water quality in Nantucket Harbor have not been analyzed as part of the DEIS or the COP. It is not enough to say that the ecosystem wide impacts are unknown. Clearly more study is needed before a project of this scale gets built.	Under the *presences of structures* IPF discussions in Section 3.6.6.3 and Section 3.6.6.5, BOEM presents a synthesis of the best available science on hydrodynamic effects from the presence of structures, including modeling that was conducted for the southern New England offshore wind lease areas. The analysis describes impacts on oceanic process and primary productivity in and around Nantucket Shoals. Additional information on this topic is included in Section 3.4.2, *Water Quality*, Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, and Section 3.5.7, *Sea Turtles*.
BOEM-2023-0011-0132-0124	Table 4.1-1 also admits even while it labels the impacts as not irreversible [Text in Blue: "Irreversible impacts on marine mammal populations could occur if one or more individuals of	Use of sound attenuation devices such as bubble curtains are only one strategy within a layered mitigation strategy that includes APMs for visual monitoring, use of soft start

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	an ESA-listed species were injured or killed or if those populations experienced behavioral effects of high severity. With implementation of mitigation measures developed in consultation with NMFS (e.g. timing windows vessel speed restrictions safety zones) the potential for an ESA- listed species to experience high-severity behavioral effects or be injured or killed would be reduced or eliminated. No irreversible high-severity behavioral effects from Project activities are anticipated; however due to the uncertainties from lack of information these effects are still possible. Irretrievable impacts could occur if individuals or populations grow more slowly as a result of displacement from the Project area."] The chart should label the impacts as they are shown in the document as "irreversible". In addition the mitigation measures will not be effective as:- Timing windows do not eliminate the presence of NARWs.- Vessel speed restrictions do not apply to the majority of vessel trips (crew transfer vessels).- PSOs cannot see whales that are under water and PAM devices cannot hear whales that are silent for hours at a time.- Pile driving including soft start warnings could send whales out of important foraging areas and into more traveled shipping lanes.- There has been put forth NO mitigations that guarantee the safety of NARWs.	methods, clearance and shutdown zones, sound field verification, and seasonal restrictions and BOEM-proposed measures for PAM and pile-driving monitoring plans, sufficient PSO coverage, notification, and reporting requirements. ESA consultation with NMFS is underway and findings of the Biological Opinion are incorporated in the Final EIS.
BOEM-2023-0011-0134-0004	Regarding biological resources it is disturbing that BOEM is still in the process of developing strategies to minimize the negative effects of offshore wind development on the North Atlantic right whales and their habitat given South Fork Wind and Vineyard Wind 1 projects have already received NEPA approval and several projects are in the Draft EIS stage. The significance of these whales to the Tribe is evident as they are prominently featured in the Tribes oral histories our seal and logo. As stated on BOEM's website "The agencies are working to understand the effects of offshore wind development on North Atlantic right whales and the ecosystems on which they depend and to develop strategies to avoid minimize and monitor offshore wind development impacts to the species."	Section 3.5.6 presents a comprehensive analysis of the impacts of the Proposed Action and other ongoing and planned projects on NARW. Impacts on NARWs are discussed in more detail in the NMFS BA for the Project, which is incorporated by reference into the EIS. ESA consultation with NMFS is ongoing and findings of the Biological Opinion are incorporated into the Final EIS.

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	[Footnote 2: https://www.boem.gov/environment/protecting-north-atlantic-right-whales-during-o?shore-wind-energy-development] The effects to North Atlantic right whales need to be more precisely assessed prior to approving OSW development and properly avoided or mitigated. These species are our relatives and as seafaring peoples integral to our traditional lifeways and cultural practices. Protections for these severely endangered whales themselves as well as the environment and habitat that nourishes and sustains them requires meticulous careful and deliberate consideration. The United States has legal and moral obligations to protect our ways of life and this includes preserving these priceless ecosystems so that our future generations may continue to live according to our traditions.	
BOEM-2023-0011-0137-0004	The treatment of operational noise on marine life in the Draft Environmental Impact Statement for Mayflower/SouthCoast Wind is inadequate because:(a) the assumptions about turbine noise rely on a least squares mathematical regression analysis of data sets that combined are clearly inappropriate because they introduce an influential dependent factor (drive type) other than size in a way that is not randomized(b) it does not account for fitness consequences to individuals or how populations may be affected [Footnote 34: if there is (as there is likely to be) insufficient variability within populations of the degree of harm to fitness caused by the impact-producing factors within the timeframe of cumulative U.S. Offshore Wind program development to allow evolutionary adaptation to environmental changes](c) The risk of cumulative adverse effects of offshore wind turbine power plants on wildlife including marine life is poorly researched and assessment processes are seriously underdeveloped for the scale of development planned and the short time scale (a decade or two) over which rapid expansion of the U.S. Offshore Wind program is reasonably expected to occur. (Assessments of cumulative effects must assess the	The Final EIS presents the best available information on operation noise impacts on marine life. As detailed in Section 3.5.6.5, operational noise is expected to be detectable by marine mammals at relatively short distances from a turbine. The comprehensive overview of WTG-generated noise in the EIS provides a summary of available information. Additionally, cumulative impacts on all marine mammals are evaluated in this EIS (Section 3.5.6.5), as well as the EISs for all other offshore wind projects.

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	cumulative exposure of a wildlife population to each hazard and then estimate how the exposure will affect the population.)	
BOEM-2023-0011-0137-0011	The SouthCoast (Mayflower) Wind Power plant is expected to modify ocean habitat so as to adversely affect marine life. The effects of the project can be expected to be cumulative i.e. in addition to other wind power plant projects planned on the OCS. The bureau has not (other than for pile driving during construction) [Footnote 44: The Bureau has to some degree considered effects of sound-generating hydrographic studies for site characterization. However the rationality of the conclusions (of negligible to minor adverse impact for most taxa is questionable given known empirical studies published in peer-reviewed scientific journals of the effects of the types and frequencies of sound and given the known sound signatures and received levels of sound pressure caused by emission from sound-generating equipment that has been declared by the developers as those they intend to use to conduct the surveys. See Appendix A.] put forth any reasonable support for its conclusions of radius of harm from operating turbines or made any proper inquiry with due diligence into impacts to the respective other taxa of marine life. [Footnote 45: The Bureau has not actually quantitatively estimated effects (of the projects it is tasked with reviewing) on any taxon or species by issuing a quantitative estimate of decline in fitness (reductions in survival rates or reproductive rates) average condition or recruitment (replacement rate) from Offshore Wind Activity within and near the power plant footprint nor performed any energy budget analyses on any species.]	Changes to the acoustic habitat have now been discussed in Section 3.5.6.5. Based on the best available knowledge, detailed in Section 3.5.6.5, operational noise is expected to be detectable by marine mammals at relatively short distances from a turbine. Therefore, impacts associated with WTG operational noise are expected to be minor.
BOEM-2023-0011-0137-0012	Underwater acoustic modeling of construction sound only is found at Appendix U2[Footnote 46: internet source: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Appendix%20U2_Underwater%20Acoustic%20Mod	Refined acoustical modeling results are included in the MMPA ITA application and have been added to Final EIS Section 3.5.6.3.

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	eling%20Report.pdf.] of the COP. The limitations presented by the available data and the contract specifications to those performing the mathematical modeling are apparent. Bioacousticians have been requesting that the Bureau require that the settings (parameters) on the sound testing equipment with which data is harvested be expanded reasonably. For example it is standard but inappropriate to use High-Pass Filter settings that filter out relevant information; It has been requested that the High-Pass filter be set to 1 Hz or as low as possible. The reasonable requests weren't satisfied.NOAA acoustical guidelines suggest a weighting function for "Low Frequency Cetaceans" that includes a 2-pole High-pass filter set at 200Hz even while Southall et al (2007) suggested moving the high-pass filter down to 7Hz there is nothing in the literature or in empirical evidence that would suggest that either of these weighting curves align with mysticetes infrasonic hearing. That some rorquals phonate below the High Pass cutoff[Footnote 47: Baumgartner M.F Van Parijs S.M. Wenzel F.W. Tremblay C.J. Esch H.C. and Warde A.M. (2008). Low frequency vocalizations attributed to sei whales (Balaenoptera borealis) J. Acoust. Soc. Am. 124 pp.1339-1349.] substantiates the inadequacy of the NOAA guidelines. Both mysticetes below the waterline and birds above the waterline depend on microbaroms and meteorological energy for migration and navigation cues. Therefore the modeling and analysis is missing proper analysis of biologically relevant sounds and thus the utility of predictions of the environmental effects of the project based on such modeling and analysis of animal exposure and consequences is limited.	
BOEM-2023-0011-0137-0013	The weighting curves in Section D of the noise-modelling appendix aren't representative of the real auditory curves of mysticetes (Baleen whales). Given estimates of harm to marine mammals is dependent upon data harvested from few animals and few species. The curves for the Low Frequency Cetaceans – which is based on informed but speculative	No audiogram based on real hearing experiments is publicly available for baleen whale hearing at this time. As such, the weighting curve applied in Section D is the accepted weighting function by the NMFS and is written into their technical guidance as such. This weighting function was generated by the U.S. Navy using the best available science

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	understanding of the hearing physiology of mysticetes (some peer-reviewed some non-peer-reviewed models and some mere predictions) vocalizations and according to the Guidelines Section II:2.1 “taxonomy and behavioral responses to sound” taken from a white paper review[Footnote 48:Reichmuth C. 2007. Assessing the hearing capabilities of mysticete whales. A proposed 15 research strategy for the Joint Industry Programme on Sound and Marine Life (JIP link not available).] of a 1990 paper [Footnote 49: Dahlheim M.E. and D.K. Ljungblad. 1990. Preliminary hearing study on gray whales 42 (Eschrichtius robustus) in the field. Pages 335-346 in J. Thomas and R. Kastelein eds. Sensory Abilities of Cetaceans. New York: Plenum Press.] whereas valuable verifiable behavioral data are available on mysticete responses to sound; Thus better estimations for Low Frequency cetaceans based on such data remains within reach[Footnote 50: e.g.: Goldbogen JA Southall BL DeRuiter SL Calambokidis J Friedlaender AS Hazen EL Falcone EA Schorr GS Douglas A Moretti DJ Kyburg C McKenna MF Tyack PL.2013 Blue whales respond to simulated mid-frequency military sonar. Proc R Soc B 280: 20130657. Blackwell SB Nations CS McDonald TL Thode AM Mathias D Kim KH et al. (2015) Effects of Airgun Sounds on Bowhead Whale Calling Rates: Evidence for Two Behavioral Thresholds. PLoS ONE 10(6): e0125720. Lucia Di Iorio Christopher W. Clark Exposure to seismic survey alters blue whale acoustic communication. Biol. Lett. (2010) 6 51–54. Manuel Castellote Christopher W. Clark Marc O. Lammers 2012 Acoustic and behavioral changes by fin whales (Balaenoptera physalus) in response to shipping and airgun noise. Biological Conservation 147 (2012) 115–122. Cerchio S Strindberg S Collins T Bennett C Rosenbaum H (2014) Seismic Surveys Negatively Affect Humpback Whale Singing Activity off Northern Angola. PLoS ONE 9(3): e86464] and the current thresholds and thus estimates of harm are not on the best available data.	(Finneran 2015). Applying weighting functions is the accepted approach for acoustic modeling with respect to predicting injury and behavioral impacts associated with noise on various functional hearing groups. This approach was taken in the acoustic modeling for all marine mammal functional hearing groups, providing a standardized and comparable approach across all marine mammal species.

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BOEM-2023-0011-0137-0014	Signal kurtosis which has great bearing on the degree of physical assault or damage to hearing and to body tissues need be included in any predictive models. While the Bureau in its publications has mentioned kurtosis and acknowledged its important it abandons the endeavor to use it for being "not practical to implement". We respectfully request to be contacted for input on how FFT (Fast Fourier Transform) can be utilized to take into account this important metric component factor that is relevant to expected harm.	Sounds with high kurtosis values (> 30) have been shown in terrestrial species to be correlated with hearing impairment (Hamernik and Qui 2001). There is growing interest in applying this finding to marine species (e.g., von Benda-Beckmann et al. 2022), but the current regulatory paradigm in the NMFS technical guidance requires that sources be classified as either "impulsive" or "non-impulsive", without taking kurtosis into effect. BOEM's technical experts are currently considering new approaches to this regulatory framework and would encourage the commenter to make their work publicly available so that regulators can draw on their knowledge in future EISs (Hamernik and Qiu 2001; von Benda-Beckman et al. 2022).
BOEM-2023-0011-0137-0029	The DEIS also does not attempt to quantify the effect of turbine-induced clouding on primary productivity and autotroph density. Wind-turbine power plants impact local atmospheric conditions through their air wakes characterized by reduced wind speed and increased turbulence. At certain threshold humidity levels localized sharp drop in air pressure caused by the blade pass causes water vaporization which when subjected to the turbulence in the wake of a turbine enables the water vapor to expand over a larger area. This turbine-induced low cloud cover in turn impacts zooplankton abundance and ecosystems as autotrophic activity by phytoplankton is impaired which affects zooplankton (heterotrophic planktonic organisms) other heterotrophs etc. (ocean productivity generally).	*Presence of Structures*, under Section 3.5.6.3, *Impacts of Alternative A- No Action Alternative*, summarizes a study of atmospheric wake effects by Daewel et al. (2022). In summary, although detectable changes to the atmospheric forces that could affect surface mixing may occur, the influence of these impacts on biological productivity are likely minor.
BOEM-2023-0011-0137-0063	In expressions of estimated impact on populations of marine life and other wildlife of various individual energy projects (including the subject SouthCoast Wind project) of the offshore wind program generally and of regional programs in numerous statements that have been published throughout this NEPA process the federal agencies and commissioned assigns [Underline: when explaining how a conclusion]—that a species or taxon is not expected to be significantly adversely	Section 3.5.6.3 of the EIS outlines the research that was used to draw this conclusion (Brandt et al. 2009, 2011, 2016; Thompson et al. 2010; Tougaard et al. 2009; Lindeboom et al. 2011; Russell et al. 2016; Southall et al. 2021; and Blackwell et al. 2004).

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	affected by operation of the wind- turbine power plants—[Underline: is reached] one of the common statements is that the animals are expected to be able to avoid operating turbines or that they will not be likely to physically contact them. There is no earnest examination of or supported conclusions about whether animals will or won't travel within the 1 nm area located inbetween the turbines or will avoid the lease area altogether or will suffer noise-induced physiological oxidative stress from attempting to travel through or inhabit within an operating power plant inbetween the turbines and what the population consequence of that are for different taxa.	
BOEM-2023-0011-0137-0065	The Bureau has not supported the presumption that the ability of animals to avoid the operating power plants or turbines is without fitness consequences that can affect species on the population-level even as it has recognized that avoidance may causes substantial diversion from a migration course which is known to increase the energy required for migration and thus to tax limited energy budgets and that taxed energy budgets decrease condition and survival across individuals in the population[Footnote 86: Without enough genetic variation in the population with respect to resiliency to these phenomenon necessary to support evolutionary adaptation and without time for populations to adapt (due to planned rapid expansion in offshore development) it is unlikely populations would be able to adapt through evolutionary processes to the rapid changes in their environment occasioned by the expected explosion in a decade or two of wind energy projects on the outer continental shelf.]	Behavioral exposure modeling is conducted as a part of the developers MMPA permitting and is incorporated by reference into the EIS.
BOEM-2023-0011-0137-0069	The analysis performed by the Bureau in the making of the DEIS focuses too singularly on direct injury to hearing apparatus of different animals. While this needs to be considered there are a plethora of other ways noise impacts marine animals. It need to consider first for each taxa for	Details about the life history and ecology of marine species are provided in the affected environment for each animal group. The analysis in the EIS is based on the best available science related to noise impacts and uses the regulatory framework

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	which it is responsible for estimating impacts how animals of that taxon "make a living" (obtain energy) survive and reproduce. Only then will it become clear how the project may impact animals of that taxa and how to perform literary research. The Bureau needs to broaden consideration of site characterization activities' expected impacts. It does not seriously address effects on individual fitness (except those related injury of the hearing apparatus) or what the mechanisms are by which (what we experience as) anthropogenic sound impacts fitness and how these effects can accumulate (across individuals and over time) to present as population effects. It does give adequate consideration to how population level effects in one species might result in consequences for others or the consequences of affecting how species interact. The DEIS also does not address to how the expected project activities will affect species distribution community composition or health of ecosystems. It does not consider the life stages of the animals for which it is tasked with evaluating project impacts and does not look for trends that span across taxa.	for marine mammals which is provided in the NMFS technical guidance. The thresholds provided therein focus solely on damage to auditory tissues, because the majority of research in this field have focused on these effects. There is secondary guidance addressing impacts on behavior, but BOEM recognizes that there are limitations to our understanding of these effects, especially because they are so highly variable across species. BOEM understands that issues related to masking, reproduction, and ecosystem effects are important to consider and is tracking this body of literature closely. Regarding effects from site characterization activities, BOEM and colleagues recently published a paper classifying active acoustic sound sources and their likelihood to result in incidental take (i.e., behavioral harassment) of marine mammals (Ruppel et al. 2022). The paper concluded that most sources used during site characterization can be considered *de minimis*, meaning unlikely to result in take, based on key characteristics of these sounds. Mitigation measures are expected to reduce potential impacts from noise to minor or negligible levels, which are unlikely to cause significant harm to ecosystems.
BOEM-2023-0011-0137-0096	[Bold: The DEIS fails to characterize sound emitted from site characterization equipment and operational turbines. These cannot be described in terms of the sound pressure levels only of its dominant frequencies because the sound can have an energy density spectrum that features substantial energy density at other frequencies.]For example Madsen and Johnson[Footnote 28: Madsen and Johnson 2006. Quantitative measures of air-gun pulses recorded on sperm whales (Physeter macrocephalus) using acoustic tags during controlled exposure experiments The Journal of the Acoustical Society of America 120 2366 (2006); https://doi.org/10.1121/1.2229287] recorded received levels during a seismic gun survey on tags attached to Sperm whales. Seismic gun has highest power at low frequencies.	A description of the activity and potential impacts on marine life associated with other site characterization work and turbine operation are described in each resource section within Chapter 3. Air guns are not proposed for use in the site characterization surveys for this project. A description of the activity and potential impacts on marine life associated with other site characterization work and turbine operation are described in each resource section within Chapter 3.

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	When whales were close to the surface the first arrivals of air-gun pulses contained most energy between 0.3 kHz and 3 kHz a frequency range extending well above the normal frequencies of interest in seismic exploration. Therefore air-gun arrays can generate significant sound energy at frequencies many octaves higher than the frequencies of interest for seismic exploration.	
BOEM-2023-0011-0137-0122	BASELINE NOISE MUST BE MEASURED Offshore wind activity including siting installation and operation will be accompanied by noise. Right from the launch of the first survey vessel there will be an effect on the natural soundscape of the subject area. For this reason it would be wise to immediately begin monitoring the area soundscapes. This would give us a temporal/spatial understanding of the density and activity of marine life in the area across all sound-making taxa – from marine arthropods to fish to marine mammals. These passive acoustical surveys need to be broad-band recording between 4 Hz to 100kHz to capture all acoustical niches anticipated in the area – from the largest whales to harbor porpoises. They will also capture anthropogenic noise sources including vessel traffic and surveying equipment; from impulse signals used for geological characterization to scanning sonars used for seafloor profiling. Additionally they will provide acoustical data that would reveal interactions between marine life and the anthropogenic noise sources to which they are being subjected.While there is already considerable anthropogenic noise in the sea due to shipping traffic robust baselining of the proposed activity areas would help reveal the acoustical changes to the habitat as a consequence of the development deployment and operation of the turbines and the associated ongoing support and maintenance of the equipment.	A description of the activity and potential impacts on marine life associated with other site characterization work and turbine operation are described in each resource section within Chapter 3.
BOEM-2023-0011-0137-0123	The implications for marine mammals of anthropogenic noise likely to be emitted from wind-turbine power plants during operation have not been studied and could result in changes that cause a decrease in fitness of these and other marine	Changes to the acoustic habitat are now discussed in Section 3.5.6.5. Based on the best available knowledge, detailed in Section 3.5.6.5, operational noise is expected to be detectable by marine mammals at relatively short distances

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	mammals in areas within auditory reach of the project.Given the grand scale on which wind projects are expected to be built and that so much of the OCS is intended to be developed and given that migration of whales are long-range it is unlikely that they will be able to migrate outside the auditory reach of operational noise from wind projects without substantial energetic costs. Disruption of the making of calls for foraging or mating or to maintain group cohesion may reduce fitness and thus can be injurious at the population level.Habitat modification constitutes "harm" within the meaning of a take in the Endangered Species Act. Our U.S. Supreme Court has concluded habitat modification is a take if it actually injures wildlife with injury including “perturbations that cause them not to use … otherwise suitable habitat”Assessments need to estimate reasonable effects on the NARW of how far a distance from the turbine the effects are expected to attenuate below harassment level and must determine whether – within that distance – overlapping areas of harassment would result from adjacent turbine to create a larger enjoined harassment area.	from a turbine. Therefore, impacts associated with WTG operational noise are expected to be minor. The SouthCoast NMFS BA (and summarized in the Final EIS) evaluated the energetic consequences of any avoidance behavior or masking effects of ESA-listed marine mammals in response to underwater noise sources, and potential delay in resting or foraging is not expected to affect any individual’s ability to successfully obtain enough food to maintain their health, to make seasonal migrations, or to participate in breeding or calving. Due to the transient nature of marine mammals, any behavioral effects would be expected to resolve within a few days to a week of exposure and are not expected to affect the health of any individual or its ability to migrate, forage, breed, or calve. Based on the results of several studies, sound pressure levels would be expected to be at or below ambient levels at relatively short distances from the WTG foundations (Miller and Potty 2017; Kraus et al. 2016; Thomsen et al. 2015). Avoidance behavior would incur small, but measurable energetic costs (i.e., the cost of swimming a given distance), but this short-term displacement to avoid the entirety of the Lease Area would not have long-term detectable impacts on marine mammals. Please refer to the NMFS BA for additional information.
BOEM-2023-0011-0140-0025	Our groups have several general and specific concerns with BOEM’s analysis of marine mammal and sea turtle occurrence abundance and seasonality in the Project Area. As an initial matter the DEIS does not provide a comprehensive assessment of all marine mammal and 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. The most detailed description is provided for the right whale but thorough descriptions are missing for the other species. [Footnote 55: SCW DEIS at 3.5.6-4 to 3.5.6-6.] Information on species is scattered across pages and therefore difficult to find and assess and there are no tables	ESA consultation with NMFS is ongoing and findings of the Biological Opinion are incorporated into the Final EIS.

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	summarizing species occurrence designations abundance/density info stock information. [Footnote 56: SCW DEIS at 3.5.6-4 to 3.5.6-9.] BOEM does provide a summary of some data and information that have 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.). However thorough descriptions of species-specific occurrence in and near the Project Area should be provided for all species by BOEM as the agency responsible for assessing environmental impacts of the proposed activity not by the developer or another agency. BOEM can 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. Regarding the specific findings for the marine mammal and sea turtle occurrence and abundance we highlight the following concerns.	
BOEM-2023-0011-0140-0026	BOEM uses the draft 2022 NMFS stock assessment population estimate of 365 and the Pace model estimate of 336 but does not refer to the 340 estimate for 2021 which uses data as of August 30 2022. [Footnote 60: SCW DEIS at 3.5.6-5] We encourage the use of the 340 population 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). [Footnote 61: NMFS 2017–2023 North Atlantic Right Whale Unusual Mortality Event supra; see also DEIS at 3.7-12.]	The Final EIS and Appendix B have been revised with the updated NARW abundance estimate (from 365 to 338) based on the most recent Marine Mammals Stock Assessment Report (Hayes et al. 2022).
BOEM-2023-0011-0140-0027	BOEM misinterprets data from Stone et al. 2017 and Kraus et al. 2016. [Footnote 62: SCW DEIS at 3.5.6-4] Blue whales were	The statement in question has been revised and concurs with the commenter; blue whales rarely occur in the Project

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	not sighted during the Northeast Large Pelagic Survey Collaborative (NLPSC) aerial surveys which covered the Rhode Island and Massachusetts Wind Energy Areas (RI-MA WEAs). Blue whale vocalizations were sparsely detected from acoustic devices during winter (Kraus et al. 2016); however due to the far detection range of a blue whale vocalization (more than 108 nm [more than 200 km]) (Kraus et al. 2016) and the lack of blue whale sightings during these recent surveys these vocalizing blue whales were likely not within the WEAs. In addition during the recent AMAPPS studies blue whales were sighted (Palka et al. 2021b) and acoustically detected along the shelf break as opposed to the shelf (Palka et al. 2021d) which further supports the occurrence of blue whales in waters farther offshore than the proposed Project Area.	area, if at all, as visual and acoustic detections of the blue whale were sparse and occurred outside of the Massachusetts and Rhode Island WEA. Stone et al. (2017) has been removed as reference as the literature did not include blue whales among the seven cetaceans documented in their survey area.
BOEM-2023-0011-0140-0028	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). [Footnote 63: E.g. NYSERDA surveys in the New York Bight recorded sei whales during August February/March and April/May; see NYSERDA (New York State Energy Research and Development Authority). 2020. Digital aerial baseline survey of marine wildlife in support of offshore wind energy. Third annual report: Summer 2016–Spring 2019 Sixth interim report. Prepared for New York State Energy Research and Development Authority by Normandeau Associates Inc. with APEM Ltd.]	Information on sei whales has been updated to include the statement that sei whales are known to occur year-round in Southern New England and the New York Bight (Davis et al. 2020), indicating that these regions have ecological importance to this species.
BOEM-2023-0011-0140-0029	The DEIS should include information on the feeding biologically important area (BIA) for fin whales designated by NMFS east of Montauk Point from March to October. [Footnote 64: LaBrecque E. C. Curtice J. Harrison S.M.V. Parijs and P.N. Halpin. 2015. Biologically important areas for cetaceans within U.S. waters – East Coast region. Aquatic Mammals 41(1):17-29.] Feeding behavior for this species has also been observed in and near the proposed Project Area. [Footnote 65: Kraus S.D. et al. 2016 Northeast Large Pelagic	Information on fin whales has been updated to include a designated BIA from the area east of Montauk Point, New York to the western boundary of Massachusetts WEA (Labrecque et al. 2015)

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	Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles supra; Stone K.M. et al. 2017. Distribution and abundance of cetaceans in a wind energy development area offshore of Massachusetts and Rhode Island supra.]	
BOEM-2023-0011-0140-0033	BOEM does not provide a clear determination for marine mammals from impact pile driving but does note that permanent threshold shift (PTS) is likely. PTS for one or more NARW could have outsized impacts on this critically endangered species and the included monitoring and mitigation is inadequate to ensure whales do not enter an area with a radius of up to 6200 meters (since observers can reliably observe marine mammals at lesser distances and animals do not always vocalize). BOEM should analyze pile driving impacts on all marine mammal species including North Atlantic right whales and update mitigation requirements as necessary to avoid PTS for North Atlantic right whales and minimize it for all other species.	BOEM's proposed mitigation measures that are adopted based on ESA consultation with NMFS are incorporated into Final EIS Appendix G. Mitigation measures related to pile driving include noise mitigation strategies, time of year restrictions, and shutdown zones.
BOEM-2023-0011-0140-0034	BOEM provides support for its "moderate" adverse impacts conclusion by stating that "the population can sufficiently recover from the impacts or enough habitat remains functional to maintain the viability of the species both locally and throughout their range." [Footnote 76: Id. at 3.5.6-13.] BOEM's conclusion that the impacts posed by vessel traffic would be minor with no population-level impacts expected for marine mammals other than NARW significantly underestimates the risk of vessel strike on marine mammals. [Footnote 77: Id. at 3.5.6-45.] 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	The EIS addresses the known use of the Project area, its vicinity to marine mammal habitat, especially its proximity to Nantucket Shoals, and considers the importance of these habitats. Section 3.5.6 of the EIS discusses the potential impact of the proposed Project on marine mammals and has been revised to include more details on the Project's proposed mitigation measures that specifically focuses on measures to protect NARWs. Additionally, Appendix G includes a comprehensive list of mitigation and monitoring measures (Table G-1, under *Vessel Operations*) that would be implemented to avoid, minimize, and mitigate adverse impacts to marine mammals, specifically the NARW. Among these measures specific to vessel strikes include requiring vessels of all sizes operating port to port to reduce speeds to 10 knots or less between November 1 and April 30. This vessel speed reduction also applies while operating or transiting in any SMAs, DMAs, or

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	vessel strike risk. Non-mandatory and non-enforceable measures are not sufficient mitigation strategies for vessel strikes. 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.	slow zones. Both applicant- and agency-proposed measures require trained lookouts to be posted on all vessel transits during all phases of the Project. A PAM system, as part of the MMPA ITA, would be developed consisting of near real-time monitoring such that NARW or other large whale calls made in or near the transit corridor can be detected and transmitted to the transiting vessel. These measures are particularly protective to NARWs and the strict implementation of such measures would overall reduce the risk of vessel strikes to zero. The mitigation measures incorporated into the ROD for the EIS would be enforceable and would reduce impacts of the Project on marine mammals. BOEM and NMFS continue to work together to use the best available information to determine appropriate mitigation measures. Additionally, mitigation and monitoring measures may arise from consultations from federal and state resource agencies and will be considered by decision makers and potentially adopted as conditions for approval.
BOEM-2023-0011-0140-0035	Even a single lethal vessel strike could jeopardize the species' survival. BOEM defines major impacts as "Impacts on individual marine mammals or their habitat would be detectable and measurable; they would be of severe intensity can be long lasting or permanent and would be extensive. Impacts on individuals and their habitat would have severe population-level effects and compromise the viability of the species." [Footnote 78: Id. at 3.5.6-13.] 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 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. [Footnote 79: E.g. CVOW-C DEIS at 3.15-32 and Ocean Wind DEIS at 3.15-55.]We also remind BOEM that there is little to no literature currently	Section 3.5.6 of the EIS discusses the potential impact of the proposed Project on marine mammals and has been revised to include more details on the Project's proposed mitigation measures that specifically focuses on measures to protect NARWs. Additionally, Appendix G includes a comprehensive list of mitigation and monitoring measures (Table G-1, under *Vessel Operations*) that would be implemented to avoid, minimize, and mitigate adverse impacts on marine mammals, specifically the NARW. For example, mitigation measures BA-5 and BA-7 ensure that vessels of all sizes operating port to port will reduce speeds to 10 knots or less between November 1 and April 30. This vessel speed reduction also applies while operating or transiting in any SMAs, DMAs, or slow zones. Vessels will steer a course away from any sighted NARWs at 10 knots or less until the 1,640-foot (500-meter) minimum separation distance has been established. Trained lookouts will be posted on all vessel

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	available to support the assumption that offshore wind development will provide tangible benefit to marine mammals. Due to a lack of evidence and significant 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.	transits during all phases of the Project and will immediately communicate any sightings to initiate the required avoidance measures. A PAM system will be developed consisting of near real-time monitoring such that NARW or other large whale calls made in or near the transit corridor can be detected and transmitted to the transiting vessel. These measures are particularly protective to NARWs and the strict implementation of such measures would overall reduce the risk of vessel strikes to zero. BOEM and NMFS continue to work together to use the best available information to determine appropriate mitigation measures. Additionally, mitigation and monitoring measures may arise from consultations from Federal and State resource agencies and will be considered by decision makers and potentially adopted as conditions for approval. To address the second comment regarding prey availability, the EIS has been updated to state that the presence of structures (as it introduces hard substrate creating an artificial reef effect) would have minor beneficial effects on fish-eating odontocetes and pinnipeds that benefit from increased prey abundance around the structures. This statement is supported by studies such as those by Raoux et al. (2017), De Mesel et al. (2015), and Degraer et al. (2020).
BOEM-2023-0011-0140-0036	There are critical omissions from BOEM's sound exposure analysis presented in the DEIS that must be addressed in the Final EIS. While this information is included in the appendices to the SouthCoast 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 marine mammal hearing groups despite a stated use of a flat 160 dB rms threshold and between species for sea turtles with the same hearing thresholds. [Footnote 80: SCW DEIS 3.5.6-39.] [Footnote 81: SCW DEIS Tables 3.5.7-5 and 3.5.7-6.] This may be unexpected given how exposure ranges are often calculated solely by	Under the *noise: pile driving* IPF discussion under Alternative B - Proposed Action has been updated throughout to reflect the latest installation parameters as outlined in the most recent MMPA ITA (December 2023). Based on the updated acoustic modeling, radial distances to PTS thresholds (i.e., Level A harassment) for impact pile driving were estimated using NMFS (2018) hearing-group-specific, dual-metric thresholds for impulsive noise and marine mammal auditory weighting functions were applied (selecting the larger acoustic isopleth or larger exposure effect to assess PTS onset). To estimate radial distances to behavioral thresholds, NMFS' impulsive noise threshold for Level B harassment under the MMPA was used (SPLRMS of 160 dB re 1 µPa). For

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	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). [Footnote 82: SCW COP Appendix U2.] In addition BOEM should correct the description and captions for Tables 3.5.6-8 through 3.5.6-13. [Footnote 83: According to the tables they report ER95% ranges to behavioral thresholds which isn't an acceptable approach to modeling the isopleth to behavioral thresholds. They also appear to report distances to the isopleths for PTS from peak and cumulative sound energy exposure but do not describe these.] These tables are described incorrectly in what they are reporting. They also report attenuated levels and unattenuated levels which again calls into question whether achievable attenuation of at least 10 dB is required or not. If it is they should not report unattenuated values.	sea turtles, radial distances to injury and behavioral thresholds for impact pile driving were estimated using peak SPLs and frequency-weighted accumulated SELs for the onset of PTS in sea turtles from Finneran et al. (2017) and from McCauley et al. (2000) for behavioral response thresholds. By incorporating animal movement into the calculation of ranges to time-dependent thresholds (SEL metrics), exposure ranges (ER95%) can provide a more realistic assessment of the distances within which acoustic thresholds may be exceeded. This also means that different species within the same hearing group can have different exposure ranges as a result of differences in movement patterns for each species. Modeling also used a 10-dB-per-hammer-strike noise attenuation to incorporate the use of a single noise-abatement system (e.g., bubble curtain system and an additional system) and is considered achievable with currently available technologies (Bellmann et al. 2020).
BOEM-2023-0011-0140-0037	Second estimates of the number of individual marine mammals that may experience injury (i.e. PTS) temporary threshold shift (TTS) or behavioral disturbance are not included in the impacts analysis. [Footnote 84: BOEM states: "Take estimates under Scenarios 1 and 2 are in the Request for Incidental Take Regulations for the Construction and Operations of the Mayflower Wind Project (September 2022) Tables 25 and Table 26 respectively." Mayflower DEIS at 3.5.6-42.] As this information represents a key component of assessing the potential for impact BOEM must incorporate this information into the Final EIS. Appendix U2 of the SouthCoast Wind COP provides exposure estimates for marine mammals and for sea turtles that could be included in the DEIS. [Footnote 85: SCW COP Appendix U2 Table 15; as noted in this letter we recommend these estimates be updated based on ver. 12 of the Roberts et al. models and the new density estimates for sea turtles developed by the U.S. Navy.] For all marine mammals and North Atlantic right whales in particular it is unreasonable to make any determination of	*Noise* IPFs such as for pile driving, HRG surveys, and UXO detonations under Alternative B - Proposed Action on Marine Mammals include the most up-to-date exposure estimates based on the latest acoustic modeling reports within the MMPA ITA Application (December 2023). Discussions related sea turtle density estimates is in Section 3.5.7.

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	impact levels for impact producing factors (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.	
BOEM-2023-0011-0140-0038	Third it is unclear from the impacts analysis if noise attenuation technology will be required during impact pile driving and other activities. Four levels of noise attenuation (0 dB 6 dB 10 dB and 15 dB) are modeled in the marine mammal section but it is not stated in the DEIS which level must be attained if any. [Footnote 86: SCW DEIS at 3.5.6-38.] The acoustic impact analysis presented in Appendix U2 of the SouthCoast Wind COP states that a noise abatement system (NAS) performance of 10 dB broadband attenuation was chosen for the study of acoustic impacts because of its achievability. BOEM's analysis of noise impacts in the DEIS should clearly state what level of noise attenuation will be required so potential impacts to marine mammals can be accurately evaluated.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0039	Fourth the DEIS'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. 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. [Footnote 87: Stöber Uwe and Frank Thomsen. "How could operational underwater sound from future offshore wind turbines impact marine life?" The Journal of the Acoustical Society of America 149.3 (2021): 1791-1795; Carduner Jordan. "Characterizing the operational soundscape of floating offshore wind parks: Implications for environmental risk assessment and wildlife." Presentation at	The best available information about measured and modeled underwater operational noise levels is available now in Section 3.5.6.6. Impacts of Alternative B. A discussion of how this noise could impact marine mammals is provided. Due to the relatively short distances over which operational noise is expected to be over ambient noise levels, the potential impacts are expected to be minor. Therefore, a full-scale acoustic modeling is not warranted for this sound source at this time.

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	the State of the Science Workshop on Wildlife and Offshore Wind Energy. New York USA. July 28 2022.] 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.	
BOEM-2023-0011-0140-0040	Within the DEIS BOEM asserts that pile-driving activities will likely exceed PTS and TTS for all marine mammal functional hearing groups. [Footnote 88: SCW DEIS at 3.5.6-41.] 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 DEIS. For example the entirety of consideration of the potential for behavioral effects is quoted below:"Mitigation would reduce PTS from impact pile driving on marine mammals; however behavioral and masking effects are still considered likely for activities with large acoustic disturbance areas. Based on the analysis conducted by Southall et al. (2021) it is expected that pinnipeds are likely to leave the area during pile-driving activities and more severe responses are likely for harbor porpoises including minor reductions in vocal output possible sustained avoidance reduced vocal mechanisms and habitat avoidance (Southall et al. 2021)." [Footnote 89: Id. at 3.5.6-41.]BOEM then provides a minor determination for the potential of behavioral impacts to pinnipeds and a moderate impact level for all other species. To include a moderate determination with such little consideration of the behavioral effects is inadequate.There are additional data available that BOEM should consider and include. 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. [Footnote 90: Van der Hoop J. Nousek-McGregor A.E. Nowacek D.P.	The discussion of potential behavioral effects to marine mammals from impact pile driving is under the cumulative impacts of the No Action Alternative, in the Noise section, under Pile Driving Noise. This section and the following subsections present the background information on the potential impacts on marine mammals from the various IPFs considered in the IPF, the determinations made under Alternative B incorporate this information into their impact determinations.

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	Parks S.E. Tyack P. and Madsen P "Foraging rates of ramfiltering North Atlantic right whales" Functional Ecology vol. 33 pp. 1290-1306 (2019).] 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." [Footnote 91: Id.] 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. [Footnote 92: Christiansen F. Dawson S.M. Durban J.W. Fearnbach H. Miller C.A. Bejder L. Uhart M. Sironi M. Corkeron P. Rayment W. Leunissen E. Haria E. Ward R. Warick H.A. Kerr I. Lynn M.S. Pettis H.M. & Moore M.J."Population comparison of right whale body condition reveals poor state of the North Atlantic right whale" Marine Ecology Progress Series vol. 640 pp. 1-16 (2020). Stewart J.D. Durban J.W. Knowlton A.R. Lynn M.S. Fearnback H. Barbaro J. Perryman W.L. Miller C.A. and Moore M.J. "Decreasing body lengths in North Atlantic right whales" Current Biology published online (3 June 2021). Available at: https://www.cell.com/current-biology/fulltext/S0960-9822(21)00614-X.] A recent study confirmed that larger females do indeed have more calves. [Footnote 93: Stewart Joshua D. et al. "Larger females have more calves: influence of maternal body length on fecundity in North Atlantic right whales." Marine Ecology Progress Series 689 (2022): 179-189.] These studies provide an indication of the significant impact disturbance during foraging may have on a marine mammal species. The waters off southern New England are a critically important foraging area for North Atlantic right whales; for this Final EIS and other DEISs that are forthcoming BOEM	

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	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. [Footnote 94: Quintana-Rizzo E. Leiter S. Cole T.V.N. Hagbloom M.N. Knowlton A.R. Nagelkirk P. Brien O.O. Khan C.B. Henry A.G. Duley P.A. and Crowe L.M. 2021. Residency demographics and movement patterns of North Atlantic right whales Eubalaena glacialis in an offshore wind energy development area in southern New England USA. Endangered Species Research 45 pp.251-268; O'Brien O. Pendleton D.E. Ganley L.C. McKenna K.R. Kenney R.D. Quintana-Rizzo E. Mayo C.A. Kraus S.D. and Redfern J.V. 2022. Repatriation of a historical North Atlantic right whale habitat during an era of rapid climate change. Scientific Reports 12(1) pp.1-10.] 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.	
BOEM-2023-0011-0140-0041	Concerningly under the noise analysis for marine mammals for the Proposed Alternative high- resolution geophysical (HRG) surveys are afforded only a paragraph while listing HRG equipment that can have significant impacts on marine mammals (sparkers and boomers which can have peak source levels greater than 140 dB). [Footnote 95: SCW DEIS at 3.5.6-44.] Further BOEM continues to rely on information from the 2021 BOEM Biological Assessment (BA) and the 2021 programmatic informal consultation. 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. Indeed in a letter submitted to BOEM and NMFS on January 20 2022 several of the undersigned groups urged NMFS to immediately reinitiate consultation under the ESA based on the best available scientific data and new right	Background information on the impact of HRG surveys on marine mammals in the Cumulative Impacts of the No Action Alternative, in the *noise* IPF, under *geophysical surveys*. This presents the potential impacts on marine mammals from HRG surveys. This information is used for the effects determination for the Proposed Action.

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	whale population number to ensure the mitigation measures on which BOEM is relying for site characterization and assessment activities are protective enough to reduce risk to right whales. [Footnote 96: Letter from Defs. of Wildlife et al. to Amanda Lefton Dir. Bureau of Ocean Energy Mgmt. & Janet Coit Assistant Adm'r NMFS Re: BOEM and NMFS Must Reinitiate Consultation on the Effects of Site Assessment Characterization Activities for Offshore Wind Energy on North Atlantic Right Whales (Jan. 20 2022) Attachment 2.] We reiterate the request for BOEM to update the analyses now in order to comply with the ESA on this and all future Atlantic coast leases.	
BOEM-2023-0011-0140-0053	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 10 dB (re: 1 µPa2s) Sound Exposure Level (SEL) or greater. [Footnote 146: SCW DEIS Appendix G page G-75.] We note that it is not clear from the DEIS whether BOEM is conditioning its permit for SouthCoast Wind on a specific level of noise reduction. [Footnote 147: SCW DEIS 3.5.6-36 to 37. BOEM states "Combinations of noise-attenuation systems (e.g. double big bubble curtain hydrosound damper plus single big bubble curtain) potentially achieve much higher attenuation than the 10-15 dB of small single bubble curtains (Buehler et al. 2015). The type and number of noise-attenuation systems to be used during construction have not yet been determined and impact pile driving 24 hours per day was deemed necessary to complete installation within as few years as possible."] Additionally even at the 10-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	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	far-field) have reached a 20 dB (re: 1 µPa2s) reduction in SEL or greater. [Footnote 148: Bellmann M. A. Brinkmann J. May A. Wendt T. Gerlach S. & Remmers P. (2020) Underwater noise during the impulse pile- driving procedure: Influencing factors on pile-driving noise and technical possibilities to comply with noise mitigation values. Supported by the Federal Ministry for the Environment Nature Conservation and Nuclear Safety (Bundesministerium für Umwelt Naturschutz und nukleare Sicherheit (BMU)) FKZ UM16 881500. Commissioned and managed by the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie (BSH)) Order No. 10036866. Edited by the itap GmbH; Bellman M. A. Wendt T. May A. Gerlach S. and Remmers P. (2022). Underwater noise during percussive pile driving: influencing factors on pile-driving noise and technical possibilities to comply with noise mitigation values (ERA report). Presentation at The Effects of Noise on Aquatic Life conference Berlin Germany 2022.] [Footnote 149: Sound Exposure Level (SEL) is defined following Bellmann et al. (2020) at 31-32. Findings are based on post-processed underwater noise measurement data and many relevant metadata of more than 2000 pile installations with and without the application of noise abatement systems (NAS) for complying with German thresholds.] 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 (ΔSEL) of 17 19 and 23 dB respectively. [Footnote 150: Bellman et al. (2020) at Table 4.] 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. [Footnote 151: Bellman et al. (2022) id.] [Footnote 152: Bellman et al. (2020 2022) id.] [Footnote 153: Peng Y. Tsouvalas A. Stampoultzoglou T and Metrikine A.	

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	(2021). Study of sound escape with the use of an air bubble curtain in offshore pile driving. Journal of Marine Science and Engineering 9(2) 232. https://doi.org/10.3390/jmse9020232.]We recognize that there are differences between the European offshore wind context and that of the U.S. making the direct transference of findings difficult. The monopiles included in the data set examined by Bellman et al. (2020 2022) were approximately 8 m or less in diameter compared with the approximately 10 m or greater diameter monopiles planned for the U.S. Larger diameter monopiles generate greater noise levels at the source. The noise reduction standard the NAS were compared against in Europe was also specifically designed to protect harbor porpoises in German waters (i.e. SEL less than or equal to 160 dB (re: 1 µPa2s) at 750 meters from the monopile installation site) and not tailored to the low-frequency cetaceans that are a priority in the U.S. That said the water depths are in some cases comparable across both regions (up to 40 m) and the European findings can be directly applied to the installation of smaller diameter pin-piles in the U.S. The limited evidence that is available from U.S. offshore wind projects also indicate alignment with Bellman et al. (2020 2022). For example the limitations of using a single NAS have been demonstrated. Measurements of sound pressure recorded during the installation of an unmitigated and mitigated monopile for the Coastal Virginia Offshore Wind pilot project indicate that a double bubble curtain (i.e. a single NAS) was most effective at higher frequencies (>200 Hz) and did not attenuate sound as effectively at lower frequencies. [Footnote 154: Ampala K. Miller J.H. Potty G.R. Newhall A. Amaral J. Frankel A.S. Mason T. and Khan A. (2022). Measuring the effectiveness of a double bubble curtain during impact pile driving at the Coastal Virginia Offshore Wind (CVOW) Pilot Project. Poster presentation at the State of the Science Workshop on Wildlife and Offshore Wind Energy. New York USA 2022.] This indicates that the deployment of a	

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	second NAS designed to attenuate noise at lower frequencies would have further reduced noise impacts.Given these developments BOEM should require the developer to implement the best commercially available combined NAS technology to achieve the greatest level of noise reduction and attenuation possible in line with the mitigation hierarchy. Based on the findings of Bellman et al. (2020 2022) which indicate a reduction of 20 dB SEL is feasible for monopiles 8 meters in diameter we recommend that up to a 10-dB (re: 1 µPa2s) reduction of SEL be viewed as a floor only. BOEM should require developers to deploy technologies proven in Europe to be capable of a 15-dB (re: 1 µPa2s) reduction in SEL or greater. The noise reduction requirement should apply to all aspects of pile driving operations including pile strikes compressors and operations vessels engaged in construction. Field measurements must be conducted on the first pile installed and data must be collected from a random sample of piles throughout the construction period. We do not support field testing using unmitigated piles. Sound source validation reports of field measurements must be evaluated by both BOEM and NOAA Fisheries prior to additional piles being installed and be made publicly available.	
BOEM-2023-0011-0140-0054	NMFS' and thus BOEM's reliance on a 160 dB (re 1 µPa2s) threshold for behavioral harassment is not supported by the best available scientific information and such reliance grossly underestimates Level B take. [Footnote 156: See e.g. Gomez C. Lawson J.W. Wright A.J. Buren A.D. Tollit D. and Lesage V. "A systematic review on the behavioral responses of wild marine mammals to noise: the disparity between science and policy" Canadian Journal of Zoology vol. 94 pp. 801-819 (2016); Tyack P.L. and Thomas L. "Using dose-response functions to improve calculations of the impact of anthropogenic noise" Aquatic Conservation: Marine and Freshwater Ecosystems vol. 29 pp. 242-253 (2019). See also Letter from the Marine Mammal Commission to Ms. Jolie Harrison Chief Permits and Conservation Division Office of	The letter from the Marine Mammal Commission opposed the use of the 160 dB re 1 µPa threshold for behavioral impacts from non-impulsive sources of noise (e.g., parametric SBPs, chirps, echosounders, sonars). In its noise modeling, SouthCoast Wind did use the lower, more precautionary Level B harassment threshold of 120 dB re 1 µPa recommended in the Marine Mammal Commission's letter for continuous, non-impulsive vibratory pile driving. Thus, behavioral disturbance from non-impulsive noise sources should be conservatively captured in the Final EIS.

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	Protected Resources National Marine Fisheries Service regarding the IHA requested by Orsted Wind LLC. (June 13 2018). https://www.mmc.gov/wp-content/uploads/18-06-13-Harrison-Orsted-Bay-State-IHA.pdf. The Marine Mammal Commission "…remains concerned that NMFS' current behavior thresholds do not reflect the current state of understanding regarding the temporal and spectral characteristics of various sound sources and their impacts on marine mammals."] 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 mammal and sea turtles is one of the primary means of reducing acoustic exposures of these species during impact pile driving.	
BOEM-2023-0011-0140-0055	BOEM sets out several Clearance and Exclusion Zones for North Atlantic right whales to be implemented at different time periods in Appendix G of the DEIS (we encourage BOEM to also include this important information on monitoring and mitigation in the main text of the Final EIS). [Footnote 157: SCW DEIS Appendix G G-77.] For impact pile driving with a minimum noise reduction/attenuation level of 10 dB (re 1 μPa2s) as intended by the SouthCoast Wind Project the following minimum Clearance and Exclusion Zone distances should be required for North Atlantic right whales (see Attachment 1):1. A visual Clearance Zone and Exclusion Zone must extend at minimum 5000 m in all directions from the location of the driven pile.2. An acoustic Clearance Zone must extend at minimum 5000 m in all directions from the location of the driven pile.3. An acoustic Exclusion Zone must extend at minimum 2000 m in all directions from the location of the driven pile.	BOEM has considered all public comments on the Draft EIS in selecting mitigation to be included in the Final EIS. Additionally, ESA consultation with NMFS is underway and findings of the Biological Opinion are incorporated into the Final EIS.
BOEM-2023-0011-0140-0056	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. Sea turtles and mysticete	BOEM has considered all public comments on the Draft EIS is selecting mitigation to be included in the Final EIS. Additionally, ESA consultation with NMFS is underway and

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	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. [Footnote 158: SCW DEIS Appendix G G-42.] 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 as well as sea turtles.	findings of the Biological Opinion are incorporated into the Final EIS.
BOEM-2023-0011-0140-0057	BOEM states that adverse effects are not anticipated on marine mammal stocks or populations due to the implementation of applicant-committed avoidance minimization and mitigation measures (Appendix G) which will reduce/eliminate potential Level A harassment the low number of UXOs identified in the Project Area and the required detonations that will be timed to occur no more than once per day. [Footnote 159: SCW DEIS at 3.5.6-43] However monitoring and mitigation measures specific to UXO detonations are not included in the Appendix G and BOEM's lack of analysis for UXO detonations for SouthCoast Wind does not comport with how this activity has been analyzed in recent and concurrent DEIS'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.	A complete analysis of potential impacts from UXOs and a full description of monitoring and mitigation measures required for this activity have been added to the Final EIS
BOEM-2023-0011-0140-0125	Although the Draft EIS provides a reasonably detailed explanation of hydrodynamic effects the Draft EIS does not analyze whether such hydrodynamic effects are likely to result in negative impacts to the cold pool a mass of cold bottom water in the Mid-Atlantic Bight overlain and surrounded by warmer water which has a northern limit in the general area of the Project. [Footnote 331: Zhuomin Chen and Enrique Curchitser Interannual variability of the Mid-Atlantic Bight Cold Pool Journal of Geophysical] Research: Oceans (2020).] In the Final EIS BOEM should attempt to quantify any impacts to	BOEM has determined the Atlantic cold pool does not overlap with Lease Area; thus, the presence of WTGs in the Lease Area would not have any impacts on oceanographic processes that could affect the Atlantic cold pool.

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	the cold pool from WTG structures and include such impacts in its impact level ratings. In the Final EIS BOEM should also include specific analysis of any impacts to Nantucket Shoals from hydrodynamic effects that it expects to occur because of the Project.	
BOEM-2023-0011-0177-0004	I read three times the mitigation measures and the impacts on right whales and the document ignores the fact that right whales are quiet for hours mothers and calves are rarely at the surface. These animals are quiet and below the surface and no amount of on board vessel watchers PSO people or acoustic monitoring is going to be able to protect them. There is just simply not an acknowledgement in the document about natural behavior of right whales which is to be silent for hours and not necessarily at the surface unless they are actively feeding.	Mitigation measures in the EIS include both PAM and visual monitoring, which would provide for detection of non-vocalizing marine mammals, as well as vessel strike avoidance measures.

N.6.11 Sea Turtles

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BOEM-2023-0011-0039-0001	There is little research done on how offshore wind farms affect marine life but in recent studies it has shown that offshore wind farms reduce the amount of oxygen in the water and increase the biogenic carbon by 10% in these areas (Offshore Wind [Fisheries NOAA. “Offshore Wind Energy: Protecting Marine Life.” NOAA Fisheries https://www.fisheries.noaa.gov/topic/offshore-wind-energy/protecting-marine-life.]). This is troubling as there is many wildlife surrounding these areas that need adequate amounts of oxygen levels. Protected wildlife within these areas include; roseate terns piping plovers leatherback sea turtles loggerhead sea turtles Kempâ€TMs Ridley sea turtles and grey seals (Nantucket Sound [“Nantucket Sound.” Center for Coastal Studies https://coastalstudies.org/our-work/marine-policy-initiative/nantucket-sound/#:~:text=Nantucket%20Sound%20is%20a%20recognize	EIS Appendix E, *Analysis of Incomplete and Unavailable Information*, Section E.1.2.7, *Sea Turtles*, acknowledges that the data to investigate impacts on sea turtles is lacking. However, the available relevant information suggests that the planned activities are not expected to result in population-level effects on sea turtles. The NOAA link provided by the commenter does not include information that offshore wind farms decrease the amount of oxygen in the water.

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	dsea%20turtles%2C%20and%20grey%20seals.]). These wildlife should be at special concern since their populations are protected in order to avoid declines and help with the conservation of them.	
BOEM-2023-0011-0137-0110	Sea turtles have a nomadic lifestyle. Speculation about sea turtles they will aggregate at the foundations of structures is just that speculation. That sea turtle populations will benefit from "fish" aggregation at the base of turbines or that such benefit will balance out the increased entanglement and other risks presented by the proposed activities is also not founded.	Section 3.5.7.3, *Presence of structures*, describes the potential for offshore wind structures to create an artificial reef effect, whereby growth around the artificial reefs may provide food for sea turtles. This is a well-established phenomenon that is explained in the text with supporting scientific references.
BOEM-2023-0011-0137-0113	The Bureau should also consider and provide an adequate analysis of whether wind-turbine Power plants can be expected to contribute to cold-shock deaths from a combination of turbine structures reducing water current velocity (and increasing localized temperatures) the physical presence of the structures themselves and interference with magnetoreception in these animals all or some of which might have the potential to facilitate lingering or containment in the lease area or nearby later in the season (when they may be cold-shocked) than they would ordinarily remain. Turtles navigate using magnetoreception especially in absence of other navigatory cues and at night. There will be cross cables throughout the sea floor inside the lease areas once developed (inter-turbine connector cables along the sea floor). Sea turtles are magnetosensitive and both sense magnetic fields and have magnetic compass orientation. The DEIS did not consider the likelihood or possibility of this confluence of factors or them separately.	A discussion of the hydrodynamic effects from offshore wind structures, including the potential to change water velocity associated with the wind wake effect, is discussed in detail in Section 3.5.7.3, *Presence of structures*. There is no evidence from Europe or modeled data to indicate the potential for structures to result in large changes in water temperature that could induce cold-shock deaths. In regards to magnetoreception, Final EIS Appendix E, *Analysis of Incomplete and Unavailable Information*, Section E.1.2.7, *Sea Turtles*, acknowledges that the effects of EMF on sea turtles are not completely understood. However, the available relevant information is summarized in the BOEM-sponsored report by Normandeau et al. (2011). Although the thresholds for EMF disturbing various sea turtle behaviors are not known, the evidence suggests that impacts may only occur on hatchlings over short distances, and no adverse effects on sea turtles have been documented to occur from the numerous submarine power cables around the world.
BOEM-2023-0011-0137-0120	Clear avoidance reactions to seismic signals at levels between 166-179 dB re 1µPa have been observed. [Footnote 55: Moein S.E. J.A. Musick J.A. Keinath D.E. Barnard M.L. Lenhardt and R. George. 1995. Evaluation of seismic sources for repelling sea turtles from hopper dredges pp. 90-93. In: L.Z. Hales (ed.) Sea Turtle Research Program: Summary Report. Technical Report	Data regarding sea turtle hearing abilities are summarized in EIS Table 3.5.7-3. NMFS has adopted the U.S. Navy acoustic thresholds for the onset of PTS, TTS, and behavioral disruptions for sea turtles as presented in Finneran et al. (2017) (and shown in Table 3.5.7-4). Section 3.5.7.3 concludes that underwater noise generated from installation

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	CERC-95] [Footnote 56: McCauley Fewtrell Duncan C. Jenner M.N. Jenner Penrose Prince Adhitya Murdoch and McCabe 2000. Marine seismic surveys – a study of environmental implications. APPEA Journal 692-708.] The DEIS has not fully examined the fitness and population effects of loss of habitat use by turtles due to offshore wind activity.	of WTGs and OSPs may temporarily cause behavioral disturbance to sea turtles. This section includes that construction activities could temporarily displace animals; however, individuals may become habituated to repeated exposures over time. BOEM has determined that the analysis provided is sufficient to support sound scientific judgments and informed decision-making about the proposed Project with respect to its impacts on sea turtles.
BOEM-2023-0011-0140-0030	Sea turtles: The description of relative occurrence should also include "Year-Round" for leatherback loggerhead green and Kemp's Ridley sea turtles. [Footnote 66: SouthCoast DEIS Table 3.5.7-1] While not as likely to occur during the winter they may occur during the spring summer and fall with peak occurrence during summer 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. [Footnote 67: CETAP. 1982. Characterization of marine mammals and turtles in the Mid- and North Atlantic areas of the U.S. Outer Continental Shelf-Final report of the Cetacean and Turtle Assessment Program. Prepared for U.S. Bureau of Land Management Washington D.C. by Cetacean and Turtle Assessment Program University of Rhode Island Graduate School of Oceanography Kingston Rhode Island. Contract AA551-CT8-48; Dodge K.L. B. Galuardi T.J. Miller and M.E. Lutcavage. 2014. Leatherback turtle movements dive behavior and habitat characteristics in ecoregions of the Northwest Atlantic Ocean. PLoS ONE 9(3):e91726; Shoop C.R. and R.D. Kenney. 1992. Seasonal distributions and abundances of loggerhead and leatherback sea turtles in waters of the northeastern United States. Herpetological Monographs 6:43-67; Thompson N.B. J.R. Schmid S.P. Epperly M.L. Snover J. Braun-McNeill W.N. Witzell W.G. Teas L.A. Csuzdi and R.A. Myers. 2001. Stock assessment of leatherback sea turtles of the western North Atlantic. Pages 67-104 in NMFS-SEFSC (National Marine Fisheries Service-	Section 3.5.7 of the EIS details the relative occurrence for all four turtle species occurring within the offshore Project area based on best available scientific information. Therefore, the relative occurrence information provided in the EIS is sufficient to support sound scientific judgements and informed decision making about the proposed Project with respect to its impact on Sea Turtles.

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	Southeast Fisheries Science Center) ed. Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-455.] During NLPSC aerial and acoustic surveys loggerhead turtles were sighted within the RI-MA WEAs during spring summer and fall with the greatest number of observations in summer and fall. [Footnote 68: Kraus S.D. et al. 2016. Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles supra; O'Brien O. K. McKenna D. Pendleton and J. Redfern. 2021. Megafauna aerial surveys in the Wind Energy Areas of Massachusetts and Rhode Island with emphasis on large whales: Interim Report Campaign 6A 2020. U.S. Department of the Interior Bureau of Ocean Energy Management. OCS Study BOEM 2021-054; O'Brien O. K. McKenna B. Hodge D. Pendleton M. Baumgartner and J. Redfern. 2021. Megafauna aerial surveys in the Wind Energy Areas of Massachusetts and Rhode Island with emphasis on large whales. Summary Report - Campaign 5 2018-2019. Agreement No.: M17AC00002. OCS Study BOEM 2021-033. US Department of the Interior Bureau of Ocean Energy Management; Quintana E. S. Kraus and M. Baumgartner. 2019. Megafauna aerial surveys in the Wind Energy Areas of Massachusetts and Rhode Island with emphasis on large whales. Summary report - Campaign 4 2017-2018. Prepared by New England Aquarium Anderson Cabot Center for Ocean Life and Woods Hole Oceanographic Institution; Stone K.M. S.M. Leiter R.D. Kenney B.C. Wikgren J.L. Thompson J.K.D. Taylor and S.D. Kraus. 2017. Distribution and abundance of cetaceans in a wind energy development area offshore of Massachusetts and Rhode Island. Journal of Coastal Conservation 21(4):527-543.] 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. [Footnote 69: NYSERDA	

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	(New York State Energy Research and Development Authority). 2020. Digital aerial baseline survey of marine wildlife in support of offshore wind energy supra.; Tetra Tech and LGL. 2020. Final comprehensive report for New York Bight whale monitoring aerial surveys March 2017 – February 2020. Technical report prepared by Tetra Tech Inc. and LGL Ecological Research Associates Inc. for New York State Department of Environmental Conservation.] One confirmed sighting of a green sea turtle was also recorded in the RI-MA 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. [Footnote 70: Kenney R. D. and K. J. Vigness-Raposa. 2010. Marine mammals and sea turtles of Narragansett Bay Block Island Sound Rhode Island Sound and nearby waters: an analysis of existing data for the Rhode Island Ocean Special Area Management Plan. In: Ocean Special Area Management Plan Vol 2. Rhode Island Coastal Resources Management Council Wakefield RI.] [Footnote 71: NEFSC (Northeast Fisheries Science Center) and SEFSC (Southeast Fisheries Science Center). 2018. 2017 annual report of a comprehensive assessment of marine mammal marine turtle and seabird abundance and spatial distribution in US waters of the western North Atlantic Ocean - AMAPPS II. Northeast Fisheries Science Center and Southeast Fisheries Science Center.]	
BOEM-2023-0011-0140-0031	BOEM uses the latest density models for cetaceans released in 2022 (Roberts et al. 2022 models). For sea turtles BOEM refers to the COP Volume II which uses seasonal density estimates from the U.S. Navy Operating Area Density Estimate database (U.S. Navy 2007). [Footnote 72: SCW DEIS at 3.5.7-3 to 3.5.7-7] 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. The Navy is shortly expected to release updated sea turtle density models and is currently making this information available upon request to	The discussions and results in the Final EIS are in alignment with the most recent JASCO acoustic modeling report for SouthCoast Wind (December 2023) and the density estimates therein. BOEM is aware of the more recent sea turtle density estimates available (DiMatteo and Sparks 2023); however, as the most recent JASCO acoustic modeling made use of the U.S. Navy Operating Area Density Estimate (NODE) database on the Strategic Environmental Research and Development Program Spatial Decision Support System (SERDP-SDSS) portal (U.S. Navy 2012, 2017) and from the

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	support agency decision-making. BOEM should request and use these updated models to derive density estimates for the Project Area.	*Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles* (Kraus et al. 2016) as basis to derive sea turtle density estimates, these are the values currently being reflected in this Final EIS.
BOEM-2023-0011-0140-0042	The SouthCoast Wind COP acknowledges that open loop cooling poses an entrapment risk for juvenile seals and for sea turtles and states "Mayflower Wind will consult with EPA and NMFS to ensure appropriately sized bar racks are included in the engineering design to minimize the risk of entrapment at the CWIS." [Footnote 97: SCW COP Version E Volume II at 6-258 and 6-2292.] [Footnote 98: Id. at 418.] However the DEIS only discusses the potential for marine mammal and sea turtle entrapment in relation to fisheries survey gear and does not mention the potential for entrapment in cooling water intakes. [Footnote 99: SCW DEIS page 3.5.6-34 [mammals] and page 3.5.7-33 [sea turtles].] In addition the only mitigation measures that involve cooling are for zooplankton. [Footnote 100: SCW DEIS pages G-49 and G-57. "To minimize potential impacts on zooplankton from impingement and entrainment in offshore wind HVDC converter station open-loop cooling systems no open-loop cooling systems would be permitted in the enhanced mitigation area of the Lease Area. No geographic restrictions on the offshore export cable corridor nor the installation of an HVAC OSP are included in this mitigation measure."] BOEM is required to analyze the impacts of open loop cooling on juvenile seals and sea turtles and should include bar racks as well as other appropriate options as part of their mitigation measures to protect seals and sea turtles.	The Final EIS, Section 3.5.7.5 has been revised to add a new IPF discussion, *Discharges/intakes*, which includes an updated discussion of the impacts of the HVDC converter OSPs on sea turtles, based on information from SouthCoast Wind's NPDES permit application for one HVDC converter OSP for Project 1. The discussion includes mention of bar racks.
BOEM-2023-0011-0140-0043	BOEM notes that dredging including the use of hopper dredging may be used for cable installation sand wave clearance exit pits and ground prep for gravity-based structure foundations but provides little analysis on the potential impacts to sea turtles. [Footnote 101: SCW DEIS page 3.5.7-27] Given the well-documented and severe	Text concerning GBS dredging impacts have been removed, as GBS foundations are no longer in the PDE. Dredging is only anticipated to occur within three relatively small sand wave clearance areas in the Falmouth ECC, with no sand wave clearance dredging is anticipated within the Brayton Point ECC.

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	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. [Footnote 102: E.g. Dickerson D. et al. 2004. Dredging impacts on sea turtles in the southeastern USA: A historical review of protection. Proceedings of World Dredging Congress XVII Dredging in a Sensitive Environment. Vol. 27; Harms Craig A. et al. 2020. Gas embolism and massive blunt force trauma to sea turtles entrained in hopper dredges in North and South Carolina USA. Diseases of Aquatic Organisms 142 189-196.] BOEM should therefore explicitly estimate areas of dredging total volume of dredge material 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.	
BOEM-2023-0011-0140-0044	In addition in 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. [Footnote 103: SCW DEIS page 3.5.7-14.] This is particularly true when these activities are taking place in nearshore areas where sea turtles densities are higher.	The statement that interactions from dredging and cable emplacement is lower in the offshore areas in comparison to nearshore navigational channels is well supported and consistent with the assessments in other BOEM offshore EIS documents. Should cable laying and seabed preparation activities occur in nearshore areas, habitat disturbance would typically be minimized by SAV surveys and these areas would then be avoided during construction.
BOEM-2023-0011-0140-0045	Given that marine mammals and 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 SouthCoast 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 SouthCoast Wind surveys based on measures of survey effort and provide an appropriate impact	SouthCoast Wind has prepared fisheries monitoring plans for the Lease Area and Brayton Point ECC. Final EIS Section 3.5.7.5, *Gear Utilization*, has been revised to include a discussion of these plans and their potential for effects on sea turtles. For example, a demersal otter trawl survey will be conducted by SMAST in the Lease Area. SMAST is working with NMFS to obtain a LOA from NMFS prior to survey activities. The LOA application states as a result of surveys they “do not expect bycatch of or interaction with marine mammals, sea turtles, sturgeons, or other protected species” based on BMPs. An official workplan is being developed.

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	level determination. [Footnote 104: Available as part of the NEFSC PEA]	

N.6.12 Wetlands

None.

N.6.13 Commercial Fisheries and For-Hire Recreational Fishing

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BOEM-2023-0011-0106-0003	We believe BOEM must prior to approving any cable landings emanating from RI-MA wind energy areas do a cumulative analysis of ALL cable landings that are slated from not only all RI-MA lease areas and South Coast Wind but throughout the Atlantic Ocean from Maine to South Carolina. Included within that analysis must be reviewing the cumulative economic losses that could occur of the historical commercial trawl fleet fishing. Not just the fleet that would displaced from the RI-MA lease areas cables that become exposed but throughout the coastline. Within that analysis there must be a delineation of losses by fishery. Displacement from commercial fishing grounds and cumulative impacts would also include in areas where armoring of a transmission or inter-array cable would take place and the areas within a lease and cable landing that are exposed to sediment mobility like many of the lease areas of South Coast Wind are within Appendix F2- Scour Potential Impacts from Operational Phase and Post-Construction Infrastructure and Attachment C by Fugro "Sediment Mobility Potential."	Conducting an analysis of impacts from all offshore wind cables throughout the Atlantic Ocean is outside the scope of this EIS, the purpose of which is to evaluate the SouthCoast Wind Project. Within this EIS, BOEM appropriately evaluates the cumulative effects of the installation of the SouthCoast Wind cables when combined with ongoing and planned projects within the geographic analysis area. At this time, the exact location of all cables and cable protection for all planned offshore wind projects is not known but estimates on total cable length and protection are estimated in Appendix D and considered as part of the cumulative analysis of commercial fisheries in Section 3.6.1 Each individual project will be subject to a standalone environmental analysis that will allow for public input and will identify mitigation measures to avoid or minimize impacts on environmental resources.
BOEM-2023-0011-0112-0031	Table 3.6.1-5 through Table 3.6.1-10 include average commercial fishing landings and 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	Data from NOAA's Socioeconomic impact tool was used to compile the tables referenced in the comment. Please refer to Section 3.6.1.1, *Commercial Fisheries in the Offshore Project Area*, for a description of the variability of catch for herring.

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	provided in NOAA's Socioeconomic Impacts tool (Hyperlink: https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development). Fisheries revenues can fluctuate for a variety of reasons (changing fish distributions change in fishing regulations market factors etc.); therefore an average value may not always accurately describe the economic value of the fishery. This is particularly true for Atlantic herring where the DEIS states that herring is the top species within the Regional Fisheries Area accounting for 27% of landings over 2008 - 2019 (page 3.6.1-9). Atlantic herring is now considered overfished with a rebuilding plan in place effective July 2022.	Please refer to Table 3.6.1-12 for additional context into which species are more exposed as well as how the average annual revenue from the Lease Area compares to the entire geographic analysis area. This table also more accurately represents fluctuations in catch and shows that the landings/revenue of Atlantic herring from the offshore project area did not contribute greatly to the total landings/revenue of Atlantic herring in the geographic analysis area. In addition, refer to Table 3.6.1-21, which depicts the number of vessels and trips associated with a specific FMP and the level of effort estimated in the Lease Area. Tables 3.6.1-5 through 3.6.1-8 deal with the regional fisheries area, whereas tables 3.6.1-9 and 3.6.1-10 deal with the much smaller Offshore Project Area and should be compared against the RFA and geographic analysis area.
BOEM-2023-0011-0112-0032	The Offshore Project Area and the Regional Fisheries Area are referenced throughout the Affected Environment and impacts sections; however only text descriptions are provided versus also providing a figure like what is provided for the Geographic Analysis Area (Figure 3.6.1-1).	A figure has been added to Section 3.6.1 depicting the regional fisheries area. The Offshore Project area is the offshore area encompassing the footprint of the project, which is depicted in Chapter 2.
BOEM-2023-0011-0112-0033	The Regional Fisheries Area is defined as GARFO statistical areas 537-539 and 611-612 (page 3.6.1-8). It is unclear why these specific statistical areas were selected and why area 613 was excluded.	The Final EIS has been revised to correct the text to indicate that statistical area 613 is included. A new figure has been added showing the extent of the RFA. The RFA provides a condensed region, relative to the geographic analysis area, to better analyze impacts at a more relevant scale for the fisheries that operate in the Offshore Project area
BOEM-2023-0011-0112-0034	We recommend better characterizing which commercial and recreational fisheries and fish species would be affected by various stages of wind development and why. Unless necessary to protect confidential data grouping data across and within FMPs is not particularly helpful given the impact determinations could differ by fishery and species.	Section 3.6.1 describes fisheries in the geographic analysis area, RFA, and Offshore Project area, and describes in various tables that particular species that are fished in these areas, such as in Table 3.6.1-6. A description of the biological and ecological impacts to various recreational and commercial fish species, and life stages likely impacted by the various stages of wind development is provided in FEIS Section 3.5.5.

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BOEM-2023-0011-0112-0035	Table 3.6.1-19 includes the number of revenue outliers in the lease area by year; however the table description and corresponding text do not include a description on what is meant by 'outliers.' This is a term that is typically used for observations that lie an abnormal distance from other values in a sample. Text on page 3.6.1-21 indicates that the outliers in Figure 3.6.1- 2 are vessels that derived a high proportion of its revenue from the lease area. No analysis is presented that shows this determination used standard statistical techniques for example the third quartile plus 1.5 times the interquartile range is a standard approach to estimating 'mild' outliers. [Footnote 7: https://www.itl.nist.gov/div898/handbook/prc/section1/prc16.htm] The FEIS should describe specifically how these revenue outliers were determined. In some years up to 29% of the vessels are characterized in this way which is a large percentage suggesting the underlying data generally cover a narrow range of values but with a substantial number of vessels falling outside the range. In addition to documenting the methods we suggest calling these vessels "highly dependent" including more detailed table captions and column headers for tables and including cross references to tables in the corresponding text.	NMFS calculated these outliers using ggplot2 in R (Wickham 2016). The methodology is as follows: The lower and upper hinges correspond to the first and third quartiles (the 25th and 75th percentiles). This differs slightly from the method used by the boxplot() function, and may be apparent with small samples. See boxplot.stats() for more information on how hinge positions are calculated for boxplot(). The upper whisker extends from the hinge to the largest value no further than 1.5 * IQR from the hinge (where IQR is the inter-quartile range, or distance between the first and third quartiles). The lower whisker extends from the hinge to the smallest value at most 1.5 * IQR of the hinge. Data beyond the end of the whiskers are called "outlying" points and are plotted individually. Section 3.6.1.1, *Commercial Fisheries in the Offshore Project Area*, has been revised to include this additional information.
BOEM-2023-0011-0112-0036	Page 3.6.1-32 includes a discussion on the most affected fishery management plans that occur in and near the lease area and also along the export cable corridors however the text references VMS data from 2015-2016 does not reference the previously provided data tables that have more recent data and information and states "exceptionally high landings of Atlantic herring in 2013 put Atlantic herring as the most affected species by landings" which does not reflect current conditions. For example longfin squid are one of the top ten species by revenue within the SouthCoast lease area (according to NOAA's Socioeconomic Impacts tool). Longfin squid landings and ex-vessel revenues have fluctuated drastically over time especially from 2015 - 2021 (MAFMC	The FEIS states that squid and Jonah crab would be the most affected fisheries. Please refer to FEIS Section 3.6.1.1, *Commercial Fisheries in the Offshore Project Area*, for a description of the variability of catch for herring. Please refer to Table 3.6.1-12 which more accurately represents fluctuations in catch and shows that the landings/revenue of Atlantic herring from the offshore project area did not contribute greatly to the total landings/revenue of Atlantic herring in the geographic analysis area. The VMS data on the NEODP has not been updated from 2015-2016 and does not include the < 4 knot modifier to represent fishing.

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	Longfin Squid Fishery Information Document 2022) (Hyperlink: https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/62603fdf8be6d8487d2d479f/1650474975761/Longfin_2022_FID.pdf). The FEIS should clearly state how most affected and impacted species fisheries etc. are determined using the most recent data available along with a longer time series to capture the periodicity of fisheries biology and management.	
BOEM-2023-0011-0112-0038	For-hire recreational fishing is included within the Socioeconomic Conditions and Cultural Resources section which also includes commercial fisheries; however no data tables or figures are provided nor is information provided about recreational highly migratory species trips. The DEIS references the COP Volume 2 which includes commonly caught recreational fish species in MA and RI in 2019 (COP Vol. II page 11-41). Additional years of data should be provided including the most recent fishing year available along with the number of trips landings and revenue by species in the fisheries affected environment and impact section.	NMFS's assessment of impacts of Atlantic Offshore Wind Development does not have any recreational data for the Lease Area. FEIS Section 3.6.1.1 has been revised to include a description of the common recreational fishing locations within and near the Offshore Project Area; this includes times of year and species targeted in these areas.
BOEM-2023-0011-0112-0039	Pages 3.6.1-41-42 reference the potential for commercial and for-hire recreational vessel operators to switch gear types and to target less-valuable species. These may not be feasible given the high cost potentially lower prices and different permits that would be required. Such adaptation would only occur over the longer term and may require fishery management changes. It should not be assumed that fisheries management will adapt in any particular way as fisheries management must achieve a number of varied objectives and offshore wind energy development is just one consideration.	The FEIS identifies different scenarios that individual vessel operators may or may not make as different conditions arise from offshore wind development (with and without the Proposed Action). The FEIS states that operators may leave the area entirely or continue to fish in the Lease Area during the operations and maintenance phase. There are many vessel operators who carry multiple permits and operate vessels outfitted for different gear types (generalists), just as there are operators who fish for a particular species with one gear type (specialist). The FEIS clearly states there is variability of individual risk tolerance and the ability/willingness/skill of individual operators to adapt to changing conditions. The FEIS does not assume that management/operators will/will not adapt, and fully

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		recognizes that some individuals may not be able to adapt given fuel, cost, risk tolerance, and management concerns.
BOEM-2023-0011-0112-0040	The fisheries revenue exposure compares FMP revenue exposure within the lease area to the total annual FMP revenue in the Mid-Atlantic and New England regions. This comparison minimizes the potential impact of lease development on fisheries. We recommend also comparing revenue exposure to a more geographically specific area or port.	The FEIS includes an analysis of impacts with a regional fisheries area, which is smaller than the geographic analysis area and larger than the Project area, which describes. Further, the average number of trips and vessels from ports in the region is included in Table 3.6.1-15. Table 3.6.1-16 shows commercial fishing revenue of federally permitted vessels in the Lease Area by the ten most affected ports and shows commercial fishing engagement and reliance.
BOEM-2023-0011-0112-0041	The DEIS describes commercial and recreational fisheries within the lease area and the export cable corridor. Some fisheries will be impacted by activities within both the lease area and the export cable corridor while other fisheries will be primarily impacted by one or the other. It is important to consider the differences in impacts due to the different activities which will occur in the lease area and the cable corridor and the different fisheries that operate in those areas. Different mitigation measures may also be relevant for the two areas. For these reasons we support the approach of analyzing the lease area and export cable corridor separately in terms of their impacts on fisheries as well as considering their combined impacts. This approach should be carried forward in future analyses of other wind projects.	The FEIS describes separate impacts for the Lease Area and the ECCs. This provides context for how much value is derived from these areas relative to all other areas accessible to fishing.
BOEM-2023-0011-0112-0043	The Councils are concerned about the impacts of boulder removals required for cable installation especially when done via plow (grapnel or boulder clearance plows) which is the proposed method for larger boulders that cannot be avoided by rerouting in combination with orange peel grabber (page 3.6.1-48). We recommend using grabs to relocate boulders given plowing will have a much larger impact on benthic habitats than grabs. The FEIS 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	Regarding boulder relocation, refer to the response to comment BOEM-2023-0011-0185-0270. SouthCoast Wind has stated grabs are the preferred method for relocating boulders.

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	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.	
BOEM-2023-0011-0117-0017	Fishing Industry Impacts: Under the current plan to develop the region around Coxes Ledge the Project will harm the Cod fishery historically the economic driver of the fishing industry in New England (Dlouhy 2014). South Fork Wind Revolution Wind and SouthCoast Wind farms will surround this critical marine habitat. Cod spawn in the Coxes Ledge region. They rely on acoustic communication during this ritualized sensitive behavior (Zemeckis 2014). Noise from construction and operations of turbines will interfere with their communication and have "population-level impacts on Southern New England Atlantic Cod" (Chiarella 2021). Other fisheries such as lobster that are less mobile and more site specific will be even more impacted. The DEIS fails to consider the cumulative impact of Revolution Wind South Fork and SouthCoast Wind. Further it fails to consider multiplicative effects of interactions among multiple stressors.	The proposed SouthCoast Wind Farm Area is not immediately adjacent to Coxes Ledge; the border of the Lease Area is over 50 km from Coxes Ledge, noise impacts from pile driving wind turbine foundations for the SouthCoast Wind Farm Area are not modeled to travel that far. The EIS analyzes the cumulative impacts of each alternative in combination with ongoing and planned offshore wind projects, including South Fork wind. The analysis considers how overlapping activities could have a cumulative impact on commercial and for-hire recreational fishing.
BOEM-2023-0011-0123-0025	The developer has considered a variety of offshore fishing data sources: vessel trip reports (VTRs) vessel monitoring systems and Marine Recreational Information Program data. Each data source has merits and limitations as none of these data reporting systems were designed to assess the spatial distribution and value of offshore catch. A variety of studies are currently underway to generate additional data sharing systems and assessment tools.• Other sources of data and improved methods should be incorporated into impact assessment as they become available. For example vessel monitoring system (VMS) automatic identification system (AIS) and electronic monitoring data are becoming more prevalent and may present opportunities to improve upon existing methods. These data may offer higher spatial and	FEIS Section 3.5.2, *Benthic Resources*, and 3.5.5, *Finfish, Invertebrates, and EFH*, provide more information on where and when species may be found. The data provided by NMFS does provide some spatial context to where and how much revenue is derived from the Lease Area and the ECCs relative to the geographic analysis area. While some VMS data is used, the most up-to-date VMS data on the Northeast Ocean Data Portal provides likely vessel transits. The socioeconomic data compiled by NMFS does not provide any data for for-hire/recreational fishing within the Lease Area due to insufficient data.

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	temporal resolutions and address challenges associated with self-reporting when compared to VTRs.• Additional methods are particularly needed to understand potential changes to recreational fishing activities.	
BOEM-2023-0011-0123-0026	The RIDEM looks forward to reviewing proposed fisheries resource monitoring survey designs associated with the SouthCoast Farm. We recommend survey proposals should include a preliminary power analysis demonstrating that the proposed design will achieve a minimum of 80% statistical power (see Cohen 1988). However higher power levels with low effect sizes should be targeted. Both power and effect size should be discussed with the FAB prior to survey implementation. Efforts should also be made to use shared sampling methods and results with other wind development surveys and existing fisheries surveys.	BOEM thanks the RIDEM for the comment and the willingness to collaborate on fishery resource monitoring survey designs.
BOEM-2023-0011-0136-0027	Concern remains about the datasets utilized in the DEIS to reflect commercial fishing activity in and around the Project Areas. The DEIS utilizes VTR datasets from 2008 - 2021 and VMS data sets from 2014-2019. It should be noted that changes have happened in the fishing industry resulting from Covid-19. We recommend extending the VTR and VMS datasets coverage for at least 10 years prior to 2014. Looking at each fishery individually is the only way to fully analyze and understand the potential impacts. By aggregating the fisheries data the DEIS will compact effort and lose the more minor but equally important impacted fisheries.	The NMFS compiled data from VTR datasets from 2008 through 2021. Further, the NEODP has complete data for multiples fisheries from 2011-2014 and 2015-2016; this data has the <4 knot modifier associated with it, which is the indicator thought to be representative of actual fishing, based on typical tow speeds. Earlier data only has the modifier for a few species as well as for the data that goes to 2019. Thus the 2011-2016 data appears to be the most up-to-date and useful information for this EIS. A disclaimer has been added to Section 3.6.1.1, noting that a decline in revenue for a number of species in 2020 is attributed to disruptions from the Covid-19 pandemic.
BOEM-2023-0011-0136-0028	"In 2019 total species landings in the Mid-Atlantic and New England regions were valued at $2.02 billion." [Footnote 24: See DEIS p. 3.6.1-7] This (ex-vessel revenues) shows the economic benefits to the fishing vessels and the DEIS acknowledges the $9.4 billion in personal and proprietor income provided by the seafood industry to the Mid-Atlantic and New England regions. The importance of the downstream economic activity provided by sustainable seafood harvesters	Section 3.6.1.5 qualitatively assesses impacts on the commercial fishing/seafood industry, noting that the impacts on other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term and minor to major, depending on the fishery in question. Further analysis of the socioeconomic impacts on fishing support industries is included in Section 3.6.3, *Demographics, Employment, and Economics* and

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	should not be minimized. The DEIS fails to undertake an analysis of the impacts to jobs in the commercial fishing/seafood industry despite acknowledging the "living resource" sector of the Ocean Economy. (See section C. Impacts to Small Businesses below) In 2018 the Mid-Atlantic seafood industry supported 136813 jobs while the New England seafood industry supported 211359 jobs. [Footnote 25: See National Marine Fisheries Service. 2022. Fisheries Economics of the United States 2019. U.S. Dept. of Commerce NOAA Tech. Memo. NMFS-F/SPO-229A 236 p. Mid-Atlantic includes the states of Delaware Maryland New Jersey New York and Virginia. New England includes the states of Connecticut Maine Massachusetts New Hampshire and Rhode Island.]	Section 3.6.4, *Environmental Justice*. BOEM is proposing a mitigation measure that would require SouthCoast Wind to conduct an analysis of impacts to shoreside seafood businesses and to develop a plan to compensate for losses to shoreside businesses. BOEM has added this measure to the FEIS; refer to Section 3.6.1-11 as well as Appendix G, Table G-2; CF-5.
BOEM-2023-0011-0136-0029	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. For example according to Table 3.6.1-9 of the SouthCoast DEIS the average annual revenues generated by Federally permitted vessels participating in the Mackerel Squid and Butterfish fisheries within the lease areas was $88286. These revenues are likely indispensable to the small businesses prosecuting that fishery.	The average number of mackerel, squid, and butterfish vessels fishing in the lease area is estimated at 91; the expected number of vessels is 14, this would amount to an impacted revenue equaling $970 or $6,307 per vessel annually, using the average annual revenue of $88,286. From a trip perspective, the average number of trips annually in the Lease Area for mackerel, squid and butterfish is 613, and the expected number of trips is 15, which amounts to either $144 dollars per trip or $5,883 per trip using the annual revenue of the Lease Area of $88,286. While these amounts differ by an order of magnitude, no fishing operation could rely on traveling the distance to the Lease Area for a trip worth $5,883 on a consistent basis. Fishing will not be restricted in the Lease Area during the operation and maintenance phase; a financial compensation program has been implemented by SouthCoast Wind to cover for these exposures. Please refer to Section 3.6.1-11.
BOEM-2023-0011-0136-0030	The DEIS fails to analyze any economic impact on commercial fishing along installed cable corridors. Exposed cables and cable protection measures pose a major hazard for bottom tending gear vessels. This is particularly concerning in areas	Impacts from direct cable installation will be temporary (i.e. elevated total suspended solids and sedimentation). The area of direct impact per cable is 19.7 ft. The areas of secondary cable protection would be small in nature and

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	with strong currents such as Muskeget Channel - a proposed location for the export cables. We have already seen exposed cables from the Block Island Wind project and overseas and we strongly urge BOEM to require the monitoring and timely reburial of exposed cables. For these reasons it is shortsighted to assume that there will be no economic impacts to commercial fisheries along export cable routes temporarily or permanently.	would only be used as a last resort, where remedial burial would not be feasible. Further, the installed secondary cable protection would be designed to be mobile bottom-tending gear friendly. The addition of secondary protection would not preclude all mobile bottom-tending gear from fishing in the area, nor would it preclude static fishing gear. Overall, impacts of direct cable installation and cable protection measures as noted above will be temporary given the small area of direct impact, and the small areas of secondary cable protection.
BOEM-2023-0011-0136-0031	BOEM incorrectly assumes that all fisheries will be able to adapt and/or regulatory needs namely fishery management plans - will be adaptable and adaptable on a relevant time scale. “Fishing vessel operators unwilling or unable to travel through areas where offshore wind facilities are located or to deploy fishing gear in those areas may be able to find suitable alternative fishing locations and continue to earn revenue while others may switch the species they target and/or the gear they use.” [Footnote 26: See DEIS p. 3.6.1-41] RODA reiterates that fishermen cannot simply “go somewhere else to fish” or “switch fisheries” for many reasons: 1) harvested species are not uniformly distributed and may not be present ‘elsewhere’ 2) management restrictions constrain where and how fishermen can fish and 3) individuals and businesses have made long term financial and cultural investments and often cannot easily switch to harvesting a difference species without significant costs. It is frustrating the BOEM continues to either not understand or minimize the reality of displacement and (in)ability for adaptation.	Please refer to the response to comment BOEM-2023-0011-0112-0039.
BOEM-2023-0011-0136-0032	The DEIS does acknowledge the potential changes to fishery management from impacts to independent surveyors and changed patterns of fishing behaviors. But the document claims that changes will have “moderate beneficial impacts on commercial and for-hire recreational fisheries as management adapts to changing fishing patterns data availability and	FEIS Section 3.6.1.5 (under Presence of Structures), highlights the impact of potential changes to fishery management as a range of scenarios. The impacts could also include long-term, moderate, beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect. This does not change the preceding conclusions

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	management options" [Footnote 27: See DEIS p. 3.6.1-45] with no analysis of how this conclusion was reached. RODA strongly objects to this finding: that increased uncertainty and changed fishing behavior will benefit the commercial fishing industry.	in the same paragraph of moderate to major adverse impacts on commercial fisheries and minor to moderate adverse impacts on for-hire recreational fishing. FEIS Section 3.5, *Finfish, Invertebrates, and EFH* provides a description of the artificial reef effects.
BOEM-2023-0011-0136-0033	The DEISs 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 DEIS analysis. 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 DEIS to adequately understand the impacts of offshore wind development activities on small businesses. [Footnote 28: See https://www.regulations.gov/comment/BOEM-2022-0033-0055] 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.	Please refer to the response to comment BOEM-2023-0011-0136-0028.
BOEM-2023-0011-0136-0040	Fisheries Communications Plans: The Fisheries Communication Plan (FCP) for Mayflower Wind is insufficient and out-of-date. Mayflower Wind's Fisheries Liaison Officer no longer is at SouthCoast and no information is provided on the new appropriate contact. The FCP 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	BOEM requested input from SouthCoast Wind regarding this comment. SouthCoast Wind has stated that a new Fisheries Liaison Officer is now working with the company; updates to the Fisheries Communication Plan are anticipated (as necessary and applicable) and will be submitted to BOEM, and posted on the SouthCoast Wind website. The updated Fisheries Communication Plan will include additional details on two-way communication conducted to date with the fishing communities.

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	the developer and their representatives respect the input inclusion and limited available time to participate in meetings. Fishermen have already put time and resources into providing feedback (through meetings and written letters described above) and nowhere indicates if or how they plan to incorporate the feedback they have already solicited. We have requested numerous times to BOEM developers and states to work directly with the fishing industry to provide readily accessible project information. Repeatedly fishermen have requested Atlantic leaseholding developers to improve the basic dissemination of project information—shoreside and perhaps more importantly on the water. RODA urges BOEM to work with us to ensure that we can effectively get critical project information to fishermen in a relevant and accessible manner. We also respectfully request that timely provision of relevant project information for these purposes in a format determined by the fishing community be a condition of any OSW permit that BOEM may issue in the future.	SouthCoast Wind has stated that it supports direct communication with the fishing community and acknowledges that such communication is valuable and necessary in order to effectively co-exist with the fishing community. In response to requests from fishermen for easily accessible information on offshore activities, SouthCoast Wind maintains a website with a calendar of activities including vessel name and area of operation, that is updated on a regular basis.
BOEM-2023-0011-0139-0028	SouthCoast Wind would like to highlight that we have prepared and submitted with Rhode Island state permit applications a Fisheries Monitoring Plan (FMP) for the Brayton Point ECC. The FMP was prepared by a local firm based in Newport RI (Inspire Environmental) and integrates local knowledge of key fisheries. SouthCoast Wind met on March 7 2023 with the Rhode Island Fishermen's Advisory Board (FAB) Rhode Island Coastal Resources Management Council and Rhode Island Division of Marine Fisheries to present and gain input on the draft FMP. SouthCoast Wind is also working with the University of Massachusetts School of Science and Technology (SMAST) to develop and implement a fisheries monitoring program for the Lease Area with data collection consistent with other leaseholders in the Massachusetts/Rhode Island Wind Energy Area. SouthCoast Wind requests that this information be incorporated and reflected in the FEIS.	Please refer to FEIS Section 3.5.5.5; this discussion of impacts associated with the Proposed Action includes a description of the fisheries monitoring plan for the Brayton Point ECC.

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BOEM-2023-0011-0139-0029	Regarding the specifics included in the DEIS on commercial and recreational fisheries in Section 3.6.1.3 the DEIS states "However there is not enough resolution in the data to allow estimates to be made on a small enough scale to differentiate impacts along wind farm export cable corridors." While limitations of this data are known (and acknowledged in other parts of the DEIS) and while data from export cable corridors is included later (i.e. Section 3.6.1.5 of the DEIS) it is important to acknowledge that there is still utility in these data even in this portion of the DEIS and what it is describing. While there is not enough resolution to meaningfully draw a distinction between two hypothetical export cable corridors that are very close these data are useful in showing the relative amount of fishing effort in areas such as export cable corridors where impacts will be of very limited duration and magnitude.	FEIS Section 3.6.1.5 includes descriptions of the fisheries/species impacted in the ECCs.
BOEM-2023-0011-0139-0030	Section 3.6.1.5 of the DEIS states that "some commercial fishers may avoid the Lease Area if large numbers of recreational fishers are drawn to the area by the prospect of higher catches". However due to the large distance of SouthCoast Wind's Lease Area from shore the likelihood of a significant increase in recreational fishing vessel traffic in the Lease Area is low. This is particularly true when compared to the Block Island Wind Farm which is cited as a comparison in this section of the DEIS. Outreach by SouthCoast Wind to the local recreational fishing community has shown that this distance (23 miles from the closest turbine to shore) will preclude large increases in recreational fishing vessel traffic owing to the time/fuel considerations and the composition of the recreational fishing fleet. Outreach conducted by SouthCoast Wind to the recreational fishing industry and community as well as anecdotal observations by SouthCoast Wind G&G survey vessels indicate that a smaller number of larger recreational fishing vessels utilize the Lease Area during the summer months targeting high profile gamefish while a larger number of more diverse recreational fishing vessels	FEIS Section 3.6.1.3 reflects this caveat in the discussion of the traffic IPF.

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	utilize the export cable corridors and surrounding area targeting a wider array of species.	
BOEM-2023-0011-0139-0032	In its discussion of Alternative C Section 3.6.1.6 of the DEIS states that "The only difference would be for recreational and commercial fishers that exclusively use the Sakonnet River in particular aquaculture lease holders and floating fish trap fishers. These individuals would experience negligible to major impacts from offshore wind development." While there are aquaculture lease holders and permitted locations for floating fish traps near the Export Cable Corridor to Brayton Point the corridor (and especially the much smaller extent of the cable itself) do not directly overlap with these other uses. Hydrodynamic/sediment transport modeling conducted by SouthCoast Wind (COP Appendix F3) has shown minimal impacts at the distances from which aquaculture lease holders and permitted fish traps exist from proposed cable laying activities. SouthCoast Wind feels that it is important to acknowledge that outreach to the commercial fishing industry by SouthCoast Wind has shown that there are other commercial fisheries in the Sakonnet River and Mount Hope Bay notably for whelk and mantis shrimp. This outreach has also shown that the majority of effort in these fisheries occurs outside of indicative centerline for the export cable. Further outreach also showed that at least some of the commercial fishing vessels in this area are trailered as opposed to being docked at local fishing ports. BOEM has not analyzed potential impacts from traffic impacts on local roads that would be associated with Alternative C to fishermen that trailer their vessels in this area.	The analysis of the Proposed Action under Section 3.6.1.5 has been modified to include information on sediment modeling from installation of cables and to acknowledge that most of the effort for whelk and mantis shrimp fisheries occurs outside of the centerline for the export cable. The analysis of Alternative C in Section 3.6.1.6 was revised to acknowledge that outreach to the fishing community has showed that at least some of the commercial fishing vessels in this area are trailered as opposed to being docked at local fishing ports.
BOEM-2023-0011-0139-0043	Page 3.6.1-1 within Section 3.6.1.1 the date range for data shown in the title for Table 3.6.1-3 is listed as “2010-2019” while the date range described in the text on page 3.6.1-6 referring to Table 3.6.1-3 is listed as “2008-2019”. SouthCoast Wind requests that this discrepancy is amended in the FEIS for clarity.	Please refer to FEIS Section 3.6.1.1, in which Tables 3.6.1-1 through 3.6.1-4 reflects updates to the years for the description of landings and revenue for the geographic analysis area. Relevant text references have also been updated. The date range for landings and revenue for the geographic analysis area is 2010 through 2019.

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BOEM-2023-0011-0139-0044	Page 3.6.1-35 within Section 3.6.1.3 the two Coastal Virginia Offshore Wind turbines are listed as contributing to the cumulative impacts to commercial and recreational fisheries from SouthCoast Wind. While those turbines are in the geographic analysis WTGs that may be installed in other project's lease areas near SouthCoast Wind will contribute to cumulative impacts and commercial fishing vessels do transit from Virginia to SouthCoast Wind's Offshore Project Area the presence of two turbines off of the coast of Virginia will contribute no conceivable cumulative impact in addition to SouthCoast Wind's Proposed Action.	The section cited in the comment describes the No Action Alternative, which does not include consideration of the SouthCoast Wind project (Proposed Action). Please refer to Section 3.6.1.5 for a discussion of cumulative impacts inclusive of the Proposed Action.
BOEM-2023-0011-0139-0045	Page 3.6.1-47 within Section 3.6.1.5 the DEIS states "The relocation of boulders also could increase the risk of gear snags as uncharted or unknown obstructions could result in damage to equipment lost revenue and potential safety impacts." However SouthCoast Wind will make both the original and relocated locations of boulders available in a way that they can be charted.	FEIS Section 3.6.1.5 reflects updates to this statement. Refer also to the response to comment BOEM-2023-0011-0185-0270.
BOEM-2023-0011-0139-0046	Page 3.6.1-64 within Section 3.6.1.10 the DEIS states that "Mayflower Wind would implement a gear loss and damage compensation program consistent with BOEM's draft guidance for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585 or as modified in response to public comment." However SouthCoast Wind already has implemented such a program not only for gear but also for foregone revenue. The application form for this compensation program is available on SouthCoast Wind's website and was developed in coordination with other offshore wind developers to provide consistency to the commercial fishing industry. Further this form was developed using input from the commercial fishing industry. This process is designed to cover potential impacts from gear interactions with SouthCoast Wind G&G survey vessels but will be adapted to	FEIS Section 3.6.1.111 has been updated to reflect that SouthCoast Wind has implemented 1) the gear loss and damage compensation program and 2) the lost income mitigation measure.

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	cover gear interactions with construction vessels and eventually the presence of structures.	
BOEM-2023-0011-0178-0001	More than several times this evening it had been mentioned that some sections of these cables would need to be armored meaning that what they call mattresses would be placed above them and these mattresses are basically concrete and steel which would actually effect or impact or prevent fisherman from crossing over these sections. There is no mention made of the length or the place or positioning of these cables which I know may be difficult to determine previous to trying to lay the cables as a buried cable but at some point it needs to be published because these like I say are going to be minefields for anyone attempting to use bottom gear on these fishing areas. Like I say many times these comments were made and they were passed on very obliquely as no real big deal but I want to make sure that people understand that there is more consequences involved with these mattresses than they may understand and it needs to be -- needs to be more precisely presented to the public as to how it may impact those who actually work in these areas.	The estimated percent of cable protection needed in the Lease Area is 10%, 10% in the Falmouth ECC, and 15% of the Brayton Point ECC. Cable protection is a last resort that will be used only after all other remedial burial options have been ruled out. Further, to the extent practicable the cable protection used will be mobile gear friendly, with sloped/tapered designs.

N.6.14 Cultural Resources

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BOEM-2023-0011-0117-0027	Cultural Heritage and Tourism: The Project will negatively impact the cultural value of hundreds of properties with historical relevance within the viewshed. Colonial landmarks attract more tourists than any other type of historical site (Cameron 2010). The harm to these resources may be irreversible. The impact on historic properties violates the Historic Preservation Act (Public Law 89-665; 54 U.S.C. 300101 et seq.) The DEIS minimizes the Project's impact on our cultural heritage and does not consider the difference between colonial history and other types of historical landmarks.	Section 3.6.2, *Cultural Resources,* and Appendix I, *Finding of Adverse Effect for the SouthCoast Wind Construction and Operations Plan* (hereafter, *Finding of Adverse Effect*), discuss the impacts of the Project on cultural resources, including historic aboveground resources, marine and terrestrial archaeological resources, ancient submerged landform features (ASLFs), and traditional cultural places (TCPs). Although Section 106 of the National Historic Preservation Act (NHPA) focuses its effects assessment specifically on those cultural resources that are listed or eligible for listing in the National Register of Historic Places

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		(NRHP), the potential Project impacts on cultural resources are considered and discussed in the EIS regardless of periods of historic and cultural significance. In compliance with Section 106 of the NHPA, BOEM has consulted with federally recognized Tribes, the Massachusetts and Rhode Island State Historic Preservation Officers (SHPOs), the Advisory Council on Historic Preservation (ACHP), and consulting parties on the identification of historic properties in the Project's area of potential effects (APE), assessment of effects on historic properties, and measures to resolve adverse effects. BOEM's analysis in Section 3.6.2, *Cultural Resources*, focuses on physical resources valued by a group of people, including historic properties as defined in the NHPA (54 United States Code [USC] 300308). BOEM's analysis of Project impacts on tourism is provided in Section 3.6.8, *Recreation and Tourism*.
BOEM-2023-0011-0119-0001	Alternative C-2 would make landfall on the ocean-facing side of Breakwater Point in Little Compton and follow a route north through Tiverton to the westernmost end of Schooner Drive where it would enter Mount Hope Bay. Similar to Alternative C-1 the route of Alternative C-2 is planned to follow existing public road rights-of-way in shoulders and medians but may also include private property and transmission line rights-of-way. These alternative routes were not included in the original terrestrial archaeological survey area. An archaeological assessment of these routes should be conducted to identify known sites and areas of archaeological sensitivity that may be impacted.	As presented in the MOA and *Terrestrial Archaeology Phased Identification Plan* (MOA Attachment 12), a phased approach to the identification and evaluation of historic properties within the terrestrial portion of the Project's APE will be completed where final design selection occurs after approval of the COP and for areas that have not been surveyed for historic properties. If Alternative C-2 is chosen, the procedures for identifying archaeological resources as presented in the Phased Identification Plan will be followed.
BOEM-2023-0011-0119-0002	The Analysis of Visual Effects to Historic Properties (the AVEHP) defines the theoretical distance at which the blade tips would potentially be obscured by the curvature of the earth as 42.88 miles. The 43-mile radius of the offshore Area of Potential Visual Impact (APVI) does not include any land in Rhode Island. The closest Rhode Island land to the offshore lease area appears to be between 57 and 60 miles distant (Warren Point in Little Compton). The south end of the Cliff	BOEM thanks RIHPHC for its review and comments.

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	Walk in Newport appears to be between 62 and 65 miles to the closest proposed WTG location and the closest point on Block Island appears to be between 57 and 60 miles distant. Based on the information in the reports from this and other offshore wind projects we believe that the SouthCoast Wind WTGs will not be visible from historic properties in Rhode Island.	
BOEM-2023-0011-0119-0003	RIHPHC staff reviewed reports related to the potential visual impacts of the Project on historic properties including the Analysis of Visual Effects to Historic Properties (COP Appendix S 2023) (the AVEHP) the Visual Impacts Assessment (COP Appendix T; December 2022) and the Cumulative Historic Resources Visual Effects Analysis - Mayflower Wind Project (January 2023). These reports analyze an array of up to 147 WTGs with maximum heights of 1066.3 feet above Mean Lower Low Water (MLLW) and the height of the tops of the WTG nacelles at 605.1 feet above MLLW. The AVEHP defines the theoretical distance at which the blade tips would potentially be obscured by the curvature of the earth as 42.88 miles. The 43-mile radius of the offshore Area of Potential Visual Impact (APVI) does not include any land in Rhode Island. The closest Rhode Island land to the offshore lease area appears to be approximately 58 miles distant (Warren Point in Little Compton). The south end of the Cliff Walk in Newport appears to be between 62 and 65 miles to the closest proposed WTG location and the closest point on Block Island appears to be approximately 58 miles distant. Based on the information in the reports from this and other offshore wind projects we believe that the SouthCoast Wind WTGs will not be visible from historic properties in Rhode Island.	BOEM thanks RIHPHC for its review and comments.
BOEM-2023-0011-0119-0004	Two precontact sites were located in the terrestrial archaeological survey in Portsmouth Rhode Island: [Redacted terrestrial archaeological resource names and identification numbers] These sites are potentially eligible for listing in the National Register of Historic Places (NRHP); impacts to both	Per BOEM's request, SouthCoast Wind revised the TARA report (COP Appendix R) for its recommendations section to include snow-fencing and monitoring during construction, and revised the TARA abstract to match the updated recommendations section.

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	sites should be avoided and if this is not possible there should be archaeological monitoring of the cable duct trench excavation in the vicinity of the sites.	Additionally, BOEM, with the assistance of SouthCoast Wind, revised the MOA and *Historic Property Treatment Plan for Archaeological Sites in Rhode Island* (MOA Attachment 7) to include minimization measures (i.e., snow-fencing and monitoring), a draft and final Monitoring Report, and Rhode Island SHPO Archaeological Site Form updates. The revised HPTP also includes the potential for development and implementation of a *Historic Property Archaeological Site Protection Plan* for ongoing O&M; this plan would be completed after any archaeological data recovery in order to incorporate the results of the resulting data collection. The HPTP states that BOEM, in consultation with participating consulting parties, will determine whether the Protection Plan is required after data collection is completed.
BOEM-2023-0011-0119-0006	The Bureau of Ocean Energy Management (BOEM) has made a finding of effect for the proposed project as reported in the Determination of Effect for NHPA Section 106 Consultation (Draft Environmental Impact Statement Appendix I; 2023). BOEM's determination is that the project will have adverse effects on five submerged sites in Rhode Island however no above- ground sites in Rhode Island either archaeological or built will be adversely affected by the proposed project. As Rhode Island's Interim State Historic Preservation Officer I concur with this determination of effect for Rhode Island properties.	BOEM thanks Rhode Island Historical Preservation & Heritage Commission (RIHPHC; Rhode Island SHPO) for its concurrence with BOEM's *Finding of Adverse Effect.*
BOEM-2023-0011-0119-0007	BOEM has proposed a Draft Memorandum of Agreement (MOA) to document the resolution of the Project's adverse effects. While we recognize that the MOA is still in draft form we do have one comment which applies to Section III Measures to Mitigate Adverse Effects to Identified Historic Properties. It is our understanding that it may not be possible to avoid the following submerged cultural resources located in Rhode Island waters: Target BP-03 Target BP-04 Target BP-05 Target BP-11 and Target BP-20. RIHPHC has not made any	BOEM, with the assistance of SouthCoast Wind, has revised the MOA and *Historic Properties Treatment Plan for Ancient Submerged Landforms and Submerged Cultural Resources* (Attachment 6) accordingly. As described in Stipulation I of the MOA, SouthCoast Wind has committed to avoiding 31 marine archaeological resources and 7 ASLFs by complying with protective buffers recommended by the Qualified Marine Archaeologist (QMA). BOEM has determined that the remaining marine

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	determinations of NRHP eligibility for these sites other than agreeing that they are potentially eligible for listing in the NRHP. Confirming if this is in fact the case should be the first step in the mitigation process before the other approach stages suggested in Section III(A)(1)(iii)(a) (under development) are undertaken.	archaeological resource and the remaining two ASLFs will be adversely affected by the Project. Prior to execution of the MOA, SouthCoast Wind will conduct additional investigation of the marine archaeological resource to determine whether it is eligible for the NRHP. If the resource cannot be avoided and is determined to be eligible for the NRHP as a result of the investigation, mitigation measures will be developed through consultation and documented in the MOA. As described in Stipulation III of the MOA, for ASLFs that cannot be avoided, BOEM will implement the mitigation measures as stipulated in III.C and described in associated attachments in the MOA as conditions of approval of the Project COP. BOEM has also revised Appendix I, *Finding of Adverse Effect*, to reflect the jurisdictional waters for each marine archaeological resource and ASLF.
BOEM-2023-0011-0119-0008	RIHPHC staff reviewed the Area of Potential Effects Delineation Memorandum for Mayflower Wind Project (ICF January 2023). The Project's Marine Area of Potential Effects (APE) includes the route of the Brayton Point offshore export corridor in Rhode Island waters. The Rhode Island portion of the Terrestrial APE consists of a 3-mile underground onshore export cable route across Aquidneck Island in the Town of Portsmouth. The Visual APE does not include any properties in Rhode Island water or on land within the boundaries of the State of Rhode Island. We concur with the delineation of the proposed Project's Area of Potential Effects (APE) in relation to Rhode Island properties.	BOEM thanks RIHPHC for its review and comments.
BOEM-2023-0011-0119-0009	Twenty targets were identified in the Rhode Island portion of the Brayton Point Export Cable Corridor APE. The RIHPHC concurs with the recommendations in the MARA that the following targets are potentially eligible for listing in the NRHP: Target BP-02 Target BP-03 Target BP-04 Target BP-05 Target BP-09 Target BP-11 Target BP-12 Target BP-13 Target BP-14 Target BP-18 Target BP-19 and Target BP-20. We concur	Thank you for RIHPHC's concurrence. BOEM, with the assistance of SouthCoast Wind, has revised the MOA and *Historic Properties Treatment Plan for Ancient Submerged Landforms and Submerged Cultural Resources* (MOA Attachment 6) to include avoidance of additional marine archaeological resources including Targets BP-03 and BP-11. As described in Stipulation I of the draft MOA, prior to

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	that avoidance using the boundaries of the areas to be avoided as presented in the MARA would result in a finding of no effect on these resources. We understand that the project design is not finalized and that it might not be possible to avoid Targets BP-03 BP-04 BP-05 BP-11 and BP-20. If this proves to be the case additional investigation of these targets will be necessary to determine if they are in fact significant resources.	execution of the MOA and commencement of any bottom-disturbing activities associated with construction of the project, SouthCoast Wind will either commit to avoidance of these remaining targets or will conduct additional marine archaeological resource investigation of the targets to determine whether the targets are eligible for the NRHP.
BOEM-2023-0011-0121-0021	BOEM should also ensure that all impacted tribes are properly consulted including state-recognized tribes and non-federally recognized tribes in a geographic analysis area that is representative of their historical presence in the region. Robust consultation with tribes should be extended to Project activities that take place out of the state or region. Ensuring the consultation of tribes and ensuring the preservation of cultural resources is critical for advancing the environmental justice goals set by the Biden-Harris Administration.	BOEM has consulted with federally and non-federally/state-recognized Tribes on the identification of historic properties, assessment of effects, and resolution of adverse effects under Section 106 of the NHPA. This includes consultations on content in Section 3.6.2, *Cultural Resources*; Appendix I, *Finding of Adverse Effect*; and Attachment A of Appendix I, *Memorandum of Agreement* (MOA), including on the development of avoidance, minimization, and mitigation measures stipulated in the MOA and adopted by the Project and protocol for handling any unanticipated discoveries of archaeological resources during Project construction, installation, or O&M, including a consultation process with Tribes on any such discoveries. BOEM's analysis of Project impacts on environmental justice populations is provided in Section 3.5.4, *Environmental Justice*.
BOEM-2023-0011-0128-0002	the DEIS is inadequate because it fails to take a "hard look" at impacts to historic and cultural resources by undervaluing their significance undervaluing their connections to a pristine ocean viewshed and downplaying adverse impacts to the Town's economy	The Draft EIS provides an assessment of environmental impacts, including on cultural resources and historic properties, for this federal action in accordance with NEPA requirements and other regulatory frameworks. BOEM is addressing all regulatory requirements of the NHPA Section 106 process through NEPA substitution. BOEM informed the public and NHPA Section 106 consulting parties that BOEM would use the NEPA process to substitute for the steps in the Section 106 process when it released the Notice of Intent (NOI) for the Project. BOEM has engaged in, currently engages in, and will continue to engage in consultation with

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		federally recognized Tribes, SHPOs, ACHP, and consulting parties. Section 3.3 of the *Analysis of Visual Effects to Historic Properties* (AVEHP; COP Appendix S), provided to Section 106 consulting parties on February 2, 2023 and January 17, 2024, and provided to consulting parties on July 1, 2024, for reference in the distribution of the revised draft MOA analyzes whether unobstructed ocean views are character-defining features of historic properties identified in the APE and assesses whether changes to character-defining ocean views adversely affect the identified historic properties. Section 3.6.2, *Cultural Resources*, and Appendix I, *Finding of Adverse Effect*, describe the significance of ocean views as character-defining features of historic properties and how the Project will affect these views. As discussed in Appendix I, BOEM has found the Project would have adverse effects on two TCPs (i.e., Chappaquiddick Island and Nantucket Sound) and the Nantucket Historic District National Historic Landmark (NHL). BOEM has consulted and will continue to consult with federally recognized Tribes and consulting parties on the identification of historic properties, assessment of effects, and resolution of adverse effects under Section 106 of the NHPA. BOEM's analysis in Section 3.6.2, *Cultural Resources*, focuses on physical resources valued by a group of people, including historic properties as defined in the NHPA (54 USC 300308). BOEM's analysis of Project impacts on economics is provided in Section 3.6.3, *Demographics, Employment, and Economics.*
BOEM-2023-0011-0128-0004	BOEM has failed to comply with Section 106 of the National Historic Preservation Act	BOEM disagrees with the assertion that the agency has failed to comply with Section 106 of the NHPA. BOEM has consulted with federally recognized Tribes and consulting parties on the identification of historic properties, assessment of effects, and resolution of adverse effects under Section 106 of the NHPA. From September to October 2021, BOEM initiated Section 106 consultation by inviting federally recognized Tribes, Massachusetts and Rhode Island

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		SHPOs, ACHP, and other federal, state, and local agencies and organizations to consult on the Project. BOEM held five NHPA Section 106 Consultation Meetings on July 7, 2022; March 16, 2023; January 24, 2024; July 15, 2024; and October 8, 2024, to provide consulting parties with information regarding the NEPA and NHPA review processes, Project, cultural resources technical reports produced for the Project, BOEM's finding of adverse effect, and MOA, and to solicit feedback from consulting parties on any of the aforementioned topics and documents. BOEM considered consulting party feedback in the development of the Final EIS, including in BOEM's *Finding of Adverse Effect* (Appendix I) and MOA.
BOEM-2023-0011-0128-0005	BOEM has failed to use all possible planning to minimize harm to National Historic Landmarks as required by Section 110(f).	Per Section 110(f), BOEM notified the U.S. National Park Service (NPS; as delegate of the Secretary of the Interior) and ACHP of its determination of adverse effect on the Nantucket Historic District NHL with the distribution of BOEM's Draft EIS, including Appendix I, *Finding of Adverse Effect*, on February 2, 2023. The NPS and ACHP have been active consulting parties on the Project since accepting BOEM's invitation to consult at the initiation of the NHPA Section 106 process beginning on September 29, 2021. BOEM is fulfilling its responsibilities to give a higher level of consideration to minimizing harm to NHLs, as required by NHPA Section 110(f), through implementation of the special requirements outlined at 36 CFR 800.10. As described in more detail in Appendix I, *Finding of Adverse Effect*, BOEM has considered prudent and feasible alternatives to avoid adverse effects on the Nantucket Historic District NHL. BOEM held consultation meetings with federally recognized Tribes and consulting parties, including those associated with the NHL, on July 7, 2022; March 16, 2023; January 24, 2024; July 15, 2024; and October 8, 2024.BOEM has taken into account all prudent and feasible measures proposed by consulting parties to avoid, minimize, and mitigate adverse effects on NHLs.

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		As described in Appendix I, BOEM has identified one alternative (i.e., Alternative D) that reduces the number of WTGs from the maximum-case scenario of the Proposed Action. This alternative would reduce the visibility of the Project from the NHL. However, BOEM has determined the Nantucket Historic District NHL would still be adversely affected by the Project given the size, location, and number of proposed WTGs and distance of the Wind Farm Area to the shoreline under this alternative. As a result, BOEM determined that all feasible alternatives would result in visual adverse effects on this NHL. The only alternative that BOEM was able to identify that avoids any Project effects on this NHL was the No Action Alternative.
BOEM-2023-0011-0128-0006	THE DEIS IS INADEQUATE BECAUSE IT FAILS TO TAKE A "HARD LOOK" AT IMPACTS TO CULTURAL AND HISTORIC RESOURCES. By ignoring Nantucket's significance and its historic oceanfront context BOEM has failed to uphold its obligations to properly inform the public in the DEIS and through public meetings about the full range of SouthCoast Wind's anticipated effects as NEPA requires.	Section 3.6.2, *Cultural Resources*, and Appendix I, *Finding of Adverse Effect*, describe BOEM's finding that the Nantucket Historic District NHL would be visually adversely affected by the Project. Appendix I, *Finding of Adverse Effect*, Section I.3.1.3, *Assessment of Effects on Historic Properties in the Visual APE*, provides further detail on the significance of the Nantucket Historic District NHL, its maritime setting and seaward views, and impacts on the viewshed and setting from the introduction of offshore Project components (WTGs and OSPs). The public was provided opportunities to comment on the impact on Nantucket Historic District NHL and BOEM's finding of adverse effect during the public comment period on the Draft EIS (originally scheduled to end on April 3, 2023, and extended to April 18, 2023). BOEM also held three virtual public meetings on the Draft EIS where the public was able to provide comments on and ask questions about the Draft EIS, including on the impacts on cultural resources and BOEM's finding of adverse effect. The virtual public meetings were held on March 20, 2023, at 5:00 p.m., March 22, 2023, at 1:00 p.m., and March 27, 2023, at 5:00 p.m. To provide more context for the historical significance of Nantucket, BOEM has integrated additional discussion of

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		Nantucket's history into Section 3.6.2, Table 3.6.2-1, *Cultural context of the Project area in coastal Massachusetts and Rhode Island*, and Appendix I, *Finding of Adverse Effect*, based on the AVEHP's (COP Appendix S) overview of the historic significance of the Nantucket Historic District NHL. Please refer to response to comment BOEM-2023-0011-0128-0002 for additional information on BOEM's assessment of the Project's visual effects.
BOEM-2023-0011-0128-0012	Due to the historic integrity of historic properties within the Project Area and Area of Potential Effects BOEM must establish and implement best practices. Based on the omissions described above the DEIS should be amended to reflect—and the Final EIS should include—a complete cumulative assessment of all impacts to historic and cultural properties and include additional cumulative visual simulations for the Town of Nantucket's historic properties including those reasonably foreseeable effects that adjacent wind farms will generate.	Section 3.6.2.5, *Impacts of Alternative B – Proposed Action on Cultural Resources*, includes an analysis of the cumulative impacts on cultural resources from the Proposed Action in combination with other ongoing and planned non-offshore wind and offshore wind activities. The CHRVEA, which was provided to consulting parties for review and comment on February 2, 2023, specifically addresses anticipated cumulative visual effects on historic properties accruing from the Project and other foreseeable wind farms. Numerous visualizations are provided in the VIA (COP Appendix T), AVEHP (COP Appendix S), and CHRVEA for a range of conditions from various KOPs. Additionally, Appendix C of the CHRVEA includes cumulative visual simulations from five KOPs within the Nantucket Historic District NHL (i.e., Sanford Farm Barn, Tom Nevers Beach, Cisco Beach, Head of Plains, and Madaket Beach) during daytime and nighttime conditions. The cumulative visual simulations include locations within and nearby the Nantucket Historic District NHL, TCPs, and other historic properties. Please refer to response to comment BOEM-2023-0011-0128-0024 regarding requests for additional visual simulations.
BOEM-2023-0011-0128-0014	According to the VIA CHRVEA and SLVIA SouthCoast is expected to cause major adverse effects to Nantucket even though BOEM cites "NEPA's objective of providing Americans with aesthetically and culturally pleasing environments."	Section 3.6.9, *Scenic and Visual Resources*, describes the impacts of the Project on seascape, open ocean, landscape, and viewer experience. BOEM has revised Section 3.6.2, *Cultural Resources*, to specify that the Project's nighttime

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	[Footnote 13: SLVIA at H-1.] Adjacent wind farms will magnify SouthCoast's adverse effects and along with SouthCoast will change the ocean's undeveloped character to an industrial wind farm environment with major adverse impacts on scenic and visual resources. Although BOEM characterizes adverse effects in some cases as "minor" or "moderate" BOEM has failed to rely on worst case visual scenarios preferring to use atmospheric haze to minimize SouthCoast's visibility. Considering the sensitivity of Nantucket's historic properties and direct connection to the ocean's viewshed as one of their character-defining features BOEM should consider all visual effects as "major" and err on the side of caution rather than in SouthCoast's favor even though risks are not fully known. The DEIS also fails to assess adverse effects to Tuckernuck and Muskeget Islands even though they are part of the Nantucket NHL. Nor does the DEIS assess adverse effects—especially nighttime lighting effects—on Maria Mitchell Association's historic observatory one of the Town's historic assets that depends on dark night skies to continue its historic use.	lighting impacts on cultural resources will be negligible when the ADLS is not active and moderate for the duration of the ADLS activation. This is consistent with the impact levels defined in Section 3.6.2, Table 3.6.2-2, *Definitions of potential adverse impact levels for cultural resources by type*. BOEM has consulted with federally recognized Tribes, SHPOs, ACHP, NPS, and consulting parties on the development of mitigation measures stipulated in the MOA to resolve adverse effects on the Nantucket Historic District NHL, which includes Tuckernuck and Muskeget Island and the Maria Mitchell Observatory.
BOEM-2023-0011-0128-0015	Due to the high cultural and historic sensitivity of our client' ocean-facing historic properties best practice criteria must be applied. Minimum standards should include: • Requiring the least impactful nighttime lighting such as ADLS as a permit condition; • Requiring all windfarms in a specific region to use the same non-reflective paint color determined to be most effective in minimizing the visual impacts per specific atmospheric/geographical conditions of the lease sites; • Establishing minimum set-back standards from land with specific considerations for historic landmarks and areas with tourism-driven economies; • For communities with historical significance BOEM should help ensure that local stakeholders receive fair and direct access to any state and federal agencies or resources which may provide critical regulatory guidance on how best to avoid minimize and mitigate the local impacts of offshore	BOEM thanks the Town of Nantucket for these comments. In order to minimize visual effects on historic properties, BOEM will include the use of and ADLS and general application of paint colors (no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey) that conform to BOEM's *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development* (as cited in Appendix H; BOEM 2021) as conditions of COP approval. SouthCoast Wind will implement an ADLS to reduce nighttime visual impacts on aboveground historic properties in the visual APE for offshore Project components. BOEM has and will continue to engage with communities and stakeholders on all phases of offshore wind energy development in the region. BOEM has and will continue to engage in consultation with federally recognized Tribes, Massachusetts and Rhode Island SHPOs, ACHP, consulting

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	windfarms. This support would be provided independent of the Section 106 process and would for example identify and encourage dialogue between communities with their State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP); and • Requiring—to the extent to which harm to historic and cultural resources cannot be avoided or minimized—appropriate project mitigation measures to offset the impacts to communities such as community benefit agreements offshore wind mitigation trust funds or other economic development arrangements as are standard in the offshore wind industry globally. At this critical juncture in the development of the U.S. offshore wind industry stakeholders are open minded if not supportive of a successful industry that shares benefits with local communities who will bear the brunt of adverse impacts and certain risk of loss to their economies.	parties, and the public on resolution of adverse effects on historic properties from offshore wind energy development, as required under NHPA Section 106. BOEM has consulted on mitigation of adverse effects on historic properties with all required and interested parties, as reflected in Appendix I, *Finding of Adverse Effect*, and the MOA.
BOEM-2023-0011-0128-0016	The documents BOEM provided for review as drafted fall short of the NHPA's mandates that require consideration and resolution of all adverse effects. By contrast BOEM downplays them. In reviewing SouthCoast Wind's visual simulations our client has serious concerns regarding the assessment of adverse effects to these properties. Without additional visualizations to and from historic properties including all NHLs (including Nantucket Island Muskeget Island and Tuckernuck Islands) consulting parties cannot understand how SouthCoast Wind and projects cumulative to SouthCoast Wind will affect their historic properties' integrity including their context seaside character and connection to a maritime setting that has historically depended on open views to and from the Atlantic Ocean. The number and density of SouthCoast Wind's turbines will create a visual mass that will have a presence of large-scale modern infrastructure on the horizon that cannot be avoided.	Please refer to responses to comments ACHP-02-02 and BOEM-2023-0011-0128-0012.

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BOEM-2023-0011-0128-0017	However BOEM cannot reasonably expect consulting parties to understand the full extent of SouthCoast Wind's adverse visual effects. The visual simulations that BOEM has provided are too limited in nature and not only preclude meaningful consultation and resolution of adverse effects but BOEM's continued reliance on them will result in decision making that is arbitrary capricious and contrary to law. Because current visual assessments and simulations do not show the actual impact of the SouthCoast Wind's turbines and associated infrastructure BOEM must amend them to assess adverse impacts and to determine appropriate avoidance minimization or mitigation measures. Failure to do so will result in a record of decision that is arbitrary capricious and contrary to law.	In addition to the visual simulations provided within the VIA (COP Appendix T) and CHRVEA to consulting parties on February 2, 2023, BOEM provided video simulations to Tribes and consulting parties on September 30, 2024. Please refer to response to comment BOEM-2023-0011-0128-0024 regarding requests for additional visual simulations.
BOEM-2023-0011-0128-0022	Furthermore BOEM has not fully shown consulting parties or the public how SouthCoast Wind will address potential lighting impacts including during the construction phase. Prolonged constant and bright lights will be required to construct the WTGs as well and this lighting will cause major impacts to our client' views for at least close to a decade when all the projects are considered cumulatively over decades of their expected lifespans. BOEM must include construction impacts including lighting in its final analysis of impacts to historic properties so that consulting parties and the public can evaluate them.	COP Volume I and COP Appendix T, *Visual Impact Assessment* (VIA), describe the proposed lighting for onshore and offshore Project components, including temporary construction lighting. Final EIS Section 3.6.9, *Scenic and Visual Resources,* and Section 3.6.2, *Cultural Resources*, describe Project lighting impacts during construction, installation, O&M, and decommissioning for both onshore and offshore Project components. BOEM has consulted with federally recognized Tribes, Massachusetts and Rhode Island SHPOs, ACHP, and other consulting parties under Section 106 of the NHPA to identify avoidance, minimization, and mitigation measures for resolving adverse effects on historic properties, including those caused by Project lighting. BOEM provided federally recognized Tribes and consulting parties with drafts of the MOA and Historic Property Treatment Plans (HPTPs) on February 2, 2023, January 17, 2024, July 1, 2024, and September 30, 2024, for review and comment. BOEM also held NHPA Section 106 Consultation Meeting #3 on January 24, 2024, to provide an overview of the MOA and solicit feedback from federally recognized Tribes and consulting parties, including on potential avoidance, minimization, and

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		mitigation measures; and Meeting #4 on July 15, 2024 and Meeting #5 to finalize the MOA. Mitigation measures determined through consultations for the Nantucket Historic District NHL and stipulated in the MOA (Appendix I, Attachment A), as well as an associated HPTP for the NHL, which is attached to the MOA, will be implemented by the Project to resolve adverse effects in accordance with Section 106 and Section 110(f) of the NHPA.
BOEM-2023-0011-0128-0023	Our client is especially concerned about lighting impacts to the dark night sky both during and after construction and urges BOEM to take a hard look at these impacts with special attention paid to internationally renowned Maria Mitchell Association's historic observatory a contributing property within the NHL which depends on visitation revenue for its continued maintenance and preservation.	Thank you for these comments. Please refer to responses to comments BOEM-2023-0011-0128-0014 and BOEM-2023-0011-0128-0024.
BOEM-2023-0011-0128-0024	In addition BOEM must consider the visual impacts of all light units on each turbine and their reflections on the ocean's surface especially during nighttime hazy conditions that will magnify their glow—and how nighttime light pollution will further diminish the integrity of all historic properties and NHLs within the APE. [Footnote 19: For example see Amy Shira Teitel Why is the Night Sky Turning Red? Light Pollution Is Turning Our Dark Skies Red DISCOVER (Aug. 23 2012) at https://www.discovermagazine.com/the-sciences/why-is-the-night-sky- turning-red; Joshua Sokol The Sky Needs Its "Silent Spring" Moment SCIENTIFIC AMERICAN (Oct. 1 2022) at https://www.scientificamerican.com/article/the-sky-needs-its-silent-spring-moment/.]	BOEM has considered the impacts of WTG lighting in the EIS. As described in EIS Chapter 2 under the Proposed Action Alternative, all structures would have appropriate markings and lighting in accordance with USCG and International Association of Marine Aids to Navigation and Lighthouse Authorities guidelines. This includes where navigational lighting would be placed near the base, midway WTG towers, and on the WTG nacelles. Weather or atmospheric conditions are considered, as is distance to historic properties, which would ameliorate the effects of lighting impacts such as in surface reflection. The EIS also considers that the impacts of Project lighting would be greater in areas where darker skies exist or would be reduced by existing ambient lighting. Section 3.6.2, *Cultural Resources*, describes lighting impacts during construction, installation, O&M, and decommissioning for both onshore and offshore Project components. Appendix I, *Finding of Adverse Effect*, describes the effects of lighting on historic properties in the APE, including the Nantucket Historic District NHL. Additionally,

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		lighting impacts on scenic and visual resources are described in Section 3.6.9, *Scenic and Visual Resources.* During operation of the Project, SouthCoast Wind will use ADLS on the WTGs, which activates the hazard lighting system in response to detection of nearby aircraft. The synchronized flashing of the aviation warning lights would occur only when aircraft are present. The shorter-duration synchronized flashing of ADLS is anticipated to have reduced visual impacts at night as compared to the standard continuous, medium-intensity red strobe FAA warning system. Based on estimates from SouthCoast Wind, ADLS-controlled obstruction lights would be activated for less than 5 hours per year (COP Appendix T, Section 5.1.3; SouthCoast Wind 2024). It is estimated that the reduced time of FAA hazard lighting resulting from an implemented ADLS would reduce the duration of potential impacts of nighttime aviation lighting to less than 1 percent of the normal operating time that would occur without using ADLS. Atmospheric and environmental factors such as haze and fog would influence visibility and perception of hazard lighting from historic properties. Numerous visualizations are provided in the VIA (COP Appendix T), AVEHP (COP Appendix S), and Cumulative Historic Resources Visual Effects Analysis (CHRVEA) for a range of high-contrast conditions from various key observation points (KOPs). Attachment 3 of the VIA includes visual simulations intended to capture a range of lighting conditions (i.e., side lit, back lit, front lit) at different times (e.g., from morning through night) from seven KOPs on Martha's Vineyard and fifteen KOPs on Nantucket, providing adequate coverage from along the south coastline and inland areas of Nantucket Island. BOEM determined this information is sufficient to enable an informed assessment of visual impacts as found in the VIA, AVEHP, and CHRVEA.
BOEM-2023-0011-0128-0025	BOEM's Technical Reports include an assessment of adverse effects. The size and scale of SouthCoast Wind within our	As described in Appendix I, *Finding of Adverse Effect*, and MOA, BOEM has found the Project would have adverse

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	client' historic viewshed with its constant daytime view alteration coupled with nighttime and construction lighting will inexorably change the historic nature of Nantucket's historic properties their feeling their association and the connections of these historic properties to the ocean and its unimpeded horizon.	effects on the Nantucket Historic District NHL. BOEM has consulted with federally recognized Tribes and consulting parties, including the Town of Nantucket, on the development of mitigation measures to resolve adverse effects on the NHL. Mitigation measures determined through consultations for the Nantucket Historic District NHL and stipulated in the MOA (Appendix I, Attachment A), as well as an associated HPTP for the NHL, which is attached to the MOA, will be implemented by the Project to resolve adverse effects in accordance with Section 106 and Section 110(f) of the NHPA.
BOEM-2023-0011-0128-0026	In addition considering the magnitude of SouthCoast Wind's adverse effects on the landscape and visual blight SouthCoast Wind will cause BOEM should consider Nantucket for eligibility as traditional cultural property so that BOEM can assess adverse effects more accurately rather than downplaying them. The historic properties located within the Nantucket NHL maintain ties to living communities who continue to preserve maintain and associate these properties with cultural practices traditions lifeways and social institutions—all of which are located within the Nantucket NHL and who continue to appreciate occupy and use these properties. [Footnote 20: See e.g. NATIONAL PARK SERVICE GUIDELINES FOR EVALUATING AND DOCUMENTING TRADITIONAL CULTURAL PROPERTIES NATIONAL REGISTER BULLETIN 38.]	The AVEHP (COP Appendix S) and Appendix I, *Finding of Adverse Effect*, consider and discuss the historic significance of the Nantucket Historic District NHL. BOEM has determined it is beyond a reasonable and good-faith effort to research and evaluate the Nantucket Historic District NHL as a TCP as it is already designated as an NHL and identified as an adversely affected historic property in BOEM's *Finding of Adverse Effect* (Appendix I) and the MOA. Throughout the course of NHPA Section 106 consultations on this Project, BOEM has welcomed input from the Town of Nantucket on mitigation measures for adversely affected historic properties located within the APE. In its development of the MOA, BOEM considered a potential mitigation measure for the assessment of Nantucket Island as a TCP. Consulting parties did not agree to this measure as part of the mitigation to resolve adverse effects on the Nantucket Historic District NHL. Mitigation measures determined through consultations for the Nantucket Historic District NHL and stipulated in the MOA (Appendix I, Attachment A), as well as an associated HPTP for the NHL, which is attached to the MOA, will be implemented by the Project to resolve adverse effects in accordance with Section 106 and Section 110(f) of the NHPA. As described in more detail in the MOA and associated Attachment 9 (*Historic*

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		Properties Treatment Plan For Nantucket Historic District), the Lessee will conduct cultural resource surveys of the NHL in areas selected by the Town of Nantucket in consultation with the Massachusetts SHPO, consulting Tribal Nations, and other participating consulting parties.
BOEM-2023-0011-0128-0027	Descriptions about Nantucket are illustrative of the traditional historic relationship of this community to its pristine ocean setting and the connections the living community continues to have to their settings and celebrate. BOEM however has not explored these connections and thus not provided the deeper level of historic property identification and analysis of adverse effects that Nantucket merits.	The Nantucket Historic District NHL is identified as a historic property in the SouthCoast Wind Project's visual area of potential effects, and BOEM determined that the NHL would be visually adversely affected by offshore Project components in EIS Appendix I, *Finding of Adverse Effect*. Per BOEM's request, SouthCoast Wind prepared a supplemental analysis and report for the Nantucket Historic District NHL, including contextual photographs of ocean views from the Nantucket Historic District NHL, to further support BOEM's compliance with Section 110(f). BOEM distributed this supplemental analysis to consulting parties on January 17, 2024, and provided a copy of this document for reference in the distribution of the revised MOA on July 1, 2024. Please refer to responses to comments BOEM-2023-0011-0128-0005 and BOEM-2023-0011-0128-0026 for additional information on BOEM's fulfillment of its Section 110(f) obligations pertaining to the Nantucket Historic District NHL.
BOEM-2023-0011-0128-0028	Distinguishing features of Nantucket's NHL designation—diversity of historic and cultural resources and their high level of integrity overall size of the resource and centrality of its ocean viewshed—mean that among the almost 2600 properties designated as NHLs throughout the country few comparators exist. Indeed the only NHLs arguably comparable with Nantucket's significance's significance may be the French Quarter in New Orleans Charleston Historic District in South Carolina the Santa Fe Historic District in New Mexico. Internationally Venice and its lagoon a UNESCO World Heritage Site is the most similar destination. Nevertheless the DEIS ignores Nantucket's significance and downplays the harm that SouthCoast will cause to it.	Please refer to responses to comments BOEM-2023-0011-0128-0005, BOEM-2023-0011-0128-0026, and BOEM-2023-0011-0128-0027.

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BOEM-2023-0011-0128-0029	Going forward in revising SouthCoast Wind's DEIS and technical reports BOEM must employ common sense in its assessment of Nantucket's historic properties' character and setting and work closely with consulting parties (as opposed to consultants) to understand how people in this community—including historic property owners who were never notified by BOEM about this permitting process—interact with these properties and how SouthCoast Wind will adversely affect these properties individually and cumulatively.	BOEM has determined the Nantucket Historic District NHL would be adversely affected by the Project as described in Section 3.6.2, *Cultural Resources*; Appendix I, *Finding of Adverse Effect*; and the CHRVEA report. In addition to the Town of Nantucket's participation in Section 106 consultation, per BOEM's request, SouthCoast Wind published a public notice of the Project inviting property owners of potentially affected historic properties and other parties with a demonstrated interest in the undertaking to participate in Section 106 consultation. The public notice was published on August 10, 2023 in the Inquirer and Mirror in order to be accessible by Nantucket and other communities in the Project area.
BOEM-2023-0011-0128-0030	As evidence of BOEM's skipping steps in the Section 106 and NEPA process BOEM has submitted to consulting parties a draft Memorandum of Agreement (MOA) before consulting parties have had an opportunity to conclude consultation with BOEM on earlier steps in the Section 106 process. Suggested minimization measures do not qualify as such because BOEM has not used all possible planning to avoid or minimize harm including the evaluation of scenarios with fewer turbines on SouthCoast's front rows closest to the Town. [Footnote 21: SouthCoast Wind appears to take the position that it should receive credit for minimization measures for design aspects that SouthCoast Wind would have to do anyway such as turbine spacing and layout which is required by the U.S. Coast Guard. U.S. Coast requirements dictate turbine placement for reasons of navigational safety not minimization of adverse effects under Section 106. Similarly atmospheric conditions are not minimization measures either. Moreover use of nonreflective paint and Aircraft Lighting Detection Systems have become standard.]	Under 36 CFR 800.8(c), for NEPA substitution, BOEM is required at the Draft EIS stage to identify and describe the proposed measures to resolve any adverse effects on historic properties. BOEM's approach to sharing a draft MOA as an attachment with the Draft EIS offers the public an opportunity to review the proposed measures to avoid, minimize, and mitigate adverse effects. BOEM has solicited feedback from consulting parties throughout the NHPA Section 106 consultation process, including in the development of the MOA. BOEM has adopted the approach of distributing drafts of MOAs to facilitate meaningful consultation and seek consulting party feedback on the information contained in the draft MOAs. The draft MOAs offer measures to avoid, minimize, and mitigate adverse effects that have been developed by qualified historic preservation professionals and/or based on consulting party feedback. Measures in the draft MOAs are not final and include only those that had been identified as potential options at that point in the consultation process. The inclusion of standardized avoidance or minimization measures in the MOA does not preclude the development and implementation of other measures that are determined

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		through consultations, nor does it preclude the ability of such measures to substantively minimize adverse effects on historic properties. BOEM has developed standardized measures, such as nonreflective paint and ADLS, because they are effective means for avoiding or minimizing both adverse effects on historic properties and adverse impacts on other environmental resources. A draft of the MOA was distributed to consulting parties for review and comment on February 2, 2023, as a starting point for consultations on the development of avoidance, minimization, mitigation, and monitoring measures to be included in the Final MOA. Revised versions of the Draft MOA were distributed to consulting parties on January 17, 2024 and July 1, 2024, to solicit additional input. BOEM also held NHPA Section 106 Consultation Meeting #3 on January 24, 2024, to provide an overview of the finding of adverse effect and MOA and solicit feedback on potential avoidance, minimization, and mitigation measures; and Meeting #4 July 15, 2024 and Meeting #5 on October 8, 2024 to finalize the MOA. BOEM has determined through consultation that the measures as stipulated in the MOA resolve the Project's adverse effects on historic properties. Please refer to response to comment BOEM-2023-0011-0128-0005 for additional information on BOEM's fulfillment of its Section 110(f) obligations pertaining to the Nantucket Historic District NHL.
BOEM-2023-0011-0128-0031	Moreover the MOA has proposed mitigation measures to resolve adverse effects that are not adequate have not been requested and do not offset the magnitude of harm that SouthCoast Wind will cause. BOEM's message to consulting parties is that whatever SouthCoast Wind wants is a fait accompli and whatever consulting parties want does not matter.	BOEM has solicited feedback from consulting parties throughout the NHPA Section 106 consultation process, including in the development of the MOA. BOEM has adopted the approach of distributing drafts of MOAs to facilitate meaningful consultation by helping consulting parties understand the specific types of input and information needed to develop this agreement document. The draft MOAs offer standard and example measures that have been developed by qualified historic preservation professionals and/or based on consulting party feedback.

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		Measures in the draft MOAs are not final and include only those that had been identified as potential options at that point in the consultation process. A draft of the MOA was distributed to consulting parties for review and comment on February 2, 2023, as a starting point for consultations on the development of avoidance, minimization, mitigation, and monitoring measures to be included in the Final MOA. Revised versions of the Draft MOA were distributed to consulting parties on January 17, 2024, July 1, 2024, and September 30, 2024, to solicit additional input. BOEM also held NHPA Section 106 Consultation Meeting #3 on January 24, 2024, to provide an overview of the finding of adverse effect and MOA and solicit feedback from consulting parties on potential avoidance, minimization, and mitigation measures; and Meeting #4 on July 15, 2024 and Meeting #5 on October 8, 2024 to finalize the MOA. BOEM has determined the measures as stipulated in the MOA resolve the Project's adverse effects on historic properties.
BOEM-2023-0011-0128-0032	Moreover our client objects to the draft MOA and proposed mitigation plans since they do not meet the standard needed for mitigation to offset unavoidable adverse effects and fail to consider the creation of appropriately capitalized historic preservation mitigation funds. Nevertheless so that all consulting parties can understand the basis of SouthCoast Wind's mitigation proposals and so that future consultation can be productive we request copies before the next consultation meeting of all documents on which SouthCoast Wind and BOEM have relied to show that the existing mitigation proposals are the result of all possible planning to minimize harm. This information is also needed to understand how SouthCoast Wind's proposed mitigation proposals rise to a level of "rough proportionality" relative to SouthCoast Wind's adverse effects and which would be required to offset those effects.	BOEM welcomes consulting parties' input on specific mitigation measures to resolve adverse effects on historic properties. Please refer to responses to comments BOEM-2023-0011-0128-0015 and BOEM-2023-0011-0128-0031 for additional information on the development of mitigation measures to resolve adverse effects on historic properties, including the Nantucket Historic District NHL.

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BOEM-2023-0011-0128-0033	However BOEM and SouthCoast Wind's reliance on undefined mitigation measures in the draft MOA is not a workable solution especially where BOEM and SouthCoast Wind have failed to address our client's concerns.	Please refer to responses to comments BOEM-2023-0011-0128-0015 and BOEM-2023-0011-0128-0031.
BOEM-2023-0011-0128-0034	BOEM's Draft MOA has proposed the following mitigation measures the gist of which includes: • Historic property surveys of neighborhoods along Nantucket Island's south coast with National Register nomination eligibility recommendations; • possible Archaeological Overview and Assessment of the above neighborhoods to focus on the pre-contact history with an emphasis on areas subject to coastal erosion SouthCoast Wind's proposal does not amount to acceptable mitigation for at least twenty-five to thirty years of harm to Nantucket's historic context the risk that SouthCoast Wind might never be decommissioned and the indirect and cumulative financial harm our client' historic properties are expected to experience.	Please refer to response to comment BOEM-2023-0011-0128-0031.
BOEM-2023-0011-0128-0035	As our client has already explained to BOEM and SouthCoast Wind a sufficiently capitalized historic preservation mitigation fund tailored to the community which the Town can deploy for needed historic preservation and coastal resiliency purposes to protect its historic properties is the most appropriate and efficient way to offset SouthCoast Wind's adverse effects that cannot be avoided. Moreover the Town and Vineyard Wind established Nantucket Offshore Wind Community Fund specifically for this purpose and for future developers to use to offset the adverse effects that they will cause to the Town's historic properties and its economy. Therefore our client objects globally to the proposed mitigation offers that have not developed through consultation. What BOEM has apparently endorsed undermines Section 106's legitimacy. Moreover SouthCoast Wind's proposals are essentially meaningless and discount the value property owners and historic preservation advocates—	Please refer to responses to comments BOEM-2023-0011-0128-0031 and BOEM-2023-0011-0128-0032. BOEM notes that the Nantucket Offshore Wind Community Fund referenced here was developed outside of NHPA Section 106 consultation and did not resolve adverse effects to historic properties from other offshore wind energy development projects.

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	including local governments—place on their historic oceanfront settings.	
BOEM-2023-0011-0128-0036	Finally BOEM cannot demonstrate that it has complied with Section 110(f) of the NHPA. As noted above BOEM's visual simulations are not adequate. BOEM has not prepared enough of them during different seasons and times of day for consulting parties to consider them as representative samples for understanding the adverse effects of SouthCoast Wind and cumulative offshore wind developments. BOEM has the duty to assess all adverse effects and to resolve all adverse effects; the NHPA does not place the duty on consulting parties to extrapolate guess or fill in the blanks. Without a comprehensive understanding of visual impacts as a starting point BOEM cannot possibly demonstrate all possible planning to minimize harm because the full extent of SouthCoast Wind's adverse effects is unknown.	The current analysis and visual simulations represent a good-faith effort to analyze the visibility of the Project from affected historic properties per the VIA (COP Appendix T) requirements of a "typical day." The photographic visualizations were taken during summer, fall, and winter and under different lighting conditions and at different times of day. Current KOP coverage is sufficient to represent visibility along the shoreline for historic properties in the Project APE. Please refer to responses to comments BOEM-2023-0011-0128-0014 and BOEM-2023-0011-0128-0017 for additional information on BOEM's visual effects assessment and visual simulations.
BOEM-2023-0011-0128-0037	Moreover for Section 110(f) purposes it is not appropriate for BOEM to default to SouthCoast Wind's preferred alternative in the Draft Environmental Impact Statement ruling out all other minimization alternatives—as well as other avoidance and minimization measures—because they do not fit with SouthCoast Wind's self-serving purpose and need.	Please refer to response to comment BOEM-2023-0011-0128-0005.
BOEM-2023-0011-0128-0038	Likewise BOEM's apparent decision that SouthCoast Wind will not significantly affect our client's NHL's historic integrity fails to consider their inseparable connection to the Atlantic Ocean or the special sensitivity that those who value NHLs have to integrity losses. Section 110(f) demands a heightened level of scrutiny that BOEM has not yet met.	Please refer to response to comment BOEM-2023-0011-0128-0005.
BOEM-2023-0011-0128-0039	Finally the DEIS contains no evidence that the National Park Service has consulted with and agrees with BOEM on its avoidance minimization and mitigation measures which Section 110(f) requires.	Please refer to response to comment BOEM-2023-0011-0128-0005.
BOEM-2023-0011-0132-0084	Nantucket is a cultural resource for which unobstructed ocean views or a setting free of modern visual elements is a	Per Section 3.6.2, Table 3.6.2-2, *Definitions of potential adverse impact levels for cultural resources by type*, "major"

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	contributing element to its historical integrity. The document states that the proposed Project may have moderate visual impacts on the Nantucket Historic District NHL. The impact will in fact be major. In describing the "no action alternative" it states that other construction is likely to happen. This makes no sense. Nantucket's Historic Landmark status affords it strong protections under NEPA from not only SouthCoast Wind but any other projects in its viewshed. It is simply not acceptable to assume this that Nantucket's would have impacts from other projects regardless of the proposed action. The only approved project impacting Nantucket in this regard is in dispute.	impacts are defined as equivalent to a Section 106 (36 CFR 800.5(a)(1)) finding of adverse effect on historic properties such that characteristics of historic properties would be "affected in a way that diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association ***to the extent that the property is no longer eligible for listing in the NRHP*** [emphasis added]." Although BOEM has found the Project will have adverse effects on the Nantucket Historic District NHL, BOEM has determined the NHL will retain its overall integrity and character-defining features that contribute to its eligibility for listing in the NRHP. Therefore, BOEM has found the Project will have moderate impacts on the Nantucket Historic District NHL. Under the No Action Alternative, BOEM would not approve the COP and the SouthCoast Wind Project would not be built. Ongoing activities that would contribute to baseline conditions, excluding the Proposed Action, are also described under the No Action Alternative. Offshore wind activities that have already been constructed (Block Island Wind Farm offshore Rhode Island and Coastal Virginia Offshore Wind Pilot Project offshore Virginia) or that have an approved COP (e.g., Vineyard Wind 1 in Lease Area OCS-A 0501, South Fork Wind Farm in Lease Area OCS-A 0517, Revolution Wind project in Lease Area OCS-A 0486, and Sunrise Wind Farm in Lease Area OCS-A 0487,) are considered ongoing activities that have been included in the No Action Alternative. These offshore wind activities have completed the environmental review process and the public has had the opportunity to comment on them. The No Action Alternative does not include reasonably foreseeable planned activities, such as the buildout of other offshore wind projects within the region. The No Action Alternative acts as the baseline to evaluate potential impacts of the Proposed Action within the geographic analysis area for each Chapter 3 resource topic.

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		The CEQ NEPA Implementing Regulations require NEPA impact analysis to include cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to other past, present, and reasonably foreseeable actions. The cumulative impact analysis for the No Action Alternative considers the impacts of ongoing activities and other reasonably foreseeable planned activities, excluding the Proposed Action, as described in Appendix D, *Planned Activities Scenario*. The cumulative impact analysis of the Proposed Action considers approval of the SouthCoast Wind Project in combination with other reasonably foreseeable planned activities within the geographic analysis area for each Chapter 3 resource topic. As such, the analysis of the No Action Alternative in Section 3.6.2, *Cultural Resources*, serves in part to identify how and where impacts on cultural resources and historic properties are ongoing, potential, or would be likely without approval of the Project.
BOEM-2023-0011-0132-0085	The document correctly states that the WTGs would adversely impact the Nantucket Historic District NHL and that the presence of visible WTGs from the Proposed Action alone would have long-term continuous widespread impacts on these resources. However the document states that these impacts would be moderate and there is no basis for that claim. The impacts are clearly major.	Please refer to response to comment BOEM-2023-0011-0132-0084.
BOEM-2023-0011-0132-0086	After stating that the Nantucket Historic District NHL would be subject to viewshed impacts with portions of up to 743 WTGs theoretically be visible from the southern shores of the district and the closest WTG approximately 14.8 miles (23.8 kilometers) away from the resource the document states that the intensity of cumulative visual impacts on these historic properties would be limited by distance and environmental and atmospheric factors such as meteorological conditions like low cloud cover fog or haze. However clear calm days are	Section 3.6.9, *Scenic and Visual Resources,* addresses impacts from the Proposed Action on seascape, open ocean, and landscape character and viewers. Additionally, within this section, Section 3.6.9.5 addresses cumulative impacts of the Proposed Action combined with other ongoing and planned activities. The VIA (COP Appendix T) states that all efforts were made to secure KOP photos under clear-sky conditions; however, that was not always possible. Simulations reflect a range of visual contrast under differing conditions (e.g., overcast/cloudy, haze, clear); such conditions are identified

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	when the viewshed is most likely to be enjoyed. Therefore the impacts are major.	with each simulation. The Project contains more visual simulations than other offshore wind projects of similar magnitude, and BOEM has determined the existing simulations adequately represent the impacts without needing additional simulations. Please refer to responses to comments BOEM-2023-0011-0132-0084 and BOEM-2023-0011-0128-0024 for additional information on BOEM's assessment of the Project's visual effects.
BOEM-2023-0011-0132-0095	Regarding construction lighting the document state the impacts will minor. This is supported by claims that the construction will be short term when in fact the duration has been increased from 4 to 7 years. It also states that lighting impacts will be reduced by atmospheric and environmental conditions such as clouds fog and waves that could partially or completely obscure or diffuse sources of light. However clear calm evenings are when the dark skies of Nantucket are most often enjoyed. The dark nighttime sky is a character-defining feature that contributes to the historic significance and integrity of Nantucket. The impacts to Nantucket's nighttime skies will clearly be major.	The AVEHP (COP, Appendix S) and Section 3.6.2, *Cultural Resources*; Section 3.6.9, *Scenic and Visual Resources*; and Appendix I, *Finding of Adverse Effect*, consider the visual impacts of lighting, including light from vessels, use of lighting during construction and decommissioning, and use of lighting on WTGs and offshore substations during O&M. The EIS indicates the visibility of the WTGs will be variable depending on current meteorological and day or nighttime conditions. Please refer to response to comment BOEM-2023-0011-0132-0084.
BOEM-2023-0011-0132-0111	Table 3.6.2-1. This table that covers significant historical events makes no mention of Nantucket its whaling history or its importance as the largest National Historic Landmark. The impacts to tourism on Nantucket do not seem to be a consideration at all. From a social justice standpoint many lower paying tourism jobs are what will be lost. Nantucket's economy will be severely impacted and this is not addressed.	BOEM has integrated additional discussion of Nantucket's history into Section 3.6.2, Table 3.6.2-1, *Cultural context of the Project area in coastal Massachusetts and Rhode Island*, and Appendix I, *Finding of Adverse Effect*, including recognition of the historic whaling and tourism industries on Nantucket Island. BOEM's analysis in Section 3.6.2, *Cultural Resources*, focuses on physical resources valued by a group of people, including historic properties as defined in the NHPA (54 USC 300308). BOEM's analysis of Project impacts on economics and tourism are provided in Section 3.6.3, *Demographics, Employment, and Economics*, and Section 3.6.8, *Recreation and Tourism*, respectively.

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BOEM-2023-0011-0132-0114	Considering the importance of the view shed to Nantucketer's and its visitors all scenic impacts to the NHL are MAJOR. The visual analysis explains that a criterion for assessing the impact to viewshed is the concern to the audience. The views on Nantucket are of utmost importance to Nantucketer's and its visitors.	Please refer to responses to comments BOEM-2023-0011-0132-0084 and BOEM-2023-0011-0132-0086.
BOEM-2023-0011-0133-0001	[The Nantucket Maria Mitchell Association provided historical and background information on the Maria Mitchell Association and Maria Mitchell Observatory and House.]	Thank you for this additional context. Analysis of impacts on night skies can be found in Section 3.6.2, *Cultural Resources*, and Section 3.6.9, *Scenic and Visual Resources*. Please refer to response to comment BOEM-2023-0011-0128-0014 for additional information regarding BOEM's assessment of effects on the Nantucket Historic District NHL, which includes the Maria Mitchell Observatory.
BOEM-2023-0011-0133-0002	Dark skies are critical to our work in observation of the galaxy. We are actively conducting research via direct observation year-round and we offer programming to the community for learning and observing the night sky. Last year we had more than 3000 visitors to the Loines Observatory and offered 20 Open Nights at the Observatory for free to the local community (parents children and educators) through our grant funded "Look Up" program. Our goal is that every child growing up on Nantucket looks through our telescopes and sees Jupiter or Saturn views the Milky Way and understands the importance of this special natural resource – dark skies – and humanity's responsibility to protect it.	Please refer to response to comment BOEM-2023-0011-0133-0001.
BOEM-2023-0011-0133-0003	MMA and its stakeholders interact with the dark skies daily and have done so historically for over 100 years as part of the traditional historical use of MMA's properties and otherwise. For example currently ourdirector of astronomy our telescope technician 6 REU students and 2 post baccalaureate research fellows are using the observatories year-round to collect data and conduct astrophysical research. This research is funded by the NSF through competitive grants that we have received for many years. This research encompasses a wide variety of topics including variable stars dwarf galaxies quasars galaxy	Please refer to response to comment BOEM-2023-0011-0133-0001.

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	formation and evolution and the newly discovered enigmatic and fast radio bursts. For many years now numerous other Nantucket residents and visitors to Nantucket as a result of MMA or on their own participate in observational activities of this sort as well in furtherance of MMA's longstanding mission.	
BOEM-2023-0011-0133-0004	[The Nantucket Maria Mitchell Association provided additional information and specific studies on research conducted on artificial lighting and dark/night skies.]	Please refer to response to comment BOEM-2023-0011-0133-0001.
BOEM-2023-0011-0133-0005	[The Nantucket Maria Mitchell Association provided additional information and on how impacts to the Maria Mitchell Association and Maria Mitchell Observatory and House could impact tourism and economy.]	BOEM's analysis of Project impacts on tourism and economics are provided in Section 3.6.8, *Recreation and Tourism*, and Section 3.6.3, *Demographics, Employment, and Economics*, respectively. Please refer to response to comment BOEM-2023-0011-0133-0001 for additional information.
BOEM-2023-0011-0133-0006	[The Nantucket Maria Mitchell Association provided additional comments on other impacts, aside from disruption of the night sky, that may contribute to adverse effects on the Maria Mitchell Association and Maria Mitchell Observatory and House.]	Please refer to response to comment BOEM-2023-0011-0133-0001.
BOEM-2023-0011-0133-0034	MMA also has concerns about the process itself. For example BOEM has published a draft Memorandum of Agreement (MOA) at a time when there is still no consensus on what adverse effects will flow from the projects much less how those effects might be mitigated. The draft MOA contains no mitigation pertinent to MMA in any way and MMA was not consulted with respect to the draft MOA. The limited mitigation that is identified in the draft MOA appears to be window dressing at best. Both the premature timing of publishing such a document and the patently inadequate content of the document raise concerns about whether there is a predetermined result of the process. MMA objects.	Please refer to response to comment BOEM-2023-0011-0128-0031.
BOEM-2023-0011-0133-0035	[Footnote 1: Other examples include the failure of BOEM to rely upon any sources other than the applicant's own hired	BOEM has ensured SouthCoast Wind's consultants meet the U.S. Secretary of the Interior's Professional Qualifications

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	consultants the rapid pace at which the process is proceeding the failure of BOEM to reveal the existence of a revised COP until the day comments were due the failure to publish much of the relevant information at all and when published the failure to do so in a readily accessible and readable format.]	Standards, as required per BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (dated May 27, 2020) and the MOA. Cultural resource technical documents prepared by SouthCoast Wind's consultants meet applicable state guidelines and have taken into consideration several data sources as well as consulting party feedback. BOEM has determined the cultural resource technical reports demonstrate a good-faith effort to identify historic properties in the APE and are sufficient to allow BOEM to make a finding of adverse effect for the Project. Version E of the COP became available for review on BOEM's website on March 23, 2023. The public comment period was initially scheduled from February 17, 2023, to April 3, 2023, but was extended 15 days to end on April 18, 2023, to ensure the public had adequate time to review the latest version of the COP. The EIS and COP are published on the BOEM website and formatted per Section 508 of the Rehabilitation Act to ensure the greatest amount of accessibility to the public. BOEM has also posted public summaries or redacted versions of Section 106 documents to BOEM's website; unredacted versions containing confidential or sensitive information are distributed to consulting parties electronically and/or via hard copy if a hard copy is requested. In addition to BOEM's Section 106 document distributions to all consulting parties on February 2, 2023, January 17, 2024, July 1, 2024, and September 30, 2024, BOEM has provided information to consulting parties by request and has made its representatives available to answer questions via email, phone, and consultation meeting throughout the duration of the Project.
BOEM-2023-0011-0133-0036	No consideration has been given to the impact of the proposed project on: MMA's historical and current use of its observatory for observation of stars and other elements of the night sky dome; MMA's historical and current educational	The Maria Mitchell Association is within the Nantucket Historic District NHL, a historic property that BOEM has determined would be adversely affected by the Project. In Section 3.6.2, *Cultural Resources,* of the Final EIS, BOEM

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	mission with respect thereto; the historical and current use of numerous other locations throughout the Nantucket Historic District for observation of stars and other elements of the night sky dome; the economic impact on MMA; or the impact on MMA's other missions regarding appreciation of the sea scape sea life and nature more broadly. The approach has instead been to focus exclusively on the degree to which aviation lighting on the towers is perceptible by observers in one location on shore. While important this is a distinctly different issue from the issues identified above.	assessed visual effects from the presence of structures and nighttime lighting for aboveground historic properties and TCPs for which a dark nighttime sky is a character-defining feature that contributes to the historic significance and integrity of the resource, including the Nantucket Historic District NHL. BOEM consulted with federally recognized Tribes and consulting parties, including the NPS, Nantucket Maria Mitchell Association, and Town of Nantucket, on the development of mitigation measures to resolve adverse effects on the NHL. Mitigation measures determined through consultations for the Nantucket Historic District NHL and stipulated in the MOA (Appendix I, Attachment A), as well as an associated HPTP for the NHL, which is attached to the MOA, will be implemented by the Project to resolve adverse effects in accordance with Section 106 and Section 110(f) of the NHPA.
BOEM-2023-0011-0134-0005	Disturbance of the seabed may result in irreparable damage to historically significant and culturally and spiritually important archeological resources. Our submerged cultural and sacred sites face complete destruction or irreparable damage unless sincere planning for avoidance impact minimization or mitigation is conducted in collaboration with our Tribe and all other affected Tribal Nations. The entire wind energy project area under consideration should be protected due to its eligibility for listing on the National Register as a Traditional Cultural Property and under other Tribal Indigenous Traditional and Ecological Knowledge.	Thank you for these comments. BOEM recognizes its government-to-government obligation to consult with Tribal Nations that may attach religious and cultural significance to historic properties, including sacred sites, which may be affected by the Project. BOEM understands that Tribal Nations possess special expertise in assessing the eligibility of historic properties with religious and cultural significance to Tribal Nations. In consultation with Tribal Nations, three TCPs were identified in the APE for the Project: Nantucket Sound TCP, Chappaquiddick Island TCP, and Vineyard Sound and Moshup's Bridge TCP. Two TCPs were identified as adversely affected by the Project: Nantucket Sound TCP and Chappaquiddick Island TCP. In addition, BOEM understands that the ASLFs in Nantucket Sound identified in the Project's marine APE may be contributing elements to the Nantucket Sound TCP and may contain archaeological resources that are of historical, cultural, and spiritual importance to the Wampanoag Tribe of Gay Head (Aquinnah). SouthCoast Wind prioritized avoidance measures for TCPs and ASLFs to the extent feasible. Due to avoidance

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		commitments made by SouthCoast Wind as stipulated in the MOA, BOEM determined the Project would have no effect on 7 of the 9 identified ASLFs that are or may be contributing elements to the Nantucket Sound TCP. However, avoidance was determined to not be possible for four of the ASLFs. As such, BOEM has consulted with federally recognized Tribes and consulting parties, including the Wampanoag Tribe of Gay Head (Aquinnah), on the development of minimization and mitigation measures to minimize and/or resolve adverse effects on the Nantucket Sound TCP and the two ASLFs. These measures, as well as an Unanticipated Discoveries Plan for marine archaeological resources (MOA Attachment 13), are stipulated in the MOA. BOEM welcomes continued consultation with Tribal Nations and will work with Tribal Nations to incorporate their expertise and Indigenous Traditional Ecological Knowledge in NHPA Section 106 consultations over the course of the Project and implementation of the MOA.
BOEM-2023-0011-0139-0033	Section 3.6.2.5 of the DEIS states that “the Proposed Action may have negligible to major physical impacts on 46 marine archaeological resources.” SouthCoast Wind disagrees with this statement as it lacks important details regarding the nature of the specific marine archaeological resources and some avoidance commitments the Project has already made to date. Out of the 46 submerged cultural resources encountered during geophysical and geotechnical surveys conducted by SouthCoast Wind and analyzed by the Qualified Marine Archaeologist (QMA) for the Project 5 are located within the Lease Area 16 are within the Falmouth ECC and 25 are within the Brayton Point ECC. As stated in the Historic Properties Treatment Plan for Ancient Submerged Landforms and Submerged Cultural Resources (COP Appendix Q.4) 14 of the 46 marine archaeological resources were not recommended for avoidance by the QMA because they were determined to not be culturally significant. Out of the remaining 32 marine archaeological resources SouthCoast	Per Section 3.6.2, Table 3.6.2-2, *Definitions of potential adverse impact levels for cultural resources by type*, “negligible” impacts are defined as equivalent to a Section 106 (36 CFR 800.4(d)(1)) finding of no effect on historic properties. In Section 3.6.2.5, *Impacts of Alternative B – Proposed Action on Cultural Resources*, BOEM’s statement that 46 identified marine archaeological resources would be subject to “negligible to major impacts” is intended to indicate that individual resources among the total of 46 resources would be subject to negligible, minor, moderate, or major impacts. BOEM has revised Section 3.6.2.5 in the Final EIS for clarity. Additionally, Appendix I, *Finding of Adverse Effect*, describes BOEM’s finding of effect for each of the 46 identified marine archaeological resources in greater detail and reflects SouthCoast Wind’s avoidance commitments for 31 of the 32 marine archaeological resources in the marine APE

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	Wind has committed to avoiding 11 by micro- routing around the resources. These commitments were included in COP Appendix Q.4 which also states that SouthCoast Wind is still evaluating the feasibility to micro-route around the remaining 21 marine archaeological resources which have been recommended for avoidance by the QMA.	recommended to be historic properties potentially eligible for listing in the NRHP, as stipulated in the MOA.
BOEM-2023-0011-0139-0034	The DEIS notes that three tribally important Traditional Cultural Properties (TCPs) have been identified in the Project's cultural resources geographic analysis area two of which may be subject to impacts from the Project (COP Appendices Q and R): Chappaquiddick Island and Nantucket Sound. Both TCPs are eligible for listing in the NRHP. TCPs are places landscape features or locations associated with the cultural practices traditions beliefs lifeways arts crafts or social institutions of a living community. Ancient Submerged Landscape Features (ASLF) may be contributing elements to TCPs. The Nantucket Sound and Chappaquiddick Island TCPs intersect the Falmouth ECC. SouthCoast Wind recognizes the importance of TCPs and is committed to avoiding adverse impacts on ASLFs. Of the 16 ASLFs located within the SouthCoast Wind APE 15 were recommended for avoidance by the QMA. Eleven of the ASLFs are found along the Falmouth ECC and six of those ASLFs along the Falmouth ECC lie below the vertical APE and will not be adversely affected by construction. Where avoidance may not be possible consultation with the relevant authorities and stakeholders to develop mitigation plans may be required based on construction activities. SouthCoast Wind is developing and will adhere to a Mitigation Plan and an Unanticipated Discoveries Plan; these plans are described in Appendices G and I of the DEIS.	Appendix I, *Finding of Adverse Effect*, and the MOA have been revised to reflect avoidance, minimization, mitigation, and monitoring measures for TCPs and ASLFs as identified and finalized through BOEM's NHPA Section 106 consultations since publication of the Draft EIS. Please refer to response to comment BOEM-2023-0011-0134-0005 for related information on the Nantucket Sound TCP and ASLFs.
BOEM-2023-0011-0139-0035	The two tribally important TCPs identified in the Project's cultural resources geographic analysis area (Chappaquiddick Island and Nantucket Sound) are subject to visual impacts from the visibility of Project components. We note that the	Section 3.6.2, *Cultural Resources,* describes the effect of clouds, fog, waves, sea spray, and haze, which could reduce the impacts of lighting and visibility of WTGs.

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	scale extent and intensity of these impacts would be partially mitigated by environmental and atmospheric factors such as clouds haze fog sea spray vegetation and wave height that would partially or fully screen the WTGs from view during various times throughout the year.	
BOEM-2023-0011-0165-0001	Oak Grove cemetery is a non profit non denominational cemetery formed in 1847 and we abut the Lawrence and Lynch location for the converter station of just about a thousand feet the whole boarder. We have concerns of the location of that station. I know in the paper they showed a diagram and it's pretty darn close to our border fence. The noise factor is significant. I think the -- as you look at the cemetery we are very active and we have sufficient how you say burial site for the next hundred years. We are also the very -- the largest cemetery on Cape Cod with veterans outside of our born national cemetery and we have an awful lot of national heroes that are interm there in the cemetery not to mention Catherine Lee Bates and Winston Jenkins and a few other folks that have been very prominent within the Falmouth history. The noise factor we feel would prohibit many of our expanding in the future since that expansion is along that borderline.	BOEM determined one of the Project's proposed onshore substations would have adverse effects on the Oak Grove Cemetery under Section 106 of the NHPA if technical, logistical, grid interconnection, or other unforeseen challenges that arise during the Project's design and engineering prevent Project 2 from making interconnection at Brayton Point and the Falmouth variant ECC is utilized, making landfall and interconnection in Falmouth, Massachusetts. BOEM has consulted with federally recognized Tribes and consulting parties, including the Oak Grove Cemetery, on the development of mitigation measures to resolve adverse effects on historic properties. Mitigation measures determined through consultations for Oak Grove Cemetery and stipulated in the MOA (Appendix I, Attachment A), as well as an associated HPTP for Oak Grove Cemetery, which is attached to the MOA, will be implemented by the Project to resolve adverse effects in accordance with Section 106 of the NHPA if the Falmouth variant ECC is utilized. Per BOEM's request, SouthCoast Wind revised the AVEHP (COP, Appendix S) for the onshore substation in Falmouth to include more description of the potential physical and auditory effects on the Oak Grove Cemetery from construction, installation, and O&M. The AVEHP discusses locations within the cemetery from which potential views of the station and associated construction activities would be possible. Based on the analysis, construction activities would likely generate the greatest noise that could temporarily impact the cemetery. This revised AVEHP was provided to consulting parties for review and comment on January 17,

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		2024, and was used to revise Section 3.6.2, *Cultural Resources*, and Appendix I, *Finding of Adverse Effect*.
BOEM-2023-0011-0165-0002	We also are in the process oh for the last year and a half of building a -- some folks may laugh at it as to what a cemetery is doing with it but we are building a butterfly garden it's a symbol of renewed life and it's in honor of those folks in Falmouth Mashby that have passed as a result of Covid. It's a significant size garden it's essentially 100 by 50 and we are proceeding with phase two and it just happens to have been right along the general area of our border with Lawrence and Lynch existing site. That we feel would have a significant impact the noise level that has been discussed we have not actually read anything that mitigates that noise and we would like some additional environmental considerations reviewed before that site is actually selected.	Please refer to response to comment BOEM-2023-0011-0165-0001.

N.6.15 Demographics, Employment, and Economics

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BOEM-2023-0011-0015-0008	Will energy costs increase as a result like they did in France? Are these even economically sensible?	The Project will generate up to 2,400 MW of energy that will supply electric power to customers in the northeast United States, including Massachusetts, Connecticut, and/or Rhode Island. The price of the power generated by the Project will be determined by offtake agreements, also known as power purchase agreements, negotiated between SouthCoast Wind and electric distribution companies, subject to each state's offshore wind procurement laws and regulations. The electric distribution companies that acquire the power from the Project will distribute and sell the power to their customers. While SouthCoast Wind's offtake agreements may influence the electricity prices paid by ratepayers in the states where the Project's power is purchased, the exact cost cannot be known at this time, as electricity rates are affected by myriad factors including current demand for electricity, the mix and price of other generation sources (e.g., other

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		offshore wind projects, natural-gas power plants), and other factors, including natural events like high summertime temperatures. In electricity markets where wind power is generated, the electricity cost for ratepayers may be variable, such as when the market is saturated with electricity due to windy seasons, or, conversely, when there is less wind, the power demand may be higher, causing rates to increase. This information has been added to Section 3.6.3.5, *Impacts of Alternative B - Proposed Action on Demographics, Employment, and Economics*, of the Final EIS.
BOEM-2023-0011-0030-0001	I am generally in favor of the Southcoast Wind project as large scale problems need large scale solutions. The impact on reducing our dependence on fossil fuels is undisputable. The impact on reducing energy bills is unclear - there are too many variables to forecast any positive results at this time. What is clear is that the residents of Falmouth Heights will be negatively impacted perhaps only for one year during construction perhaps for much longer in ways that are not clear at the moment. The rest of us in Falmouth and the rest of Massachusetts will derive some benefit from this project while we're asking one particular neighborhood to bear many of the risks and inconvenience. Is there some way to compensate them such as rebates for a percentage of their property taxes for a number of years? The shortfall in tax revenue to Falmouth should be filled in by Southcoast Wind who can make it up by passing some of the those costs to all consumers who are benefitting from the project.	While construction of onshore facilities is an unavoidable aspect, construction-related inconveniences are expected to be minor and localized, as discussed further in Final EIS Section 3.6.3.5. Traffic disruptions would be temporary during construction; SouthCoast Wind has committed to implementing a Traffic Management Plan to minimize disruptions to residences and commercial establishments. Moreover, local communities will realize economic benefits from local preference in terms of construction hiring and spending. It is therefore premature to conclude that Falmouth or other onshore communities would see tax revenue shortfalls as a result of construction. Also refer to the response to comment BOEM-2023-0011-0015-0008.
BOEM-2023-0011-0038-0003	At the CCC Subcommittee New England Connector 1 meeting many opponents cited the LLC status of most of the foreign wind farm development companies and the Jones Act constraints on utilizing foreign equipment and construction vessels as a source of economic uncertainty in providing more local jobs and the projects being completed in a timely fashion to reduce ghgs by 2030. I am not an expert in these issues but BOEM might want to utilize the Economic Multiplier Effect for	Comment noted. Also refer to the response to comment BOEM-2023-0011-0121-0002.

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	coastal counties where wind farm development is being considered since the Jones Act constraints and LLC status are unlikely to be changed by Congress. The Gulf of Maine Council on the Marine Environment developed an EME indicator which might provide a useful case study.	
BOEM-2023-0011-0055-0004	The ongoing maintenance/ preventive maintenance associated with these structures have an intangible cost to the area. There will frequently be trucks and personnel interrupting the life and lifestyles of residents businesses and tourists. Additionally the amount of dredged material generated will need to be hauled away does this require a constant flow of trucks in and out of congested neighborhoods?	Impacts on local communities from vehicle traffic would result from construction of the landfall locations, installation of onshore cable routes, and construction of onshore substations/converter stations, which are analyzed in Final EIS Sections 3.6.3, *Demographics, Employment, and Economics*, and Section 3.6.5, *Land Use and Coastal Infrastructure*. Traffic disruptions would be temporary during construction, and SouthCoast Wind has committed to implementing a Traffic Management Plan to minimize disruptions to residences and commercial establishments. Dredging would be used for installation of offshore cables. Dredged material would be side cast alongside the cable corridor route. Accordingly, no offsite (onshore) disposal of dredged material or use of trucks to haul material would be required.
BOEM-2023-0011-0117-0029	Human Well-being: Rhode Island and the nation as a whole suffer from a mental health crisis and increased drug abuse. Encounters with nature improve both mental and physical health by providing a sense of awe (Lopes 2020; Chirico 2021 Monroy 2022). Compromising the ocean's natural state will potentially exacerbate the country's mental health problems by destroying a source of visual peace and open space. BOEM has failed to take this adverse impact into its analysis.	Final EIS Sections 3.6.3, *Demographics, Employment, and Economics*, 3.6.4, *Environmental Justice*, and 3.6.8, *Recreation and Tourism*, analyze the socioeconomic, environmental justice, and recreational impacts of the Proposed Action on affected communities, including effects associated with the presence of offshore wind projects. The cited concerns regarding offshore wind energy's potential to exacerbate community mental health is speculative and therefore beyond the scope for consideration in the EIS.
BOEM-2023-0011-0121-0001	The DEIS also estimates a range of compensation from $43000 for trades and technicians to $150000 for managers. Given that one of the biggest factors affecting workers' compensation is whether they are members of a trade union We recommend evaluating and reporting in the FEIS the status of any negotiations between the developer and labor	Please refer to response to comment BOEM-2023-0011-0121-0002.

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	unions as a critical factor in determining whether economic benefits to residents of the Commonwealth will be maximized. [Footnote 1: Bureau of Labor Statistics "Union Members" 2021. Available online: www.bls.gov/news.release/pdf/union2.pdf]	
BOEM-2023-0011-0121-0002	However for a U.S. workforce to access opportunities in offshore wind developers must share information about the specific skills training and certifications required as well as information about the employment opportunities related to the project. This information along with specifc commitments to develop durable pathways for minority contractors and workers into training and employment throughout the Project is invaluable. In the FEIS socioeconomic impacts analysis these factors should be considered along with the status of negotiations related to project labor or community workforce agreements labor peace agreements and Community Benefits Agreements with labor unions and grassroots organizations based in environmental justice communities such as Fall River New Bedford Brockton Wareham Falmouth Hyannis Edgartown Tisbury and Aquinnah. If there are no such negotiations this also merits consideration in the FEIS.	Section 3.6.3.5 of the Final EIS provides information on SouthCoast Wind's proposed investments in community development and workforce training. Additional detailed information is included in the COP. Regarding training, each role will have training and certifications unique to the skills necessary to safely and effectively complete the tasks required. The primary training and certification body for the industry is the Global Wind Organization, which provides standard training and certifications recognized throughout the offshore wind industry. SouthCoast Wind has committed to the hiring of local personnel to fill the positions required for the various preparation and construction activities. The training and use of local and regional resources will be prioritized so that the regional populations can benefit from the direct and indirect economic benefits. SouthCoast Wind enacted Supplier and Workforce Diversity Plans, which promote career pathways for minority workers both within SouthCoast Wind and with the suppliers. SouthCoast Wind has formed local partnerships across New England to support a diverse and inclusive offshore wind workforce pipeline. For example, through its partnership with the National Society of Black Engineers, SouthCoast Wind committed to funding internships with SouthCoast Wind and/or the Project's suppliers. Additionally, SouthCoast has a partnership with Bristol Community College to support the development of its National Offshore Wind Institute, which will be in an environmental justice community. In 2022, SouthCoast Wind signed a Memorandum of Understanding (MOU) with North America's Building Trades

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		Unions and the United Brotherhood of Carpenters regarding the onshore and offshore construction work for the delivery of the first 1,200 MW from the Lease Area. The MOU was renewed in 2024. The MOU includes commitments to create jobs for local and diverse workers and to comply with the labor requirements of the Inflation Reduction Act, including paying prevailing wages and utilizing apprentices. Consistent with industry practice, SouthCoast Wind will negotiate a Project Labor Agreement once the main contractors have been appointed and the Proposed Action is closer to a Final Investment Decision. SouthCoast Wind has committed to making O&M jobs locally based in the state(s) that procure energy from the Project. Regarding job agreements with environmental justice communities, SouthCoast Wind has established a Protected Species Observer (PSO) Training Program, where it is working to provide local Native American communities with cost-free training and all certifications to work as a PSO. Information regarding the use of local work force and labor agreements has been added to the Final EIS in Section 3.6.3.5, *Impacts of Alternative B – Proposed Action on Demographics, Employment and Economics.*
BOEM-2023-0011-0121-0005	The DEIS provides information related to job creation including direct indirect and induced jobs. The FEIS should build on this information and include further specificity for each of these categories. The DOL's Good Jobs Initiative highlights equity and job quality principles and metrics to be used in federal grant making processes that should be strongly considered by BOEM for use in the FEIS.	SouthCoast Wind's COP indicates that full-time equivalent (FTE) job-years created in Massachusetts for this Project would be 14,860 direct jobs, 4,300 indirect jobs, and 7,780 induced jobs, totaling 26,940 FTE job-years from the Project. The EIS discusses this further by FTE job-years per Project phase. For the number of jobs anticipated by labor categories, for offshore wind in general, please see the National Renewable Energy Laboratory's (NREL's) U.S. Offshore Wind Workforce Assessment at https://www.nrel.gov/docs/fy23osti/81798.pdf (Stefek et al. 2022).

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BOEM-2023-0011-0121-0006	According to NREL the average and maximum job creation utilizing 25% domestic content versus 100% domestic content in offshore wind projects results in a difference of approximately 30000-40000 jobs from 2023-2030. The DEIS provides some information related to the local regional and domestic manufacture of components to be utilized in the Project but BOEM should make efforts to include greater detail in the FEIS.	Best available Project-specific information regarding direct, indirect, and induced FTE job-years as well as those that will be in development, construction, and operations can be found in Final EIS Section 3.6.3.5. Also refer to the response to comment BOEM-2023-0011-0121-0002.
BOEM-2023-0011-0121-0007	The FEIS should specify job categories and job numbers per category resulting from each domestically manufactured component as well as how these numbers are accounted for in the total number of direct indirect and induced jobs gross state product and personal income anticipated from the project.	SouthCoast Wind has conducted an analysis of job creation associated with the Proposed Action (COP Appendix BB, Economic Development Benefits Report). Annual FTE employment was calculated by subtracting the total operating margin from the gross value added and dividing that value by the average annual wage plus non-wage average annual cost of employment. The development, construction, and operation of the full Lease Area with up to 2.4 GW of offshore wind capacity will create approximately 26,900 FTE years in Massachusetts and 27,800 FTE years in the New England/New York region. These total job types are summarized in Section 3.6.3.5 of the Final EIS and in the COP Volume 2, Section 10.1.2.1. Appendix BB, which is business confidential, provides some additional information regarding jobs within supply chain categories that has informed BOEM's analysis in the Final EIS. For the number of jobs anticipated by labor categories, for offshore wind in general, please see NREL's U.S. Offshore Wind Workforce Assessment at https://www.nrel.gov/docs/fy23osti/81798.pdf (Stefek et al. 2022).
BOEM-2023-0011-0121-0008	The FEIS should also include an assessment of education and certifications necessary to access each job category the training average wages hours career advancement physical demands and safety information as well as any commitments the company has made to ensure workers have the free and fair choice to join a union such as through a union neutrality	An assessment of the education, certifications, training, safety information, and other requirements for employment to ensure workers have equitable access to employment opportunities is beyond the scope of BOEM's NEPA process, the purpose of which is to analyze the environmental and human effects of the Project and to aid decision-makers in

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	agreement. This information is essential for the U.S. workforce to have equitable access to employment opportunities.	deciding whether to approve or disapprove SouthCoast Wind's COP. BOEM does not regulate labor or employment. However, information regarding employment requirements in the offshore wind industry is available in Appendix B of NREL's U.S. Offshore Wind Workforce Assessment (Stefek et al. 2022), which lists different roles and the educational requirements for potential jobs in the offshore wind industry, such as for development, supply chain, and manufacturing jobs. For example, a factory-level supply chain and manufacturing plant manager will need a bachelor's degree in a relevant engineering field and experience in a manufacturing supervisory role and an electrical technician will need an associate's degree or vocational training for electricity or in electrical engineering. Consistent with the National Labor Relations Act, individuals have the autonomy to decide if they want to be represented by a union and which specific union they would like to represent them.
BOEM-2023-0011-0121-0009	Finally the FEIS should also contain information about the manufacture of offshore wind energy components that did not take place in the U.S. in order to understand the full breadth of employment benefits that could be expected as a domestic offshore wind supply chain matures.	Final EIS Section 3.6.3.5 includes estimates on direct, indirect, and induced employment from the Project, which include jobs created through increased demand for materials, equipment, and services. SouthCoast Wind has not yet selected manufacturers for all of the required equipment and material, so the manufacturing location is not known. SouthCoast Wind has stated it will source equipment, materials and supplies, and other services such as vessel provisioning and servicing, and certain fabrication work, from within the region to the extent feasible.
BOEM-2023-0011-0121-0010	Similarly for O&M job impacts the FEIS should specify O&M job categories job numbers in each category and how job numbers are accounted for in the total number of direct indirect and induced jobs gross state product and personal income anticipated from the Project. The FEIS should also include an assessment of education and certifications necessary to access those jobs training average wages career	Please refer to responses to comments BOEM-2023-0011-0121-0007 and BOEM-2023-0011-0121-0008.

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	advancement hours physical demands and safety information as well as any commitments the company has made to ensure workers have the free and fair choice to join a union such as through a union neutrality agreement.	
BOEM-2023-0011-0121-0011	The FEIS should also indicate the number of jobs that if any require specialized experience that would prohibit workers in the U.S. from accessing those jobs and the specific experience and training that is required. When it comes to training, the FEIS should specify whether workers will need to go overseas to receive training and the duration of that training. Given the size of offshore wind projects the FEIS should be sure to specify jobs categories related to the operation and maintenance of every aspect of the Project including the turbines themselves cables and onshore and offshore substations. Any apprenticeship utilization should also be documented and the types of apprenticeships to ensure that they are DOL-certified.	Please refer to response to comment BOEM-2023-0011-0121-0008.
BOEM-2023-0011-0121-0012	The FEIS should include all construction jobs associated with the Project including any construction jobs anticipated to prepare the port that is selected for assembly preparation of the cable route and interconnection and the construction or site preparation of any manufacturing facilities. Consistent with the previous two categories BOEM should specify job categories job numbers in each category and how job numbers are accounted for in the total number of direct indirect and induced jobs gross state product and personal income anticipated from the Project. The FEIS should also include an assessment of education and certifications necessary to access each job category the training average wages hours career advancement physical demands and safety information. If any construction jobs require specialized experience that prohibit workers in the U.S. from accessing these jobs that should also be detailed including the number of jobs as well as the training and experience required. The	Please refer to responses to comments BOEM-2023-0011-0121-0007 and BOEM-2023-0011-0121-0008.

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	FEIS should also specify whether workers will need to go overseas to receive training and the duration of that training.	
BOEM-2023-0011-0121-0013	The FEIS should be sure to include the status of Project Labor Agreements (PLAs) or Community Workforce Agreements (CWAs) associated with all aspects of the construction of the Project.	Please refer to response to comment BOEM-2023-0011-0121-0002.
BOEM-2023-0011-0121-0014	BOEM should be sure to include detailed information regarding training. One of the main mechanisms for building career pathways is through registered apprenticeship pre-apprenticeship and other union-affiliated training programs.	Please refer to responses to comments BOEM-2023-0011-0121-0002 and BOEM-2023-0011-0121-0008.
BOEM-2023-0011-0121-0015	BOEM should also include any language access needs for the local community that may be present in order to access jobs benefits. The NEPA guidance study does not require demographics related to language or education but BOEM should consider these and other qualities that should be taken into account to ensure jobs are accessible to a diverse workforce. Any agreements that project developers have made to increase access be it to jobs in manufacturing operations and maintenance construction or otherwise should be detailed in the FEIS to increase transparency and the local community's ability to access these resources and benefits.	Comment noted.
BOEM-2023-0011-0130-0009	Fossil fuel retirements will mean the loss of some high-quality employment in the sector. 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. 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 FEIS should consider these impacts in its analysis of all alternatives particularly the "No Action Alternative."	The No Action Alternative analysis in Section 3.6.3.3 of the Final EIS has been updated with additional information regarding the type of energy used in the region (e.g., fossil fuel, wind), jobs by energy type, and the potential impacts on energy employment by energy type from the expansion of the offshore wind industry. As offshore wind projects including the Proposed Action and other activities in the geographic analysis area come online, it is a reasonable assumption that there will be increased demand for jobs in the wind energy sector at the same time that jobs related to electric power generated by fossil fuels may be reduced.
BOEM-2023-0011-0130-0011	Robust socioeconomic analysis is critical to achieve the maximum economic benefits from offshore wind projects. The	Please refer to responses to comments BOEM-2023-0011-0121-0005 and BOEM-2023-0011-0121-0008.

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	FEIS 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.	
BOEM-2023-0011-0130-0012	While some of the details may not be available the FEIS should reference agreements that are in place such as the MOU between SouthCoast Wind and North America's Building Trades Unions (NABTU) covering all of SouthCoast' s contractors and subcontractors for construction of the company's offshore wind project.	Final EIS Section 3.6.3.5 has been updated to reference the MOU SouthCoast Wind entered into with North America's Building Trades Unions and the United Brotherhood of Carpenters. Consistent with industry practice, SouthCoast Wind will negotiate a Project Labor Agreement once the main contractors have been appointed and the Proposed Action is closer to a Final Investment Decision.
BOEM-2023-0011-0130-0013	It would be useful for the FEIS to detail the projected economic impact for the region under one scenario in which the parties successfully negotiate a Project Labor Agreement (PLA) and a scenario in which they do not. The Department of Labor (DOL) reports that unions raise wages for all workers and the Bureau of Labor Statistics reports that non-union workers earn just 83 percent of what unionized workers earn. [Footnote 4: News Release Bureau of Labor Statistics US Department of Labor. January 19 2023. https://www.bls.gov/news.release/pdf/union2.pdf] PLAs have also been demonstrated to reduce project costs for developers save public funds in the long run and produce increased economic benefits for the local community. [Footnote 5: Frank Manzo et al. Efficiencies of Project Labor Agreements 2015. https://illinoisepi.org/site/wp-content/themes/hollow/docs/wages-labor- standards/Illinois-PLAs-in-CDB-Projects-FINAL.pdf]	The Final EIS, Section 3.6.3, appropriately discloses the economic impacts of the Proposed Action based on projected employment and investment in the regional economy. An economic impact analysis of scenarios with and without a Project Labor Agreement is beyond the scope of BOEM's NEPA process. BOEM does not regulate labor or employment, and the establishment of a Project Labor Agreement is at the discretion of SouthCoast Wind. Such an analysis would not support the decision makers in deciding whether to approve or disapprove SouthCoast Wind's COP. Refer also to response to comment BOEM-2023-0011-0130-0012.

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BOEM-2023-0011-0130-0015	Finally the National Renewable Energy Laboratory (NREL) has estimated that the vast majority of offshore wind's potential economic benefit lies in supply chain [Footnote job:s projecting a potential 12000-49000 full time equivalent jobs annually in domestic manufacturing. Indeed NREL names failure to develop sufficient domestic manufacturing as one of the biggest roadblocks to reaching the Biden Administration's offshore wind energy goals. The FEIS for SouthCoast Wind should provide as much detail as possible about the developer's plans to source domestic] and local content.	SouthCoast Wind has not yet selected manufacturers for all of the required equipment and material, so the manufacturing location is not known. SouthCoast Wind has stated it will source equipment, materials and supplies, and other services such as vessel provisioning and servicing, and certain fabrication work, from within the region to the extent feasible. In its engagement with its anticipated supply chain, SouthCoast Wind has asked for suppliers to provide their localization plans and ability to provide domestic content.
BOEM-2023-0011-0131-0007	There is some additional information that the Project did not include in its DEIS that we believe would be useful in a more comprehensive understanding of the economic impact of the project and could lead to more intentional measures to create good jobs at the established industry standards. We urge BOEM to require SouthCoast Wind to include in its DEIS • What steps SouthCoast Wind is taking to build new facilities associated with the operations maintenance or supply chain for the Project under a Project Labor Agreement or other labor agreements • What steps SouthCoast Wind is taking to ensure the renovation of any facilities associated with the construction operations maintenance or supply chain will be done under a Project Labor Agreement • What steps SouthCoast Wind is taking to ensure the remediation of hazards or hazardous materials from land or buildings associated with the Project be done under a project labor agreement at the established prevailing or industry standard wages and benefits and with adequate protections for worker and community safety	Please refer to responses to comments BOEM-2023-0011-0130-0012 and BOEM-2023-0011-0121-0002.
BOEM-2023-0011-0131-0011	SouthCoast Wind has not declared any commitments in the DEIS about the quality of jobs in O&M activities; the creation of family-sustaining jobs where workers have a free voice in their working conditions is crucial to mitigating the employment and economic impacts of the Project. Moreover	SouthCoast Wind has committed to making O&M jobs locally based in the state(s) that procure energy from the Project. It has also stated it will pay prevailing wages consistent with the requirements of the Inflation Reduction Act. Overall, the

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	the existence of a labor dispute could interrupt the project's operation putting BOEM's revenue at risk–and risking noncompliance with the statutory mandate of a fair return–and causing economic harm to the communities affected by the project.	Project would have beneficial impacts on employment and wages in the regional economy.
BOEM-2023-0011-0131-0012	CJMA urges BOEM to require SouthCoast Wind to include more detail in its DEIS to minimize the adverse socioeconomic effects and maximize beneficial impacts through the creation of good union careers: • What steps SouthCoast Wind is taking to operate under a Labor Peace Agreement (LPA) for all Operation & Maintenance directly employed and contracted workers and including those who may work on port facilities or transmission infrastructure to connect to the grid and its willingness to enter into such an Agreement • What steps SouthCoast Wind is taking to ensure that all O&M jobs for workers directly employed as well as employed by contractors will pay at least the prevailing wage rate or established industry standard wages and benefits so that good jobs are being created • What steps SouthCoast Wind is taking to ensure it has a procurement policy for use of contractors based on best value rather than low bid in order to fairly evaluate regulatory compliance history and fair employment practices	SouthCoast Wind has stated it is committed to paying prevailing wages consistent with the requirements of the Inflation Reduction Act. Also refer to responses to comments BOEM-2023-0011-0130-0012 and BOEM-2023-0011-0121-0002.
BOEM-2023-0011-0131-0016	CJMA encourages BOEM to assess the impacts of the Proposed Action on the workers who will be manufacturing the parts and supplies for the Project and integrate such assessments in the final environmental impact statement (EIS). Again any interruption in the supply chain for the Project delays this crucial investment in reducing greenhouse gas emissions and puts the economic well-being of affected communities at risk.	Section 3.6.3 analyzes the effects on employment from the construction, O&M, and decommissioning of the Project. It includes estimates on direct, indirect, and induced employment from the Project, which include jobs created through increased demand for materials, equipment, and services. The section also describes commitments SouthCoast Wind has made with respect to hiring, training, and working with partners to develop capabilities and experience in the domestic offshore wind industry.
BOEM-2023-0011-0131-0019	CJMA urges BOEM to require SouthCoast Wind to provide more detail regarding their supply chain including:	Section 3.6.3 describes commitments SouthCoast Wind has made with respect to hiring, training, and working with

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	• What measures SouthCoast Wind will take to prioritize use of domestic manufacturing and domestic manufacturers • What measures SouthCoast Wind will take to encourage labor peace agreements for its Tier 1 and Tier 2 supply chain manufacturers • What measures SouthCoast Wind will take to encourage supply chain employers to pay family sustaining wages and benefits at or above the levels that may have been established through collectively bargained agreements	partners to develop capabilities and experience in the domestic offshore wind industry. SouthCoast Wind has stated it will source equipment, materials and supplies, and other services such as vessel provisioning and servicing, and certain fabrication work, from within the region to the extent feasible. In its engagement with its anticipated supply chain, SouthCoast Wind has asked for suppliers to provide their localization plans and ability to provide domestic content. Information on fringe benefits, salaries, training pathways, recruitment, and retention plans would vary across the supply chain and would not be under the direct control of SouthCoast Wind. Hiring targets that may be included in contracts for the Project are at the discretion of SouthCoast Wind and are not known.
BOEM-2023-0011-0131-0020	What measures will SouthCoast Wind take to require that the employers pay full cost of GWO and helicopter training and certification the required annual anti-harassment training in Massachusetts or any specialized training needed by workers engaged in the constructions operations maintenance of the project.	Section 3.6.3 describes commitments SouthCoast Wind has made with respect to hiring, training, and working with partners to develop capabilities and experience in the domestic offshore wind industry. Information on fringe benefits, salaries, training pathways, recruitment, and retention plans would vary across the supply chain and would not be under the direct control of SouthCoast Wind.
BOEM-2023-0011-0131-0021	What measures will SouthCoast Wind take to engage with its employers and union stakeholders to develop mutually agreeable plans to provide job opportunities for workers from environmental justice communities and workers displaced by the transition away from fossil fuels in the construction operations and maintenance of the project	Section 3.6.3 describes commitments SouthCoast Wind has made with respect to hiring, training, and working with partners to develop capabilities and experience in the domestic offshore wind industry. Information on fringe benefits, salaries, training pathways, recruitment, and retention plans would vary across the supply chain and would not be under the direct control of SouthCoast Wind. Refer also to response to comment BOEM-2023-0011-0121-0002.
BOEM-2023-0011-0131-0022	What measures will SouthCoast Wind take to make sure the jobs created are accessible by public transportation or by a SouthCoast Wind shuttle or transit program so that there is not an unreasonable long commute time to the work location	Section 3.6.3 describes commitments SouthCoast Wind has made with respect to hiring, training, and working with partners to develop capabilities and experience in the domestic offshore wind industry. Information on fringe

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	in order to make the jobs more accessible to workers who may not own or have access to cars	benefits, salaries, training pathways, recruitment, and retention plans would vary across the supply chain and would not be under the direct control of SouthCoast Wind.
BOEM-2023-0011-0131-0023	What measures will SouthCoast Wind take to make sure employers are living up to their commitments with regard to fair employment practices	Section 3.6.3 describes commitments SouthCoast Wind has made with respect to hiring, training, and working with partners to develop capabilities and experience in the domestic offshore wind industry. Information on fringe benefits, salaries, training pathways, recruitment, and retention plans would vary across the supply chain and would not be under the direct control of SouthCoast Wind. SouthCoast Wind has committed to implementing the labor and apprenticeship requirements of the Inflation Reduction Act.
BOEM-2023-0011-0131-0024	What measures SouthCoast Wind will take to make publicly available fair employment policies such as requirement for Project Labor Agreements Labor Peace Agreements Best Value Contracting and adoption of prevailing wages	Please refer to responses to comments BOEM-2023-0011-0130-0012 and BOEM-2023-0011-0131-0021.
BOEM-2023-0011-0131-0025	What measures will SouthCoast Wind take to maintain harmonious labor relations and provide information to union stakeholders relating to the employment and working conditions of workers the project	Please refer to responses to comments BOEM-2023-0011-0130-0012 and BOEM-2023-0011-0131-0024.
BOEM-2023-0011-0131-0026	What measures will SouthCoast Wind take to ensure high levels of workplace safety including a detailed worker-informed written safety program for employees and subcontractors	Section 3.6.3 describes commitments SouthCoast Wind has made with respect to hiring, training, and working with partners to develop capabilities and experience in the domestic offshore wind industry. Information on fringe benefits, salaries, training pathways, recruitment, and retention plans would vary across the supply chain and would not be under the direct control of SouthCoast Wind.
BOEM-2023-0011-0131-0027	What measures will SouthCoast Wind take to require contractors and subcontractors to certify that workers are properly classified	Section 3.6.3 describes commitments SouthCoast Wind has made with respect to hiring, training, and working with partners to develop capabilities and experience in the domestic offshore wind industry. Information on fringe benefits, salaries, training pathways, recruitment, and

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		retention plans would vary across the supply chain and would not be under the direct control of SouthCoast Wind.
BOEM-2023-0011-0132-0101	The socio-economic impacts to Nantucket are grossly understated and further study is needed. The document correctly states that 100 % of Nantucket's economy is based on tourism but it fails to acknowledge the impact to low wage seasonal workers who tend to be from underrepresented groups such as immigrants and people of color. Independent study and research are clearly needed to understand the impact to this fragile island tourism economy.	Information regarding lower-income workers can be found in Final EIS Section 3.6.4, *Environmental Justice*. Final EIS Section 3.6.8, *Recreation and Tourism*, includes analysis of anticipated effects on tourism, which are expected to be moderate.
BOEM-2023-0011-0132-0122	In Table 4.1-1 the impacts in the categories of "Demographics Employment and Economics" do not include the loss of tourism revenues and jobs on Nantucket.	The comment refers to EIS Section 4.1, *Unavoidable Adverse Impacts of the Proposed Action*. Demographic, employment, and economic impacts cited in this section and the noted table are for the entire geographic analysis area, which encompasses several counties in Massachusetts, Rhode Island, and Connecticut. Table 4.1-1 acknowledges that both construction and operation of the Proposed Action could result in impacts related to decreases in tourism and recreational activities. Impacts are not further disaggregated. Please refer to Final EIS Section 3.6.8, *Recreation and Tourism*, for more specific considerations of particular counties/communities within the geographic analysis area, including Nantucket.
BOEM-2023-0011-0146-0001	is there any kind of published analysis of the return on investment and cost benefit of the Block Island wind farm that has been compared and included with this proposal? And if not I'd like to have that made available to our community so we can review that.	The purpose of the EIS is to evaluate the environmental impacts of the Project and a cost benefit analysis of the Block Island wind farm is outside the scope of this analysis. Furthermore, BOEM is not aware of such an analysis being prepared. NREL has developed a cost benefit analysis tool for windfarm operations at the following link: https://www.nrel.gov/docs/fy23osti/83712.pdf (Hammond and Cooperman 2022).
BOEM-2023-0011-0158-0004	The final adverse impact is the effect on the rate payers that are going to buy this electricity. This is not really adequately covered in the impact statement because the fact is that the	Please refer to response to comment BOEM-2023-0011-0030-0001.

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	power contract that SouthCoast Wind has signed they are really not going to be able to meet it.	
BOEM-2023-0011-0158-0005	Another adverse impact which is really not discussed in the impact statement there is a lot of supposed benefits related to U.S. jobs but the fact is that the sponsors of SouthCoast Wind they are all foreign-owned companies. There is Shell Renewables from the UK and there is Ocean Winds which is made up of two consortiums French company ENGIE and Spanish company EDP. ENGIE in fact invests in nuclear power in France which is a much preferred way to address climate change rather than this offshore wind proposal. There is a Dutch company that's going to do the geo scan there is a Dutch company that's going to do construction and cabling and there is a Danish company that's going to do the substation construction where is the U.S. involvement in this?	Final EIS Section 3.6.3.5 includes estimates on direct, indirect, and induced employment from the Project, which include jobs created through increased demand for materials, equipment, and services. SouthCoast Wind has not yet selected manufacturers for all of the required equipment and material, so the manufacturing location is not known, but the analysis in the EIS accounts for the fact that some jobs will occur overseas. SouthCoast Wind has stated it will source equipment, materials and supplies, and other services such as vessel provisioning and servicing, and certain fabrication work, from within the region to the extent feasible. SouthCoast Wind has also committed to making O&M jobs locally based in the state(s) that procure energy from the Project.

N.6.16 Environmental Justice

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BOEM-2023-0011-0130-0007	The FEIS should include information about stakeholder engagement and consultation with environmental justice populations and federally recognized and state acknowledged tribes. Several of the ports under development to become critical staging areas for offshore wind projects are located in environmental justice communities. The FEIS should include steps that are being taken to ensure these and other environmental justice communities are seeing economic benefits and not subjected to undue burdens. 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.	Regarding stakeholder engagement and consultation and finding of disproportionate burden, refer to response to comment BOEM-2023-0011-0056-0008. Regarding the realization of economic benefits, Section 3.6.4.6 of the Draft EIS discusses the economic benefits that environmental justice communities may experience due to the Project, including long-term effects such as decreased air emissions and increases in for-hire recreational fishing due to the artificial reef effect.

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BOEM-2023-0011-0130-0014	SouthCoast Wind has made financial contributions to support diversity in the offshore wind workforce. We would recommend that the FEIS provide further detail of plans to ensure that economically marginalized communities are able to access the full pipeline from workforce development and wraparound supports through employment in the offshore wind supply chain development operations and maintenance.	Section 3.6.4.6 of the Final EIS states that SouthCoast Wind has committed to hiring individuals local to the Project area for 75 percent of the O&M workforce, which could provide local communities, including environmental justice communities, employment for the duration of the Project's lifespan. Section 3.6.4.6 also notes that SouthCoast Wind is additionally encouraging local hiring of construction crew, which may result in employment opportunities for many environmental justice populations. Section 3.6.3*, Demographics, Employment, and Economics*, also notes that the offshore wind industry at large is expected to support as many as 82,500 FTE jobs in 2030, approximately 40 percent of which would be long-term, O&M positions.
BOEM-2023-0011-0131-0002	Thus, consistent with the Act BOEM must require bidders for offshore leases to detail how their plans will promote and preserve the welfare of the communities affected by the project for which the lease is sought. These communities include the persons who will work on the project who will maintain the project who will produce the materials to be used in the project and the communities proximate to the development the ports and infrastructure that will support the project. The term "human environment" has a particular meaning. Congress defined the term to mean "[t]he physical social and economic components conditions and factors which interactively determine the state condition and quality of living conditions employment and health of those affected directly or indirectly by activities occurring on the outer Continental Shelf." 43 U.S.C. § 1331(i). See also 30 § CFR 585.112. BOEM's own regulations require prospective lessees to describe in their Site Assessment Plans GAPs and Construction Operations Plans information concerning the project's implications for "[e]mployment existing offshore and coastal infrastructure (including major sources of supplies services energy and water) land use . . . [and] minority and lower income groups." 30 CFR §§ 585.611(b) 585.627(7) and 585.646(7). For these reasons we urge BOEM to require much	Section 3.6.3, *Demographics, Employment, and Economics*, states that the offshore wind industry is expected to support as many as 82,500 FTE jobs in 2030, approximately 40 percent of which would be long-term, O&M positions. The section also describes the employment benefits for the Project, which include 530 FTE job-years during development, 5,760 FTE job-years during construction, 20,330 FTE job-years during operations, and 310 FTE job-years during decommissioning. Section 3.6.4, *Environmental Justice*, also notes that SouthCoast Wind has committed to making at least 75 percent of the O&M workforce local. Sections 3.4.1, *Air Quality*, 3.6.3, *Demographics, Employment, and Economics,* and 3.6.4, *Environmental Justice*, of the Final EIS discuss the potential Project impacts on economics, employment, and health at greater length.

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	more information from the Project than is currently described in the DEIS. BOEM must be seeking information that will help empower affected environmental justice communities and help close the wealth gap through good union careers. We note that this is precisely what the President has demanded that agencies do with E.E. 14008 §§ 217 and 219.	
BOEM-2023-0011-0132-0125	Table 4.1-1 attempts to address social justice but fails to address the loss of tourism jobs on Nantucket which will impact low-income people as well as people of color and other disadvantaged workers.	Chapter 4, Table 4.1-1, of the Draft EIS notes in the resource areas for both demographics, employment, and economics and environmental justice that the Project may have unavoidable adverse impacts on employment or income. The potential adverse employment impact on environmental justice as described in Table 4.1-1 refers specifically to low-income, minority, and other disadvantaged populations. BOEM has updated Section 3.6.4.6 of the Final EIS to acknowledge that Nantucket and Martha's Vineyard both contain underserved populations within the viewshed of the Project's WTGs. BOEM determined that while these communities may experience some reduced recreational and tourism activity, the visible presence of WTGs would be unlikely to affect shore-based or marine recreation and tourism in the geographic analysis area as a whole.
BOEM-2023-0011-0177-0002	One is that you have a section on social justice and the town of Nantucket is completely ignored in that section. The number of tourism jobs that are at stake here in an economy that relies almost 100 percent on tourism is significant and I think that Nantucket was completely skipped over in your -- there is no -- you are not taking into consideration the impact on tourism jobs which will obviously be significant.	Section 3.6.4.1 of the Final EIS, which defines Massachusetts environmental justice communities according to the State of Massachusetts guidelines, has been updated to indicate that the town of Nantucket includes a community that meets the minority criteria for environmental justice communities. BOEM has updated Section 3.6.4.6 of the Final EIS to acknowledge that Nantucket and Martha's Vineyard both contain minority populations within the viewshed of the Project's WTGs. BOEM determined that while these communities may experience some reduced recreational and tourism activity, the visible presence of WTGs would be unlikely to affect shore-based or marine recreation and tourism in the geographic analysis area as a whole. Furthermore, views of WTGs would be sustained from many

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		coastal communities along the shore and would not disproportionately affect environmental justice populations. The impacts of the Project on employment and tourism are discussed at greater length in Section 3.6.3, *Demographics, Employment, and Economics*, and Section 3.6.8, *Recreation and Tourism*, respectively, of the Final EIS.

N.6.17 Land Use and Coastal Infrastructure

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BOEM-2023-0011-0029-0001	There seems to be some debate as to whether the EMF that radiates from these cables would cause health related issues to the large number of adults and children that frequent this area. Based on the limited studies there seem to be conflicting results. Key points of the Exponent Inc. Report are summarized below. • The early study conducted by the WHO indicated in the WHO 2007 Report that there was a link between EMF and childhood leukemia. Subsequent studies cast some doubt on these results but the conclusion was that some precautionary measures are warranted in interpreting these results. The WHO also stated that "However some gaps in knowledge about biological effects exist and need further study." • A study was conducted that demonstrated a potential relationship between the residential proximity to overhead and underground transmission lines and childhood cancer. • Su et al. (2018) study between parental exposure to ELF magnetic field and childhood CNS (central nervous system tumors) reported a weak statistically significant association between material exposure to ELF magnetic fields and CNS tumors. Also states that the results provide limited evidence for an association which should be explained with caution.	The SouthCoast Wind COP has two appendices that address electromagnetic field (EMF) concerns: Appendix P1, Electric and Magnetic Field Assessment for the Proposed Mayflower Wind Project, and Appendix P2, High Voltage Direct Current Electric and Magnetic Field Assessment. In Appendix P1, SouthCoast Wind states that magnetic field levels were modeled for the onshore transmission route and represent six underground installation scenarios for onshore export cables buried at a minimum depth of 3 feet. All scenarios are less than the International Commission on Non-Ionizing Radiation Protection health-based guideline of 2,000 milligauss (mG) for allowable public exposure of 60-hertz (Hz) magnetic fields at approximately 197 mG to 403 mG. Common household appliances (refrigerators, lamps, electric ranges, heaters) emit a larger frequency of magnetic field than these cables would. Some of the modeled scenarios are greater than the Massachusetts guideline of 85 mG for magnetic fields at right-of-way (ROW) edges; it should be noted that this guideline is not health based and was established in the 1980s to maintain the status quo for EMF levels on and near overhead transmission line ROW. Additionally, the United States has no federal standards limiting general public or residential exposure to 60-Hz EMF. Appendix P2 assesses the potential human health impact from HVDC. The report concludes that there is not significant

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	• Another study indicated that a small association between ELF/EMF and adult brain cancer could not be ruled out. • Carles et al. (2020) investigated the association between residential proximity to power lines and brain tumor development among adults in France. Several statistically significant associations were reported. These were later challenged. • Another statement reflected that while some scientific uncertainty remains on a potential relationship between adult lymphohematopoietic malignancies and magnetic field exposure because of continued deficiencies in study methods. • • The WHO 2007 Report indicated while there is some evidence for increased risk of miscarriage associated with measured maternal magnetic field exposure the evidence is inadequate. • The WHO also stated “when evaluated across all studies there is only very limited evidence of an association between estimated ELF exposure and Alzheimer’s disease risk. • Li et al. (2020) assessed whether maternal exposure to magnetic fields was associated with the development of ADHD in their offspring. The authors reported a statistically significant association between mothers exposed to high levels of magnetic fields and diagnosis of ADHD in offspring. It is difficult to understand how anyone who reads this report can conclude with certainty that this Southcoast Wind Project is safe for the beachgoers tourists residents children and grandchildren that visit frequently. Based on 43 years working for medical technology companies that conducted clinical studies and filed for FDA clearance before they could market their products it was obvious that study results can be significantly influenced by the study design critical criteria measured and the follow-up period. The varying results reported under these different studies demonstrated that the	enough research done to determine adverse human health effects from HVDC EMF. Appendix P2 also states that there are no United States federal standards limiting general public or occupational exposure to EMF from HVDC, and that research has primarily been focused on the adverse human health effects from HVAC. There is some evidence, however, for acute health effects from highly elevated magnetic fields, but the exposure would have to be in excess of 1 tesla (10,000,000 mG), which the Proposed Action would not reach.

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	health risks are real and the state and town officials need to make the safe and right decision for their constituents. How can anyone conclude that consistent exposure to EMF is safe in a densely populated residential and highly utilized recreational area? The magnitude of this project and the potential health risks requires the state town and company officials to invest the time effort and dollars to identify a more appropriate onshore location.	
BOEM-2023-0011-0034-0003	Exiting the Park the cables would be buried in Worcester Ct. which is bordered by many mature shade trees and sidewalks. The road contains recently installed sanitary sewers gas and water lines and storm water drains and structures. The sanitary sewer lines and manholes are in the center of the 24 foot wide road. Placement of the duct bank is problematic to say the least if not impossible. Placing the cables on either side of the sewer structures would require removal of trees and shrubs in perpetuity along a scenic residential street. In a short stretch of Worcester Ct. from Lake Leaman Rd. to Alma Rd. (less than 1000 feet) there are eight sewer manholes several storm drains mature trees on both sides a sidewalk on the west side and of course water and gas lines.	Comment noted. The precise location where cables would be buried in relation to the road/public ROW has not yet been determined. The information regarding recently constructed improvements is noted.
BOEM-2023-0011-0090-0002	My concerns are there is a lack of information on the digging stages areas. No indication in the Construction and Operations Plan with the intentions with RWU or Montaup. There is MAJOR disruption for students in the dorm as well for the golfers at Montaup.	As described in Final EIS Section 2.1.2.1 and depicted on Figure 2-4, there are three cable route options, one with two sub-options, that include HDD staging areas on Aquidneck Island. Additional information on the staging areas is contained in COP Volume 2, Section 12.1.2, including aerial photos showing the location of the landfall locations, inclusive of staging areas, for the site across Anthony Road from Roger Williams University parking lot and Montaup Country Club. Final EIS Section 3.6.5.5 describes the impacts from construction of onshore infrastructure, including onshore cables and the landfall/HDD staging area sites, related to land disturbance, noise, and traffic. As stated in this section, installation of the cable landfall sites and underground cable routes would disturb neighboring land

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		uses through construction noise, vibration, dust, and travel delays along the affected roads, but the impacts would be temporary and the sites would be returned to their previous condition in use. In addition, construction staging would occur in parking lots adjacent to or near the landfall locations at Aquidneck Island, which may temporarily reduce available parking; however, impacts would be limited because construction would be outside of the peak tourism seasons.
BOEM-2023-0011-0110-0003	The EIS devotes a considerable amount of analysis to the impact of SCW's project on everything from bats to birds to sea turtles but precious little to the impact on human health (actually just one conclusory paragraph in section 3.6.5.5). Why is this and why isn't there extensive analysis on this topic? The EIS indicates that SCW's cables could carry anywhere from 200000 volts to 525000 volts at different points along its route. It's not clear if the cable at the POI is limited to 375000 volts or if it might carry as many as 525000 volts. Needless to say this is a huge amount of electricity that SCW wants to run through a residential community irrespective of any proposed mitigation measures. My immediate concern is with the attendant EMF radiation both at the beach and all along Worcester Park given that the cable(s) will run only feet under the surface. The EIS states in section 3.6.5.5 that the "EMF impacts on land use would be long term but negligible" citing a single 2010 international study on the subject. My understanding is that the effect (particularly long term) of EMF radiation on humans is at best inconclusive and I'm not aware of any studies that have examined the effects of a 375 or 525 kv cable running three feet under a community park. The EIS indicates that the exposure level should be no more than 400 milligaus (I'm not even sure if that figure is verifiable); however other experts believe that there is no safe level (especially for children) above 1 milligauss. The bottom line is that the cited 2010 study notwithstanding there appears to be no general consensus on safe levels of EMF exposure and the fact that	Please refer to response to comment BOEM-2023-0011-0029-0001 above, which describes the studies and literature review that have been conducted relative to HVAC and HVDC EMF. As presented in Volume 1 of the COP (Table 3-14) and Appendix C of the Draft EIS, *Project Design Envelope and Maximum-Case Scenario*, as part of SouthCoast Wind's PDE, the voltage for the Falmouth export cables would be 200 kilovolts (kV) to 345 kV if HVAC is used or ±525 kV if HVDC is used. As discussed in Final EIS Section 3.6.5, based on available literature and anticipated levels of EMF, no adverse human health impacts from HVAC and HVDC are anticipated.

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	there is no such consensus should cause BOEM to take a much harder examination of this issue. Anything less is wholly inimical to the public interest and frankly irresponsible.	
BOEM-2023-0011-0166-0004	Another issue facing Falmouth just outside of Falmouth Heights is the converter station that's going to be at the substation. There is a noise component that's associated with a converter station and we have seen it reported in excess of 80 decibels. That must be mitigated and I think SouthCoast will certainly have to address that issue.	The analysis of operational acoustics in Falmouth is presented in Final EIS Section 3.6.5.5 under the *Noise* IPF. The analysis captures the maximum noise impacts for the Lawrence Lynch and Cape Cod Aggregates sites, whether an HVAC substation or HVDC converter station moves forward. SouthCoast Wind has committed to complying with the MassDEP requirement to achieve noise levels no more than 10 A-weighted decibels (dBA) greater than ambient noise levels at any inhabited buildings near either property for sound produced by the facility during its 24-hour operation. The analysis of operational acoustics presented in the COP (Volume 2, Section 9.1) found that noise-mitigating sound walls would be required for an HVAC substation to achieve compliance. For the HVDC converter station, similar mitigations could be employed, if necessary. However, with its smaller footprint, the fence line of an HVDC converter station would be farther from sensitive noise receptors (such as residences), allowing for greater noise attenuation.

N.6.18 Navigation and Vessel Traffic

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BOEM-2023-0011-0065-0019	Navigation: We oppose any approval of projects until a comprehensive solution to marine vessel radar interference can be completed tested and verified for success. The National Academies of Sciences (NAS) 2022 study entitled "Wind Turbine Generator Impacts to Marine Vessel Radar (2022 was supported by contracts between the National Academy of Sciences and Bureau of Ocean Energy Management under Award Number 140M0119D0001/140M0121F0013. [Footnote 23National: Academies of Sciences Engineering and Medicine. 2022. Wind	The Draft EIS addresses the adverse impacts of WTG structures on marine vessel radars in Sections 3.6.6.3 and 3.6.6.5 under the *Presence of Structures* IPF. As part of its assessment, BOEM considered the USCG analysis of WTG array impacts on marine vessel radar included as part of *The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study* (MARIPARS, USCG 2019-0131), published May 14, 2020, and the National Academies of Sciences, Engineering, and Medicine 2022 study published by the National Academies Press (2022) titled *Wind Turbine*

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	Turbine Generator Impacts to Marine Vessel Radar. Washington DC: The National Academies Press. See document at Wind Turbine Generator Impacts to Marine Vessel Radar |The National Academies Press.] (https://nap.nationalacademies.org/catalog/26430/wind-turbine-generator-impacts-to-marine-vessel-radar) It details the very real and life threatening issue of marine vessel radar interference and contains no immediate or concrete solutions. BOEM cannot simply as it did in the case of the Vineyard Wind project simply contain a "mitigation measure" that requires the developer to study and develop a potential solution after construction has already occurred. [Footnote 24: See Vineyard Wind ROD p. 95 mitigation measure 88.] This puts US mariner's lives at risk and is unacceptable. We have requested for years that the USCG and BOEM conduct modeling studies as the USCG did for the Cape Wind project for the MA WEA and other East Coast lease areas utilizing both the size and number of turbines planned for each area. We have requested implementable solutions prior to project approval not "potential future mitigation measures" to be developed after the fact. BOEM has a responsibility under OSCLA to "ensure… (A) safety". Ensuring safety means that there are implementable and successful solutions before construction not afterwards. Hope in the future is not a solution. Furthermore if the National Academies of Sciences radar experts could not come up with immediate solutions it is doubtful that a developer or BOEM will be able to do so. BOEM is accountable to act on the information it possesses; it cannot abdicate this accountability to a potential future solution when mariners' lives will be placed in danger in the now.	*Generator Impacts to Marine Vessel Radar*. This latter reference, cited by the commenter, is already incorporated in the Draft EIS. BOEM will continue to engage with the fishing community, offshore wind developers, and other stakeholders regarding the issue of marine vessel radar interference. However, BOEM cannot delay approval of the Project for an indefinite amount of time for new technological solutions to be tested, as doing so would jeopardize the economic viability of the Project and would not meet the purpose and need. BOEM expects that certain technology-based measures and non-technology-based measures will be used to reduce impacts on marine radar such as greater use of an Automatic Identification System (AIS) and electronic charting systems, new technologies like light detection and ranging (LiDAR), employing more watch-standers, and avoidance of wind farms altogether. This information has been added to Section 3.6.6.3 under the *Presence of Structures* IPF. It is outside the scope of the NEPA process to require additional USCG analyses or studies beyond what USCG has relied upon for its review and decisions regarding the Project.
BOEM-2023-0011-0065-0020	BOEM's DEIS takes the developer's word that "Most instances of interference could be mitigated through the proper use of radar gain control (Mayflower Wind 2022)". [Footnote 25: DEIS p. 3.6.1-52.] This is in direct contradiction to the National Academies of Science's experts who noted that "Given the	In Sections 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*, and 3.6.6, *Navigation and Vessel Traffic*, BOEM acknowledges the impacts on marine vessel radar, citing the 2022 National Academies of Sciences study on WTG impacts on marine vessel radar. The National

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	copious detections shown on the MVR display in Figure 2.10 a natural operator response is to adjust the detection threshold upward (reduce the receive gain) to “declutter” the PPI. Unfortunately the unintended consequence of an increased detection threshold is the suppression of weaker returns from smaller vessels or objects such as buoys that “fall under” the detection threshold setting. This undesirable consequence was acknowledged by MVR manufacturers who further indicated that small vessels were primarily the domain of coast guards navies and search and rescue (SAR) operators.	Academies of Sciences study concludes that WTGs do cause interference to marine vessel radar, decreasing the effectiveness of the Maritime Transportation System and potentially complicating maritime surface search and rescue (SAR) operations. BOEM expects that certain technology-based measures and non-technology-based measures will be used to reduce impacts on marine radar such as greater use of AIS and electronic charting systems, new technologies like LiDAR, employing more watch-standers, and avoidance of wind farms altogether. This information has been added to Section 3.6.6.3 under the *Presence of Structures* IPF.
BOEM-2023-0011-0065-0021	Moreover in the context of navigation it was suggested that smaller boats could easily maneuver out of the way of larger ships. Such statements are concerning however as the complexities of multiple ships traversing a large WTG farm may complicate the perceived ease with which small craft can maneuver from harm’s way or the corresponding impact on other vessels responding to attempts to navigate free of collision.” [Footnote 26: National Academies of Sciences Engineering and Medicine. 2022. Wind Turbine Generator Impacts to Marine Vessel Radar. Washington DC: The National Academies Press. See document at Wind Turbine Generator Impacts to Marine Vessel Radar |The National Academies Press p. 37-38.] (https://nap.nationalacademies.org/catalog/26430/wind-turbine-generator-impacts-to-marine-vessel-radar) BOEM cannot continue to prefer a developer’s assertions over actual expert conclusions whether that be NOAA or the National Academies of Sciences. Our vessels consistently transit the proposed Project area and the lives of our captains and crew are at stake.	In Section 3.6.6.5 under the *Presence of Structures* IPF, BOEM acknowledges the navigational complexities for vessels navigating through a wind farm, noting that all vessels will need to navigate with greater caution. Given the uniform grid pattern and the 1-nm spacing between turbines, BOEM anticipates that smaller vessels may choose to navigate through the wind farm area. However, the analysis also notes that Proposed Action structures would increase the risk of allision, as well as collision with other vessels navigating through WTGs, and could interfere with marine radars, resulting in a moderate impact on navigation.
BOEM-2023-0011-0065-0022	BOEM states that “Impacts on navigation can also be mitigated with AIS and electronic chart systems which many fishing vessels use as well as use of additional watchstanders (National Academies of Sciences Engineering and Medicine	The National Academies of Sciences study, *Wind Turbine Generator Impacts to Marine Vessel Radar,* Chapter 3, which is cited in the Final EIS, does identify use of AIS and electronic charting systems and employing more watch-

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	2022)" but it apparently has not actually read the report. The Working Group found no immediate solutions to the problem of radar interference. Key findings of the committee included "no standard approach to active radar deployment for operation in a WTG environment is available" and that the USCG recognizes that "how MVR will lose efficacy in a WTG environment and corresponding impact on navigation performance requires in-depth testing and evaluation". [Footnote 27: Ibid p. 66.] Additionally contrary to BOEM's assertion not all vessels particularly the recreational vessels that BOEM expects to increase in offshore wind areas carry AIS making AIS a non-solution unless BOEM were to require that all vessels in the area-including recreational vessels-possess AIS. Electronic charts do not help you see radar targets. Additional watch standers do not help if your radar is not functioning. None of these are acceptable "solutions" or "mitigations" to the loss of radar. Loss of radar is loss of navigability.	standers for vessels as mitigating methods if the effectiveness of marine vessel radar is degraded. The study also notes these methods cannot "replace the instantaneous, active engagement with the environment of an MVR [marine vessel radar]." BOEM acknowledges in Section 3.6.6.5 under the *Presence of Structures* IPF of the Final EIS that while other navigation tools are available, marine vessel radar is the main tool used by most vessels, and the potential for degradation of radar within or near the wind farm area would result in a moderate impact on navigation.
BOEM-2023-0011-0096-0001	We have concerns about the placement of the offshore export cables from the SouthCoast Wind Energy project. As the Falmouth cable corridor runs north of Martha's Vineyard it appears to overlap with an area of high towing vessel traffic. Similarly the Brayton Point corridor will follow the flow of maritime traffic up the Sakonnet River. If a vessel transiting along these routes must lower an anchor during an emergency situation it would risk inadvertently striking one of these cables. This could be dangerous to mariners and the environment. If it is not possible to find an alternative route for the cables the best practice is for them to cut perpendicularly across the transit route and be buried at least 15 feet deep. This will reduce safety risks to vessel operators to the environment and to the cables themselves.	The Draft EIS assesses the impacts associated with anchoring over export cables in Section 3.6.6.5 under the *Anchoring* IPF. As described, SouthCoast Wind has conducted a Cable Burial Risk Assessment to calculate the target cable-lowering depth to minimize risks associated with offshore export cable burial. The offshore export cables would be buried at a target depth of 6 feet (1.8 meters) but may be up to 13.1 feet (4 meters) deep depending on site specific conditions. If sufficient burial depth cannot be achieved, armoring or other cable protection would be used to protect cables and would avoid direct contact with an anchor. The analysis in the Draft EIS determined that impacts from anchoring in an emergency situation would be negligible.
BOEM-2023-0011-0106-0005	We oppose any approval of any wind lease area project until a viable tested and proven marine radar system is verified by the National Academy of Sciences (NAS) and an industry	The Draft EIS addressed the adverse impacts of WTG structures on marine vessel radars in Sections 3.6.6.3 and 3.6.6.5 under the *Presence of Structures* IPF. As part of its

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	chosen group of commercial trawl fishermen working jointly that solves the marine radar interference issue. The system must be able to be produced ordered and received within a timely fashion and is comparable in cost to other commercial fishing radar systems. To allow a lease holder to promise monitoring and mitigation in the future when the danger is clear and present now is unacceptable. No commercial fishermen should have his life put in jeopardy while developers continue to kick the safety can down the road promising solutions that do not work and BOEM allows them to do so. The National Academies of Sciences Engineering and Medicine 2022 report "Wind Turbine Generator Impacts to Marine Vessel Radar" made clear one cannot just reduce the gain and move forward. BOEM should understand the seriousness of this issue since safety is a core tenet the Secretary of the Interior must ensure within the Outer Continental Shelf Lands Act. Requiring AIS of all commercial vessels would be an added expense that many could not afford and recreational boats are not required to have AIS which would make targets within a wind energy area during fog or inclement weather still invisible to the commercial boat inside a turbine field.	assessment, BOEM considered the USCG analysis of WTG array impacts on marine vessel radar included as part of MARIPARS (USCG 2019-0131), published May 14, 2020, and the National Academies of Sciences, Engineering, and Medicine 2022 study published by the National Academies Press (2022) titled *Wind Turbine Generator Impacts to Marine Vessel Radar*. BOEM will continue to engage with the fishing community, offshore wind developers, and other stakeholders regarding the issue of marine vessel radar interference. However, BOEM cannot delay approval of the Project for an indefinite amount of time for new technological solutions to be tested, as doing so would jeopardize the economic viability of the Project and would not meet the purpose and need. BOEM expects that certain technology-based measures and non-technology-based measures will be used to reduce impacts on marine radar such as greater use of AIS and electronic charting systems, new technologies like LiDAR, employing more watch-standers, and avoidance of wind farms altogether. This information has been added to Section 3.6.6.3 under the *Presence of Structures* IPF.
BOEM-2023-0011-0136-0034	BOEM must identify test and verify a comprehensive solution to marine vessel radar interference for all offshore wind development projects. The National Academies of Sciences (NAS) 2022 study entitled "Wind Turbine Generator Impacts to Marine Vessel Radar". [Footnote 29: National Academies of Sciences Engineering and Medicine. 2022. Wind Turbine Generator Impacts to Marine Vessel Radar. Washington DC: The National Academies Press. Available at https://nap.nationalacademies.org/catalog/26430/wind-turbine-generator-impacts-to-marine-vessel-radar] It details the very real and life threatening issue of marine vessel radar interference and contains no immediate or concrete solutions. BOEM cannot simply contain a "mitigation measure" that requires the developer to study and develop a	See response to comment BOEM-2023-0011-0065-0019.

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	potential solution after construction has already occurred as they did with the Vineyard Wind project. [Footnote 30: See Vineyard Wind ROD p. 95 mitigation measure 88.] This puts US mariner's lives at risk and is unacceptable. We have requested for years that the USCG and BOEM conduct modeling studies as the USCG did for the Cape Wind project for the MA WEA and other East Coast lease areas utilizing both the size and number of turbines planned for each area. We have requested implementable solutions prior to project approval not "potential future mitigation measures" to be developed after the fact. BOEM has a responsibility under OSCLA to "ensure... (A) safety". Ensuring safety means that there are implementable and successful solutions before construction not afterwards. Hope in the future is not a solution. Furthermore if the National Academies of Sciences radar experts could not come up with immediate solutions it is doubtful that a developer or BOEM will be able to do so. BOEM is accountable to act on the information it possesses; it cannot abdicate this accountability to a potential future solution when mariners' lives will be placed in danger in the now.	
BOEM-2023-0011-0136-0035	BOEM's DEIS takes the developer's word that "Most instances of interference could be mitigated through the proper use of radar gain control." [Footnote 31: See DEIS p. 3.6.1-52] This is in direct contradiction to the National Academies of Science's experts who noted that "Given the copious detections shown on the MVR display in Figure 2.10 a natural operator response is to adjust the detection threshold upward (reduce the receive gain) to "declutter" the PPI. Unfortunately the unintended consequence of an increased detection threshold is the suppression of weaker returns from smaller vessels or objects such as buoys that "fall under" the detection threshold setting. This undesirable consequence was acknowledged by MVR manufacturers who further indicated that small vessels were primarily the domain of coast guards navies and search and rescue (SAR) operators.	See responses to comments BOEM-2023-0011-0065-0020 and BOEM-2023-0011-0065-0021.

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	Moreover in the context of navigation it was suggested that smaller boats could easily maneuver out of the way of larger ships. Such statements are concerning however as the complexities of multiple ships traversing a large WTG farm may complicate the perceived ease with which small craft can maneuver from harm's way or the corresponding impact on other vessels responding to attempts to navigate free of collision." [Footnote 32: National Academies of Sciences Engineering and Medicine. 2022. p. 37-38.] BOEM cannot continue to prefer a developer's assertions over actual expert conclusions whether that be NOAA or the National Academies of Sciences. Our vessels consistently transit the proposed Project area and the lives of our captains and crew are at stake.	
BOEM-2023-0011-0136-0036	BOEM states that "Impacts on navigation can also be mitigated with AIS and electronic chart systems which many fishing vessels use as well as use of additional watchstanders (National Academies of Sciences Engineering and Medicine 2022)" but in fact them Working Group found no immediate solutions to the problem of radar interference. Key findings of the committee included "no standard approach to active radar deployment for operation in a WTG environment is available" and that the USCG recognizes that "how MVR will lose efficacy in a WTG environment and corresponding impact on navigation performance requires in-depth testing and evaluation". [Footnote 33: Ibid p. 66.] Additionally contrary to BOEM's assertion not all vessels particularly the recreational vessels that BOEM expects to increase in offshore wind areas carry AIS making AIS a non-solution unless BOEM were to require that all vessels in the area-including recreational vessels-possess AIS. Electronic charts do not help you see radar targets. Additional watch standers do not help if your radar is not functioning. None of these are acceptable "solutions" or "mitigations" to the loss of radar. Loss of radar is loss of navigability.	See response to comment BOEM-2023-0011-0065-0022.

N.6.19 Other Uses

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BOEM-2023-0011-0117-0023	Rare Earth Metals: Wind turbines require the use of rare earth metals (lanthanides neodymium praseodymium dysprosium terbium). Mining these metals contaminates water tables generates radioactive waste risks harmful human exposure and generates CO2 emissions (Ives 2013). The push for offshore turbines has increased the demand for rare earth metals. The pressure for more supply may require ocean floor mining which will incur another stress on the ocean and on global warming by resuspending carbon previously sequestered in marine sediments further heavy metal contamination of marine food webs and further biodiversity loss. Increasing demand for rare earth metals could have a profound effect on public health (Hamley 2022). BOEM needs to consider the global environmental costs of mining rare earth metals in the overall assessment of the project's environmental impacts.	BOEM does not consider the mining of components used in the Project to be a direct or indirect impact of the Proposed Action or a connected action that would warrant analysis under NEPA. SouthCoast Wind has not proposed development of a mining project as part of its Proposed Action. Should development of offshore wind components require a new or expanded mining operation in the U.S., the mining operator would be required to pursue separate environmental review.
BOEM-2023-0011-0123-0013	The RIDEM is supportive of the SouthCoast Wind Farm and remains committed to minimizing all potential impacts to fish habitat, especially within the Sakonnet River portion of Narragansett Bay. The DMF monitors fish and invertebrate abundance in the Sakonnet River and Mt. Hope Bay and has three surveys regularly sampling near the proposed cable route: • Coastal Trawl Survey (http://www.dem.ri.gov/programs/marine-fisheries/surveys- pubs/coastal-trawl.php) • Narragansett Bay Seine (http://www.dem.ri.gov/programs/marine-fisheries/surveys-pubs/narrabay-seine.php) • Rhode Island Lobster Ventless Trap Survey (http://www.dem.ri.gov/programs/marine-fisheries/surveys-pubs/lobster- ventless.php)	Section 3.6.7.1, *Description of the Affected Environment and Future Baseline Conditions*, of the Final EIS has been updated to include the Rhode Island Department of Environmental Management Division of Marine Fisheries studies provided by the commenter.

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	• Please refer to the hyperlinked websites for survey methodologies. The seine survey samples at fixed locations from May – October annually with a focus on juvenile fish (Figure 1). The trawl survey samples at fixed stations on a monthly basis year-round in addition to seasonal random sampling throughout RI state waters. • Refer to Figures 2-13 for mean annual abundance from the two surveys for Atlantic cod black sea bass summer flounder (fluke) scup tautog and winter flounder. • Both Atlantic cod (Figures 2-3) and black sea bass (Figures 4-5) demonstrate recent increases in overall relative abundance; while fluke (Figures 6-7) scup (Figures 8-9) and tautog (Figures 10-11) remain variable. Winter flounder has been consistently in decline (Figures 12-13). • The Rhode Island Lobster Ventless Trap survey has documented high catch per trap (or catch per unit effort) of lobsters in some years where the Sakonnet River has been selected for randomized sampling (Figure 14). The Sakonnet River also supports a substantial commercial harvest of whelk (both channeled and knobbed) (Figure 15).	
BOEM-2023-0011-0136-0041	A finding of [Bold: major] impacts to scientific research and surveys (p. ES-15) 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 and NOAA are currently working on mitigation strategies to minimize impacts of the Proposed Action on NOAA scientific research and surveys, including the ones used for stock assessment. Section 3.6.7.10, *Proposed Mitigation* Measures, describes the NOAA and BOEM Federal Survey Mitigation Strategy that both agencies are pursuing.

N.6.20 Recreation and Tourism

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BOEM-2023-0011-0034-0005	SouthCoast states construction would occur in the “off-season”. There is no such season in Falmouth Heights. The beaches parking lots and parks are used year-round. Heights Beach parking lot is one of the very few on the southern coast of Falmouth where people can view the water and Marthas Vineyard from their cars. Tourists senior citizens and many handicapped residents enjoy the scenic vistas from the comfort of their cars all year long.	As described in Section 3.6.8.5, *Impacts of Alternative B – Proposed Action on Recreation and Tourism*, construction of onshore components is expected to result in temporary road and/or lane closures (and potential traffic congestion) during installation. SouthCoast Wind will work with the towns of Falmouth, Somerset, and Portsmouth (and others as may be needed) to develop and implement a construction period traffic management plan to avoid and/or minimize disruptions to residents, visitors, commercial uses, and recreational areas in the vicinity of construction activities (Table G-1, Appendix G). Such a traffic management plan will help identify/implement detours where needed.
BOEM-2023-0011-0055-0008	There is a completely subjective conclusion in the Draft that there will be ‘minor’ impact to Recreation and Tourism. A project of this size and scope could only have detrimental effects and ‘Major’ impact there will be no positive benefit to the businesses reliant on tourism. The assessment used by BOEM and its consultants cannot be based on any measurable criteria to reach the conclusion(s) cited.	As described in Section 3.6.8.5, *Impacts of Alternative B – Proposed Action on Recreation and Tourism*, the impacts of the Proposed Action on recreation and tourism are anticipated to be minor with minor beneficial impacts. Short-term impacts from construction and installation activities are expected as a result of noise, anchored vessels, and hinderances to vessel navigation as a result of the installation of the export cable and WTGs. Long-term impacts include the presence of cable scour protection and structures in the Wind Farm Area, which would affect recreational vessel navigation and visual quality. Beneficial impacts would result from the reef effect and sightseeing attraction of offshore wind energy structures. Refer also to Table 3.6.8-1, which provides impact level definitions concerning recreation and tourism. Based on a review of best-available information, none of the conditions cited in the table for “major” impacts are anticipated as a result of the Proposed Action or alternatives.
BOEM-2023-0011-0117-0020	Commercial and Recreational Boating: As the Ocean State Rhode Island takes enormous pride in its boating and	Section 3.6.8 analyzes impacts from the Proposed Action and other offshore wind farms in the geographic analysis area on

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	recreational fishing eminence. SouthCoast Wind and the other OWFs slated for the coastal waters off Rhode Island will substantially negatively impact marine navigation sailing power boating whale watching and most importantly fishing (NOAA McCann 2013). By displacing these activities SouthCoast Wind violates the Outer Continental Shelf Lands Act (43 U.S.C. §§ 1331 et seq.). The BOEM DEIS fails to adequately address the legal, financial, and cultural ramifications of these negative impacts.	recreational activity, including boating and fishing. In the description of the affected environment, BOEM describes the presence and cultural and financial importance of these activities to the region and has added information to the Final EIS on recreational boating and sailing. The analysis notes that while most recreational boating and fishing takes place closer to shore than the Lease Area, boaters and anglers that venture out to the Lease Area would face obstacles from the presence of structures. While the Lease Area would be available to these activities, some boaters and anglers may choose to avoid the Wind Farm Area entirely. Additional analysis of the economic impacts from the wind projects includes Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*, which analyzes of impacts on for-hire recreational fishing, and Section 3.6.3, *Demographics, Employment, and Economics*. Refer also to response to comment BOEM-2023-0011-0055-0008.
BOEM-2023-0011-0117-0026	Moreover Rhode Island hosts 21 million tourists every year. Tourism provides 11% of Rhode Island's jobs and supplies the state with 1.3 billion dollars of tax revenue (RICC 2020). SouthCoast Wind and associated wind farms' turbines will dominate the horizon from nearly every public beach in Rhode Island and will be visible from a distance of 40 miles. The visual impact will affect over 600 popular destinations including 178 public beaches in Massachusetts and Rhode Island. Contrary to BOEM's projections a survey in England indicates that 37% of tourism-related business owners affirm that wind farms have negatively impacted their businesses (Mordue 2020). The BOEM DEIS minimizes the impact on tourism and does not consider the effect this will have on Rhode Island's economy.	The Mordue et al. 2020 study cited by the commenter looks at impacts on tourism-related businesses as a result of onshore wind turbines. Section 3.6.9.5, *Impacts of Alternative B – Proposed Action on Scenic and Visual Resources*, describes changes in seascape, open ocean, and landscape conditions as a result of WTGs and which beaches are anticipated to have visual impacts as a result of the Proposed Action. Within this section refer to Figure 3.6.9-2 and Table 3.6.9-14; the figure and table show that none of the wind turbines associated with the Proposed Action would be visible from any location in the state of Rhode Island. Section 3.6.3.5, *Impacts of Alternative B – Proposed Action Demographics, Employment, and Economics*, provides analysis of potential economic impacts on the tourism industry as a result of the Proposed Action.
BOEM-2023-0011-0128-0008	The Town of Nantucket is a longstanding steward of one of the nation's most significant NHLs yet BOEM refuses to consider its unique history or consider adequately the	Section 3.6.8.1, *Description of the Affected Environment and Future Baseline Conditions*, and Section 3.6.8.5, *Impacts of Alternative B – Proposed Action on Recreation and Tourism*,

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	Project's specific impacts to the community including harm to its tourism economy its financial well-being and tax base and greater sensitivity that heritage tourists have to the loss of historic character and context.	have been revised in the Final EIS to clarify the importance of historic resources, including the Nantucket Historic District, to tourism and recreation on Nantucket, and the potential effects from WTG/OSP visibility on heritage tourists visiting the Nantucket Historic District. As described in Section 3.6.2.5, *Impacts of Alternative B – Proposed Action on Cultural Resources*, portions of up to 743 WTGs will theoretically be visible from the southern shores of the Nantucket Historic District NHL, with the closest WTG approximately 14.8 miles (23.8 kilometers) away from the resource. The Final EIS acknowledges that the presence of visible WTGs from ongoing and planned activities, including the Proposed Action, would have long-term, continuous, and moderate impacts on the Nantucket Historic District NHL and the Nantucket Sound TCP. As part of its responsibilities under Section 106 of the NHPA, BOEM has consulted and will continue to consult with federally recognized Tribes and consulting parties on the identification of historic properties, assessment of effects, and resolution of adverse effects (refer to Appendix I). Mitigation measures determined through consultations for the Nantucket Historic District NHL and stipulated in the MOA (Appendix I, Attachment A), as well as an associated HPTP for the NHL, which is attached to the MOA, will be implemented for the Project to resolve adverse effects in accordance with Section 106 and Section 110(f) of the NHPA, which may also help minimize potential effects on tourism in the Nantucket Historic District from the presence of WTGs. As described in the Final EIS Section 3.6.3 and Section 3.6.8, views of offshore WTGs would have impacts on certain businesses serving the recreation and tourism industry. Impacts could be adverse for particular locations if visitors and customers avoid certain businesses (i.e., hotels or rental dwellings) due to views of the WTGs; impacts could be neutral or beneficial if views do not affect visitor decisions or influence some visitors positively. Based on the relationship

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		between visual impacts and impacts on tourism and the recreational experience, the impact of visible WTGs from the Proposed Action in combination with other ongoing and planned activities would result in long-term, continuous, and minor impacts on recreation and tourism in the overall geographic analysis area, with moderate impacts on shoreline areas with views of WTGs. Seaside locations could experience some reduced recreational and tourism activity, but the visible presence of WTGs would be unlikely to affect shore-based or marine recreation and tourism in the geographic analysis area as a whole and would therefore not have a substantial effect on the tourism economy. For the Proposed Action alone, BOEM anticipates long-term, continuous, but minor impacts on recreation and tourism. BOEM has added discussion to the Final EIS of the impacts on the recreation and tourism economy, including citing several studies (including Parsons and Firestone 2018; Parsons et al. 2020; Smythe et al. 2018; and Trandafir et al. 2020) describing the adverse, beneficial, or neutral impacts from the visual presence of offshore wind projects to further support the conclusions noted above. These studies represent the best available information on impacts on tourism and recreation from the visual presence of offshore turbines. Specifically, text has been added to Section 3.6.3.3 and Section 3.6.3.5 of the *Demographics, Employment, and Economics* section, and Section 3.6.8.3 and Section 3.6.8.5 of the *Recreation and Tourism* section.
BOEM-2023-0011-0128-0009	For example although the DEIS notes that the "scenic quality of the coastal environment is important to the identity attraction and economic health of many of the coastal communities" and that tourism in these communities is a multibillion-dollar industry the DEIS finds the "employment and economic impact would be localized short term and minor." [Footnote 8: DEIS at 3.6.8-1] [Footnote 9: DEIS at 3.6.8-17] In fact the DEIS states falsely that the project would have a beneficial impact on tourism with 2.5% of visitors	Please refer to response to comment BOEM-2023-0011-0128-0008. Final EIS Section 3.6.8.5 has been revised to clarify that 2.5% of visitors coming to see WTGs could offset some lost trips from visitors who consider views of WTGs to be negative (Parsons and Firestone 2018). With regard to impacts on property values and related tax revenues, Hoen et al. (2013) analyzed housing prices from home sales occurring within 10 miles (16 kilometers) of

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	coming to see the wind turbine generators (WTGs). The DEIS fails to contemplate the effect of the wind turbine generators (WTGs) on Nantucket's tourism economy in any serious way—or the effect that SouthCoast Wind will have on historic properties within the community that depend on visitor revenue—from adverse visual effects other than to dismiss the risk. Nor does the DEIS assess the potential for harm to the Town's tax revenues due to SouthCoast's visual blight and risk to property values. To the extent that the DEIS suggests that industrial-scale visual turbine blight would benefit historic communities our client objects. BOEM's conclusion is not supported by credible research. [Footnote 10: DEIS at 3.6.8-16.]	onshore wind facilities in nine U.S. states and found no statistical evidence that home values were affected in the post-announcement/preconstruction or post-construction periods. The Massachusetts Clean Energy Center also commissioned a report—*Relationship between Wind Turbines and Residential Property Values in Massachusetts* (Atkinson-Palombo and Hoen 2014)—to study if home values were affected by their proximity to onshore WTGs. The study analyzed 122,198 home sales occurring between 1998 and 2012 of homes within 5 miles (8 kilometers) of 41 Massachusetts wind turbines. Results of this study indicated that there were no effects on nearby home prices resulting from the development of a wind farm in a community. Brunner et al. (2024) found that onshore wind farms in the United States had temporary adverse impacts on property values within a limited distance (1–2 miles) and that wind farms farther away did not adversely affect property values. A 2017 study found that when placed more than 8 miles (7 nm; 13 kilometers) from shore, there is a minimal effect on vacation rental values associated with offshore wind farms (Lutzeyer et al. 2017). A 2018 study also found that there was no impact on property values when the wind farm is 5.6 miles (9 kilometers) offshore (Jensen et al. 2018). Dong and Lang (2022) found that the Block Island Wind Farm did not adversely affect property values on Block Island or on the Rhode Island mainland. Because Project will be a substantial distance from shore—with the closest WTGs 23 miles (37 kilometers) from Nantucket and 30 miles (48 kilometers) from Martha's Vineyard—any impacts on property values are expected to be negligible. This information was added to the Final EIS, Section 3.6.3, *Demographics*, *Employment, and Economics*.
BOEM-2023-0011-0128-0010	The DEIS contains no analysis of how the Town's tourism economy will be affected even though the Town and its citizens as well as workers depend on it for the current and future maintenance and preservation of the historic	Please refer to responses to comments BOEM-2023-0011-0128-0008 and BOEM-2023-0011-0128-0009.

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	properties under its jurisdiction or control. Under NEPA BOEM must consider a wide range of effects specifically including impacts that are "historic cultural [and] economic." [Footnote 11: 40 C.F.R. § 1508.1(g)(1).] Tourism revenue and property values are vital to the Town of Nantucket's economy. Tourism alone is a $10 billion industry in Massachusetts supporting over 102100 jobs every year. Spoliation of historic landscapes increases the risk of lost tourism revenue and property taxes which are expected to decrease after SouthCoast Wind industrializes the ocean landscape with its unavoidable visual clutter and light. Impacts to our client' tourism economy would be devastating to the economic health of the area and put thousands of jobs in danger creating environmental justice risks. Nevertheless the DEIS ignores these risks in contravention of NEPA.	Section 3.6.4, *Environmental Justice*, discusses the impacts on environmental justice populations in Nantucket from the Proposed Action.
BOEM-2023-0011-0128-0011	Despite this risk the DEIS' discussion of tourism blithely dismisses potential impacts to Nantucket's economy without any serious discussion or supporting research preferring instead to rely on flawed incomplete studies and ignoring industry research that shows that 15% of tourists will not return to oceanfront communities once offshore wind farms are built. Even if 2.5% of visitors travel to see the WTGs as the DEIS suggests the loss of 12.5% of visitors will be devastating to the tourism economy. [Footnote 12: DEIS at 3.6.8-21] Moreover visits to see the wind farm are likely to be a onetime event and will not guarantee repeat visits as the current pristine ocean views do. Thus BOEM cannot support its conclusion that the overall impact to tourism will be "minor" especially when Project impacts at the landscape level are expected to range from "moderate" to "major adverse." BOEM must carefully consider the impacts on our client' unique character as an oceanfront community and its historic properties that qualify as a "resource" both to the area's economy and under NEPA's definition. BOEM must further analyze and quantify these potential adverse effects as BOEM develops the Final EIS.	Please refer to responses to comments BOEM-2023-0011-0128-0008, BOEM-2023-0011-0128-0009, and BOEM-2023-0011-0055-0008.

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BOEM-2023-0011-0132-0098	In section 3.6.8 the following statement is made and it adds significant confusion with regard to lighting as no mention of ADLS is made. Perhaps this the true scenario Nantucket should expect. [Text in Blue: [Bold: "Lighting:] Construction-related nighttime vessel lighting would be used if offshore wind development projects include nighttime dusk or early morning construction or material transport. In a maximum-case scenario lights could be active throughout nighttime hours for other offshore wind projects in the geographic analysis area simultaneously under active construction (Appendix D). Vessel lighting would enable recreational boaters to safely avoid nighttime construction areas. The impact on recreational boaters would be localized sporadic short term and minimized by the limited offshore recreational activities that occur at night.][Text in Blue: In the geographic analysis area permanent aviation warning lighting required on the WTGs would be visible from beaches and coastlines of Martha's Vineyard and Nantucket and could have impacts on recreation and tourism in certain locations if the lighting influences visitor decisions in selecting coastal locations to visit. FAA hazard lighting systems would be in use for the duration of O&M for up to 901 WTGs. The amassing of these WTGs and associated synchronized flashing strobe lights affixed with a minimum of three red flashing lights at the mid-section of each tower and one at the top of each WTG nacelle in the offshore wind lease areas would have long-term impacts on sensitive onshore and offshore viewing locations based on viewer distance and angle of view and assuming no obstructions. Atmospheric and environmental factors such as haze and fog would influence visibility and perception of hazard lighting from sensitive viewing locations (Section 3.6.9 Visual Resources)."] Once again haze and fog are introduced as mitigating but it is on clear nights that the environment is usually enjoyed by the public.	The text cited by the commenter relates to the cumulative impacts of the No Action Alternative. This considers impacts of other planned non-offshore wind and offshore wind activities, as described in Appendix D, *Planned Activities Scenario*. This does not include the Proposed Action or alternatives. Because many of the other planned offshore wind projects in the region are early in the planning process, it cannot be assumed that they will implement ADLS lighting. Please refer to Final EIS Section 3.6.8.5, *Impacts of Alternative B -— Proposed Action on Recreation and Tourism.* Under the *Lighting* IPF, this section of the Final EIS notes SouthCoast Wind's commitment to provide ADLS as part of the Proposed Action, distinct from permanent aviation warning lighting as is currently assumed for other offshore wind projects in the vicinity.
BOEM-2023-0011-0132-0100	In addition the DEIS needs to assess the discomfort of watching blades rotate reduced breeze higher air	Final EIS Section 3.6.9.5, *Impacts of Alternative B – Proposed Action on Scenic and Visual Resources*, describes changes in

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	temperature and audible noise to humans at the shore from turbine operations.	seascape, open ocean, and landscape conditions as a result of WTGs and which beaches are anticipated to have visual impacts as a result of the Proposed Action. With the WTGs proposed to be at least 15 miles distant from the nearest shoreline, the additional effects contemplated by the commenter are not reasonably foreseeable. Please refer to response to comment BOEM-2023-0011-0132-0105.
BOEM-2023-0011-0132-0104	Additional impacts to recreational impacts are discussed on page 3.6.8-13 with the statement [Text in Blue: [Bold: "Presence of structures:] The placement of 901 WTGs (excluding the Proposed Action) in the geographic analysis area would contribute to impacts on recreational fishing and boating. The offshore structures would have long-term adverse impacts on recreational boating and fishing through the risk of allision; risk of gear entanglement damage or loss; navigational hazards; space use conflicts; presence of cable infrastructure; and visual impacts."]For hire recreational fishing is a major attraction on Nantucket. There is no analysis the DEIS as to how this industry especially regarding how deep-sea fishing (Tuna) would be impacted. It appears that some fishing grounds would be inaccessible and others would require re-routing significant distances to reach.	Please refer to Final EIS Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing,* for a discussion of impacts on for-hire recreational fishing, including consideration of access to fishing grounds, including for tuna.
BOEM-2023-0011-0132-0105	The DEIS attempts to make correlations to studies on much smaller turbines in Europe smaller wind farms such as Block Island (only 5 turbines close to shore) and studies where visual simulations have not been provided to the impacts to tourism on Nantucket. It is known that visitors to Nantucket are there for the natural setting including unencumbered views of the ocean. In the same section a University of Delaware Study is mentioned. It is our understanding that this study has been discrediting for referencing much smaller turbines and for not asking follow-up questions. A NC study that shows greater impact is not mentioned. Given the importance of Nantucket as a NHL a study unique to Nantucket should be independently conducted.	The Final EIS cites studies involving smaller WTGs than are proposed for the planned offshore wind projects in the region, including the Proposed Action. For example, the 2018 Parsons and Firestone study was based on turbines with blade tips of 574 feet (175 meters) at distances of 2.5 to 20 miles (4 to 32 kilometers) offshore. In comparison, the Proposed Action's WTGs would have a blade tip height of up to 1,066.3 feet (325.0 meters) but would be 23 miles (37 kilometers) from shore at the closest point. Both the WTGs examined in the studies and the WTGs considered as part of planned offshore wind projects would have WTG hubs, nacelles, navigation lights, and rotor blades visible to viewers on the nearest beaches. The visibility of the WTGs would be

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		variable depending on meteorological, moonlight, and sunlight conditions. In views seaward, there would be periods of high, moderate, low, and no visibility. Therefore, both the 2018 Parsons and Firestone study and this EIS conclude that the WTGs' hubs, nacelles, navigation lights, and rotor blades would be visible to viewers on the nearest beaches. The taller WTGs associated with planned offshore wind projects would result in increased numbers of WTGs visible but they would be at greater distances compared to the cited studies; therefore, the results of the studies are still relevant to this analysis. This information has been added to Final EIS Section 3.6.8. Additional studies have also been added to Section 3.6.8. It is unclear which North Carolina study is being referenced in the comment. Draft EIS Section 3.6.8.3 cited a North Carolina State University study that found nighttime views of aviation hazard lighting would adversely affect the rental price of properties with ocean views (Lutzeyer et al. 2017). Impacts on recreation and the tourism economy throughout the geographic analysis area, which includes Nantucket, are described in both Section 3.6.3 and Section 3.6.8.
BOEM-2023-0011-0132-0106	The document also states generally that [Text in Blue: "WTGs visible from some shoreline locations in the geographic analysis area would have adverse impacts on visual resources when discernable due to the introduction of industrial elements in previously undeveloped views. Based on the relationship between visual impacts and impacts on recreational experience the impact of visible WTGs on recreation would be [Highlighted text: moderate] long term continuous and adverse."] However for Nantucket where tourism is based on the natural environment the impact is undoubtedly [Highlighted text: major].	As described in Final EIS Section 3.6.8.5, *Impacts of Alternative B – Proposed Action on Recreation and Tourism*, impacts of the Proposed Action are anticipated to be minor adverse to minor beneficial. Cumulative impacts of the Proposed Action in combination with ongoing and planned activities are expected to be moderate adverse with minor beneficial impacts. Consistent with the impact rating guidance included within Table 3.6.8-1, the main factors informing this impact rating are the expected extent of visual impacts associated with the presence of structures and lighting; impacts on fishing and other recreational activity from noise, vessel traffic, and cable emplacement during construction; and beneficial impacts on fishing from the reef effect.

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BOEM-2023-0011-0132-0107	The following statement on page 3.6.8-21 makes it apparent that no attempt has been made to understand the reason for tourism to Nantucket whose natural environment draws visitors from the throughout the United States and the world. For example [Text in Blue: "beaches with views of WTGs could gain trips from the estimated 2.5 percent of beach visitors for whom viewing the WTGs would be a positive result offsetting some lost trips from visitors who consider views of WTGs to be negative (Parsons and Firestone 2018)."] That 2.5% of beach visitors would like to take a sightseeing trip to see turbines is preposterous to state as a benefit. In fact that means 97.5% do not want to take such a trip.	The comment is noted. Additional information on potential impacts on recreation and tourism was added to the Final EIS, including a more recent study that showed that beachgoers at local, state, or national park beaches self-reported as more favorable toward wind power and correspondingly appeared less inclined to cancel a trip due to the presence of wind turbines. Notably, the same study cited by the commenter showed that 68% of respondents indicated that WTG visibility would neither improve nor worsen their experience visiting the coast.
BOEM-2023-0011-0132-0108	After providing no data or studies to show how for hire recreational fishing on Nantucket might be impacted the document states on page 3.6.3-26 [Text in Blue: "across the Massachusetts and Rhode Island lease areas up to 1069 offshore structures 149 of which would be attributable to the Proposed Action would affect employment and economics by affecting marine-based businesses. Presence of structures would have both beneficial impacts such as by providing sightseeing opportunities and fish aggregation that benefit recreational businesses and adverse effects such as by causing fishing gear loss navigational hazards and viewshed impacts that could affect business operations and income".] The implication that people would incur the time and expense to travel to Nantucket a place where repeat business to enjoy the natural environment is the norm to take a one-off sightseeing trip to see WTGs is just silly. Without the data to back this up there is no basis to make the claim. Perhaps at least interview local business and maybe the Chamber of Commerce. This entire section shows no attempt to understand the unique tourism economy that encompasses Nantucket.	Analysis of the impacts of the Proposed Action on for-hire recreational fishing, which analyzes impacts across the geographic analysis area including Nantucket, can be found in Final EIS Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*. Coastal Massachusetts, including Nantucket Island, attracts tourists for multiple reasons, including access to recreational activities such as beachgoing, surfing, fishing (inshore and offshore), and boating. As described in Final EIS Section 3.6.8.5, *Impacts of Alternative B – Proposed Action on Recreation and Tourism*, the presence of WTG structures is anticipated to create new benthic habitat that will act as artificial reefs expected to attract numerous species of algae, shellfish, finfish, and sea turtles. This prospective new fishing opportunity could attract anglers and recreational boaters to offshore areas. That same section, along with Section 3.6.3.3, cite studies that found offshore wind turbines may have beneficial impacts on tourism and recreation, including the potential for demand for boat tours of the facilities. Please refer to responses to comments BOEM-2023-0011-0128-0008 and BOEM-2023-0011-0055-0008 regarding the additional analysis that has been added regarding Nantucket. The studies cited throughout Section 3.6.3 and Section 3.6.8, which incorporate data and views of people from a diversity

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		of geographic locations, represent the best available information to inform BOEM's analysis of impacts on tourism and recreation from the visual presence of offshore turbines, including on Nantucket. In addition, BOEM has consulted and will continue to consult with consulting parties, including the Town of Nantucket, to identify effects on historic properties, including the Nantucket Historic District, as part of its responsibilities under Section 106 of the NHPA. BOEM and consulting parties are identifying mitigation measures to resolve adverse effects on the Nantucket Historic District.
BOEM-2023-0011-0132-0110	In section 3.6.8 Nantucket tourism on Nantucket is summarized as follows: [Text in Blue: "Nantucket County is south of Cape Cod and encompasses approximately 44.97 square miles of land (U.S. Census Bureau 2021d). It is 14 miles long and 3.5 miles wide (Town & County of Nantucket MA 2022a). The county consists of the Island of ' which is an extremely popular summer tourist destination. In the summer months the population of the Island of Nantucket increases by a factor of five due to tourists and seasonal residents (COP Volume 2 Section 10.3.1.1.1; Mayflower Wind 2022). The county is home to many beaches such as Brant Point Beach which is home to the Brant Point Lighthouse. One of the most popular beaches on the island is Jetties Beach which has a café restaurant and tourist shop during the summer (Town and County of Nantucket 2022b)."] The statement makes no mention of the island's popular South Shore beaches such as Surfside Cisco Madaket and Ladies some of which have been named to leading travel publications "Most beautiful beaches in the world". There is also no mention of the sunsets on the West side of the island. It is convenient for BOEM and misleading to readers to only mention beaches with views to the North.	Thank you for your comment. Additional contextual information concerning onshore and offshore attractions of Nantucket was added to Final EIS Section 3.6.8.1, *Description of the Affected Environment and Future Baseline Conditions*.
BOEM-2023-0011-0132-0112	The idea that wind turbines would generate tourism interest in Nantucket is a fairy tale. Especially if one agrees with the premise of the document that wind turbines will be	Please refer to responses to comments BOEM-2023-0011-0132-0108 and BOEM-2023-0011-0132-0107.

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	widespread off the coast of MA and RI. The type of repeat tourism that Nantucket experiences and that its economy depends upon is related to the natural beauty and the “unobstructed view of the ocean that is a balm to the soul” (from NHL document) Occasional trips to view wind farms could never come close to replacing what will be lost.M. An independent study of lost tourism dollars is necessary to protect Nantucket’s economy.	
BOEM-2023-0011-0140-0089	As noted earlier the presence of WTG structures could also cause hydrodynamic effects. Hydrodynamic effects occur when structures cause changes in current speed wave height and sediment transport. [Footnote 322: While not discussed in these comments changes to waves could have serious impacts on recreation. In addition to considering how changes in waves may affect marine life the BOEM should consider how changes in waves affect ocean users. Sunrise Wind and BOEM should engage in a robust and transparent stakeholder process with coastal and ocean recreation enthusiasts and experts including sailors kiteboarders surfers and other stakeholders to vet modeling data in relation to potential impacts on wave riding breaks and other wind-driven activities. Such a process would use the best available science and expertise to help build understanding of impacts to wind waves and associated recreation opportunities which may assist in conflict mitigation.]	Section 3.4.2, *Water Quality*, and Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, cite multiple studies of hydrodynamic effects from WTG foundations. These studies identify the potential for wake effects to occur from a few hundred meters to tens of kilometers from a structure. As recreational activities involving waves (surfing, windsurfing, kiteboarding) are generally concentrated near shorelines and are not typically occurring at distances similar to the offshore lease area, BOEM does not expect substantive effects on wind- and wave-driven activities.
BOEM-2023-0011-0158-0003	One thing that's not adequately covered in the impact statement is the impact on the Falmouth economy and tourism industries in particular. This thing is going to make landfall on one of the most popular beaches in Falmouth essentially putting it out of commission for at least one season possibly more it's also going to run a cable right through the heart of the business area of Falmouth essentially cutting the town in half making certain groceries stores pretty much inaccessible and as one commentor in the last meeting said suggested just we are all going to do it during the winter	As described in Section 3.6.8.5, *Impacts of Alternative B – Proposed Action on Recreation and Tourism*, construction of onshore components is expected to result in temporary road and/or lane closures (and potential traffic congestion) during installation. SouthCoast Wind will work with the towns of Falmouth, Somerset, and Portsmouth (and others as may be needed) to develop and implement a construction period traffic management plan to avoid and/or minimize disruptions to residents, visitors, commercial uses, and recreational areas

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	what does that do for the 35000 residents permanent residents of Falmouth that are year round residents.	in the vicinity of construction activities (Table G-1, Appendix G). Such a traffic management plan will help identify/implement detours where needed.

N.6.21 Scenic and Visual Resources

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BOEM-2023-0011-0117-0028	Visibility: The 968-foot-tall wind turbines will be much more visible than the company's simulations imply and will flash red lights during the night. Human visual processing enlarges objects on the horizon. This phenomenon called the Ponzo illusion explains why a full moon rising on the horizon appears much larger than the same moon once it is overhead (Gregory 2013). Humans will experience the turbines as far more sizable than the simulations convey. Human visual processing also pays more attention to moving objects than stationary ones. As a result humans will be keenly aware of these structures on the horizon. BOEM has not adequately considered the visual impact.	The simulations were prepared following accepted professional and industry practices that BOEM believes provide a reasonable depiction of what would be seen by a viewer. Simulations in the COP Appendix T (e.g., KOP 8-N Tom Nevers Field-nighttime) show nighttime lighting of WTGs. Additional information regarding the methodology for preparing the simulations is included in COP Appendix T.
BOEM-2023-0011-0128-0018	The visual simulations BOEM provided for review are incomplete and inadequate. As a result they fail to show the actual impact of SouthCoast Wind. Consequently BOEM must include additional simulations to assess accurately adverse impacts and to determine appropriate avoidance minimization or mitigation measures. As the lead federal agency BOEM must provide consulting parties and the public with adequate and easily accessible information that informs all parties of potential impacts. BOEM's adverse effect characterizations and visual simulations are too limited to show the full extent of SouthCoast Wind's aesthetic impacts. BOEM and consulting parties therefore are operating at an informational disadvantage that assures arbitrary and capricious decision making.	The simulations were developed using accepted professional and industry practices. Approximately 123 photo-simulations were prepared from 33 KOPs that depict what a viewer might see of the Project at various locations based on geographic information system–based viewshed modeling. Additional information regarding the methodology for preparing the viewshed model and simulations is included in the COP Appendix T. BOEM determined that the information is sufficient to enable BOEM to conduct an informed assessment of visual impact.

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BOEM-2023-0011-0128-0021	In addition, it is impossible for consulting parties to understand the full range of SouthCoast's visual effects because of problems with BOEM's approach to visual simulations. Contrary to what BOEM has provided, visual simulations need to be revised and presented together rather than in separate reports that make comparisons difficult if not impossible. Visual simulations should also refrain from using humid hazy or blurry conditions to minimize potential wind turbine visibility. BOEM should also revise them so that they all show what SouthCoast and additional wind farms will look like during every season at multiple times of day including at night rather the piecemeal approach that BOEM has adopted.	Multiple visualizations are provided in COP Appendix T, *Visual Impact Assessment*, which provide a range of high-contrast conditions from multiple KOPs. Simulations offer a spread of conditions (side lit, back lit, front lit), times of day (from morning to sunset), and seasons. The COP VIA states that all efforts were made to secure KOP photos under clear-sky conditions; however, that was not always possible, and simulations reflect a range of visual contrast under differing conditions (e.g., overcast/cloudy, haze, clear); such conditions are identified with each simulation. Additionally, cumulative effects simulations were produced (see EIS Appendix H, *Seascape, Landscape, and Visual Impact Assessment*, and Appendix C of the CHRVEA) showing other offshore wind projects within the Project viewshed displaying incremental visual changes over time as projects are constructed. BOEM determined that the number of visual simulations prepared for the SouthCoast Wind Project is adequate to analyze and determine the Project's magnitude of impact.
BOEM-2023-0011-0132-0082	The document is presenting the cumulative impacts of the no action alternative in a confusing manner. There is a "no action alternative" for which the visual impacts are moderate and a "cumulative no action alternative" in which the visual impacts are major. Regarding Nantucket even one project, the existing VW1 for instance, has major visual impacts. The reader needs to read four separate sections on impacts the fourth of which always implies the SouthCoast/Mayflower project in the context of all the other projects that are not yet approved has only a minor impact. This seems intentionally confusing and inaccurate.	The No Action Alternative looks at ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities (those projects with an approved COP, e.g., Vineyard Wind 1, South Fork, Revolution Wind), for scenic and visual resources and analyzed the impacts of such if the proposed Project was not developed. BOEM also analyzed cumulative impacts of the No Action Alternative, which looks at other planned non-offshore wind activities and planned offshore wind activities and the relative impacts those may have if the proposed Project was not developed.
BOEM-2023-0011-0132-0091	[Text in Blue: "The WTGs and OSPs would be lit and marked in accordance with Federal Aviation Administration (FAA) and U.S. Coast Guard (USCG) lighting standards and consistent with BOEM best practices. Mayflower Wind would implement an Aircraft Detection Lighting System (ADLS) to automatically	As described in COP Volume 1, Section 3.3.12, USCG navigation lighting consists of quick flashing yellow lights intended to be visible to mariners. SouthCoast Wind is required to submit to BOEM a lighting, marking, and signaling plan in accordance with federal law and regulations

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	activate lights when aircraft approach. Lighting would be placed on all structures and would be visible throughout a 360- degree arc from the surface of the water. Tower marking would include unique rows and columns of letters and numbers to maximize charting effectiveness. Reflective paint and lettering materials would be used to provide visibility at night."] USCG lighting standards are on at all times and this is not mitigated in anyway. This is a problem for Nantucket where there is a tradition of viewing and studying dark skies.	and guidelines, which would include information regarding navigation lighting in accordance with USCG standards. The plan must address aviation and navigation safety, avoidance of harm to wildlife, and avoidance of interference with other uses.
BOEM-2023-0011-0132-0093	Regarding construction lighting the impacts are described as short term. However the construction time frame for this project is 7 years and at least 10 years for the cumulative projects. This does not equate to short-term.	BOEM has defined *short term* in Section 3.3 of the Final EIS to equate to impacts associated with construction. Because construction lighting would result in visual impacts during construction activities, BOEM has accurately characterized the impacts as short term. BOEM acknowledges in EIS Section 3.6.9.5 under the *Lighting* IPF that these impacts would occur over a period of years during construction, primarily associated with nighttime vessel traffic.
BOEM-2023-0011-0132-0096	Once again the claim that since other projects will have lighting the contribution from this project is negligible is misleading confusing and erroneous since none of these other projects have been built.	As stated in Section 3.6.9.5, *Cumulative Impacts of the Proposed Action*, lighting from the Proposed Action in combination with other offshore wind projects would have minor to major long-term cumulative impacts on scenic and visual resources. In evaluating cumulative lighting impacts, BOEM appropriately considered how the SouthCoast Wind Project in combination with other offshore wind projects in the Massachusetts and Rhode Island lease areas would contribute to lighting impacts.
BOEM-2023-0011-0132-0099	Table 3.6.9-14 indicates that two areas KOP-8-N Tom Nevers Field-Nighttime and KOP-12-N Cisco Beach- Nighttime would result in "major' impacts. The following areas are listed as moderate: KOP-8-N Tom Nevers Field-Daytime KOP-10-N Nobadeer BeachKOP-11-N Miacomet Beach and Pond KOP-12-N Cisco Beach-DaytimeKOP-13-N Hummock Pond Road Bike Path KOP-16-N Head of PlainsKOP-17-N Bartlett's Farm KOP-18-N Ladies Beach KOP-20-N MadequechamKOP-22-N Madaket Beach at Sunset. However given the importance of	The impact levels for each KOP identified in Table 3.6.9-14 were determined based upon distance and other criteria described in detail immediately above the table. BOEM has reviewed the impact levels of all KOPs and determined they are appropriate based upon these criteria. The status of a KOP as historic in nature does not affect the visibility of offshore structures from a KOP and therefore does not influence the visual impact levels. However, visual impacts on historic properties, including the Nantucket Historic

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	these area to visitors and residents of Nantucket the historic nature of the unobstructed viewshed and the simulations provided in Attachment H these areas should also be listed as major. The next group which is listed in this chart as impacted in a “minor’ way should be moved to “moderate” impacts. It is unclear if any residents or visitors to Nantucket have been consulted in this is matter.	District, are evaluated in context of their setting and historical nature in Section 3.6.2, *Cultural Resources*, and through the Section 106 consultation process, as described in Appendix I. The Nantucket Historic District Commission, Nantucket Historical Commission, and Nantucket Planning & Economic Development Commission are all Section 106 consulting parties. BOEM has consulted with the consulting parties under Section 106 of the NHPA to identify avoidance, minimization, and mitigation measures for resolving adverse effects from Project lighting, the visible presence of WTGs, and other effects on historic properties, including the Nantucket Historic District NHL. Additional information about Section 106 consultation and measures to mitigate adverse effects are presented in Appendix I. In addition, BOEM requested and received public comments about visual impacts during the public scoping period for the Draft EIS (November 1 to December 1, 2021).
BOEM-2023-0011-0133-0014	Threshold. The International Dark-Sky Association (IDA) uses magnitudes per square arcsecond (mpas) to evaluate the darkness of the sky. A reading of lower than 20.2 mpas means that the Milky Way is no longer visible. On Nantucket the average reading is currently 20.61 as shown:[See original attachment for figure of average darkness]. Will BOEM be monitoring the level of skyglow as part of their permitting process or otherwise? Will BOEM commit to requiring that the current dark skies over Nantucket be maintained or improved?	Section 3.6.9.5 under the *Lighting* IPF analyzes the impacts from nighttime lighting of WTGs. To minimize visual effects from lighting, SouthCoast Wind has committed to equipping offshore wind structures with an ADLS that keeps aviation warning lights off until aircraft are present, thereby protecting the existing natural night sky condition. BOEM has added a visual monitoring requirement to the Final EIS, measure SV-1 in Table G-2 of Appendix G, *Mitigation and Monitoring*. SV-1 would require SouthCoast Wind to monitor the visual effects of the wind farm during construction and O&M in both daytime and nighttime and monitor the performance of the ADLS, which would ensure the system is functioning properly.
BOEM-2023-0011-0133-0015	The IDA uses a variety of calibrated monitoring equipment around the world to track the quality of the night sky. The International Dark-Sky Association (IDA) uses a variety of calibrated monitoring equipment around the world to track the quality of the night sky. These devices are designed to	BOEM has evaluated the effects of nighttime lighting on the affected environment in Section 3.6.9.5 under the *Lighting* IPF. Because SouthCoast Wind has committed to using an ADLS, BOEM anticipates impacts on nighttime lighting would be negligible, except when the ADLS is activated, when

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	measure the brightness of the night sky and assess the impact of light pollution on astronomical observations as well as on wildlife human health and the environment. Some of the equipment used by the IDA includes: 1. Sky quality meters (SQMs): These devices measure the brightness of the sky in magnitudes per square arcsecond and can be used to generate standardized data that can be compared across different locations and times. 2. Radiometers: These devices measure the intensity of light in different wavelengths and can be used to determine the spectrum of light pollution in a given location. 3. Photometers: These devices measure the amount of light in a specific range of wavelengths and can be used to measure the brightness of specific sources of light such as streetlights or advertising signs. 4. All-sky cameras: These devices capture images of the entire sky and can be used to generate time-lapse videos or still images that show the brightness and movement of stars planets and other celestial objects. 5. Portable observatories: These are mobile observatories that can be deployed to remote or rural areas to conduct scientific research on the night sky and collect data on the impact of light pollution. By using a variety of calibrated monitoring equipment the IDA is able to collect standardized data on the quality of the night sky in different locations around the world. This data can be used to raise awareness of the importance of dark skies promote policies and regulations that limit light pollution and encourage the development of sustainable lighting practices that preserve the natural beauty of the night sky. Has BOEM identified a baseline and an anticipated impact on that baseline? Will BOEM monitor the light sources from permitted wind warms against the current baseline?	impacts would be major (refer to Table 3.6.9-14). BOEM has added a visual monitoring requirement to the Final EIS, measure SV-1 in Table G-2 of Appendix G, *Mitigation and Monitoring*. SV-1 would require SouthCoast Wind to monitor and compare the visual effects of the wind farm during construction and O&M (daytime and nighttime) to the findings in the COP VIA and verify the accuracy of the visual simulations. In addition, SouthCoast Wind would be required to monitor the performance of the ADLS to ensure the system is functioning properly.
BOEM-2023-0011-0133-0017	The DEIS appears to rely exclusively on the report provided by AECOM the consultant hired by the applicant which itself appears to have adopted an approach based exclusively on	SouthCoast Wind produced the VIA and visual simulations following BOEM guidance and accepted professional and industry best practice visualization techniques. BOEM

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	comparing: (a) photographs taken by AECOM in 2020 using a Nikon D4 camera (COP 4.2.1) with (b) "simulations" generated by AECOM through digital manipulation of the photographs. The chosen approach fails to provide an adequate basis for understanding the proposed project and its impacts on dark skies for numerous reasons including but not limited to: A. Lack of Quantitative Data & Analysis – visual impact as measured by photographs is only one part of the exercise. Using standard scientific methods precise lumen levels and other quantitative measurements can and must be made as part of both the baseline and "alternative" assessment.	conducted multiple reviews of and verified the VIA and simulations. BOEM determined the analysis and simulations were adequate for evaluation. For the EIS, BOEM's third-party NEPA contractor conducted an independent analysis, which is presented in Section 3.6.9 and Appendix H of the EIS, apart from the findings in the COP VIA using the data provided in the COP. Because SouthCoast Wind has committed to using an ADLS, BOEM anticipates impacts on nighttime lighting would be intermittent, occurring only for a few hours each year (refer to Section 3.6.9.5). BOEM has added a visual monitoring requirement to the Final EIS, measure SV-1 in Table G-2 of Appendix G, *Mitigation and Monitoring*. SV-1 would require SouthCoast Wind to monitor and compare the visual effects of the wind farm during construction and O&M (daytime and nighttime) to the findings in the COP VIA and verify the accuracy of the visual simulations.
BOEM-2023-0011-0133-0018	B. Non-Standard Equipment –While the Nikon D4 camera can be used to capture images of the night sky it is not the appropriate equipment to use for standard dark skies measurement. This is because the camera's built-in light meter is designed to measure the amount of light that is being reflected off the subject being photographed rather than the amount of ambient light in the surrounding environment. Additionally the camera's sensor can be affected by factors such as temperature humidity and atmospheric conditions which can introduce errors and inconsistencies into the measurements. Any equipment used must be calibrated and standardized for accurate measurement and error analysis. Light measurement meters on the other hand are specifically designed to measure the amount of ambient light in a given environment and are calibrated to provide accurate and reliable measurements. These meters can be used to measure a variety of different types of light including visible light infrared light and ultraviolet light and can provide readings in a variety of different units such as lux foot-candles or	The camera used for the visual simulations captures what would be seen from a viewer's standpoint. Simulations were prepared following accepted professional and industry best practices, and the COP VIA and simulations were reviewed by BOEM. BOEM determined the simulations provide an appropriate and valid depiction of what would be seen by a viewer at each KOP. Environmental conditions encountered on the day photos were taken for the visual simulations are discussed in the COP VIA.

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	micromoles per square meter per second. To accurately measure dark skies and assess the impact of light pollution it is important to use equipment that is specifically designed for this purpose such as specialized light meters or sky quality meters. These devices are designed to provide accurate and reliable measurements of the brightness of the night sky and can be used to generate standardized data that can be used for scientific research and policy-making. Using equipment that is not designed for this purpose can result in inaccurate or inconsistent measurements which can compromise the integrity of the data and limit the effectiveness of efforts to address light pollution.	
BOEM-2023-0011-0133-0019	C. Poorly Chosen Equipment Settings – There is inadequate explanation provided for the shutter speed aperture and other settings used in the camera.	Shutter speed and aperture are described on each of the visual simulations included in EIS Appendix H, *SLVIA Cumulative Visual Simulations*. Refer also to response to comment BOEM-2023-0011-0133-0018.
BOEM-2023-0011-0133-0020	D. Inadequate Elevation and Location – The only KOP for which nighttime information regarding Nantucket was provided originally was 12N – Cisco Beach. The newly published revised COP uses a different KOP from Tom Nevers as well. It appears that the KOP was measured based upon the eye-height of an adult standing on the beach. COP 4.1.2; 4.2.5. But for purposes of observing night skies multiple other KOP's must be considered including observational heights associated with MMA's observatory rooftop observation of the skies from homes and other sites from which dark skies are appreciated and also including beach locations in the western part of the island closer to the development location.	The commenter is correct that nighttime visual simulations are provided for two KOPs on Nantucket, 12-N Cisco Beach and 8-N Tom Nevers Field. The camera used for the visual simulations captures what would be seen from a viewer's standpoint. The current analysis and visual simulations represent a good-faith effort to analyze the visibility of the Project from various points along Nantucket, based on the digital viewshed modeling (refer to COP Appendix T for more information on viewshed modeling and KOP selection). BOEM has determined that the simulations adequately represent visual impacts without needing additional simulations.
BOEM-2023-0011-0133-0021	E. Limited Orientation – the orientation for the photographs focuses on the horizon. To be sure the horizon orientation is an important one. But data should also be collected focusing more clearly upon the impact of the project's lighting on the entire night sky.	Please refer to responses to comments BOEM-2023-0011-0133-0017 and BOEM-2023-0011-0133-0018.

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BOEM-2023-0011-0133-0022	F. Incomplete Assumptions About Observer Activities – the approach assumes that observers will use only their naked eyes to appreciate the night sky and does not take into account or provide any data or information with respect to the changes from baseline that will occur for those using telescopes or other observational equipment.	The COP VIA and the EIS do not consider telescope viewing when establishing baseline conditions. The current analysis and visual simulations represent a good-faith effort to analyze the visibility of the Project from various KOPs along Martha's Vineyard and Nantucket from a typical viewer's standpoint. BOEM determined that the simulations adequately represent visual impacts without needing additional simulations.
BOEM-2023-0011-0133-0023	G. Small Sample Size-- Images are provided for only one KOP on one day at one time under one set of environmental conditions and using one camera setting.	Please refer to responses to comments BOEM-2023-0011-0133-0017 and BOEM-2023-0011-0133-0018.
BOEM-2023-0011-0133-0024	H. Unexplained Inconsistent Data -- The provided images do not align with the images made public by the applicant in COP Appendix T Attachment 2	While it is unclear which specific images the commenter is referring to, the visual simulations provided in Appendix T of the COP are simulations of the SouthCoast Wind Project from several KOPs. Attachment H-1 to Appendix H of the EIS includes cumulative visual simulations that show impacts from the SouthCoast Wind Project by itself and in combination with other projects under five different scenarios, which is further explained in Appendix H.
BOEM-2023-0011-0133-0025	I. Withheld Data -- The COP references the existence of additional "confidential" images which are not included in the DEIS or provided in the publicly accessible version of the COP.	BOEM cannot make publicly available information deemed business confidential by the developer. However, BOEM has determined all visual simulations developed for the Project and analyzed by BOEM for the EIS have been publicly posted to BOEM's website as part of COP Appendix T or as part of Draft EIS Appendix H.
BOEM-2023-0011-0133-0026	J. Data Promised but Not Provided -- The COP asserts that video simulations and imagery will be provided in support of the proposal but we have not been able to locate the video simulations in the DEIS or the public record.	BOEM received video simulations produced by the developer and posted the video to BOEM's webpage for the SouthCoast Wind Project.
BOEM-2023-0011-0133-0027	K. Data Provided Only from the Applicant not from other Sources – It appears that BOEM did not retain or consult with any independent experts in this area but rather that the DEIS relies exclusively on data provided by the applicant based upon reports funded by the applicant.	BOEM conducted a review of the COP to verify the simulations and analysis were conducted according to accepted professional and industry practices. In addition, BOEM performed its own analysis in the EIS, which is presented in Section 3.6.9, *Scenic and Visual Resources*, and

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		Appendix H, *Seascape, Landscape, and Visual Impact Assessment*.
BOEM-2023-0011-0133-0028	L. Unexplained Methodology Regarding Digital Alteration – Neither the COP nor the DEIS explain the specifics of the methodology used to digitally alter the nighttime photographs in order to create the "simulations" that are provided.	The photos used for the nighttime simulations were taken during daytime hours and modified digitally to display nighttime conditions. BOEM believes these reflect the nighttime conditions satisfactorily. Additionally, the analysis found that impacts would be major when the ADLS is activated but negligible when the ADLS is not activated. COP VIA Section 4.2.5 has been revised to include an explanation about how the nighttime visual simulations were created.
BOEM-2023-0011-0133-0029	M. Impacts of Permanent Lights on Structures – The DEIS and COP each appear to assume that once an object is located below the curvature of the earth it will no longer have impacts on the KOP. Based on this assumption there appears to have been little to no consideration given to lighting from "lower levels" of the permanent structures. While the assumption regarding curvature of the earth may be true when it comes to perceiving a physical object itself the assumption is not necessarily true when it comes to perceiving light given off by a physical object. The light may be visible from the KOP even if the lighting source is not. In addition, the light may have impacts on the night sky from the vantage point of the KOP that are beyond the impact of just seeing the light itself.	The analysis of lighting impacts in the EIS assumes maximum impact from nighttime lighting of WTGs, whether the object is visible or obscured by Earth curvature. During the construction phase, aviation warning lights will be installed and remain on when the tower construction rises above 200 feet above sea level until the ADLS is installed, tested, and approved, likely when the Project transitions to the operational phase. As discussed in the COP and Section 3.6.9, *Scenic and Visual Resources*, when the ADLS is activated, nighttime lighting impacts at KOPs would be major and would then be reduced to negligible when the ADLS is not activated. Furthermore, BOEM has added a visual monitoring requirement to the Final EIS, which would require SouthCoast Wind to monitor the visual effects of the wind farm during construction and O&M (daytime and nighttime) and monitor the effectiveness of the ADLS (refer to measure SV-1 in Table G-2 of Appendix G, *Mitigation and Monitoring*). This measure would ensure that the ADLS is being implemented effectively and would determine whether the actual visual impacts from the Project during construction and O&M correspond to the impacts described in the COP and EIS.
BOEM-2023-0011-0133-0030	N. Impacts of Lights from Sea and Air Traffic – It is unclear whether any consideration was given to the quantitative and measurable anticipated impact on dark skies from the lighting	Please refer to Section 3.6.9.5 under the *Lighting* IPF, which describes visual impacts from nighttime vessel lighting associated with the Project. The exact number of vessels that

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	associated with the increased sea and air traffic created by the ongoing operation of the proposed project itself from the need to maintain and repair the project on an ongoing basis and from the changed sea routes of other traffic that will be caused by the physical barriers that the project and related projects create. These effects are likely material and should be considered.	would be present at night versus in daytime is not known; however, the *Traffic (vessel)* IPF in Section 3.6.9.5 describes that there would be on average 15 to 35 vessels present during construction at any given time and 1 to 3 vessel trips per day during O&M. BOEM anticipates the majority of these vessel trips would be during the daytime but, during construction, foundation installation vessels and other support vessels would likely be present in the Project area 24 hours per day during active construction periods, and would result in a moderate to major impacts (refer to Section 2.1.2.1, *Construction and Installation*, in Chapter 2 for the estimated Project construction schedule). Regarding impacts on other non-Project vessel traffic, as described in Section 3.6.6, *Navigation and Vessel Traffic*, non-Project vessels may choose to travel through the Lease Area or travel around the Lease Area once the wind farm is operational. The exact change in vessel routes, and associated nighttime vessel lighting impacts, cannot be known, as the vessel route decision would be up to the vessel operator at the time of the vessel trip, but BOEM does not anticipate lighting impacts from non-Project vessels would be meaningfully different from current conditions. Under normal operations, offshore flights in support of the Proposed Action, either with aircraft, drones, or helicopters, would be limited to daytime only. SouthCoast Wind would consider night flights only in case of medical emergency to evacuate an injured or sick person to the nearest hospital. If such flights occur, impacts would be negligible because of the short duration aircraft lights would be visible during flight. It should also be noted that during construction, aviation warning lights will be installed and remain on when the tower construction rises above 200 feet above sea level until the ADLS is installed, tested, and approved. Information regarding these impacts has been added to Section 3.6.9.5.
BOEM-2023-0011-0133-0031	O. Impacts of "Temporary" Lights – Both the construction and the decommissioning of the projected are described at times	Impacts from construction and decommissioning nighttime vessel lighting from the Project are discussed in Section

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	as "temporary." Even under generous assumptions about the time to complete these activities for just this one project the temporary effect is for a substantial period of time. Once the cumulative effect of construction and decommissioning of other proposed projects is taken into account the "temporary" begins to become "continuous." The effects on dark skies of the lighting generated by sea traffic structures and activities associated with construction and decommissioning do not appear to have been quantified and taken into account in the DEIS.	3.6.9.5 under the *Lighting* IPF. These impacts from lighting are described as short term, which is defined in Section 3.3, *Definitions of Impact Levels*, as corresponding to the construction and decommissioning phases. The exact number of vessels that would be present at night versus in daytime is not known; however, the *Traffic (vessel)* IPF in Section 3.6.9.5 describes that there would be on average 15 to 35 vessels present during construction at any given time, and it is anticipated that decommissioning vessel traffic would be similar. During periods of foundation installation, vessels and equipment would be present and lit 24 hours per day. BOEM revised Section 3.6.9.5 of the Final EIS to acknowledge that in addition to vessel and equipment lighting, additional nighttime lighting during construction and decommissioning would be present on the offshore structures themselves. In regard to cumulative effects of the Proposed Action in combination with other offshore wind projects, BOEM has added discussion to Section 3.6.9.5, *Cumulative Impacts of the Proposed Action*, of the Final EIS describing the cumulative impacts from lighting and vessel traffic. The analysis notes that, during periods of overlapping construction, offshore wind projects would generate between 165 and 385 vessel trips daily. The analysis also notes that the Proposed Action would contribute up to 147 of a combined total of 1,048 WTGs that would be installed in the geographic analysis area between 2023 and 2030. The cumulative lighting impacts from the combined projects during construction and decommissioning are still considered short term, as they would only occur during periods of overlapping construction and decommissioning.
BOEM-2023-0011-0133-0032	P. Inadequate Assumptions About the Quantity of WTG Lighting – FAA regulations adopted as guidance by BOEM require at least two intense red lights for each and every structure to be placed at the top of the nacelle and three or more such lights slightly lower down the structure. FAA infra	BOEM believes that the analysis in COP Appendix Y3 provides a reasonable approximation of the level of air traffic that may result in ADLS activation. While it is possible that additional aircraft from the Project or other nearby offshore wind projects could trigger the ADLS, BOEM does not

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	13.7.1. The COP and DEIS concede that the effect of mandatory WTG lighting would be "major" when it comes to dark skies. However they rely also upon the assumption that ADLS will be able to be used and that such use will cause the "major" effect to exist for fewer than five minutes per year. This conclusion is based upon a three-page analysis conducted by Capital Airspace Group and submitted and funded by the applicant. COP Appendix Y3. The brief analysis however is inadequate among other reasons because it is based exclusively on a calculation of how often identified aircraft with active transponders entered the relevant airspace during the period February 1 2019 through January 31 2020. This analysis fails to take into account among other things that: There will be substantially increased air traffic associated with construction and operation of the project itself. See e.g. DEIS at 3.4-22 referencing 280 airplane trips per year and 2080 helicopter trips per year (quoting COP Vol 1 Section 3.3.14.1 Table 3-21). There will be substantially increased air traffic associated with the other projects currently anticipated for development as well. The relevant airspace does not require active transponders in all cases and therefore an assessment of how many aircraft without active transponders will be present is required. It is not clear that the data consulted by Capital Airspace included data relating to military aircraft. Air traffic to and near the island is at a higher level that it was during the measurement period. ADLS may be set off by things other than aircraft including WTG's or other objects in the area wildlife ships or weather developments to name a few. See e.g. https://detect-inc.com/aircraft-detection-lighting-systems/ (describing sensitivity to birds and drones)Companies participating in the ADLS market promote and contemplate that ADLS be set to detect objects at a boundary greater than the minimum distance required by the FAA/BOEM. https://detect-inc.com/aircraft- detection-lighting-systems/FAA regulations	anticipate there would be much nighttime air traffic (versus daytime air traffic) to service offshore wind projects for safety reasons. During construction, aviation warning lights will be in the on position once the tower construction rises over 200 feet above sea level. The ADLS will not be operational until after the system is installed, tested, and approved. The analysis in COP Appendix Y3 shows that with the ADLS, nighttime aviation lighting would be activated for less than 1 percent of normal operating time; even with an increase in air traffic beyond that estimated in COP Appendix Y3, BOEM anticipates the length of time nighttime lighting would be activated would remain short in overall duration. The analysis in the EIS (refer to Table 3.6.9-14) acknowledges that when aviation lighting is turned on (the ADLS is activated), impacts would be major, and when aviation lighting is off, impacts would be negligible; the conclusion would be the same whether the time the ADLS is triggered is less than 1 percent of normal operating time or a slightly greater amount of time due to increased aircraft trips. As described in Section 2.3, *Non-Routine Activities and Low-Probability Events*, of Chapter 2, non-routine activities requiring corrective maintenance because of low-probability events, which could include ADLS malfunction, could occur but are unlikely. While ADLS malfunction would result in extended nighttime impacts, BOEM expects SouthCoast Wind would stock spare parts and have sufficient workforce available to conduct corrective maintenance activities to limit the duration of these impacts. Furthermore, BOEM has added a visual monitoring requirement to the Final EIS, which would require SouthCoast Wind to monitor the visual effects of the wind farm during construction and O&M (daytime and nighttime) and monitor the effectiveness of the ADLS (refer to measure SV-1 in Table G-2 of Appendix G, *Mitigation and Monitoring*). This measure would ensure that the ADLS is being implemented effectively and would determine whether the

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	as adopted in BOEM guidance (see infra) require lighting activation not only during night- time hours but also during any period of reduced visibility. FAA at 13.51. ADLS may malfunction and create lighting beyond that it is intended to due to oversensitivity or error. FAA regulations adopted by BOEM as guidance require that all lighting be activated and remain activated in the event of any malfunction or error in even one part of the overall system. 4/28/21 Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development BOEM; FAA 11/16/20 AC70/7460 at 10.25. These are just examples. The myriad of possibilities that the real world throws up are exactly why looking only at 2019 flight data is inadequate when real-world experience with ADLS exists and should be taken into account. See e.g. https://ocean-energyresources.com/2022/08/04/deutsche-windtechnik-is-granted- worlds-first-approval-for-use-of-adls/	actual visual lighting impacts from the Project during construction and O&M correspond to the impacts described in the COP and EIS.
BOEM-2023-0011-0133-0033	Q. Inadequate Assumptions About the Effect of WTG Lights: The COP and DEIS concede that the effect of mandatory WTG lighting would be “major” when the lighting is “on” but assume that there is no effect at any other time. However the effect of a flashing light on observers and their ability to appreciate the night sky likely persists beyond the time that the light is actually “on.” This is particularly true if the observer is using observational equipment. This additional potential effect was not considered and should be.	The analysis of lighting impacts in the EIS assumes maximum impact from nighttime lighting of WTGs based on best available information and accepted professional practices. It would be speculative to assess how each individual observer may perceive the effect of nighttime light from ADLS activation. BOEM anticipates that the ADLS would be activated for less than 1 percent of normal operating time. The analysis found that impacts would be major when the ADLS is activated but negligible when the ADLS is not activated, and these conclusions would be the same whether lighting impacts persist or do not persist beyond the time aviation lighting is on for an individual observer.

N.6.22 Project Design Envelope

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BOEM-2023-0011-0140-0091	Given that the two cable landfalls will occur where sensitive subaquatic vegetation habitats are present the use of HDD is	SouthCoast Wind has proposed the use of HDD at all cable landfall locations in its COP. If BOEM approves the COP,

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	crucial for avoiding and minimizing environmental impacts. Although SouthCoast Wind has already committed to employing HDD for the project's landfall BOEM should require use of HDD as a condition for project approval.	SouthCoast will be required to adhere to the development plans contained in the COP and any other conditions imposed by BOEM.
BOEM-2023-0011-0140-0095	BOEM should require SouthCoast Wind to develop and implement an anchoring plan as a condition of COP approval. Such a plan should delineate areas of complex and sensitive habitat around each turbine and cable locations and identify areas restricted from anchoring. To further reduce impacts BOEM should require to the extent practicable SouthCoast Wind to employ microrouting of the export cable corridor to avoid siting in complex benthic habitats and other sensitive habitat areas particularly in the area of Muskeget Channel which features a high proportion of complex habitats. Similarly as proposed by BOEM SouthCoast Wind should be required to limit boulder clearance activities in order to avoid minimize and mitigate impacts to complex habitats.	As stated in the Anchoring subsection of Section 3.5.2.5, SouthCoast Wind has committed to avoiding habitat loss to benthic resources during construction by selecting lower impact construction methods, where possible, which would include avoiding anchoring on sensitive habitat such as eelgrass beds and hard-bottom habitats. Table 3.5.2-3 which was added to Section 3.5.2.11 presents BOEM-proposed mitigation measures including one measure that requires that boulder clearance be limited to the extent practicable and best efforts should be made to microsite to avoid these areas. Further, the Cable emplacement and maintenance subsection in Section 3.5.5.5 identifies potential anchoring and boulder clearance areas along the Falmouth and Brayton Point ECCs and efforts to minimize impacts at these locations.
BOEM-2023-0011-0140-0096	As proposed BOEM should also require SouthCoast Wind to undertake pre-construction construction and installation and post-construction monitoring of benthic habitats and fisheries in the Project Area. The Draft EIS provides few details on these monitoring studies. At a minimum BOEM should require SouthCoast 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 these habitats and species that occur because of construction activities the presence of WTG structures in the water columns hydrodynamic effects EMF noise and other impacts. Regarding hydrodynamic effects the plan should attempt to monitor hydrodynamic impacts in the area of Nantucket Shoals that is in the vicinity of the lease area as well as the proposed 20-km Nantucket Shoals buffer that overlaps the	BOEM has proposed mitigation measure BA-3, which would require SouthCoast Wind conduct fisheries and benthic habitat monitoring surveys during pre-construction, construction, and post-construction phases of the Project (refer to Table G-2 in Appendix G), which would include monitoring of sensitive habitat in the Muskeget Channel, Sakonnet River, and Mount Hope Bay. Another BOEM-proposed mitigation measure MA-1, would require that boulder clearance be limited to the extent practicable and best efforts should be made to microsite to avoid these areas. SouthCoast Wind has developed draft monitoring and mitigation plans benthic resources and fisheries. Details on these plans for finfish and benthic species within the Project area are provided under the Gear Utilization IPF of Section

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	lease area. Moreover the monitoring plan should require SouthCoast Wind to monitor impacts to sensitive habitats in the export cable corridors including in Muskeget Channel the Sakonnet River and Mount Hope Bay. The monitoring plan should also evaluate impacts to juvenile cod HAPC and whether cable protection and/or burial is mitigating impacts to these habitats. [Footnote 374: We note that we have concerns about the route of the Brayton Point export cable corridor up the Sakonnet River because of its designation as juvenile cod HAPC and the presence of boulder fields Crepidula reefs and other complex habitats in the river. While we do not recommend that BOEM select Alternative C–which would avoid siting the export cable corridor in the river–due to questions regarding its feasibility we urge BOEM to require South Coast Wind to utilize microrouting in the Sakonnet River to the greatest extent practicable to avoid these sensitive habitats and to implement robust monitoring to measure any impacts to juvenile cod HAPC and other EFH in the river.] Finally if there is an open loop cooling system at the converter station the monitoring plan should evaluate the impacts from entrainment and impingement of marine organisms as well as the impact of thermal water discharge to the ecosystem.	3.5.5.5, *Impacts of Alternative B – Proposed Action on Finfish, Invertebrates, and Essential Fish Habitat*. As part of SouthCoast Wind's National Pollutant Discharge Elimination System (NPDES) permit application submitted to USEPA (TetraTech and Normandeau Associates, Inc. 2023), the impingement, entrainment, and thermal discharge impacts of the open-loop cooling water intake system were assessed. A summary of these results is presented in the Discharges/intakes subsection of Section 3.5.2.5. Further, SouthCoast Wind plans to monitor the hydrodynamic changes within the Lease Area (Appendix F4 - Nantucket Shoals Hydrodynamic Impacts Study; SouthCoast Wind Incidental Take Application (LGL 2024).

N.6.23 Mitigation and Monitoring

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BOEM-2023-0011-0065-0006	Notably BOEM only required the developer in the Vineyard Wind Record of Decision to "monitor" and report on cable burial but did not prescribe any timeframe within which the developer would be required to rebury the cable should it become exposed. [Footnote 5: See Vineyard Wind ROD p. 59 mitigation measure 18. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Final-Record-of- Decision-	SouthCoast Wind has committed to the following applicant-committed mitigation measure to ensure appropriate depth is maintained (refer to Table G-1 in Appendix G): "Long term monitoring of cable burial depth and condition will serve as another mitigation strategy, ensuring appropriate burial depth is maintained during the O&M phase." An exact timeframe is not specified, as the time required to re-bury a cable would be subject to various factors such as

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	Vineyard-Wind-1.pdf.] Experience with the Block Island Wind farm as well as offshore wind farms overseas dictate that this can take years. This is unacceptable for cables traversing mobile bottom tending fishing grounds.	weather and vessel and equipment availability. SouthCoast Wind will develop and implement a Cable Maintenance Plan that requires prompt remedial burial of exposed and shallow-buried cable segments, review to address repeat exposures, and a process for identifying when cable burial depths reach unacceptable risk levels.
BOEM-2023-0011-0070-0007	The DEIS estimates that up to 10% of each export cable route will require boulder field clearance via plow and those additional large boulders along the export cable and interarray cable routes will need to be moved by grab lift. Boulders pose a hazard for fishing vessels that may get hung up by their gear; relocating the boulders without effectively communicating their new locations compromises personal safety. The FEIS should include a boulder relocation reporting plan to document and communicate the locations of moved or newly uncovered boulders to vessels that fish the area. This boulder reporting plan would complement the proposed Fisheries Communication plan.	Regarding boulder relocation, refer to the response to comment BOEM-2023-0011-0185-0270 As described in FEIS Appendix G, Table G-1, SouthCoast Wind will implement a comprehensive communication plan and a Fisheries Communication Plan to keep relevant marine stakeholders informed of the Project activities especially during the construction and decommissioning phases, which will include the distribution of notices to inform mariners of Project-related activities within the offshore export cable corridors and Lease Area. A boulder relocation mitigation measure will be developed through EFH consultation as needed and the drafting of COP T&Cs.
BOEM-2023-0011-0100-0002	I ask for the following mitigation: * SouthCoast Wind LLC should respect the spirit of local regulations regarding dust noise and hours of industrial traffic to the extent feasible balanced against the wider public's interest in locally sourced safe reliable clean electricity. * During the construction phase I ask that SC Wind minimize work done outside of typical construction hours to the extent feasible balanced against technical environmental regional traffic and state and federal legal constraints and balanced with the wider public benefit from quickly completing construction. * I similarly ask that SC Wind voluntarily respect local noise ordinances during O&M except during emergencies when the wider public's need for speedy repairs of this essential offshore energy link is balanced against residential neighbors' noise concerns.* I ask that SouthCoast Wind immediately notify local authorities and emergency response services of any accidental releases during all proposed activities and that it publish on its project	Appendix A of the Final EIS describes the local and state permits that SouthCoast Wind is required to obtain. Although BOEM analyzed the entirety of the Project in the Draft EIS for environmental impacts, BOEM's jurisdiction is limited to federal waters, which is approximately 3 nm to 200 nm offshore. If the SouthCoast Wind COP is approved by BOEM, SouthCoast Wind would still be required to obtain all required permits from local and state jurisdictions before commencing operations. In its COP, SouthCoast Wind has committed to a variety of measures to minimize effects on local communities, which are included in Table G-1 in Appendix G of the Final EIS. For example, SouthCoast Wind has committed to minimizing the amount of work conducted outside of typical construction hours. SouthCoast Wind has also proposed various measures to minimize noise impacts, including establishing temporary noise barriers, using equipment silencers, and turning off

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	website all publicly available reports to and responses from state and federal environmental agencies regarding any alleged releases within municipal or state waters for the convenience of residents who may have trouble accessing this public information.* When voluntarily respecting local regulations is not feasible due to the wider public's interest in quickly constructing or repairing the onshore transmission facility at Brayton Point I ask that following each incident SouthCoast Wind LLC publicly explain its constraints to local officials and then to the wider public respectfully listening to local concerns while reminding local residents of the wider public interest in securing and maintaining a local energy source.	construction equipment when not in use. Regarding accidental releases, SouthCoast Wind will be required to adhere to federal, state, and local regulations in the event of an accidental release, including any reporting requirements. SouthCoast Wind will develop a Safety Management System, OSRP, and SPCC Plan, as required, to avoid, control, and address accidental releases that occur during Project activities.
BOEM-2023-0011-0112-0001	The analysis in the DEIS has important ramifications for terms and conditions which may be implemented through final project approval including fisheries mitigation and compensation measures. With this in mind we strongly encourage BOEM to consider the recommendations listed in the wind energy policies adopted by both Councils which apply across all projects. [Footnote 3: Available at https://www.mafmc.org/s/MAFMC_wind_policy_Dec2021.pdf] Our two Councils worked together on and adopted the same wording for these policies.	FEIS Section 3.6.1.11 and Table G-1 of Appendix G reflect several applicant-proposed mitigation measures that seek to reduce impacts to commercial and recreational fishing. These measures seek to reduce gear interactions with Project components, reduce displacement of biological resources, and avoid impacts from changes in vessel traffic during construction and the O&M phase. Additionally, BOEM proposed measures are shown in section G-2 and include: compensation for gear loss and damage, compensation for lost fishing income, mobile gear friendly cable protection measures, fishing gear and anchor strike incident reporting, and a shoreside seafood business analysis.
BOEM-2023-0011-0112-0046	We recommend that all final mitigation guidelines be reflected in terms and conditions for BOEM's approval of this project. This is especially important given the DEIS only states that "the lessee shall implement a gear loss and damage compensation program" and "a compensation program for lost income for commercial and recreational fishermen and other eligible fishing interests for construction and operations consistent with BOEM's draft guidance..." (page G- 51).	BOEM has considered all proposed mitigation measures listed in the Draft EIS and identified during the public comment period for inclusion in the Final EIS. Based upon the analysis in the Final EIS, the BOEM decision maker will select the mitigation measures to be required in the ROD.
BOEM-2023-0011-0112-0047	Appendix G includes the analyzed potential mitigation and monitoring measures; however it is unclear which of these	Based on public comments received on the Draft EIS, BOEM has revised and made additions to the mitigation measures

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	measures are likely to be required by BOEM as opposed to optional. The FEIS should clearly indicate which mitigation measures will be required and how they affect the impacts determinations.	listed in Appendix G. In addition, each Chapter 3 resource section analyzes the effects of the mitigation measures proposed by BOEM. Based upon the analysis in the Final EIS, the BOEM decision maker will select the mitigation measures to be required in the ROD.
BOEM-2023-0011-0112-0048	The Councils are supportive of time of year restrictions to reduce potential impacts to sensitive life stages of fishery species to reduce impacts to fisheries and to avoid impacts to submerged aquatic vegetation and other structured habitats throughout the project area and cable route. The DEIS suggests that some time of year restrictions may be required (e.g. pile driving would only be allowed in the "enhanced mitigation area" during June 1 - October 31 which could reduce impacts on cod spawning and could also benefit other species; pages 3.5.5-60 and 3.5.5.61). Further detail should be provided in the FEIS on specific time of year restrictions what exactly these measures would achieve and any monitoring measures that would be in place. We recommend working with NOAA Fisheries on impact determinations and identification of sensitive habitats and fishing periods to avoid as ways to mitigate impact.	An analysis of proposed mitigation measures has been added to the mitigation section of each Chapter 3 resource section. NMFS-recommended conservation measures as part of the Essential Fish Habitat (EFH) consultation and recommended measures included in the Preferred Alternative are identified in the Final EIS.
BOEM-2023-0011-0112-0052	Appendix G of the DEIS states that cable protection measures "should reflect the pre-existing conditions at the site" and if "necessary in non-trawlable habitat...then should consider using materials that mirror the benthic environment" (page G-59). However, Volume 1 of the DEIS states that "Cable protection methods such as the creation of a rock berm concrete mattress placement rock placement and fronded mattresses may be used" (page 2-14). It is unclear which measures will be used for cable protection and the Councils are concerned with rock placement mattress protection etc. measures. Per the Councils' offshore wind energy policy (Hyperlink: https://d23h0vhsm26o6d.cloudfront.net/NEFMC-Offshore-Wind-Energy-Policy-December-2021.pdf) we recommend that if scour protection or cable armoring is	SouthCoast Wind has proposed cable protection measures where target burial depth cannot be achieved. Cable protection measures could include rock berms, concrete mattresses, rock placement, fronded mattresses, or half shells. To minimize the effects of these cable protection measures on commercial and recreational fishing, BOEM has proposed mitigation measure CF-3 (refer to Table G-2 in Appendix G) to ensure cable protection measures are trawl-friendly and generally match the existing conditions of the site. SouthCoast Wind would be required to adhere to this mitigation measure when installing cable protection.

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	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. [Footnote 12: For examples see: Glarou M. M. Zrust and J. C. Svendsen (2020). "Using Artificial-Reef Knowledge to Enhance the Ecological Function of Offshore Wind Turbine Foundations: Implications for Fish Abundance and Diversity." Journal of Marine Science and Engineering 8(5). Hermans A. O. G. Bos and I. Prusina (2020). Nature-Inclusive Design: a catalogue for offshore wind infrastructure. Den Haag The Netherlands Wageningen Marine Research: 121p. Lengkeek W. K. Didderen M. Teunis F. Driessen J. W. P. Coolen O. G. Bos S. A. Vergouwen T. C. Raaijmakers M. B. de Vries and M. van Koningsveld (2017). "Eco-friendly design of scour protection: potential enhancement of ecological functioning in offshore wind farms. Towards an implementation guide and experimental set-up." (17-001): 87p]	
BOEM-2023-0011-0112-0053	Unexploded ordnances (UXOs) can be uncovered during site preparation activities. The DEIS states that “several alternative strategies will be considered prior to detonating the UXO in place” including avoidance lifting and shifting the UXO low-order detonation and deflagration (Volume 2 page 136). 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 UXOs. 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	At this time, BOEM is not planning to change our mitigation measures in light of this comment. BOEM’s understanding is that COP T&Cs already include sufficient protections related to UXOs, although BOEM's technical review branch (ETRB) may be able to provide more information.

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	UXOs is essential and should not rely only on email notifications.	
BOEM-2023-0011-0112-0054	Appendix G includes several compensation-related mitigation measures including $35 million for ports and infrastructure $10 million for local innovation and entrepreneurship $5 million for applied research $5 million for workforce development $10 million for marine science $7.5 million for operations and maintenance port upgrades and $5 million for low-income strategic electrification (page G-25). We support these types of compensation measures but emphasize that fishermen from multiple states fish in the project area and compensation for these individuals may also be needed. The DEIS is not clear if these compensation measures are only applicable for Massachusetts or to a broader region.	The financial commitments cited in the comment are not specific to the fishing community and are not intended to compensate for impacts on fishing interests. These commitments were tied to SouthCoast Wind's prior offtake agreement with the State of Massachusetts, which has since been canceled. SouthCoast Wind is proposing similar commitments for other offtake agreements. BOEM is proposing two mitigation measures, CF-1 and CF-2 (refer to Table G-2 in Appendix G), that would provide compensation for gear loss and damage and compensation for lost finishing income. Compensation resulting from these programs would be available for any commercial and recreational fisherman and other eligible fishing interests affected by the Project.
BOEM-2023-0011-0112-0055	The 1 nm spacing between offshore structures and the Fisheries Communication Plan are listed as mitigation measures within the Recreation and Tourism resource area (page G-27). These should be characterized as part of commercial and recreational fishing mitigation measures.	In Volume 2, Table 16-1, of the SouthCoast Wind COP, SouthCoast Wind has categorized 1-nm spacing between offshore structures and development of a Fisheries Communication Plan as mitigation for recreation and tourism impacts. However, this categorization does not preclude these measures from benefiting commercial and recreational fishing interests, and BOEM agrees these measures would mitigate impacts on commercial and recreational fishing. Furthermore, SouthCoast Wind has categorized other measures as specifically benefiting commercial and recreational fishing, such as implementing 1-nm by 1-nm spacing of offshore structures and working with commercial and recreational fishermen to determine construction timing and locations.
BOEM-2023-0011-0112-0056	Appendix C notes that an estimated "boulder field clearance 10 percent of route" is expected for the Falmouth and Brayton Point offshore export cable routes (page C-11) though it is not clear how much of the lease area will need to be cleared of boulders. We recommend developing a clear strategy for boulder relocation that is protective of habitats in	The amount of boulder removal in the Lease Area associated with inter-array cables is included in the 99-acre estimated area of seabed preparation shown in Appendix C, *Project Design Envelope and Maximum-Case Scenario*. Appendix C in the Final EIS has been updated to clarify that boulder field

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	the area potentially relocating them to soft bottom directly adjacent to existing hard bottom areas. We also recommend this type of seabed clearance be done during times of year that minimizes direct impacts to spawning seasons of vulnerable finfish species the impact of which is noted in Volume 1 (page 3.5.5-28). Mobile gear fishing activity should also be considered when planning specific placement options. Relocation areas with similar habitat impacts might have higher or lower potential for conflict with trawling and dredging activities.	clearance in the Lease Area is not expected but that local boulder removal may be needed. Regarding boulder relocation, refer to the response to comment BOEM-2023-0011-0185-0270. Based on preliminary information provided by SouthCoast Wind, seabed preparation and boulder re-location will be minimized through continued micro-routing of cables.
BOEM-2023-0011-0112-0057	Recreational fishermen often fish on boulder habitats. We recommend that maps of boulder relocation sites be made available to recreational and commercial fishing communities and others.	SouthCoast Wind is developing a Boulder Relocation Plan that will include a plan to document and communicate the locations of moved or newly uncovered boulders to the fishing community.
BOEM-2023-0011-0123-0003	Work with the Rhode Island commercial and recreational fishing industries to minimize impacts to fishing activities and the biological resources on which they rely to the greatest extent possible and offer appropriate mitigation plans if adverse impacts cannot be avoided.o Mitigation plans should be developed with substantial input from the Rhode Island Fishermen's Advisory Board (FAB) and the CRMC.	Measures proposed by SouthCoast Wind to mitigate impacts on commercial and recreational fishing are identified in Table G-1 in Appendix G. Information regarding SouthCoast Wind's outreach to the fishing community is described in the Fisheries Communication Plan (COP Appendix W). Furthermore, BOEM has proposed several additional measures (refer to Table G-2 in Appendix G) including compensation for lost fishing income, requiring cable protection measures to be trawl-friendly with tapered/sloped edges, and requiring fishing gear and anchor strike incident reporting.
BOEM-2023-0011-0123-0004	Conduct comprehensive fisheries resource monitoring surveys consistent with the recommendations outlined by the Responsible Offshore Science Alliance (ROSA): https://www.rosascience.org/wp-content/uploads/2022/09/ROSA-Offshore-Wind-Project-Montioring-Framework-and-Guidelines.pdf. • These surveys should address concerns related to biological impacts associated with pile driving and	SouthCoast Wind has prepared a fisheries monitoring plans for Rhode Island state waters. The fisheries monitoring plan was prepared in accordance with the Rhode Island Ocean Special Area Management Plan and applicable sections of the Rhode Island Code of Regulations, notably 650-20-05 RI Code R. §11.9.9 (Baseline Assessment Requirements in state waters), and also with recommendations set forth in BOEM's *Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf*. Additional fisheries monitoring guidance

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	operational noise habitat loss and creation sedimentation electromagnetic fields and cumulative impacts. • Surveys should include as many years as possible for data collection during pre during and post construction phases of the project to best characterize the environmental impacts. Given that one of the proposed cable routes is slated to pass through Rhode Island state waters through the Sakonnet River surveys should be designed to assess impacts of the project to species of concern for Rhode Island including species of ecological importance as well as social value.	was obtained from the Responsible Offshore Science Alliance's *Offshore Wind Project Monitoring Framework and Guidelines*. SouthCoast Wind is developing the plan in consultation with RIDEM and local commercial and recreational fishermen. The plan must be reviewed and approved by RIDEM as part of SouthCoast Wind's Water Quality Certificate application.
BOEM-2023-0011-0123-0005	Conduct high resolution benthic habitat characterization and avoid areas of sensitive benthic habitats. Complex benthic habitats provide refuge and structure for juvenile fish and invertebrates as well as spawning areas for adult life history stages.o The NOAA Greater Atlantic Regional Fisheries Office recently developed benthic habitat mapping recommendations to better inform Essential Fish Habitat consultations: https://media.fisheries.noaa.gov/2021-03/March292021_NMFS_Habitat_Mapping_Recommendations.pdf?null. These recommendations should be followed to ensure avoidance of sensitive habitats.	SouthCoast Wind has collected extensive geophysical data and ground-truth data to support the mapping and characterization of benthic habitats in the Project area, which is included in COP Appendix M.3. This information has been used in Project design to minimize impacts on sensitive benthic habitats and in support of the EFH Assessment for NMFS.
BOEM-2023-0011-0123-0006	Support NOAA's efforts to minimize impacts to or adapt fish invertebrate and marine mammal monitoring surveys in and around the wind energy area as well as along the cable route. These surveys provide some of the primary data used for informed fisheries and wildlife management decisions and disruptions to such long-term monitoring efforts will introduce additional uncertainty into stock assessments and population monitoring. These assessments are the primary tools used to manage and protect the resources of which have direct effects on commercial and recreational fishing.	BOEM is committed to working with NOAA toward a long-term regional solution to account for changes in survey methodologies because of offshore wind farms. BOEM-proposed mitigation measure OU-1 addresses implementation of the Federal Survey Mitigation Strategy for the Northeast U.S. Region, which is intended to mitigate the effect of offshore wind energy development on NMFS surveys.
BOEM-2023-0011-0123-0007	Minimize impacts to birds sea turtles and marine mammals especially the critically endangered North Atlantic right whale (Eubalaena glacialis).	Comment acknowledged. SouthCoast Wind and BOEM, in consultation with USFWS and NMFS, have proposed several

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	• Southern New England has been identified as a significant foraging ground for right whales during their migrations. Significant measures have been taken to improve their population status via commercial lobster fishing restrictions. Additional commercial fishing measures are being evaluated by the Atlantic Large Whale Take Reduction Team in addition to vessel speed requirement to meet additional risk reduction targets. As such the project should take the necessary actions to ensure it does not counteract these efforts. Impact minimization could occur through but is not limited to construction time of year restrictions and exclusion zones vessel speed restrictions (applied to all vessels associated with the wind farm) and noise mitigation measures. Sound scientific data collection and monitoring of the wind energy area is also essential to evaluating potential effects in real-time to enable implementation of adaptive management measures.	measures to minimize impacts on birds, sea turtles, and marine mammals, which are presented in Appendix G.
BOEM-2023-0011-0123-0008	The RIDEM Division of Fish and Wildlife prohibits any in-stream work from March 1 to July 1 to protect the in-migration of anadromous species including alewife (Alosa pseudoharengus) blueback herring (Alosa aestivalis) and American shad (Alosa sapidissima). While the project does not include work instream construction along the export cable corridor has the potential to affect fish staging to enter the riverine systems during their migration. The Division of Fish and Wildlife recommends that work through this corridor does not take place from February 15 through July 1 to allow the anadromous migrations to take place unimpeded. The Division also limits in-stream work during juvenile out-migrations from September 15 until November 15. However if the project can demonstrate there will be no entrapment or entrainment of juvenile out-migrants the Division may reconsider its restrictions during state application review.	RESPONSE PENDING.

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BOEM-2023-0011-0126-0002	It is our hope and expectation that final guidance for mitigating impacts on commercial and recreational fisheries related to project siting design navigation access safety measure and most importantly financial compensation will be completed before a final Environmental Impact Statement on the Project is finalized. We provided extensive comments regarding fisheries mitigation in our comment letter submitted to BOEM in response to the previous RFI for the draft mitigation guidance.	BOEM appreciates the New Bedford Port Authority's comments and continued engagement in the discussion of fisheries mitigation. Comments on the proposed draft *Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585* are outside the scope of the SouthCoast Wind EIS. BOEM is actively working on the fisheries mitigation guidance but we cannot provide an estimated date of completion.
BOEM-2023-0011-0126-0003	Our primary concern with the process to date which remains evident in this environmental impact statement is the lack of definite enforceable measures relative to fisheries mitigation. We appreciate that BOEM has addressed our previous comments on other EIS and placed a requirement that the mitigation measures on the project "shall" be consistent with the final mitigation recommendations of BOEM. (Appendix G - Mitigation and Monitoring). Having said that we would still direct BOEM to our previous comments related to the overall lack of clarity and enforceability with the language presented in the draft document. BOEM must make every effort to make certain that there is a uniform approach to fisheries mitigation through all lease areas and developers. The developers are understandably waiting on BOEM to lead the way on this. While we applaud the inclusion of a mitigation requirement and the creation of a fund to compensate for lost fishing revenue there are two primary issues with the quoted language. The first is that BOEM's requirement of just 5 years post construction will be sufficient for compensating fishermen for revenue lost as a result of the construction of the Project. This limited time frame is not sufficient to help the fishermen recover from any impact of the project. The second issue is the reference to the fishermen being able to "adjust somewhat" and that their losses will therefore be mitigated. Ongoing fisheries regulation combined with the introduction of thousands of offshore wind platforms will	BOEM is actively working on finalizing the fisheries mitigation guidance.

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	likely severely limit the ability of the fishermen to "adjust somewhat". The fishermen are an existing user of the OCS. Statutorily BOEM must address the impact of the new use on them. "Adjust somewhat" is a direction to the fishermen not the developer. The burden for mitigating the impact of offshore wind on the commercial fishing industry must rest with BOEM and the developers.	
BOEM-2023-0011-0126-0005	We appreciate Southcoast Wind's recognition of the importance of the commercial fishing industry which is further reflected in their proactive and ongoing outreach and communications with commercial fishermen and industry leaders through the Southcoast Wind Fisheries Liaisons and Representatives. Southcoast Wind should continue to advocate and promote such a program moving forward and should consider developing a separate fisheries innovation fund similar to Vineyard Wind's mitigation plan to support local fisheries programs and projects to further their commitments and relationship to this important industry.	Comment acknowledged. SouthCoast Wind has proposed various measures to ensure continued coordination with the fishing industry and minimize impacts on commercial and recreational fishing as described in Table G-1 in Appendix G. At this time, BOEM is not aware of SouthCoast Wind proposing a separate fisheries innovation fund.
BOEM-2023-0011-0126-0007	There continues to be uncertainty both on the amount of commercial fisheries mitigation that will be needed in the aggregate as well as the source of those funds and how and when they will be accessed. Developers such as Southcoast Wind have already provided the federal government with billions of dollars in lease proceeds and will continue to do so in future lease rounds. It is more than appropriate for the federal agencies to deploy a significant amount of recent and future revenues to address the impacts on existing industries from the offshore wind developments. Developers should be required to contribute to a mitigation protocol but given the amount the federal government has received it should not be left to the developers alone to address these impacts.	Draft EIS Appendix G included a BOEM-proposed mitigation measure (CF-2), which would require SouthCoast Wind implement a compensation program for lost income for commercial and recreational fishermen and other eligible fishing interests. FEIS Section 3.6.1.11 has been revised to note that the application has implemented such a compensation program. BOEM continues to work with the fishing industry and federal and state regulatory industry on minimizing impacts on commercial and recreational fisheries, including by developing *Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585*.
BOEM-2023-0011-0132-0032	The mitigation measures for the North Atlantic Right Whale are not realistic. These critically endangered marine mammals are often below the surface and quiet for hours. Especially	NARW presence can be accurately determined using PAM, which can transmit the detection information to operators in near real-time. PAM has been historically and effectively used by NMFS to record a range acoustic data on marine

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	mother and calf pairs. Both PSO and PAM will be inadequate in this common occurrence.	mammals, including the NARW. The complementary strategies of vessel speed reduction, seasonal restrictions, and acoustic and visual detection would be valuable when the low amplitude, short broadband signals produced by subsurface mother-calf pairs limit the detection efficiency from PSOs and PAM. Vessels will comply with NMFS regulations and vessel speed restrictions (≤10 kts) in NARW management areas including SMAs and active DMAs during migratory and calving periods from November 1 to April 30. Vessels will also reduce speed (≤10 kts) or entirely avoid visually (aerial/vessel sighting) or acoustically (acoustic buoy/glider detection) triggered Right Whale Slow Zones. The layered mitigation measures proposed by SouthCoast Wind as outlined above, including noise-attenuation systems, maintaining vessel separation distances (500 m), site-specific exclusion and harassment zones, and seasonal and time-of-year restrictions for survey and construction activities would minimize or prevent overall potential impacts of the Proposed Action to sensitive, at-risk species such as the NARW.
BOEM-2023-0011-0132-0034	There is no time of year NARW and other whales are not present. The January 1st to April 30th exclusion for pile driving unacceptable. Just this March there have been over 60 sightings of NARW in the area.	March falls within the January 1st to April 30th time of year restriction, thus those sighted whales would not have been exposed to pile driving noise under the current mitigation measures.
BOEM-2023-0011-0132-0043	The "Habitat-based Marine Mammal Density Models for the U.S. Atlantic: Latest Versions" are provided by a collaboration led by the Marine Geospatial Ecology Laboratory at Duke University whose collaborators include: Northeast Fisheries Science Center/NOAA Fisheries Southeast Fisheries Science Center/NOAA Fisheries Dept. of Biology and Marine Biology UNC Wilmington Virginia Aquarium & Marine Science Center Virginia Coastal Zone Management Program Maryland Dept. of Natural Resources Riverhead Foundation for Marine Research and Preservation New Jersey Dept. of Environmental Protection Woods Hole Oceanographic Institute Center for	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS. In January 2024, SouthCoast Wind submitted a "Supplemental North Atlantic Right Whale Monitoring and Mitigation Plan for Pile Driving" to NMFS to clarify mitigation measures intended to protect NARWs. This monitoring plan for pile driving is meant to supplement the existing monitoring and mitigation measures currently described in

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	Coastal Studies Florida Fish and Wildlife Conservation Commission New England Aquarium Massachusetts Clean Energy Center Bureau of Ocean Energy Management Clearwater Marine Aquarium Research Institute Georgia Dept. of Natural Resources New York Dept. of Environmental Conservation Tetra Tech and HDR. [Highlighted text: The models show that the year-round presence of NARW and other large cetaceans has been known for some time. There are NO months in which NARWs and Humpback Whales are not present it the MA/RI WEAs.]The area around Nantucket Shoals was described by Andrew Lipsky in a March 9 2022 presentation as part of the NOAA Ecosystem Based Management & Ecosystem Based Fisheries Management Seminar Series as being the "only winter foraging habitat on earth for NARWs which co-occurs with Southern New England WEAs". As also shown in a presentation from a May 2021 Duke University to the Marine Mammal Sub- committee it has been known for some time that the MA/RI wind lease area is the only know year-round foraging ground for NARWs. This critically endangered species is present in all months. They have been visually sighted at times when PAM devices did not identify them. This underscores the ineffectiveness of PAM tools for identifying the presence of NARW. PSOs may see NARW at the surface in calm waters and in good light but they will not be able to detect them in rough seas or when they are under water. The NARW especially mother and calf pairs are often out of sight and are quiet for hours at a time.	the request for Incidental Take Regulations (ITRs), which was deemed Adequate and Complete by NMFS on September 19, 2022.
BOEM-2023-0011-0132-0054	Regarding the thousands of helicopter trips – will the helicopters have PSOs to avoid harassment of NARWs?	As described in Section 3.5.6 of the Draft EIS, BOEM would require all aircraft operations to comply with current approach regulations for NARWs or unidentified large whales (50 CFR 222.32), which would include prohibiting aircraft from approaching within 1,500 feet (457 meters). BOEM determined Impacts on NARW and other marine mammals would be minor and no additional mitigation would be needed.

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BOEM-2023-0011-0136-0037	While indicated as a mitigation measure in Appendix G no information is provided regarding compensation for damage and/or lost gear from any offshore wind development activities including a claim application form. Compensation for gear loss or damage as a result of interactions with the project should be assured. Language should be included 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. [Footnote 34: 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.]	SouthCoast Wind already has implemented such a program not only for gear but also for foregone revenue (refer to the response to comment BOEM-2023-0011-0126-0007). The application form for this compensation program is available on SouthCoast Wind's website and was developed in coordination with other offshore wind developers to provide consistency to the commercial fishing industry. Further this form was developed using input from the commercial fishing industry. This process is designed to cover potential impacts from gear interactions with SouthCoast Wind G&G survey vessels but will be adapted to cover gear interactions with construction vessels and eventually the presence of structures.
BOEM-2023-0011-0136-0038	Mitigation measure CF-2 Compensation for lost fishing income refers to BOEM's draft guidance for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf as the basis for compensation for lost income. This draft guidance was woefully inadequate in its approach to fisheries compensation. RODA submitted detailed comments outlining those inadequacies and we incorporate those comments by reference. [Footnote 35: See https://www.regulations.gov/comment/BOEM-2022-0033-0083]	Please refer to the response to comment BOEM-2023-0011-0136-0037.
BOEM-2023-0011-0136-0039	Mobile Gear–Friendly Cable Protection Measures: In developing such 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	Comment acknowledged. SouthCoast Wind has proposed various measures to ensure continued coordination with the fishing industry and minimize impacts on commercial and recreational fishing from cable installation as described in Table G-1 in Appendix G. In addition, BOEM is proposing measure CF-3, which would ensure cable protection

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	type. This may 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.	measures are trawl-friendly and do not introduce new hangs for mobile fishing gear.
BOEM-2023-0011-0139-0025	Regarding additional mitigation measures proposed throughout the NEPA process SouthCoast Wind encourages BOEM to conduct careful analysis of the best available scientific data and where possible utilize site specific data and details. Mitigation measures or project alterations that lack clear scientific support or are based on speculation would be fundamentally at odds with the national policy expressed in NEPA and should not be carried forward.	Comment acknowledged. BOEM is committed to a science-based approach for assessing impacts and identifying appropriate mitigation for proposed offshore wind activity. Based on public comments on the Draft EIS, BOEM has modified and made additions to the proposed mitigation measures included in Table G-2, Appendix G of the Final EIS.
BOEM-2023-0011-0140-0023	We note that many of the proposed monitoring and mitigation plans found in this DEIS are general at this point relying on yet-to-be-developed plans. [Footnote 41: SCW DEIS Appendix G at Tables G-1 and G-2.] We urge BOEM to use the recommendations herein to require protective measures and to allow practices to evolve as monitoring informs impact assessments. Continued robust monitoring of offshore wind projects and commitment to employ adaptive management practices will ensure that BOEM can swiftly minimize damages of unintended or unanticipated impacts to ecosystems or wildlife as well as inform strategies for future wind projects. Responsible development of offshore wind includes applying a framework of avoiding minimizing mitigating and monitoring impacts to wildlife and wildlife habitat. Even 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 SouthCoast to support conservation efforts for potentially impacted species and habitats.	SouthCoast Wind is continuing to develop its monitoring and mitigation plans as the Project progresses. Several plans are included in SouthCoast Wind's COP, including the Marine Mammal and Sea Turtle Monitoring and Mitigation Plan (Appendix O) and the Fisheries Communication Plan (Appendix W). SouthCoast Wind's Draft Post-Construction Avian and Bat Monitoring Framework has been included as Attachment G-1 in Appendix G. SouthCoast Wind's Benthic Habitat Monitoring Plan and Fisheries Monitoring Plans has been included in Appendix G of the FEIS. SouthCoast Wind's Boulder Relocation Plan is still under development.
BOEM-2023-0011-0140-0046	Our groups are concerned however with the lack of detail about the mitigation measures mentioned in the DEIS. Several of the mitigation measures described in Appendix G of the DEIS lack specificity or are yet to be finalized. For example	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and

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	rather than require specific monitoring and mitigation measures as part of the DEIS BOEM states that it will require the applicant (1) to prepare and submit a passive acoustic monitoring (PAM) plan describing all equipment procedures and protocols to BOEM and NMFS no later than 180 days prior to buoy deployment and before any foundation pile driving begins; (2) to incorporate measures into COP approval required by the final MMPA Letter of Authorization (LOA) for Incidental Take Regulations; (3) develop and submit an Alternative Monitoring Plan to NMFS and BOEM at least 90 days prior to any pile-driving activities in the event that poor visibility conditions unexpectedly arise and pile-driving cannot be stopped if stopping pile driving would pose risks to human safety or cause pile instability; (4) develop and submit a Pile-Driving Monitoring Plan to BOEM Bureau of Safety and Environmental Enforcement and NMFS at least 90 days prior to any pile-driving activities; and (5) develop and submit a Sound Field Verification Plan to BOEM U.S. Army Corps of Engineers and NMFS at least 90 days prior to any pile-driving activities. [Footnote 105: SCW DEIS Appendix G page G-52.] [Footnote 105: SCW DEIS Appendix G page G-52.] [Footnote 106: SCW DEIS Appendix G page G-62.] [Footnote 107: SCW DEIS Appendix G page G-70.] [Footnote 108: SCW DEIS Appendix G page G-73.] [Footnote 109: SCW DEIS Appendix G page G-75.] The “plans” will not be made available for public comment and the LOA application is still processing. BOEM cannot expect the public to wait until the “plans” and LOA are finalized to understand the impact of proposed activities on marine mammals and sea turtles.	ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS. In January 2024, SouthCoast Wind submitted a “Supplemental North Atlantic Right Whale Monitoring and Mitigation Plan for Pile Driving” to NMFS to clarify mitigation measures intended to protect NARWs. This monitoring plan for pile driving is meant to supplement the existing monitoring and mitigation measures currently described in the request for Incidental Take Regulations (ITRs), which was deemed Adequate and Complete by NMFS on September 19, 2022.
BOEM-2023-0011-0140-0047	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. [Footnote 113: Schoeman Renée P. et al. 2020. A global review of vessel collisions with marine animals id.] We therefore urge BOEM to implement a mandatory year-round	A range of applicant- and agency-proposed mitigation measures that have been incorporated in the FEIS are outlined in Appendix G along with BOEM-proposed measures in Appendix G, Table G-2. Among these measures specific to vessel strikes include requiring vessels of all sizes operating port to port to reduce speeds to 10 knots or less between November 1 to April 30. This vessel speed reduction also

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	10 knot speed restriction on all Project vessels associated with SouthCoast Wind at all times (except in Nantucket Sound unless a Dynamic Management Area (DMA) is designated). [Footnote 114: If it is proven through peer-reviewed scientific study that an "Adaptive Plan" which modifies these vessel speed restrictions is equally or more effective than a 10-knot speed restriction BOEM and NMFS may allow SouthCoast Wind to use such a plan as an alternative to a 10-knot speed limit. The Adaptive Plan must be developed in consultation with BOEM and NMFS and must follow a scientific study design using vessels traveling 10 knots or less.] Given that any interaction between a vessel and a right whale poses an unacceptable risk of serious injury or mortality that will have population-level consequences these protections are vital.	applies while operating or transiting in any SMAs, DMAs, or slow zones. Both applicant- and agency-proposed measures require trained lookouts to be posted on all vessel transits during all phases of the Project. A PAM system, as part of the MMPA ITA, will be developed consisting of near real-time monitoring such that NARW or other large whale calls made in or near the transit corridor can be detected and transmitted to the transiting vessel. These measures are particularly protective to NARWs and the strict implementation of such measures would overall reduce the risk of vessel strikes to zero. For more information, please refer to Appendix G and the MMPA ITA (September 2022), Section 11.1.5 under *Vessel Strike Avoidance*.
BOEM-2023-0011-0140-0048	Under the vessel strike avoidance measures provided in the DEIS all Project-associated vessels must travel at 10 knots or less from November 1 through April 30 when transiting to from or within the SouthCoast Wind development area except within Nantucket Sound (unless an active DMA is in place) and except for crew transfer vessels. [Footnote 115: SCW DEIS Appendix G page G-15-16.] [Footnote 116: Page G-45 says through May 30 and page 3.5.6-36 states April 30. Which is correct? The NMFS-designated Block Island Seasonal Management Area (SMA) is proximate to the SDWA and requires vessels 65 feet and greater in length to travel at speeds of 10 knots or less from November 1 through April 30. https://www.fisheries.noaa.gov/national/endangered-species- conservation/reducing-vessel-strikes-north-atlantic-right-whales.] Crew transfer vessels may travel at speeds greater than 10 knots if there is at least one visual observer on duty at all times aboard the vessel to visually monitor for large whales and real-time PAM is conducted. If a right whale is detected via visual observation or PAM within or approaching the transit route all crew transfer vessels must travel at 10 knots or less for the remainder of the day. All Project-associated vessels must also travel at 10 knots or less	Seasonal management areas (SMA) are in effect between November 1 through April 30. Within these SMAs, all vessels greater than 65 ft (19.8 m) in overall length must operate at speeds of 10 knots or less. The Block Island Sound SMA overlaps with the southern portion of the MA WEA and is also active between November 1 and April 30 each year. As the Cape Cod Bay SMA is active between January 1 to May 15, SouthCoast Wind will extend and adhere to vessel speed reductions through May 30. Should any visually- or acoustically- detected NARW occur outside of this period, a dynamic management area (DMA) or Right Whale Slow Zone would be triggered. Vessel operators would then be provided maps and coordinates indicating areas where right whales have been detected. For a period of 15 days after a whale is detected, vessel operators would avoid these areas or reduce speeds to 10 knots or less in order to transit these areas. Thus, active visual and acoustic detection of marine mammals would reduce any collision risks outside of the SMA period.

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	within any DMA Seasonal Management Area or slow zone designated by NMFS year-round. Crew transfer vessels traveling within any designated DMA must travel at 10 knots or less unless NARWs are confirmed to be clear of the transit route and Lease Area for 48 hours as confirmed by either vessel-based surveys conducted during daylight hours and PAM or by an aerial survey conducted once the lead aerial observer determines adequate visibility. If confirmed clear by one of these measures vessels transiting within a DMA must employ at least two visual observers on duty to monitor for NARWs. If a NARW is observed within or approaching the transit route vessels must operate at 10 knots or less until clearance of the transit route for two consecutive days is confirmed by the procedures described above. These measures still leave right whales vulnerable to vessel strike outside of the November 1-April 30 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 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 SouthCoast Wind's project Area from November 1 through May 30 as part of a Proposed Rule to amend the Vessel Speed Rule. [Footnote 117: Amendments to the North Atlantic Right Whale Vessel Strike Reduction Rule 87 Fed. Reg. 46921 46926 (Aug. 1 2022).] 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. [Footnote 118: E.g. Dynamic Speed Zones should be triggered following the confirmed detection of a single North Atlantic right whale.] Moreover even if the Atlantic SSZ is implemented as proposed current evidence demonstrates	

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	that right whales may be at risk of vessel strike year-round including outside of the November 1-May 30 season.	
BOEM-2023-0011-0140-0049	Outside of the enhanced mitigation area near Nantucket Shoals 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. [Footnote 120: SCW DEIS page 3.5.6-42.] 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. [Footnote 121: E.g. Davis G.E. Baumgartner M.F. Bonnell J.M. Bell J. Berchok C. Bort Thornton J. Brault S. Buchanan G. Charif R.A. Cholewiak D. and Clark C.W. 2017. Long-term passive acoustic recordings track the changing distribution of North Atlantic right whales (Eubalaena glacialis) from 2004 to 2014. Scientific reports 7(1) p.13460; Davis G.E. Baumgartner M.F. Corkeron P.J. Bell J. Berchok C. Bonnell J.M. Bort Thornton J. Brault S. Buchanan G.A. Cholewiak D.M. and Clark C.W. 2020. Exploring movement patterns and changing distributions of baleen whales in the western North Atlantic using a decade of passive acoustic data. Global Change Biology 26(9) pp.4812-4840; Meyer-Gutbrod E.L. Greene C.H. Davies K.T. and Johns D.G. 2021. Ocean regime shift is driving collapse of the North Atlantic right whale population. Oceanography 34(3) pp.22-31.] Best available scientific data indicates that North Atlantic right whales now rely heavily on the waters within and in the vicinity of the SouthCoast Wind Project Area year-round and that this area is increasing in habitat importance for the species.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0050	The Project Area is situated within important habitat for socializing and feeding right whales and protection of animals while foraging and mating is essential to the survival of the	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and

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	species. Foraging areas with suitable prey density are limited relative to the overall distribution of North Atlantic right whales and a decreasing amount of habitat is available for resting pregnant and lactating females. [Footnote 129: Van der Hoop Julie et al. "Foraging rates of ramfiltering North Atlantic right whales." Functional Ecology 33 (2019): 1290-1306; Plourde Stephane et al. "North Atlantic right whale (Eubalaena glacialis) and its food: (I) a spatial climatology of Calanus biomass and potential foraging habitats in Canadian waters." Journal of Plankton Research 41 (2019): 667-685; Lehoux Caroline Plourde Stephane and Lesage Veronique "Significance of dominant zooplankton species to the North Atlantic Right Whale potential foraging habitats in the Gulf of St. Lawrence: a bioenergetic approach." DFO Canadian Science Advisory Secretariat (CSAS) Research Document 2020/033 (2020). Gavrilchuk Katherine et al. "A mechanistic approach to predicting suitable foraging habitat for reproductively mature North Atlantic right whales in the Gulf of St. Lawrence." DFO Canadian Science Advisory Secretariat (CSAS) Research Document 2020/034 (2020).] This means that unrestricted and undisturbed access to suitable areas when they exist is extremely important for the species to maintain its energy budget. As previously noted scientific information on North Atlantic right whale functional ecology also shows that the species employs a "high-drag" foraging strategy that enables them to selectively target high-density prey patches but is energetically expensive. [Footnote 130: Van der Hoop Julie et al. "Foraging rates of ramfiltering North Atlantic right whales" supra.] Undisturbed access to foraging habitat is therefore necessary to adequately protect the species as is the minimization of disturbance during the species' energetically expensive migration.Virtually all whale species and small cetaceans regularly occurring in this area have been observed feeding in and close to the SouthCoast Wind Project Area. [Footnote 131: Quintana-Rizzo Ester et al. "Residency demographics and movement patterns of North Atlantic right	ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	whales Eubalaena glacialis in an offshore wind energy development in Southern New England USA" supra.] 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. [Footnote 132: Id.; O'Brien Orla et al. "Repatriation of a historical North Atlantic right whale habitat during an era of rapid climate change" supra.] 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. [Footnote 133: LaBrecque E. et al. (2015). Biologically important areas for cetaceans within U.S. waters – East Coast region supra.] [Footnote 134: Leiter Sarah M. et al. "North Atlantic right whale Eubalaena glacialis occurrence in offshore Wind Energy Areas near Massachusetts and Rhode Island USA" supra.] Courtship behaviors in the area have also been observed by humpback whales. [Footnote 135: Kraus Scott. D. et al (2016). Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles supra.]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 (outside the Nantucket Shoals enhanced mitigation area) 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. [Footnote 136: Enhanced mitigation area refers to the area delineated in Figure G-1 at SCW DEIS Appendix G at G-54.] 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.While BOEM must minimize existing	

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	and potential stressors to the North Atlantic right whale the agency must also address potential impacts to other protected large whale and small cetacean species. It is imperative that BOEM fully account for the consequences of any proposed North Atlantic right whale seasonal restriction on other protected species and evaluate alternative risk reduction strategies sufficiently protective of multiple species. Requiring a robust and scientifically proven near real-time monitoring and mitigation system for North Atlantic right whales and other endangered and protected species for use during impact pile driving and potentially other noise-generating activities would support the development of alternatives.	
BOEM-2023-0011-0140-0051	Commencement of Impact Pile Driving During Periods of Darkness or Poor Visibility Must Be Prohibited Following the mitigation hierarchy we believe BOEM should prioritize impact avoidance and support the consideration of Alternatives E-2 or E-3 which would employ 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 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. Noise impacts pose a serious risk to many marine mammal species and as our groups have previously communicated to BOEM we are extremely concerned that offshore wind developers are proposing to commence pile driving at night. As acoustic models for this and other projects demonstrate impact pile driving generates levels of noise harmful to marine mammals over large distances. It is imperative that no right whale or other marine mammal species is present in the applicable Clearance Zone when pile driving starts. We therefore appreciate BOEM prohibiting SouthCoast Wind	In the Draft EIS, BOEM analyzed the use of foundation types that would not require pile driving, including suction bucket and gravity-based foundations, and would therefore avoid significant noise impacts associated with foundation installation. BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS. Regarding nighttime pile driving, BOEM has clarified the mitigation measure regarding the conditions in which nighttime pile driving could occur and the requirement for a monitoring plan if nighttime pile driving would occur.

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	from initiating impact pile driving within 1.5 hours of civil sunset and this requirement should be carried forth to the Final EIS. [Footnote 137: SCW DEIS at Appendix G Table G-2 at G-71.]We note however that this prohibition is contradicted in the DEIS by an applicant proposed measure to start or continue pile driving at night or in poor visibility conditions “during the period when NARW are less likely to be present” (June 1 through November 30).” [Footnote 138: SCW DEIS at Appendix G Table G-2 at G-44.] These two measures are mutually exclusive and must be clarified in the FEIS. Impact pile driving started at least 1.5 hours prior to civil sunset during good visibility conditions can continue after dark as necessary providing passive acoustic monitoring and the best available infrared technologies are used to support visual monitoring of the clearance and exclusion zones during periods of darkness (see Attachment 1). [Footnote 139: It should be noted that even the best available infrared technologies may still be insufficient given that the majority of detections in dark conditions were within 50 meters. Furthermore mounted infrared camera systems detected marine mammals at a relatively low rate despite the increased effort of Protected Species Observers with these systems compared to night vision devices or passive acoustic monitoring. Smultea Environmental Sciences LLC (Smultea Sciences). 2021. Review of night vision technologies for detecting cetaceans from a vessel at sea. Prepared for Ørsted North America 399 Boylston St. 12th Floor Boston MA 02116 by M.A. Smultea G. Silber P. Donlan D. Fertl and D. Steckler.]In the case that SouthCoast Wind elected to initiate pile driving at night or during low visibility conditions for reasons of safety and operational feasibility BOEM requires the applicant to submit an “alternative monitoring plan” for review and approval by BOEM and NMFS at least 90 days prior to the planned start of pile driving. [Footnote 140: It is our understanding from the DEIS that these are the only two circumstances under which SouthCoast Wind would elect to	

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	pile drive at night or during conditions with impaired visibility but BOEM should clarify this in the Final EIS.] [Footnote 141: SCW DEIS Appendix G Table G-2 at G-74. “Include an Alternative Monitoring Plan that provides for enhanced monitoring capabilities in the event that poor visibility conditions unexpectedly arise and pile driving cannot be stopped. The Alternative Monitoring Plan must also include measures for deploying additional observers using night vision goggles or using PAM with the goal of ensuring the ability to maintain all clearance and shutdown zones in the event of unexpected poor visibility conditions. Describe a communication plan detailing the chain of command mode of communication and decision authority must be described. PSOs as determined by NMFS and BOEM must be used to monitor the area of the clearance and shutdown zones. Seasonal and species-specific clearance and shutdown zones must also be described in the PDM [Pile- Driving Monitoring] Plan including time-of-year requirements for NARWs. A copy of the approved PDM Plan must be in the possession of the lessee representative the PSOs impact-hammer operators and any other relevant designees operating under the authority of the approved COP and carrying out the requirements on site.”] 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 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 considering the public will not be able to comment on this plan. BOEM should also consider that vessels operating at night may be more likely to strike a right	

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	whale or other large whale species due to a lack of detectability.	
BOEM-2023-0011-0140-0052	Appendix G of the DEIS mentions that the Applicant will employ noise attenuation mitigation during all pile-driving activities. [Footnote 143: SCW DEIS Appendix G pages G-14 and G-18.] 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. Again while we support Alternatives E-2 and E-3 if pile driving cannot be avoided we encourage BOEM to work closely with 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. [Footnote 144: Lee J. and Southall B. Practical Approaches for Reducing Ocean Noise Associated with Offshore Renewable Energy Development. Global Alliance for Managing Ocean Noise Workshop Report. 2022 [hereinafter GAMeON 2022].] 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. [Footnote 145: Note that building robust regulatory standards for noise reduction and attenuation which can be used internationally was identified by ocean noise experts as an important next	SouthCoast Wind has committed to and BOEM has included additional measures to mitigate impacts on vibratory pile driving (refer to Appendix G) including establishing clearance zones to avoid impacts on sensitive species. In the Draft EIS, BOEM analyzed the use of foundation types that would not require pile driving, including suction bucket and gravity-based foundations, and would therefore avoid significant noise impacts associated with foundation installation. BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	step (GAMeON 2022). Our groups support this recommendation and encourage BOEM's rapid development of this standard.] 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).	
BOEM-2023-0011-0140-0058	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. [Footnote 160: Pace R.M. Williams R. Kraus S.D. Knowlton A.R. Pettis H.M (2021). Cryptic mortality of North Atlantic right whales. Conservation Science and Practice 3:2.] 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.	BOEM included in the Draft EIS (refer to Appendix G) an agency proposed mitigation measure, BA-29, BA-30, and BA-30, which include marine debris awareness training, reporting requirements, and monitoring. BOEM also included BA-33, which specifically addresses mitigation for sea turtle entanglement.
BOEM-2023-0011-0140-0091	Given that the two cable landfalls will occur where sensitive subaquatic vegetation habitats are present the use of HDD is crucial for avoiding and minimizing environmental impacts. Although SouthCoast Wind has already committed to employing HDD for the project's landfall BOEM should require use of HDD as a condition for project approval.	SouthCoast Wind has proposed the use of HDD at all cable landfall locations in its COP. If BOEM approves the COP, SouthCoast will be required to adhere to the development plans contained in the COP and any other conditions imposed by BOEM.

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BOEM-2023-0011-0140-0095	BOEM should require SouthCoast Wind to develop and implement an anchoring plan as a condition of COP approval. Such a plan should delineate areas of complex and sensitive habitat around each turbine and cable locations and identify areas restricted from anchoring. To further reduce impacts BOEM should require to the extent practicable SouthCoast Wind to employ microrouting of the export cable corridor to avoid siting in complex benthic habitats and other sensitive habitat areas particularly in the area of Muskeget Channel which features a high proportion of complex habitats. Similarly as proposed by BOEM SouthCoast Wind should be required to limit boulder clearance activities in order to avoid minimize and mitigate impacts to complex habitats.	As stated in the Anchoring subsection of Section 3.5.2.5, SouthCoast Wind has committed to avoiding habitat loss to benthic resources during construction by selecting lower impact construction methods, where possible, which would include avoiding anchoring on sensitive habitat such as eelgrass beds and hard-bottom habitats. Table 3.5.2-3 which was added to Section 3.5.2.11 presents BOEM-proposed mitigation measures including one measure that requires that boulder clearance be limited to the extent practicable and best efforts should be made to microsite to avoid these areas. Further, the Cable emplacement and maintenance subsection in Section 3.5.5.5 identifies potential anchoring and boulder clearance areas along the Falmouth and Brayton Point ECCs and efforts to minimize impacts at these locations.
BOEM-2023-0011-0140-0096	As proposed BOEM should also require SouthCoast Wind to undertake pre-construction construction and installation and post-construction monitoring of benthic habitats and fisheries in the Project Area. The Draft EIS provides few details on these monitoring studies. At a minimum BOEM should require SouthCoast 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 these habitats and species that occur because of construction activities the presence of WTG structures in the water columns hydrodynamic effects EMF noise and other impacts. Regarding hydrodynamic effects the plan should attempt to monitor hydrodynamic impacts in the area of Nantucket Shoals that is in the vicinity of the lease area as well as the proposed 20-km Nantucket Shoals buffer that overlaps the lease area. Moreover the monitoring plan should require SouthCoast Wind to monitor impacts to sensitive habitats in the export cable corridors including in Muskeget Channel the Sakonnet River and Mount Hope Bay. The monitoring plan should also evaluate impacts to juvenile cod HAPC and	BOEM has proposed mitigation measure BA-3, which would require SouthCoast Wind conduct fisheries and benthic habitat monitoring surveys during pre-construction, construction, and post-construction phases of the Project (refer to Table G-2 in Appendix G), which would include monitoring of sensitive habitat in the Muskeget Channel, Sakonnet River, and Mount Hope Bay. Another BOEM-proposed mitigation measure MA-1, would require that boulder clearance be limited to the extent practicable and best efforts should be made to microsite to avoid these areas. SouthCoast Wind has developed draft monitoring and mitigation plans benthic resources and fisheries. Details on these plans for finfish and benthic species within the Project area are provided under the Gear Utilization IPF of Section 3.5.5.5, *Impacts of Alternative B – Proposed Action on Finfish, Invertebrates, and Essential Fish Habitat*. As part of SouthCoast Wind's NPDES permit application submitted to USEPA (TetraTech and Normandeau Associates, Inc. 2023), the impingement, entrainment, and thermal discharge impacts of the open-loop cooling water intake

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	whether cable protection and/or burial is mitigating impacts to these habitats. [Footnote 374: We note that we have concerns about the route of the Brayton Point export cable corridor up the Sakonnet River because of its designation as juvenile cod HAPC and the presence of boulder fields Crepidula reefs and other complex habitats in the river. While we do not recommend that BOEM select Alternative C–which would avoid siting the export cable corridor in the river–due to questions regarding its feasibility we urge BOEM to require South Coast Wind to utilize microrouting in the Sakonnet River to the greatest extent practicable to avoid these sensitive habitats and to implement robust monitoring to measure any impacts to juvenile cod HAPC and other EFH in the river.] Finally if there is an open loop cooling system at the converter station the monitoring plan should evaluate the impacts from entrainment and impingement of marine organisms as well as the impact of thermal water discharge to the ecosystem.	system were assessed. A summary of these results is presented in the Discharges/intakes subsection of Section 3.5.2.5. Further, SouthCoast Wind plans to monitor the hydrodynamic changes within the Lease Area (Appendix F4 - Nantucket Shoals Hydrodynamic Impacts Study; SouthCoast Wind Incidental Take Application (LGL 2024).
BOEM-2023-0011-0140-0097	Additionally due to the predominance of complex habitat in Muskeget Channel the area may be an Atlantic cod spawning ground. Therefore in advance of construction BOEM should require Atlantic cod spawning surveys and deployment of passive acoustic monitoring capable of detecting the vocalizations of spawning cod in the area of Muskeget Channel to further the 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 South Coast	A fisheries monitoring plan (SouthCoast Wind 2022) has been developed for the portion of the Brayton Point ECC in Rhode Island state waters in accordance with the Rhode Island Ocean Special Area Management Plan (OSAMP), the Baseline Assessment Requirements in state waters, and other applicable sections of the Rhode Island Code of Regulations to characterize abundance and size structure, as well as, presence, movement, and behavior of key fisheries species during the pre-construction, construction, and post-construction phases of the project. The species targeted by monitoring efforts will include the striped bass (Morone saxatillis), summer flounder (Paralichthys dentatus), tautog (Tautoga onitis), false albacore (Euthynnus alletteratus), channeled whelk (Busycotypus canaliculatus), and knobbed whelk (Busycon carica) with acoustic telemetry and trap surveys as the primary monitoring methodologies. FMPs for other project areas are currently in development.

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	Wind to implement such adaptive restrictions on construction activities in Muskeget Channel.	SouthCoast Wind will conduct acoustic telemetry monitoring along the Brayton Point ECC at the mouth of the Sakonnet River using a 12-receiver array of fixed station acoustic receivers to monitor the movements, presence, and persistence of several commercially and recreationally important species (e.g., striped bass, summer flounder, tautog, and false albacore). Receivers will be deployed in early spring and retrieved in late fall to ensure seasonal overlap with the target species. Target fish species within the area in and around the receiver array will be captured via rod-and-reel, implanted with Vemco acoustic transmitters, and released back into the ocean. Acoustic telemetry methodologies have been used extensively in fisheries research (Hussey et al. 2015; Freiss et al. 2021) and mortality of tagged fish is expected to be low. SouthCoast Wind will also conduct a trap survey to monitor whelk relative abundance and size structure along commercially fished sections of the Brayton Point ECC in the Sakonnet River. The survey will identify potential impacts from the short-term disturbance of submarine cable installation on the localized channeled and knobbed whelk resources. Sampling will occur from May to November to align with the commercial fishery for whelk within Narragansett Bay at four stations to be selected with input from the commercial fishing industry. In the absence of standardized whelk survey practices, SouthCoast Wind has consulted with the local whelk fleet regarding trap design and intends to deploy three six-trap strings that will be laid parallel to the export cable at each of the four sampling locations using a Before-After Gradient (BAG) survey design. One string will be set on top of the cable as the impact gradient, one string will be placed 15-30 m from the impact string, and the third string will be set 50 m or greater from the impact string. Traps will be spaced 30 m apart for a total ground-line length of 150 m. The use of traps could result in unavoidable impacts to habitat-forming invertebrates that

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		comprise an important component of habitat for some EFH species. The extent of habitat disturbance and number of organisms affected could be comparable to and limited in extent relative to the baseline level of impacts from commercial fisheries. All whelk and bycaught species caught will be separated by species, enumerated, and weighed to obtain catch per unit effort (CPUE) estimates on a per trap basis. To maintain a record of all species caught, additional bycaught species will be separated and enumerated. To collect shell measurements for whelk caught, a measuring board fitted with a sliding edge will be used to record shell height, width, and length to the nearest millimeter (mm). Bycaught finfish length sampling will be species dependent and utilize either fork length or total length, depending on the standard for each species to the nearest centimeter (cm). Any American lobster (Homarus americanus) or Jonah crab (Cancer borealis) caught will be sampled in accordance with regional survey sampling protocols. For lobster, these parameters include recording carapace length (to the nearest mm), sex, shell hardness, shell disease state, egg stage for egg-bearing females, cull status, and note the presence/absence of a V-notch. For Jonah crab, these parameters include recording carapace width measurements, sex, presence/absence of eggs, molt condition, and shell disease state.
BOEM-2023-0011-0140-0098	Noise: Quieter foundation technologies such as gravity-based or suction bucket (or "caisson") foundations eliminate the need for pile driving and thus one of the most impactful offshore wind activities on whales and other marine life. We urge the use of quieter foundations during offshore wind energy project installation and stress the importance of providing full consideration to selecting these options as the preferred alternative. If pile driving must occur effective noise reduction and attenuation technologies are commercially available and near real-time monitoring technologies that can be used to trigger mitigation measures are being tested or are	In the Draft EIS, BOEM analyzed the use of suction bucket and gravity-based foundations. Various mitigation measures are proposed in Appendix G to minimize noise impacts on marine wildlife. SouthCoast Wind is currently considering both direct drive and geared drive WTGs. Operational noise impacts are analyzed in Section 3.5.6.

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	already being used by other sectors. [Footnote 8: See e.g. “AdBm Noise Mitigation System.” AdBm Technologies. https://adbmtech.com/][Footnote 9: See e.g. Coutinho R.W. and Boukerche A. (2021). “North Atlantic Right Whales Preservation: A New Challenge for Internet of Underwater Things and Smart Ocean-Based Systems.” IEEE Instrumentation & Measurement Magazine 24(3) 61-67; Kowarski K.A. Gaudet B.J. Cole A.J. Maxner E.E. Turner S.P. Martin S.B. Johnson H.D. and Moloney J.E. (2020). “Near real-time marine mammal monitoring from gliders: Practical challenges system development and management implications.” The Journal of the Acoustical Society of America 148(3) 1215-1230; Johnson H. Morrison D. and Taggart C. (2021). “WhaleMap: a tool to collate and display whale survey results in near real-time.” Journal of Open Source Software 6(62) 3094; Vickers W. Milner B. Risch D. & Lee R. (2021). “Robust North Atlantic right whale detection using deep learning models for denoising.” Journal of the Acoustical Society of America 149 3797.] Pending further study we also recommend the use of direct drive turbines as opposed to turbines with a gear box as direct drive turbines may emit lower noise levels and reduce the risk of behavioral disturbance or habitat displacement of North Atlantic right whales and other species during the operation phase of development. [Footnote 10: Stöber U. and Thomsen F. (2021). “How could operation sound from future offshore wind turbines impacts marine life?” The Journal of the Acoustical Society of America 149 1791.] [Footnote 11: While gravity-based and suction bucket foundations avoid the impacts of pile driving noise their installation is not necessarily noise free and the potential use of dynamic positioning systems and other noise related to installation vessels may still lead to some level of behavioral disturbance. As gravity-based and suction bucket foundations are new technologies in the U.S. it will be important to monitor the levels of noise emitted during installation at the source and model the level of	

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	potential noise exposure to large whales and other marine mammals to inform the most appropriate mitigation approaches for future offshore wind energy projects for which these foundation types are used.]	
BOEM-2023-0011-0140-0099	Section 1. Mitigation recommendations during site assessment and characterization Prohibit site assessment and site characterization activities during times of highest risk (North Atlantic right whales only):1. Site assessment and characterization activities involving high resolution geophysical survey equipment with noise levels that could injure or harass large whales (defined throughout this section as: source levels at frequencies between 7 and 35 kHz) should not occur during periods of highest risk to North Atlantic right whales. These periods are defined as times of highest relative density of animals during foraging and migration and times when mother- calf pairs pregnant females surface active groups (indicative of breeding or social behavior) or aggregations of three or more whales (indicative of feeding or social behavior) are or are expected to be present. Time periods must be defined based on the best available scientific information.2. If a near real-time monitoring system and mitigation protocol for North Atlantic right whales and other large whale species is developed and scientifically validated the system and protocol may be used to dynamically manage the timing of site assessment and characterization activities to ensure those activities are undertaken during times of lowest risk for all relevant large whale species. The development of such a protocol is particularly important where foraging aggregations of other large whale species are observed coincident with the times that pile driving would most likely be undertaken based on times of lower relative risk to North Atlantic right whales.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0100	Require diel restrictions on site assessment and characterization activities:1. Site assessment and characterization activities must not be initiated within 1.5	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and

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	hours of civil sunset or in times of low visibility when the visual “clearance zone” and “exclusion zone” (as defined below) cannot be visually monitored as determined by the lead Protected Species Observer (PSO) on duty. [Footnote 14: The term “PSO” refers to an individual with a current NOAA Fisheries approval letter as a Protected Species Observer.]	ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0101	Require the following clearance zone and exclusion zone distances prior to activities known to injure or harass large whales (large whales only):1. A visual clearance zone and exclusion zone of at least 500 m for all large whale species and 1000 m for North Atlantic right whales must be established around each vessel conducting activities with noise levels that could result in injury or harassment to large whales.2. An acoustic clearance zone and exclusion zone of at least 1000 m must be established for North Atlantic right whales around each vessel conducting activities with noise levels that could result in injury or harassment to large whales.3. If a large whale is detected within the 1000 m clearance zone but the species cannot be identified it must be assumed to be a North Atlantic right whale.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0102	Require shutdown of activities if a large whale is detected visually or acoustically (large whales only):1. If a North Atlantic right whale or other large whale species is visually or acoustically detected within the relevant clearance zone site assessment and characterization activities with noise levels that could result in injury or harassment to large whales must not be initiated.2. If a North Atlantic right whale or other large whale species is visually detected within the visual exclusion zone site assessment and characterization activities with noise levels that could result in injury or harassment to large whales must be halted.3. If a North Atlantic right whale is acoustically detected within the acoustic exclusion zone site assessment and characterization activities with noise levels that could result in injury or harassment to large whales must be halted.4. Once halted site assessment and characterization	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	activities may resume following the methods set forth in subsection (v) and after the lead PSO confirms no North Atlantic right whales or other large whale species have been detected within the relevant acoustic and visual clearance zones.	
BOEM-2023-0011-0140-0103	Require robust monitoring protocols during pre-clearance and when site assessment and characterization activities are underway:1. Monitoring of the acoustic clearance zone must be undertaken using near real-time passive acoustic monitoring (PAM) and must be undertaken from a vessel other than the survey vessel or from a stationary unit to avoid the hydrophone being masked by the survey vessel or development-related noise. [Footnote 15: Throughout this document "PAM" refers to a real-time passive acoustic monitoring system with equipment bandwidth sufficient to detect the presence of vocalizing North Atlantic right whales and/or if available at the time of construction other similar high performance sound monitoring systems and arrays).]2. Monitoring of the visual clearance zone must be undertaken by vessel-based PSOs stationed on the survey vessel to enable monitoring of the entire clearance zones for North Atlantic right whales other large whale species and sea turtles. On each vessel there must be a minimum of four PSOs following a two-on two-off rotation each responsible for scanning no more than 180° of the horizon. To effectively monitor the full exclusion zone for sea turtles multiple PSOs must be stationed at several vantage points at the highest level to allow each to continuously scan a section of the exclusion zone.3. Acoustic and visual monitoring must be required for North Atlantic right whales and monitoring must begin at least 30 minutes prior to the commencement or re-initiation of site assessment and characterization activity and must be conducted throughout the duration of activity	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0104	Require mandatory vessel speed restrictions:1. All Project-associated vessels must adhere to a 10-knot speed restriction	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles

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	at all times except for reasons of safety and in all places except in limited circumstances where the best available scientific information demonstrates that whales do not occur in the area.2. Slowing to 4 knots must be required while transiting through areas of visible jellyfish aggregations or floating vegetation lines or mats to improve protection for sea turtles. The speed must be reduced from an upper limit of 10 knots.3. Project proponents may develop in consultation with National Oceanic and Atmospheric Administration (NOAA) Fisheries an “Adaptive Plan” that modifies these vessel speed restrictions. However the monitoring methods that inform the Adaptive Plan must be proven effective using vessels traveling 10 knots or less and following a scientific study design. If the resulting Adaptive Plan is scientifically proven to be equally or more effective than a 10-knot speed restriction the Adaptive Plan could be used as an alternative to a 10- knot speed restriction. [Footnote 16: I.e. via a peer-reviewed scientific study.]	and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0105	Implement other vessel-related measures:1. All personnel working offshore must receive training on observing and identifying North Atlantic right whales other large whale species and sea turtles.2. Vessels must maintain a separation distances of 500 m for North Atlantic right whales and 100 m for other large whale species maintain a vigilant watch for North Atlantic right whales and other large whale species and slow down or maneuver their vessels as appropriate to avoid a potential interaction with a North Atlantic right whale or other large whale species.3. All vessels responsible for crew transport should use thermal detection systems to supplement visual monitoring of marine mammals.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0106	Require underwater noise reduction to the fullest extent feasible:1. The impacts of underwater noise to be minimized to the fullest extent feasible including through the use of technically and commercially feasible and effective noise reduction and attenuation measures. For example project	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	proponents should select and operate sub- bottom profiling systems at power settings that achieve the lowest practicable source level for the objective.	
BOEM-2023-0011-0140-0107	Require mandatory reporting of all North Atlantic right whale other large whale species and sea turtle detections:1. Project proponents must report all visual observations and acoustic detections of North Atlantic right whales to NOAA Fisheries or the United States Coast Guard as soon as possible and no later than the end of the PSO shift. We note that in some cases such as with the use of near real-time autonomous buoy systems the detections will be reported automatically on a pre-set cycle.2. Project proponents must immediately report an entangled or dead North Atlantic right whale other large whale species or sea turtle to NOAA Fisheries the Marine Animal Response Team (1-800-900-3622) or the United States Coast Guard immediately via one of several available systems (e.g. phone app radio). Methods of reporting are expected to advance and streamline in the coming years and projects should commit to supporting and participating in these efforts.3. Quarterly reports of PSO sightings data must be made publicly available to inform marine mammal and sea turtle science and protection.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0108	Prohibit pile driving during times of highest risk (North Atlantic right whales only):1. Pile driving must not occur during periods of highest risk to North Atlantic right whales defined as times of highest relative density of animals during foraging and migration and times when mother-calf pairs pregnant females surface active groups (indicative of breeding or social behavior) or aggregations of three or more whales (indicative of feeding or social behavior) are or are expected to be present. Time periods must be defined based on the best available scientific information.2. If a near real-time monitoring system and mitigation protocol for North Atlantic right whales and other large whale species is developed and scientifically validated the system and protocol may be used	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	to dynamically manage the timing of pile driving and other construction activities to ensure those activities are undertaken during times of lowest risk for all relevant large whale species. The development of such a protocol is particularly important where foraging aggregations of other large whale species are observed coincident with the times that pile driving would most likely be undertaken based on times of lower relative risk to North Atlantic right whales.	
BOEM-2023-0011-0140-0109	Restrict pile driving activity at night and during periods of low visibility (all large whale species and sea turtles):1. Pile driving must not be initiated within 1.5 hours of civil sunset or in times of low visibility when the visual “clearance zone” and “exclusion zone” (as hereinafter defined) cannot be visually monitored as determined by the lead PSO on duty.2. Pile driving may continue after dark only if the activity commenced during daylight hours and must proceed for human safety or installation feasibility reasons and if required night-time monitoring protocols are followed (see subsection (v)). [Footnote 17: Throughout this document “installation feasibility” refers to ensuring that the pile installation event results in a usable foundation for the wind turbine (i.e. foundation installed to the target penetration depth without refusal and with a horizontal foundation/tower interface flange). In the event that pile driving has already started and nightfall occurs the lead engineer on duty will make a determination through the following evaluation: 1) Use the site-specific soil data on the pile location and the real-time hammer log information to judge whether a stoppage would risk causing piling refusal at re-start of piling; and 2) Check that the pile penetration is deep enough to secure pile stability in the interim situation taking into account weather statistics for the relevant season and the current weather forecast. Such determinations by the lead engineer (or their alternate) on duty will be made for each pile location as the installation progresses and not for the site as a whole. This information will be included in the reporting for the project.]	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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BOEM-2023-0011-0140-0110	Require underwater noise reduction levels based on best commercially available technology(all large whale species):1. A combination of near field and far field noise mitigation and/or a combination system expected to achieve at least 15dB (re: 1µPa2s) reduction of Sound Exposure Level (SEL) from pile driving operations including pile strikes compressors and operations vessels engaged in construction must be used. [Footnote 18: E.g. reduced blow resonant panel noise abatement system (e.g. AdBm Noise Mitigation System. https://adbmtech.com/) hydrosound damper (e.g. OffNoise-Solutions Hydro-Sound-Damper-System (HSD-System). https://www.offnoise- solutions.com/) isolation casing (Noise Mitigation Screen (NMS)) and dewatered cofferdam (see Koschinski S. and Lüdemann. K. (2020). “Noise mitigation for the construction of increasingly large offshore wind turbines: Technical options for complying with noise limits.” Report commissioned by the Federal Agency for Nature Conservation Isle of Vilm Germany. https://tethys.pnnl.gov/publications/noisemitigation-construction-increasingly-large-offshore-wind-turbines).] [Footnote 19: E.g. single bubble curtain.] [Footnote 20: E.g. double bubble curtain.] [Footnote 21: Sound Exposure Level (SEL) is defined following Bellmann et al. (2020) at 31-32. Bellmann M. A. Brinkmann J. May A. Wendt T. Gerlach S. & Remmers P. (2020) “Underwater noise during the impulse pile-driving procedure: Influencing factors on pile- driving noise and technical possibilities to comply with noise mitigation values.” Supported by the Federal Ministry for the Environment Nature Conservation and Nuclear Safety (Bundesministerium für Umwelt Naturschutz und nukleare Sicherheit (BMU)) FKZ UM16 881500. Commissioned and managed by the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie (BSH)) Order No. 10036866. Edited by the itap GmbH. https://www.itap.de/media/experience_report_underwater_era-report.pdf.] [Footnote 22: Taking as a baseline projections	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	from prior noise measurements of unmitigated piles from Europe and North America. We note that combination systems using best available technology have achieved noise reduction levels 20 dB or more in the field. The goal should be to achieve the greatest noise reduction level possible in line with the principles of the mitigation hierarchy. Greater noise reduction levels could also provide more flexibility for developers. See Bellmann et al. (2020) at Table 4 (p. 106). https://www.itap.de/media/experience_report_underwater_era-report.pdf.] At minimum a 10 dB (re: re: 1µPa2s) reduction of SEL must be attained.2. Field measurements must be conducted on the first pile installed and data must be collected from a random sample of piles throughout the construction period. We do not support field testing using unmitigated piles.3. Sound source validation reports of field measurements must be evaluated by both BOEM and NOAA Fisheries prior to additional piles being installed and be made publicly available.	
BOEM-2023-0011-0140-0111	Require the following clearance zone distances prior to pile driving and exclusion zone distances during pile driving (for a minimum of 10-12 dB noise reduction (see subsection (iii)); North Atlantic right whales only):1. A visual clearance zone and exclusion zone must extend at minimum 5000 m in all directions from the location of the driven pile.2. An acoustic clearance zone must extend at minimum 5000 m in all directions from the location of the driven pile.3. An acoustic exclusion zone must extend at minimum 2000 m in all directions from the location of the driven pile.4. Clearance and exclusion zone distances for other large whale species must be designed in a manner that eliminates Level A take and minimizes behavioral harassment to the full extent practicable.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0112	Require shutdown of activities if a large whale is detected visually or acoustically (for a minimum of 10-12 dB noise reduction (see subsection (iii)); North Atlantic right whales	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and

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	only):1. Pile driving must not be initiated when monitoring methods defined in subsection (vi) result in either an acoustic detection within the acoustic clearance zone or a visual detection within the visual clearance zone of one or more North Atlantic right whales.2. Pile driving must not be initiated or if already underway must be shut down unless continued pile driving activities are necessary for reasons of human safety or installation feasibility when monitoring methods defined in subsection (vi) result in acoustic detection within the acoustic exclusion zone or a visual detection within the visual exclusion zone of one or more North Atlantic right whales.3. Pile driving must be shut down unless continued pile driving activities are necessary for reasons of human safety or installation feasibility if a North Atlantic right whale is visually detected by PSOs at any distance from the pile.4. Once halted pile driving may resume only after using the methods set forth in subsection(vi) and the lead PSO confirms no North Atlantic right whales or other large species have been detected within the relevant acoustic and visual clearance zones.	ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0113	Require robust near real-time monitoring protocols during pre-clearance and when pile driving activity is underway (all large whale species):1. Monitoring of the acoustic clearance and exclusion zone must be undertaken using near real-time PAM assuming a detection range of at least 10000 m and must be undertaken from a vessel other than the pile driving vessel or from a stationary unit to avoid the hydrophone being masked by the pile driving vessel or development-related noise.2. Monitoring of the visual clearance and exclusion zones must be undertaken by vessel based PSOs stationed at the pile driving site and on additional vessels circling the pile driving site as needed. On each vessel there must be a minimum of four PSOs following a two-on two- off rotation each responsible for scanning no more than 180° of the horizon per pile driving location. To effectively monitor the full exclusion zone for sea turtles multiple PSOs must be	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	stationed at several vantage points at the highest level to allow each to continuously scan a section of the exclusion zone. Additional vessels must survey the clearance and exclusion zones at speeds of 10 knots or less.3. Acoustic and visual monitoring must begin at least 60 minutes prior to the commencement or re-initiation of pile driving and must be conducted throughout the duration of pile driving activity. Visual monitoring must continue until 30 minutes after cessation of pile driving.4. Infrared technology must be used to support visual monitoring during any pile driving activities that extend into periods of darkness.5. Additional observers and monitoring technologies (e.g. infrared drones hydrophones) must be deployed as needed to ensure the ability to monitor the established clearance and exclusion zones including during periods of darkness or poor visibility.	
BOEM-2023-0011-0140-0114	Require mandatory vessel speed restrictions (all large whale species and sea turtles):1. All Project-associated vessels must adhere to a 10-knot speed restriction at all times except in limited circumstances where the best available scientific information demonstrates that whales do not use the area.2. Slowing to 4 knots must be required while transiting through areas of visible jellyfish aggregations or floating vegetation lines or mats to improve protection for sea turtles. The speed must be reduced from an upper limit of 10 knots.3. Project proponents may develop in consultation with NOAA Fisheries an “Adaptive Plan” that modifies these vessel speed restrictions. However the monitoring methods that inform the Adaptive Plan must be proven effective using vessels traveling 10 knots or less and following a scientific study design. If the resulting Adaptive Plan is scientifically proven to be equally or more effective than a 10-knot speed restriction the Adaptive Plan could be used as an alternative to a 10-knot speed restriction. [Footnote 23: I.e. via a peer-reviewed scientific study.]	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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BOEM-2023-0011-0140-0115	Implement other vessel-related measures (all large whale species and sea turtles):1. All personnel working offshore must receive training on observing and identifying North Atlantic right whales other large whale species and sea turtles.2. Vessels must maintain a separation distance of 500 m for North Atlantic right whales and 100 m for other large whale species maintain a vigilant watch for North Atlantic right whales and other large whale species and slow down or maneuver their vessels as appropriate to avoid a potential interaction with a North Atlantic right whale or other large whale species.3. All vessels responsible for crew transport (i.e. service operating vessels) should use automated thermal detection systems to assist monitoring efforts while vessels are in transit maintaining a speed of 10 knots.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0116	Require mandatory reporting of all North Atlantic right whale other large whale species and sea turtle detections:1. Project proponents must report all visual observations and acoustic detections of North Atlantic right whales to NOAA Fisheries or the United States Coast Guard as soon as possible and no later than the end of the PSO shift. We note that in some cases such as with the use of near real-time autonomous buoy systems the detections will be reported automatically on a pre-set cycle.2. Projects must immediately report an entangled or dead North Atlantic right whale other large whale species or sea turtle to NOAA Fisheries the Marine Animal Response Team (1- 800-900-3622) or the United States Coast Guard immediately via one of several available systems (e.g. phone app radio). Methods of reporting are expected to advance and streamline in the coming years and BOEM should require projects to commit to supporting and participating in these efforts.3. Quarterly reports of PSO sightings data must be made publicly available to inform marine mammal and sea turtle science and protection.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0117	Require clearance zone and exclusion zone distances that will eliminate Level A take and minimize behavioral harassment	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles

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	(large whale species only):1. Clearance and exclusion zone distances for North Atlantic right whales and other large whale species must be designed to eliminate Level A take and minimize behavioral harassment to the full extent practicable during the installation of gravity-based or suction bucket foundations considering noise levels expected to be generated during installation.	and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0118	Require shutdown of activities if a large whale is detected visually or acoustically (large whale species only):1. Installation of gravity-based and suction bucket foundations must not be initiated when the application of monitoring methods defined in subsection (iii) results in a detection of a North Atlantic right whale or other large whale species within the relevant clearance zone (as defined based on noise levels expected during installation; see subsection (i)).2. Installation of gravity-based and suction bucket foundations must be halted unless continued installation activities are necessary for reasons of human safety or installation feasibility when the application of monitoring methods defined in subsection (iii) results in a detection of a North Atlantic right whale or other large whale species within the relevant exclusion zone (as defined based on noise levels expected during installation; see subsection (i)).3. Once halted installation may resume after use of the methods set forth in subsection (iii) and the lead PSO confirms no North Atlantic right whales or other large species have been detected within the relevant clearance zones.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0119	Require robust near real-time monitoring protocols during clearance and installation:1. Monitoring of the clearance and exclusion zones must be undertaken using near real-time PAM from a vessel other than the installation vessel or from a stationary unit to avoid the hydrophone being masked by installation-related noise.2. Monitoring of the clearance and exclusion zone must be undertaken by vessel based PSOs stationed at the installation site. On each vessel there must be	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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	a minimum of four PSOs following a two-on two-off rotation each responsible for scanning no more than 180° of the horizon per gravity-based or suction bucket foundation installation location. To effectively monitor the full exclusion zone for sea turtles multiple PSOs must be stationed at several vantage points at the highest level to allow each to continuously scan a section of the exclusion zone.3. Acoustic and visual monitoring must be required and monitoring must begin at least 60 minutes prior to the commencement or installation activity and must be conductedthroughout the duration of installation. Visual monitoring must continue until 30 minutes after installation.4. Additional observers and monitoring technologies (e.g. infrared drones hydrophones) must be deployed as needed to ensure the ability to monitor the established clearance and exclusion zones including during periods of darkness or poor visibility.	
BOEM-2023-0011-0140-0120	Require mandatory vessel speed restrictions:1. All Project-associated vessels must adhere to a 10-knot speed restriction at all times except in limited circumstances where the best available scientific information demonstrates that whales do not occur in the area.2. Slowing to 4 knots must be required while transiting through areas of visible jellyfish aggregations or floating vegetation lines or mats to improve protection for sea turtles. The speed must be reduced from an upper limit of 10 knots.3. Project proponents may develop in consultation with NOAA Fisheries an "Adaptive Plan" that modifies these vessel speed restrictions. However the monitoring methods that inform the Adaptive Plan must be proven effective using vessels traveling 10 knots or less and following a scientific study design. If the resulting Adaptive Plan is scientifically proven to be equally or more effective than a 10-knot speed restriction the Adaptive Plan could be used as an alternative to a 10-knot speed restriction. [Footnote 24: I.e. via a peer-reviewed scientific study.]	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.

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BOEM-2023-0011-0140-0121	Implement other vessel-related measures:1. All personnel working offshore must receive training on observing and identifying North Atlantic right whales other large whale species and sea turtles.2. Vessels must maintain a separation distances of at least 500 m for North Atlantic right whales and 100 m for other large whale species. They must maintain a vigilant watch for North Atlantic right whales and other large whale species and slow down or maneuver their vessels as appropriate to avoid any potential interaction with them.3. All vessels responsible for crew transport (i.e. service operating vessels) should use automated thermal detection systems to assist monitoring efforts while vessels are in transit maintaining a speed of 10 knots.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0122	Require mandatory reporting of all North Atlantic right whale other large whale and sea turtle detections:1. Project proponents must report all visual observations and acoustic detections of North Atlantic right whales to NOAA Fisheries or the United States Coast Guard as soon as possible and no later than the end of the PSO shift. We note that in some cases such as with the use of near real-time autonomous buoy systems the detections will be reported automatically on a preset cycle.2. Project proponents must immediately report an entangled or dead North Atlantic right whale other large whale species or sea turtle to NOAA Fisheries the Marine Animal Response Team (1-800-900- 3622) or the United States Coast Guard immediately via one of several available systems (e.g. phone app radio). Methods of reporting are expected to advance and streamline in the coming years and agencies should require projects to commit to supporting and participating in these efforts.3. Quarterly reports of PSO sightings data must be made publicly available to inform marine mammal and sea turtle science and protection.	BOEM has considered all public and agency comments regarding mitigation for marine mammals and sea turtles and has worked with NMFS through the NEPA process and ESA Section 7 consultation to select the appropriate mitigation measures to carry forward in the Final EIS.
BOEM-2023-0011-0140-0127	As a condition of project approval BOEM should require SouthCoast Wind to locate the converter station outside of the 10-km buffer from Nantucket Shoals. BOEM should also	All measures committed to by SouthCoast Wind would become binding if BOEM approves the COP, including SouthCoast Wind's commitment to site the northernmost

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	consider whether requiring SouthCoast Wind to locate the converter station at a distance greater than the proposed 10-km buffer from Nantucket Shoals is feasible and would further mitigate impacts to finfish and invertebrates in the lease area. Specifically BOEM should consider the possibility of requiring SouthCoast Wind to locate the converter station outside a 20-km buffer from Nantucket Shoals which at least one NOAA scientist has asserted is a preferable buffer that should be established to reduce impingement entrainment and hydrodynamic impacts to zooplankton–that provide prey for marine mammal species–from offshore wind projects. [Footnote 361: See Letter to BOEM NOAA (May 2022)https://docs.google.com/viewerng/viewer?url=https://newbedfordlight.org/wp- content/uploads/2022/11/UR1-2023-000009_10_17_2022.pdf.]	HVDC converter OSP outside of a 10-kilometer buffer of the 30-meter isobath from Nantucket Shoals. In addition, BOEM is proposing to require NS-1, which would prohibit open-loop cooling systems in the enhanced mitigation area of the Lease Area (refer to Figure G-1 in Appendix G). SouthCoast Wind has identified the location of one HVDC converter OSP, which would be within 20 km of Nantucket Shoals, as identified in SouthCoast Wind's NPDES permit application (TetraTech and Normandeau Associates, Inc. 2023). BOEM does not concur that a measure requiring HVDC converter OSPs to be avoided outside a 20-kilometer buffer of Nantucket Shoals is necessary.
BOEM-2023-0011-0157-0004	And another kind of question/comment something that I had not seen in reviewing other projects is the notion of the developer entering into the contract for the power with private entities. So far we have only seen that with contracts with the State so I wasn't sure if that would lead to differences in terms of like how mitigation approaches would be designed and so I think explaining that better what that would look like and how that might relate to mitigation I think would be helpful.	The EIS evaluates the environmental impacts from the construction, O&M, and decommissioning of the Project and identifies mitigation measures to avoid, reduce, mitigate, and monitor impacts on resources discussed in Chapter 3. If the COP is approved, the mitigation measures selected in the ROD would be binding, regardless of whether SouthCoast Wind has private or public power purchase agreements.

N.6.24 Cumulative Impacts

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BOEM-2023-0011-0007-0003	Although offshore wind will help reach our targets for renewable generation the more pressing priority should be to upgrade our electric utility infrastructure to actually be able to accept that generation. Currently no power grid in New England is capable of accepting the combined output of all the MA lease area projects but if we improved the grid and laid the previously mentioned central trunk cable it would be	The development of an improved electrical grid in New England is outside the scope of analysis for this EIS. The purpose of the SouthCoast Wind Project EIS is to assess the reasonably foreseeable environmental, social, economic, historic, and cultural impacts that could result from the construction and installation, O&M, and conceptual

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	much more efficient and less impactful than the current proposed operations.	decommissioning of the Project proposed by SouthCoast Wind in its COP.
BOEM-2023-0011-0065-0004	The DEIS depicts the two offshore export cable corridors with landfalls at Falmouth and Brayton Point are depicted in "Figure 2-1. Mayflower Wind project area" on page 2-6 of the DEIS. What is missing from that chart are all the other export cable routes already approved (Vineyard Wind and South Fork Wind) as well as proposed (Revolution Wind Sunrise Wind New England Wind etc). Cables are a major hazard for mobile bottom tending gear vessels such as ours. The Mayflower/South Coast Wind export cables both appear to cross the Vineyard Wind export cable which will create the need for cable armoring in those places creating hangs for our vessel's gear when operating in the area as well as a spiderweb of cables that will potentially be unburied by storm and other activity. We remind BOEM as we detailed in our Vineyard Wind SEIS comments that Muskeget Channel was the site of a proposed tidal power plant in 2006 due to its strong currents; it is likely that the export cables for these multiple projects will become exposed.	SouthCoast Wind has conducted a Cable Burial Risk Assessment to calculate the target cable-lowering depth to minimize risks to the offshore export cables from damage, and to mitigate potential conflicts between commercial or recreational fishermen and the new structure. Additionally, to minimize interference with fishing activities, SouthCoast Wind has sited the export cable corridors (ECC) to minimize overlap with known areas of high fishing activity. Where applicable, SouthCoast Wind will record required cable protection on electronic charts to be distributed to fishermen (Table G-1, Final EIS Appendix G, *Mitigation and Monitoring*). Furthermore, BOEM has proposed mitigation measure CF-3, which would require cable protection measures to reflect the pre-existing conditions at the site and ensures that seafloor cable protection does not introduce new hangs for mobile fishing gear, and CF-1, which establishes a gear loss and damage compensation program (Table G-2, Final EIS Appendix G). The cumulative impacts of the offshore export cables for the Proposed Action in combination with cables from ongoing and planned offshore wind activities in the region are included in Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*, and Section 3.6.7, *Other Uses*, of the Final EIS.
BOEM-2023-0011-0065-0005	Due to their hazardous impacts to mobile bottom tending gear commercial fishing vessels the primary type of commercial fishing vessel operating in the vicinity of the Mayflower/South Coast export cables as well as the Vineyard Wind export cable and due to the cumulative impact of multiple cable export routes not only in the MA and MA/RI WEA but all up and down the coast where projects are being planned BOEM must conduct a cumulative impacts analysis on the cables themselves. It cannot allege that all the cables	Please refer to response to comment BOEM-2023-0011-0065-0004. A separate cumulative analysis of cable routes along the entire Atlantic Coast is outside the scope of the SouthCoast Wind Project EIS, which is focused on the impacts from the construction, O&M, and decommissioning of the SouthCoast Wind Project.

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	will remain unburied. This is not rational and has not been borne out in practice in other regions. Many of the cables cross each other in various places necessitating cable armoring which will also affect our ability to fish in the area. We have asked BOEM previously for charts of all approved and potential cable routes for all projects as a cumulative impact chart. We ask again here. We also ask for a cumulative impact analysis on cables. BOEM cannot continue to allege as it did in the Vineyard Wind project that impacts from cables will be temporary and minor. [Footnote 3: Vineyard Wind FEIS p. 3-213.] They will not. We remind BOEM again of our comments on the Vineyard Wind project regarding cables including warnings from offshore wind developers themselves that "In the interests of fishing safety and to prevent damage to subsea structures fishermen are advised to exercise caution when fishing in the vicinity of subsea cables and renewable energy structures. Loss of gear fishing time and catch can result if a trawler snags a subsea structure and there is serious risk of loss of life."	
BOEM-2023-0011-0086-0003	If BOEM plans to develop 22 million acres of the Outer Continental Shelf have the cumulative effects of multiple wind turbine generators been reviewed and assessed? Please refer to a recent review by Galparsoro from 2022. I would recommend no additional developments on the Continental Shelf until a cumulative assessment of the interactions between the development of all leased properties can be reviewed. BOEM must be transparent regarding all impacts of a project of this nature.	The CEQ NEPA Implementing Regulations require NEPA impact analysis to include cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to other past, present, and reasonably foreseeable actions. The cumulative impact analysis for the No Action Alternative considers the impacts of ongoing activities and other reasonably foreseeable planned activities, excluding the Proposed Action, as described in Appendix D, *Planned Activities Scenario*, of the Final EIS. The cumulative impact analysis of the Proposed Action considers approval of the SouthCoast Wind Project in combination with other reasonably foreseeable planned activities, including offshore wind activities, within the geographic analysis area for each Chapter 3 resource topic.
BOEM-2023-0011-0091-0011	The DEIS that has been developed and submitted to the BOEM is thus by itself just a small portion of the overall	Please refer to response to comment BOEM-2023-0011-0086-0003.

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	impact of this proposed new development. So by design the DEIS is biased towards depicting a lower impact in an essentially pristine and vibrant ecosystem. Therefore the EIS should evaluate the impact of the entire project as envisioned not just 1/7th thereof. So the design and body of the DEIS is not appropriate for the purpose it is being applied to and shouldn't be accepted in its current form nor its conclusions accepted.	
BOEM-2023-0011-0117-0004	Cumulative Impacts: Most glaringly the DEIS fails to include interactions between multiple pressures in the cumulative impact assessment. A recent review of the literature stresses the significance of this gap in our knowledge (Galparsoro 2022). BOEM needs to prepare a programmatic EIS to examine the entire wind development of the outer continental shelf including all interactions. Individual stressors do not act in isolation and can have a negative synergistic effect that can accumulate and exponentially increase environmental damage. Given that BOEM plans to develop 22 million acres of the Outer Continental Shelf (BOEM Draft strategy for the NARW p. 3) an assessment that considers interactions seems particularly important. No further developments should occur until a cumulative impact assessment includes a complete programmatic review and a full assessment of interactions.	As described in Chapter 1, *Introduction*, of the Final EIS, BOEM has completed multiple regional analysis and planning steps to evaluate the effects of wind development offshore Massachusetts and Rhode Island prior to the finalizing the lease areas and preparation of individual COP EISs. In December 2010, BOEM published a Request for Interest (RFI) in the *Federal Register* to gauge commercial interest in wind energy development offshore Massachusetts (75 *Federal Register* 82055) and to invite the public to comment and provide information on environmental issues and data that should be considered in the development of the area. After consideration of public comments and input from BOEM's intergovernmental Massachusetts Renewable Energy Task Force, BOEM modified the area of interest for commercial development offshore Massachusetts. In February 2012, BOEM published a Call for Information and Nominations for commercial leasing for wind power on the OCS offshore Massachusetts in the *Federal Register* (77 *Federal Register* 5820) and solicited comments from the public. After considering comments received, BOEM excluded an area of high sea duck concentration, as well as an area of high-value fisheries to reduce conflict with commercial and recreational fishing activities. In June 2014, BOEM published in the *Federal Register* a Notice of Availability of a Revised Environmental Assessment and Finding of No Significant Impact for commercial wind lease issuance and site assessment activities on the Atlantic OCS offshore Massachusetts (79 *Federal Register* 34781).

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		Based on BOEM's experiences permitting offshore wind projects off Massachusetts and Rhode Island and other areas along the Atlantic Coast, BOEM has decided to pursue a programmatic EIS for six lease areas in the New York Bight (see 87 *Federal Register* 42495). BOEM is considering programmatic reviews for lease areas in other geographic locations as well. As project-level environmental reviews have commenced in the Atlantic OCS off Massachusetts and Rhode Island, environmental impacts are being considered at a project level, consistent with NEPA requirements.
BOEM-2023-0011-0123-0001	The geographic area analysis for the analysis does not include adjacent leases. Therefore prospective effects the area of interest has on adjacent areas and vice versa are not considered. This notion follows a similar concern of not evaluating the cumulative effects of development on these areas.	The geographic analysis area is defined by the anticipated geographic extent of impacts for each resource and is described and mapped in the introduction to each Chapter 3 resource section. For example, for the mobile resources—bats, birds, finfish, and invertebrates; marine mammals; and sea turtles—the geographic analysis area for these mobile resources is the general range of the species. The purpose is to capture the impacts on each of those resources that would be affected by the Proposed Action as well as cumulative impacts from the Proposed Action in combination with ongoing and planned activities. Therefore, depending on the resource, the geographic analysis area and the cumulative impact analysis may include only the SouthCoast Wind Lease Area and neighboring leases, or it may include the full build-out of all lease areas along the U.S. Atlantic Coast.
BOEM-2023-0011-0128-0013	Moreover the DEIS fails to incorporate best practices and minimum guidelines that would apply to all offshore wind developments near the Town of Nantucket. In specifically requiring cumulative impacts analyses NEPA recognizes the significant effect that reasonably foreseeable projects can have on the surrounding landscape beyond the scope of a single development. BOEM's analysis and methodology for assessing cumulative impacts in the DEIS are confusing and unclear. Consulting parties and the public have a right to	Through the SouthCoast Wind Project NEPA process, BOEM cannot require measures or minimum guidelines that would apply to projects other than the Project. The EIS analyzes the Project as proposed in the COP and identifies mitigation measures in Appendix G that would apply to the Project. BOEM has established requirements in its regulations related to the offshore wind leasing and development process that apply to all projects and include typical requirements in its leasing documents; other regulatory agencies, such as FAA

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	understand BOEM's conclusions and how it arrived at them. Currently no reasonable person can interpret them.	and USCG, have established minimum requirements for lighting and other standards that would apply to all projects. BOEM's approach for analyzing cumulative impacts is consistent with the NEPA statute and CEQ's implementing regulations. The approach for analyzing cumulative impact is described in Section 1.6, *Methodology for Assessing Impacts*, and in the introduction to Chapter 3. BOEM has vetted the language with cooperating agencies and believes it is accurately and clearly described.
BOEM-2023-0011-0132-0001	The document lays out many Impact Producing Factors (IPFs) and attempts to explain them in four different scenarios a "no action alternative" a "cumulative no action alternative" the "proposed action" and the "cumulative impacts of the proposed action". The manner that these scenarios are laid out seems to change from section to section with an amorphous "future baseline" described as varying between ~900 and ~3000 WTGs depending on the section. The method used to layout cumulative and no action alternatives is confusing indecipherable appears designed to minimize or hide the impacts of the proposed action and fails at its fundamental purpose of informing the public about the myriad serious environmental consequences of the SouthCoast (Mayflower) Wind project and its additive impact on the wind lease area.	The geographic analysis area varies for each resource as described in the individual resource sections of Chapter 3, *Affected Environment and Environmental Consequences*, of the Final EIS. Depending on the size of the geographic analysis area, more or fewer WTGs from ongoing and planned offshore wind activities are included in the analysis for the No Action Alternative and cumulative impacts analysis for the No Action Alternative and Proposed Action.
BOEM-2023-0011-0132-0003	The document repeatedly dismisses IPFs for the proposed action as occurring regardless of whether the action takes place or not. This is simply not true. As of the writing of the document only 5 WTGs exist in the North Atlantic and these are much smaller than what is being proposed and much closer to shore. The cumulative impacts were not adequately evaluated for either the Vineyard Wind or the South Fork Wind projects and thus including those as already having been built is misleading confusing and inaccurate.	Ongoing activities that would contribute to baseline conditions, including offshore wind activities but excluding the Proposed Action, are described under the No Action Alternative. Offshore wind activities that have already been constructed (Block Island Wind Farm offshore Rhode Island and Coastal Virginia Offshore Wind Pilot Project offshore Virginia) or that have an approved COP (e.g., Vineyard Wind 1, South Fork Wind Farm, Revolution Wind) are considered ongoing activities and have been included in the No Action Alternative. The projects with an approved COP are analyzed for ongoing construction as well as future O&M. These

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		offshore wind activities have completed the environmental review process and the public has had the opportunity to comment on them.
BOEM-2023-0011-0132-0121	In Chapter 4 the following statement is made in introducing Table 4.1-1 [Text in Blue: "All impacts from planned activities are still expected to occur as described in the No Action Alternative analysis in this EIS regardless of whether the Proposed Action is approved."] This is once again a questionable statement as the only approved projects are in dispute and construction has not commenced on any projects other than the near shore Block Island Wind.	Please refer to response to comment BOEM-2023-0011-0132-0003.
BOEM-2023-0011-0132-0126	Section 4.3 discusses the long-term benefits of the offshore wind projects; both the project being analyzed and the cumulative impacts.- The first benefit is [Text in Blue: "Promotion of clean and safe development of domestic energy sources and clean energy job creation."] The document provides no back up for "clean" or 'safe". The sourcing of rare earths is never discussed nor is reliance on US adversaries needed to secure them. Nor are the tons of steel fiberglass and concrete needed to build the wind power plants discussed in terms of environmental impacts. The millions of gallons of diesel fuel oil firefighting foam and other substances are not put into context of how they will impact the environment. It is not enough to "state" that this is a clean source of energy. It must be shown and the DEIS does not have the data to support that this is a clean energy source especially when compared to dual cycle natural gas that is delivered via pipeline.- The next bullet [Text in Blue: "Promotion of renewable energy to help ensure geopolitical security reduce GHG emissions to combat climate change and provide electricity that is affordable reliable safe secure and clean."] Is also not supported when compared to domestically sourced natural gas. The US will be dependent on adversaries to secure the necessary parts and rare earths to build and repair the WTGs.- This statement is not a benefit. [Text in	The Final EIS is used as a public disclosure document and a decision-making tool to determine if BOEM should approve, disapprove, or approve the SouthCoast Wind COP with modifications. A discussion of whether the Proposed Action is a clean source of energy or potential geopolitical impacts is outside of the scope of analysis for this action. Mining or fabricating materials is not part of the Proposed Action; mines or manufacturing plants that may be used to produce material used by the Proposed Action would be subject to their own environmental review and permitting. Analysis of potential impacts on birds, bats, marine mammals including NARWs, invertebrates, and finfish can be found in Chapter 3 of the Final EIS.

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	Blue: “Delivery of power to the Massachusetts (and broader northeast U.S.) energy grid to contribute to the state’s renewable energy requirements.”] This is merely a political statement with no data to back up that offshore wind will be “renewable”. In fact offshore wind turbines have not been shown to last the 35 years provided for in the DEIS.- The last bullet [Text in Blue: “Increased habitat for certain fish species”] is a minor/trivial benefit that is does nothing to offset the harm to many more species of birds bats marine mammals including NARWs invertebrates and fish.	
BOEM-2023-0011-0134-0001	We are concerned by and oppose the Bureau of Ocean Energy Management’s (BOEM’s) use of separate National Environmental Policy Act (NEPA) documents for the development of offshore wind (OSW) projects off the coast of Rhode Island and Massachusetts. This approach fails to properly address the combined and cumulative negative environmental impacts of OSW developments located in proximity and with similar construction and operation schedules.	BOEM’s regulations at 30 CFR 585.628 require BOEM to conduct environmental review of the lessee’s COP. For each offshore wind project with a COP, including the SouthCoast Wind Project, BOEM is appropriately analyzing the cumulative effects from the Project when added to other past, present, and reasonably foreseeable actions, including offshore wind and non-offshore wind activities, consistent with the CEQ NEPA implementing regulations. Appendix D of the Final EIS describes other past, present, and reasonably foreseeable actions analyzed in the cumulative effects analysis.
BOEM-2023-0011-0134-0002	BOEM should assess the full and cumulative impacts of OSW development in the Rhode Island and Massachusetts Wind Energy Area (164750 acres) and the Massachusetts Wind Energy Area (742974 acres) through a tiered EIS or a Programmatic Environmental Impact Statement (PEIS). The Council on Environmental Quality’s NEPA Implementing Regulations encourage the use of tiering to eliminate redundancy by disclosing the impacts of large-scale programs followed by subsequent analysis of individual projects which make up the larger program. See 40 C.F.R. 1508.1(ff) (defining “tiering” as “coverage of general matters in broader environmental impact statements or environmental assessments … with subsequent narrower statements or environmental analyses … incorporating by reference the	Please refer to response to comment BOEM-2023-0011-0117-0004 and BOEM-2023-0011-0134-0001.

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	general discussions and concentrating solely on the issues specific to the statement subsequently prepared."); see also 40 C.F.R. 1501.11.The OSW projects in this area and associated status of each project's NEPA review are listed below: • Revolution Wind (Draft EIS published 2022) • South Fork Wind (Record of Decision approved 2021) • Sunrise Wind (Draft EIS published 2022) • Bay State Wind (Not started) • New England Wind (formerly Vineyard Wind South; Draft EIS published 2022) • Vineyard Wind 1 (Record of Decision approved 2021) • Beacon Wind (Not started) • SouthCoast (formerly Mayflower) Wind (Draft EIS published 2023) These projects are adjacent to each other and individually and cumulatively negatively impact the exact same communities and ecosystems. By segmenting the environmental review for this area into smaller component parts the full scope and scale of the negative environmental consequences of these projects has not been fully evaluated or disclosed and appropriate avoidance or mitigation solutions are not being considered holistically. Further this misguided segmentation approach is placing an undue burden on the Tribes that are struggling to keep up with the flow of information.	
BOEM-2023-0011-0134-0003	A PEIS is currently being prepared for the New York Bight area which consists of 488000 acres with multiple lease areas under consideration. [Footnote 1: Notice of Intent To Prepare a Programmatic Environmental Impact Statement for Future Wind Energy Development in the New York Bight (87 FR 42495)] The Rhode Island and Massachusetts WEA and Massachusetts WEA when combined are almost twice as large as the New York Bight area. Why has BOEM elected to take a holistic approach to environmental analysis of the New York Bight area but has allowed the improper segmentation of the	Please refer to response to comment BOEM-2023-0011-0117-0004 and to BOEM-2023-0011-0134-0001. Impacts on cultural and other environmental resources important to Tribal Nations from the Project and the Project in combination with other offshore wind and non-offshore wind projects are analyzed in various sections of Chapter 3, including Section 3.6.2, *Cultural Resources*, and Section 3.6.4, *Environmental Justice*.

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	Rhode Island and Massachusetts WEA and Massachusetts WEA Projects into EIGHT separate EIS processes? We question and challenge this arbitrary decision. Despite the Tribe's continued request that BOEM take a consolidated review approach BOEM has failed to incorporate this request into their process. Preparation of a PEIS will provide for more rigorous analysis of project alternatives a more accurate assessment for the disclosure of cumulative direct and indirect negative effects definitive options for avoidance or comprehensive mitigation planning and Tribal engagement opportunities. The Tribe is concerned with the combined or cumulative potential negative impacts to biological cultural and visual resources. The projects will harm the larger ecosystem and disturb views of the eastern horizon and celestial events and will destroy any submerged archeological resources all of which are of immense traditional cultural and spiritual importance to the Tribe.	
BOEM-2023-0011-0134-0006	The existing evaluation and treatment of potential cumulative impacts is woefully inadequate and does not consider the full scope of reasonably foreseeable development of 907724 acres of OSW projects off the coast of Rhode Island and Massachusetts. [Footnote 3: "Reasonably foreseeable" means "sufficiently likely to occur such that a person of ordinary prudence would take it into account in reaching a decision" 40 C.F.R. 1508.1(aa).] These cumulative or combined impacts need to be fully assessed and disclosed to the Tribe in order to allow for a truly informed decision- making process with a full understanding of the entire scope of the potential negative environmental consequences. Without this cumulative assessment the Tribe and other reviewers have been deprived of the "big picture" or a true perspective of the entire scope of negative impacts in terms of the environmental consequences viable alternatives and feasible mitigation. The impacts and mitigation associated with the projects are interconnected and the full impact of all the collective projects combined has not been disclosed. The	The EIS appropriately analyzes the cumulative effects from the Project when added to other past, present, and reasonably foreseeable actions, including offshore wind and non-offshore wind activities, consistent with the CEQ NEPA implementing regulations. The geographic scope of the cumulative analysis depends on the anticipated geographic extent of impacts for each resource. For example, for the mobile resources—bats, birds, finfish, and invertebrates; marine mammals; and sea turtles—the geographic analysis area for these mobile resources is the general range of the species. Therefore, depending on the resource, the geographic analysis area and the cumulative impact analysis may include only the SouthCoast Wind Lease Area and neighboring leases, or it may include the full build-out of all lease areas along the U.S. Atlantic Coast.

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	significance of the potential negative impacts cannot be avoided by breaking an action down into small component parts.	
BOEM-2023-0011-0136-0003	While the DEIS provides content related to cumulative impacts of ongoing and planned activities they fail to take a holistic view of the potential impacts from large-scale buildout of offshore wind developments on the Atlantic OCS. RODA other fishing industry representatives marine scientists fishery management councils the environmental community and others have consistently requested BOEM take a cumulative approach to offshore wind planning and leasing. BOEM is doing the public and the environment a disservice by continuing to review individual projects in isolation despite the large number of projects it is "fast tracking" and the existing OSW energy production targets. It is difficult to imagine that it would not also benefit developers transmission interests and the public for BOEM to clarify its approach to cumulative effects review and at a minimum implement regional planning processes as robust as those it employs for oil and gas leasing.	The EIS appropriately analyzes the cumulative effects from the Project when added to other past, present, and reasonably foreseeable actions, including offshore wind and non-offshore wind activities, consistent with the CEQ NEPA implementing regulations. The geographic scope of the cumulative analysis depends on the anticipated geographic extent of impacts for each resource. For example, for the mobile resources—bats, birds, finfish, and invertebrates; marine mammals; and sea turtles—the geographic analysis area for these mobile resources is the general range of the species. Therefore, depending on the resource, the geographic analysis area and the cumulative impact analysis may include only the SouthCoast Wind Lease Area and neighboring leases, or it may include the full build-out of all lease areas along the U.S. Atlantic Coast. The consideration of broadscale offshore wind planning and leasing is outside the scope of the SouthCoast Wind Project EIS.
BOEM-2023-0011-0136-0005	The Supplemental Environmental Impact Statement (SEIS) completed in 2020 for the Vineyard Wind I project was intended to serve as a cumulative impacts analysis for multiple projects in the region. However the SEIS was only incorporated into the record of that project as BOEM used an entirely different—and grossly insufficient—approach for the South Fork project just weeks later. It is unclear what if any approach BOEM plans to use going forward although the new leadership at Department of Interior has made clear that they disapprove of any of the environmental review practices of the last Administration so these are likely to change. 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	For the EIS, BOEM largely followed the approach to the cumulative impact analysis of the Vineyard Wind 1 EIS, with some changes based on subsequent cooperating agency and public input. BOEM intends to use a similar approach for current and future offshore wind EISs. Based on BOEM's experience permitting offshore wind projects off Massachusetts and Rhode Island and other areas along the Atlantic Coast, BOEM has decided to pursue a programmatic EIS for six lease areas in the New York Bight (see 87 *Federal Register* 42495). BOEM is considering programmatic reviews for lease areas in other geographic locations as well. As project-level environmental reviews have commenced in the Atlantic OCS off Massachusetts and

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	potentially 3000 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.	Rhode Island, environmental impacts are being considered at a project level, consistent with NEPA requirements.
BOEM-2023-0011-0136-0007	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 inconsistent NEPA reviews. While state processes have limitations these are more transparent and allow for some amount of oversight and avenues for mitigation strategies there is no clear guidance on how agreements with private entities would fulfill the public engagement and protection needs. 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.	The scope of the EIS, per BOEM's regulations, is to analyze the COP SouthCoast Wind submitted for Lease Area OCS-A 0521. The EIS appropriately analyzes the cumulative effects from the Project when added to other past, present, and reasonably foreseeable actions, including offshore wind and non-offshore wind activities, consistent with the CEQ NEPA implementing regulations. While a power purchase agreement or private offtake agreement may influence the alternatives that BOEM analyzes in the EIS (refer to Section 2.2, *Alternatives Considered but not Analyzed in Detail*), BOEM is required to analyze each project as proposed in its COP and follows the same NEPA procedural steps for each project, regardless of offtake agreement status.
BOEM-2023-0011-0136-0008	Additionally, since the Notice of Intents to prepare the DEIS BOEM has taken action on many other relevant activities in the region. There have been multiple DEISs 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. The DEIS includes an Appendix entitled Planned Activities Scenario. [Footnote 10: See Appendix D of the SouthCoast DEIS.] This estimates the total number of operational turbines in the Atlantic OCS to be 3101 by 2029. [Footnote 11: It is worth noting that this number varies from Planned Activities Scenarios in DEISs published within one month of the SouthCoast DEIS: NE Wind Coastal Virginia Offshore Wind and Sunrise Wind.] This does not include areas which have been identified for potential development	The details for other planned offshore wind activities included in Table D2-1 in Appendix D, *Planned Activities Scenario*, of the Final EIS have been updated throughout the development of this NEPA document as the PDEs for these projects are refined, and therefore there may be inconsistencies between offshore wind EISs based on when updates have been made. Regardless, the number of turbines and other parameters of other offshore wind projects analyzed in the cumulative impact assessment provides a reasonable approximation of the scale of offshore wind development planned on the Atlantic Coast. The EIS does not include development of the wind energy areas included in the Central Atlantic or the Gulf of Maine, as these regions do not yet have executed leases.

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	(Central Atlantic and Gulf of Maine) which could increase that number significantly. Yet BOEM has not sufficiently evaluated the cumulative impacts of prospective activity in the region. This must be remedied immediately and should be incorporated into all future analyses conducted by BOEM.	
BOEM-2023-0011-0137-0044	Additionally State Governments Energy Developers and BOEM have continued to disregard the individual and cumulative effect of covering millions of acres of ocean with wind turbine power plants. Operation in the U.S. Atlantic of the planned-for thousands of immense (roughly thousand- foot-tall) infrasound-generating machines one nautical mile apart spanning millions of acres is expected to constitute a major systems disruptor to natural systems that have evolved over geologic timescales including those adaptations essential to migration by which migrating animals use infrasound to perceive and map their environment or guide migration and which have evolved independently in major taxonomic groups including aves.	The Wind EIS appropriately analyzes the individual effects and the cumulative effects from the Project when added to other past, present, and reasonably foreseeable actions, including offshore wind and non-offshore wind activities, consistent with the CEQ NEPA implementing regulations.
BOEM-2023-0011-0138-0001	South Coast Wind is one of nine proposed offshore wind projects in the BOEM lease area south of Southern New England. It is impossible to assess the environmental impact of each of these projects independent of the others. They will have cumulative environmental impacts and to attempt to describe these impacts individually has no scientific merit without considering them cumulatively. Furthermore if each proposed project is going to advocate bringing generated power ashore in its own cables the potential adverse environmental impact is going to be multiplied and will impact multiple communities as well as the marine habitat. It appears that instead of consolidating cable routes to come ashore in fewer locations each project is proposing their own route(s).	The EIS appropriately analyzes the individual effects and the cumulative effects from the Project when added to other past, present, and reasonably foreseeable actions, including offshore wind and non-offshore wind activities, consistent with the CEQ NEPA implementing regulations. BOEM analyzes each offshore wind project as proposed in its COP, including offshore cables. As part of the cumulative analysis of each offshore wind COP EIS, BOEM analyzes the combined impacts of offshore cables.
BOEM-2023-0011-0140-0021	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 (e.g. as seen in Table	Impact determinations are assessed for each COP EIS. While some differences may exist, the cumulative impact determinations of the Final EIS are largely in agreement with other recently published Final EISs and consistent with the

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	ES-2) we find significant variability in the cumulative impacts by resource even for the no action alternatives. [Footnote 31: SCW DEIS at Table ES-2.] For example the cumulative effects of the no action alternative in SouthCoast Wind's DEIS on demographics are minor adverse minor beneficial. For environmental justice the cumulative effects of the no action alternative are minor adverse minor beneficial. These are not aligned with the relatively nearby Revolution Wind's DEIS which found cumulative effects of the no action alternative to be moderate to major adverse and minor to moderate beneficial on demographics and major adverse and negligible to moderate beneficial on environmental justice. [Footnote 32: See SCW DEIS at ES-2 and Revolution Wind DEIS at Table ES-2.] Similarly cumulative impacts of the no action alternative on marine mammals are considered moderate to major adverse minor beneficial in SouthCoast's DEIS but moderate to major adverse for the no action alternative of the Coastal Virginia Offshore Wind Commercial Project (CVOW-C). [Footnote 33: See SCW DEIS at Table ES-2 and CVOW-C DEIS at Table S-2.] Similar inconsistencies exist for the cumulative impact analyses for the Proposed Alternatives (e.g. SouthCoast wind's DEIS finds moderate adverse impacts in environmental justice where New England Wind's DEIS finds minor adverse minor beneficial cumulative impacts on environmental justice for the Proposed Actions; SouthCoast Wind's DEIS finds negligible to major adverse minor beneficial cumulative impacts on marine mammals whereas CVOW-C finds moderate to major adverse impacts for the Proposed Actions). [Footnote 34: See SCW DEIS at Table ES-2 Revolution Wind DEIS at Table ES-2 CVOW-C DEIS at Table S-2.]	impact level definitions within each resource section of Chapter 3, *Affected Environment and Environmental Consequences*. The explanation for each impact level determination can be found in the resource-specific section of Chapter 3. For instance, in Section 3.6.4.4, BOEM explains the reasoning behind the determination of minor beneficial impacts on environmental justice populations for the cumulative effects of the No Action Alternative.

N.6.25 National Environmental Policy Act/Public Involvement Process

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BOEM-2023-0011-0139-0038	Page 1-5 within Section 1.2 states that a Section 408 permission will be required pursuant to Section 14 of the Rivers and Harbors Act (33 USC 408). Please note that on December 16 2022 USACE confirmed that the SouthCoast Wind Project will not require Section 408 permission.	Text has been revised to clarify this.
BOEM-2023-0011-0076-0001	Further more the Applicant's request for the proposed alterations permission under USACE Section 408 should be denied because it would be injurious to the public interest and would impair the usefulness of the USACE project.	Text has been revised to clarify this.

N.6.26 USACE Permitting

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BOEM-2023-0011-0132-0006	In Table 2-4 impacts on birds are listed as moderate to major and then dismissed as the document suggests birds could be attracted to the area. Common sense would tell us that birds attracted to wind turbines most likely would end up dead. The document also does not say how this will be studied or mitigated. It just says these things will happen. This is not the full disclosure that the NEPA requires. If mitigation were to happen by turning turbines off at certain times when birds are present (as is the practice for onshore wind) then the air quality numbers are meaningless as less power would be created by the wind turbines and more single cycle natural gas would need to be burned to balance the turning off the turbines in the presence of various bird species.	Impacts on bird collisions are addressed in Final EIS Section 3.5.3, including assessment of potential bird strikes. Based on the current understanding of bird presence in the offshore environment, BOEM anticipates that bird collisions with offshore wind infrastructure will be lower than with onshore wind infrastructure. This is because bird presence in the offshore environment is much lower than onshore. Within the Atlantic Flyway along the North American Atlantic Coast, much of the bird activity is concentrated along the coastline. 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. While both groups may occur over land or water within the flyway and may extend considerable distances from shore, the highest diversity and density are centered on the shoreline (Final EIS Figure 3.5.3-1). Also refer to Final EIS Section 3.5.3.9, which includes a number of proposed mitigation measures, including deterrence, reporting, and adaptive mitigation measures.

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BOEM-2023-0011-0132-0076	The impact to birds has simply not been laid out. The document makes many statements about potential peril to birds including those listed through the ESA such as Piping Plovers. We read that at nighttime some species use the aircraft lighting to avoid turbines however ADLS is proposed. We read that birds can be attracted to the turbine areas as more prey "may" be available. However collisions seem to be a bigger problem. This statement is particularly egregious [Text in Blue: "It is generally assumed that inclement weather and reduced visibility cause changes to migration altitudes (Ainley et al. 2015) and could potentially lead to large-scale mortality events."] The DEIS promises only to monitor for bird impacts providing very little detail on said monitoring or potential mitigation. Since mitigation procedures involve shutting off turbines when migrating birds are present the greenhouse gas analysis cannot possibly be correct or thorough.	The impacts of the Proposed Action on birds are detailed in the seven IPFs in Draft EIS Section 3.5.3.5, which include lighting and the presence of structures. Details on mitigation for potential bird impacts are described in Final EIS Table 3.5.3-4, and include a number of proposed measures (e.g., deterrence, reporting, adaptive mitigation). Furthermore, to support the advancement of the understanding of bird interactions with offshore wind farms, SouthCoast Wind has developed a Draft Avian and Bat Post-Constructing Monitoring Framework (included as Attachment G-2 of Appendix G of the Final EIS) that outlines an approach to post-construction monitoring. BOEM addresses piping plover and other federally listed birds in detail in the USFWS BA that BOEM developed for ESA Section 7 compliance. Please refer to BOEM's ESA compliance documents at the following link: https://www.boem.gov/environmental-consultations.
BOEM-2023-0011-0132-0077	After explaining how the proposed action "B" would impact birds the document states [Text in Blue: "The cumulative impacts on birds would likely be moderate because although bird abundance on the OCS is low there could be unavoidable impacts offshore and onshore; however BOEM does not anticipate the impacts to result in population-level effects or threaten overall habitat function. In the context of reasonably foreseeable environmental trends the Proposed Action would contribute an undetectable increment to the cumulative impacts on birds."] This statement makes no sense. The impact is moderate or undetectable - it can't be both and it seems moderate is the correct answer.	Throughout the Final EIS, cumulative and incremental impacts of the Proposed Action are separately addressed. This approach is necessary given the numerous on- and offshore activities that are expected to proceed even if the Proposed Action is not approved. As stated in Final EIS Section 3.5.3.5, BOEM anticipates that the cumulative impacts from the Proposed Action on birds in the geographic analysis area are moderate because, although bird abundance in the OCS is low, there could be unavoidable impacts offshore and onshore; however, BOEM does not anticipate the impacts to result in population-level effects or threaten overall habitat function. Therefore, in the context of reasonably foreseeable environmental trends, the Proposed Action would contribute an undetectable increment to the cumulative impacts on birds.
BOEM-2023-0011-0132-0078	As far as birds covered by the ESA the DEIS states that the analysis for impacts to these three species has not yet been	BOEM has continually consulted with USFWS throughout the NEPA process to address the Proposed Action's impacts on federally species protected under the ESA. BOEM addresses

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	conducted. This is unacceptable and is in violation of NEPA and ESA.	federally listed birds in detail in the USFWS BA that BOEM developed for ESA Section 7 compliance. Please refer to BOEM's ESA compliance documents at the following link: https://www.boem.gov/environmental-consultations. BOEM concluded its ESA Section 7 obligations on September 1, 2023, when USFWS issued its Biological Opinion for the Project. As stated in the Biological Opinion, USFWS does not anticipate significant reduction in the reproduction, numbers, or distribution of piping plover and rufa red knot, and concluded that the Project is not likely to jeopardize the continued existence of the species. For roseate tern, USFWS concurred with BOEM's determination of "not likely to adversely affect."
BOEM-2023-0011-0137-0045	Storm cells produce infrasound. Large-size turbines produce high levels of infra sounds. The U.S. Offshore Wind program and the subject project is reasonably expected to interfere with the ability of migratory birds to avoid storms (and storm-caused mortality) and interferes with essential migration. Disruption in migratory bird's ability to use infrasound by operating thousands of large infrasound-generating machines over a vast expanse (millions of acres) of Outer Continental Shelf which serves as the Atlantic Flyway (in layman's terms a bird migration super highway) occurs from the profound disruption of essential behaviors and processes. Such impact of the U.S. Offshore Wind Program goes beyond habitat degradation to whole systems degradation for several orders and families of migratory aves which use infrasound to guide migration.	Noise impacts are covered in Final EIS Section 3.5.1, *Bats*, as well as Final EIS Section 3.5.3, *Birds*. Best available information on bird presence in the geographic analysis area has been used to prepare the EIS. BOEM will continue to collect information on bird presence in the offshore environment to help inform the assessment of potential impacts on birds from construction and operation of offshore wind farms. Based on current information, bird presence in the offshore environment is relatively low (as described in Final EIS Section 3.5). To support the advancement of the understanding of bird interactions with offshore wind farms, SouthCoast Wind has developed a Draft Avian and Bat Post-Constructing Monitoring Framework (included as Attachment G-2 of Appendix G of the Final EIS) that outlines an approach to post-construction monitoring.
BOEM-2023-0011-0137-0046	Operating thousands of infrasound-generating turbines spanning the entire Outer Continental Shelf will disrupt natural migratory processes of millions of birds and is expected to cause mortality in millions of birds by interfering with their natural ability to detect storms. Large-rotor-diameter wind turbines are substantial infrasound generators.	As described in Draft EIS and Final EIS Section 3.5.3, bird presence in the offshore environment is relatively low. The effects of offshore wind farms on bird movement ultimately depends on bird species, size of the offshore wind farm, spacing of the turbines, and the extent of extra energy cost incurred by the displacement of the flying birds (relative to

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	The effect of 147 turbines of the subject project as well as the cumulative effect of the U.S. Atlantic Offshore Wind Program build in the forseeable future constitutes a major systems disruptor for migrating birds.	normal flight costs pre-construction) and their ability to compensate for this degree of added energy expenditure. Little quantitative information seems available on how offshore wind farms may act as a barrier to movement, but a modeling effort by Madsen et al. (2012) looked at bird movement through offshore wind farms based on bird movement data collected at the Nysted offshore wind farm in the western Baltic Sea. A summary of this study is included in Draft EIS Section 3.5.3, *Cumulative Impacts of the No Action Alternative*, under the *Presence of Structures* IPF. In short, the modeling effort indicates that Project turbine spacing would be wide enough to allow bird movement and would not act as an impediment to migration. BOEM notes that turbine spacing in offshore wind farms in Europe is generally more compressed than what is being proposed on the Atlantic OCS. For example, the distances between turbines for the Nysted and Horns Rev (North Sea) wind farms are shown below, which, based on the Madsen et al. (2012) modeling, indicates they would have some level of impediment to bird migration. These distances are much narrower than distances proposed between turbines on the Atlantic OCS. • Horns Rev 1: turbines are 560 meters (0.3 nautical mile [nm]) from each other in both directions. • Horns Rev 2: turbine spacing is 500 meters (0.27 nm) in both directions. • Nysted: turbine spacing 480 meters (0.26 nm) (east/west) and 900 meters (0.48 nm) (north/south). However, BOEM identified a newer study by Vattenfall (2023) that looked at meso- and micro-avoidance movements in an offshore wind farm off Scotland. The study concluded that, together with the recorded high levels of micro-avoidance in all species (>0.96), it is now evident that seabirds will be exposed to very low risks of collision in offshore wind farms during daylight hours. This was

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		substantiated by the fact that no collisions or even narrow escapes were recorded in over 10,000 bird videos during the 2 years of monitoring covering the April–October period. The study's calculated micro-avoidance rate (>0.96) is similar to that of Skov et al. (2018), which is also mentioned in the Draft EIS and Final EIS. The Vattenfall (2023) information has been added to the Final EIS.
BOEM-2023-0011-0139-0024	SouthCoast Wind would like to highlight that to support the Avian Exposure Risk Assessment (Appendix I1 to the COP) SouthCoast Wind conducted Project-specific surveys of the Lease Area. These surveys included aerial high- definition surveys that were completed monthly from November 2019 through October 2020. Sampling effort was increased during the migratory period (e.g. April May and August 2020) for terns and other species of concern in coordination with the MassWildlife Natural Heritage and Endangered Species Program (NHESP).Survey methods consisted of flying an aircraft over the Lease Area and capturing digital still life imagery with a high-resolution camera using a grid-based survey design. A minimum of 40 percent coverage of the Lease Area was attained per survey. Third-party experts analyzed the images to enumerate birds and another third-party reviewer provided quality assurance of the data to identify any missed individuals. Third party experts were in most cases able to discern among tern species (e.g. roseate tern versus common tern) based on tail length wind structure and plumage. Additionally SouthCoast Wind employed an onboard professional avian observer who recorded all birds observed during geophysical and geotechnical surveys completed in the Lease Area between September and November 2019.SouthCoast Wind feels that it is important to highlight these site-specific Project surveys that were completed to support the COP Avian Exposure Risk Assessment and the findings of the impacts to birds in the DEIS in addition to the publicly available datasets listed by BOEM in the DEIS.	Thank you for your comment. BOEM has added to Final EIS Section 3.5.3.1 a reference to the Project-specific surveys that were conducted for the SouthCoast Wind Project and that are included in COP Appendix I1, Section 2.2.3.

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BOEM-2023-0011-0140-0059	Unlike other nearby regional offshore projects (e.g. New England Wind) the SouthCoast COP makes no mention of adding Motus tagging for seabirds or nocturnal passerine migrants nor does the COP indicate that the operator intends to install Motus receivers on turbines as part of its post-construction monitoring plan. [Footnote 172: New England Wind (NEWP) DEIS Appendix H Minimization and Monitoring p. H-3.] We recommend optimizing the number and/or the dispersion of Motus stations at SouthCoast using a design tool being developed under a New York State Energy Research and Development Authority (NYSERDA) project. [Footnote 173: Sunrise Wind Farm COP Appendix P2: Post-construction Avian and Bat Monitoring Framework p. 3.]	SouthCoast Wind's Draft Post-Construction Avian and Bat Monitoring Framework Avian and Bat Monitoring Framework has been added to Final EIS Appendix G as Attachment G-2. This plan refers to Motus tracking. SouthCoast Wind plans to install Motus receivers within the Lease Area to determine the present/absence of ESA-listed species.
BOEM-2023-0011-0140-0060	Yet unlike other offshore wind energy projects in the region having robust monitoring protocols SouthCoast has only signaled intent to coordinate with Mass Wildlife RIDEM and USFWS to identify appropriate mitigation measures to avoid noise-related impacts to nesting Piping Plovers from activities such as ground disturbance avoidance and displacement that may occur during the construction phase for the Falmouth and Brayton Point export cable corridors. [Footnote 175: See the following: NEWP COP Volume III Appendix III-R Draft Piping Plover Protection Plan pp. 1–3.] SouthCoast must detail those measures that are to be taken to protect this state-listed species and its habitats during the nesting season (April 1 – August 31). A contingency plan should be designed and implemented for any problems that arise during horizontal directional drilling cable installation. [Footnote 176: Id.] We strongly endorse plan monitoring by qualified biologists from an accredited organization or an individual with at least one year of experience at an accredited organization conducting shorebird monitoring for Piping Plovers. [Footnote 177: Id. at 2.] Monitoring and mitigation for listed birds should cover all aspects of the project throughout its operational life not just the cable installation near coastal waterbird breeding sites	Onshore components of the Proposed Action are mostly within existing, highly disturbed industrial areas that are unlikely to provide important bird habitats. As outlined in the USFWS BA Section 4.4.2, piping plovers have been reported in the vicinity of the onshore Action Areas. The summary of the 2021 Massachusetts Piping Plover Census documented breeding piping plovers at 188 sites, with one pair recorded in the vicinity of the Shore Street (Falmouth, Massachusetts) landfall site under consideration for the Proposed Action. Please refer to BOEM's ESA compliance documents at the following link: https://www.boem.gov/environmental-consultations. In addition, BOEM concluded its ESA Section 7 obligations on September 1, 2023, when USFWS issued its Biological Opinion for the Project. As stated in the Biological Opinion, "piping plovers are not likely to be adversely affected by onshore portions of the project due to lack of suitable habitat and avoidance of coastal habitat disturbance via HDD methods."

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BOEM-2023-0011-0140-0061	We note that to date no bird species including any pelagic marine or ESA-listed species has been identified as the explicit subject in the SouthCoast monitoring framework. [Footnote 178: SCW COP Volume II at 16.4–16.6.] This lack of proposed monitoring measures for bird species around the offshore wind energy infrastructure is a serious deficiency in the DEIS and COP for this project. [Footnote 179: For example and in addition to other measures Dominion Power is sponsoring a study of Whimbrel a non-listed species at that wind energy area. See: CVOW-C COP at 4-202.] Besides better addressing the needs of listed species other species also should be a focus of this project's monitoring plan. Recent tracking studies of White-winged Scoters in southern New England for example have revealed frequent commuting flights between Nantucket Sound and Long Island Sound and medium-high relative use of offshore habitats in the Project Area. [Footnote 180: Figure 4 in Meattey DE McWilliams SR Paton PW et al. 2019. Resource selection and wintering phenology of White-winged Scoters in southern New England: Implications for offshore wind energy development. The Condor: Ornithological Applications 121: duy014.] Other candidates for monitoring purposes can be found among those species designated as having higher annual exposure scores (2-3) or species having higher annual exposure (moderate-high). [Footnote 181: Table 3-1 in SCW COP Appendix I1 at 87–89.]	As stated in Final EIS Section 3.5.3, *Birds*, SouthCoast Wind has developed a Draft Post-Construction Avian and Bat Monitoring Framework included in Final EIS Appendix G, Attachment G-2. As part of the framework, SouthCoast Wind is committing to an Adaptive Management approach in which ongoing bird and bat data collection in offshore wind lease areas will be used to inform Project operations and conservation mitigation strategies, as available and applicable. In addition, BOEM has included an adaptive management mitigation measures (see Table G-2 in Appendix G) to address potential future impacts during offshore operations. Furthermore, the USFWS Biological Opinion on ESA-listed species requires the aforementioned monitoring framework and adaptive management described in the Final EIS to be implemented.
BOEM-2023-0011-0140-0062	The monitoring framework for SouthCoast does not address how acoustic disturbances from construction and related operations might cause harm to diving marine birds. [Footnote 185: Monitoring and mitigation for diving birds are not even mentioned in conjunction with acoustic disturbances e.g. SCW COP Appendix O. Marine Mammal and Sea Turtle Monitoring and Mitigation Plan.] 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 arise solely from avian changes in behavior. Because seabird taxa sensitive to this impact are	Disturbance impacts, including noise impacts, on diving birds from the Proposed Action as well as from other on- and offshore projects are addressed within Final EIS Sections 3.5.3.3 and 3.5.3.5, under the *Noise* IPF. As described, 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. Because impacts would be temporary and birds would be able to avoid the disturbance, BOEM anticipates negligible impacts. Applicant-proposed measures to

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	more prevalent during winter minimization activities like curtailment may be justified to abate harm in this season. Capable of diving to 180 m depths Razorbills especially are already known to flush readily from loud noises they are prevalent during winter in waters of the Project Area and like other alcids they are vulnerable to displacement and macro-avoidance. [Footnote 186: Piatt JF Nettleship DN. 1985. Diving depths of four alcids. The Auk 102:293–297.] [Footnote 187: Lavers J Hipfner JM Chapdelaine G. 2009. Razorbill (Alca torda) version 2.0. In The Birds of North America (P.G. Rodewald editor). Cornell Lab of Ornithology Ithaca New York USA. https://doi.org/10.2173/bna.635.] [Footnote 188: Table 3-3 in SCW COP Appendix I1 at 90.] [Footnote 189: Robinson Willmott JC Forcey G Kent A. 2013. The Relative Vulnerability of Migratory Bird Species to Offshore Wind Energy Projects on the Atlantic Outer Continental Shelf: An Assessment Method and Database. Final Report to the U.S. Department of the Interior Bureau of Ocean Energy Management Office of Renewable Energy Programs. OCS Study BOEM 2013-207. 275 pp.]Densities of diving birds are typically highest during winter months on inner and middle shelf habitats at least in this portion of the Atlantic OCS. [Footnote 190: E.g. see Figure 4–2 p. 39 in Robinson Willmott J Forcey G Vukovich M McGovern S Clerc J Carter J. 2020. Ecological Baseline Studies of the US Outer Continental Shelf: Final Report. Gainesville FL. OCS Study BOEM 2021–079.] 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 marine bird flocks enter these zones (2) using noise reduction gear like bubble curtains around pile driving when diving marine birds are present and (3) deploying other noise-source modifications or changes to operational	minimize impacts on marine life, such as soft-start procedures for pile driving, would also minimize the potential for noise exposure to diving birds, as they can depart the area when noisy activity begins.

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	parameters such as soft starts (currently included in the DEIS). [Footnote 191: Erbe C Dunlop R Dolman S. 2018. Effects of noise on marine mammals. Pp. 277–309 in Effects of anthropogenic noise on animals. Springer New York NY.]Noise monitoring and abatement during impulsive pile driving operations for monopile installation has been an established practice in other Atlantic wind energy project areas. [Footnote 192: https://media.fisheries.noaa.gov/2021-01/Dominion_CVOW_2020IHA_MonRep_OPR1.pdf?null=] Distances to injury-causing sound levels measured in one study varied from 0.7 to 3.1 km for marine mammals during installation activities. [Footnote 193: Id. p. 32.] Consequently adequate spatial buffers or suitable observation distances may be required for incorporation into study designs that are used to monitor avian reactions to subsurface acoustic disturbance.	

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N.7 General Comment Summaries and Responses

N.7.1 General Support or Opposition

Table N.7.1-1. Responses to general support or opposition comments

General Comment Summaries and Responses
Comment Summary 1: Many commenters expressed support for the Project and urged BOEM to not select the No Action Alternative, stating that doing so would produce negative effects. Many commenters felt that the benefits of the Project would outweigh the negative impacts. Commenters stated that the Project would provide high-quality jobs; numerous benefits to the economy and other local industries like hospitality, tourism, and retail; and create supply chains, boosting economic development. Multiple commenters stated that offshore wind, and this Project specifically, would contribute to state, regional, and federal renewable energy, decarbonization, and net-zero emission goals; provide environmental benefits; and help combat the effects of climate change. Many commenters expressed support for the Project's location, stating that New England has favorable renewable resources and is close to large population centers. Some commenters stated that offshore wind specifically would provide health and safety benefits and advance social justice. Others indicated that the Project would increase electricity supply and security, as well as the energy grid's diversity and reliability.
Response: Thank you for your comment. BOEM acknowledges your support for the Project.
Submission IDs contributing to comment summary: BOEM-2023-0019-0001; BOEM-2023-0019-0003; BOEM-2023-0020-0001; BOEM-2023-0028-0001; BOEM-2023-0031-0001; BOEM-2023-0032-0001; BOEM-2023-0036-0001; BOEM-2023-0037-0001; BOEM-2023-0040-0001; BOEM-2023-0041-0001; BOEM-2023-0042-0001; BOEM-2023-0044-0001; BOEM-2023-0048-0001; BOEM-2023-0050-0001; BOEM-2023-0052-0003; BOEM-2023-0054-0001; BOEM-2023-0057-0001; BOEM-2023-0060-0001; BOEM-2023-0066-0001; BOEM-2023-0067-0001; BOEM-2023-0073-0001; BOEM-2023-0082-0001; BOEM-2023-0084-0001; BOEM-2023-0087-0001; BOEM-2023-0092-0001; BOEM-2023-0097-0001; BOEM-2023-0100-0001; BOEM-2023-0111-0001; BOEM-2023-0113-0001; BOEM-2023-0113-0002; BOEM-2023-0113-0003; BOEM-2023-0114-0001; BOEM-2023-0115-0001; BOEM-2023-0120-0001; BOEM-2023-0123-0027; BOEM-2023-0130-0001; BOEM-2023-0130-0016; BOEM-2023-0135-0001; BOEM-2023-0135-0002; BOEM-2023-0141-0001; BOEM-2023-0141-0002; BOEM-2023-0148-0001; BOEM-2023-0149-0001; BOEM-2023-0152-0001; BOEM-2023-0154-0001; BOEM-2023-0156-0001; BOEM-2023-0159-0001; BOEM-2023-0161-0002; BOEM-2023-0162-0001; BOEM-2023-0164-0001; BOEM-2023-0168-0001; BOEM-2023-0169-0001; BOEM-2023-0170-0001; BOEM-2023-0174-0001; BOEM-2023-0179-0001; BOEM-2023-0181-0001
Comment Summary 2: Many commenters expressed opposition to the Project, stating that the negative impacts outweigh the benefits, and asked that BOEM not approve the Project. Many commenters felt that there was not enough information, specifically on the impacts of the Project, and too many unknowns remained.

General Comment Summaries and Responses
Many commenters were concerned about negative impacts on marine life including whales, dolphins, sharks, sea turtles, and fowl, specifically that the Project would interfere with echolocation and displace or kill species. Commenters were also concerned about negative environmental impacts, including degradation of air and water quality, loss of biodiversity, warming ocean water temperatures, and waste. Some commenters expressed concern for the potential for oil, fuel, or chemical leaks, stating that wind turbines should not be placed in the ocean. Several commenters were concerned about the locations of the transmission lines on beaches and in residential areas and were concerned that they would corrode in the ocean. Some commenters claimed that the wind turbines would pose negative health effects, stating that the turbine noise and vibration would cause illness. Others stated that the Project would negatively affect defense systems, navigation, and co-use of the ocean. Some commenters argued that alternative forms of energy production would be more efficient and reliable, require less O&M, and have fewer negative impacts. One commenter stated that the Project would provide negligible benefits due to the expected lifetime of the Project. Other commenters expressed concern about the cost of the Project, how taxpayer money was being used, and the potential for increased electrical costs. Numerous commenters stated that the Project would cause negative impacts on the fishing and tourism industry and negatively affect the economy. Commenters stated that the Project would produce negative visual impacts, light pollution, and sound pollution that would decrease tourism and property values. Some commenters expressed that they felt the process had not been transparent enough and was moving too fast. One commenter felt that BOEM would approve the Project regardless of public input.
Response: Thank you for your comments. More detailed and specific comments were provided on many of these topics and are included and addressed within those topics. BOEM acknowledges your opposition to the Project based on these general concerns.
Submission IDs contributing to comment summary: BOEM-2023-0005-0001; BOEM-2023-0008-0001; BOEM-2023-0008-0002; BOEM-2023-0009-0001; BOEM-2023-0011-0001; BOEM-2023-0012-0001; BOEM-2023-0012-0002; BOEM-2023-0013-0001; BOEM-2023-0016-0001; BOEM-2023-0017-0001; BOEM-2023-0018-0001; BOEM-2023-0045-0001; BOEM-2023-0046-0001; BOEM-2023-0058-0001; BOEM-2023-0061-0001; BOEM-2023-0063-0001; BOEM-2023-0064-0001; BOEM-2023-0067-0001; BOEM-2023-0068-0001; BOEM-2023-0069-0001; BOEM-2023-0072-0001; BOEM-2023-0075-0001; BOEM-2023-0078-0001; BOEM-2023-0081-0015; BOEM-2023-0085-0005; BOEM-2023-0086-0010; BOEM-2023-0090-0001; BOEM-2023-0094-0001; BOEM-2023-0098-0001; BOEM-2023-0099-0001; BOEM-2023-0101-0001; BOEM-2023-0102-0001; BOEM-2023-0102-0002; BOEM-2023-0103-0001; BOEM-2023-0104-0001; BOEM-2023-0105-0001; BOEM-2023-0107-0001; BOEM-2023-0108-0001; BOEM-2023-0109-0001; BOEM-2023-0116-0001; BOEM-2023-0132-0007; BOEM-2023-0132-0008; BOEM-2023-0144-0001; BOEM-2023-0144-0004; 0155-0001; BOEM-2023-0182-0001; BOEM-2023-0183-0001

N.7.2 Purpose and Need

General Comment Summaries and Responses
Comment Summary 1: One commenter voiced concerns regarding uninterrupted reliability of service, especially during winter storms, while one commenter asserted that the Project would increase energy reliability, especially during the winter when winds are strongest.
Response: Potential impacts of severe storms are described in Final EIS Section 2.4, *Non-Routine Activities and Low-Probability Events*. The engineering specifications of the WTGs and their ability to sufficiently withstand weather events is independently evaluated by a certified verification agent when

General Comment Summaries and Responses
reviewing the Facility Design Report and Fabrication and Installation Report according to international standards, which include withstanding hurricane-level events.
Submission IDs contributing to comment summary: BOEM-2023-0011-0055, BOEM-2023-0011-0139
Comment Summary 2: Several commenters questioned the purposed of the Project and voiced concerns that the energy and carbon impacts to produce the WTGs would not be offset by the carbon emissions saved and electricity generated by the Project.
Response: As stated in Section 1.2, the project purpose is grounded in BOEM's authority under the OCSLA to authorize renewable energy activities on the OCS, EO 14008, the shared goals of the federal agencies to deploy 30 GW of offshore wind energy capacity in the United States by 2030 while protecting biodiversity and promoting ocean co-use, and consideration of the goals of the Project applicant. Analysis of the impact of carbon and other air emissions and avoided emissions as a result of the Proposed Action can be found in Section 3.4.1.5, *Impacts of Alternative B – Proposed Action on Air Quality*.
Submission IDs contributing to comment summary: BOEM-2023-0011-0085, BOEM-2023-0011-0086

N.7.3 Proposed Action and Alternatives

General Comment Summaries and Responses
Comment Summary 1: Several commenters expressed general support for alternatives that maximize power generation and are cost-efficient while ensuring environmentally responsible development.
Response: Comment noted.
Submission IDs contributing to comment summary: BOEM-2023-0011-0130, BOEM-2023-0011-0122, BOEM-2023-0011-0127
Comment Summary 2: Some commenters indicated that they did not support Alternative A – No Action Alternative because the region would not see the economic benefits and reduced greenhouse gas emissions that would result from the Project.
Response: The commenters' opposition to Alternative A is noted.
Submission IDs contributing to comment summary: BOEM-2023-0011-0122, BOEM-2023-0011-0130
Comment Summary 3: Several commenters indicated their support for Alternative B – Proposed Action because it would create jobs and economic growth and would reduce greenhouse gas emissions.
Response: The commenters' support of Alternative B is noted.
Submission ID contributing to comment summary: BOEM-2023-0011-0122
Comment Summary 4: Several commenters indicated their support for Alternative C – Fisheries Habitat Impact Minimization because it addresses concerns about the potential impact of the offshore export cable on fisheries and habitat areas.
Response: The commenters' support of Alternative C is noted.

Submission IDs contributing to comment summary: BOEM-2023-0011-0122, BOEM-2023-0011-0126
Comment Summary 8: A commenter indicated that they did not support Alternative C – Fisheries Habitat Impact Minimization because of technical, financial, and environmental challenges as a result of the onshore export cable route.
Response: The commenter's opposition to Alternative C is noted.
Submission IDs contributing to comment summary: BOEM-2023-0011-0135, BOEM-2023-0011-0127
Comment Summary 5: Several commenters indicated that they did not support Alternative D – Nantucket Shoals Alternative because there was a lack of evidence of adverse impacts on the Nantucket Shoals ecosystem and that it would lead to project delays.
Response: The commenters' opposition to Alternative D is noted.
Submission IDs contributing to comment summary: BOEM-2023-0011-0122, BOEM-2023-0011-0127, BOEM-2023-0011-0127, BOEM-2023-0011-0135
Comment Summary 6: Several commenters indicated their support for Alternative E – Foundation Structures Alternative, which would use quiet foundation types and avoid impacts of pile-driving noise on marine mammals and sea turtles.
Response: The commenters' support of Alternative E is noted.
Submission IDs contributing to comment summary: BOEM-2023-0011-0122, BOEM-2023-0011-0130
Comment Summary 9: A commenter indicated that they did not support Alternative E – Foundation Structures Alternative because they felt the developer should retain decision-making when it comes to selecting the best foundation design given the area conditions.
Response: The commenter's opposition to Alternative E is noted.
Submission ID contributing to comment summary: BOEM-2023-0011-0127
Comment Summary 10: A commenter indicated their support for Alternative F – Muskeget Channel Cable Modification Alternative because it would provide the best opportunity to minimize impacts on natural and cultural resources, respond to the needs of coastal communities, and proceed in a safe, efficient, and responsible manner.
Response: The commenter's support of Alternative F is noted.
Submission ID contributing to comment summary: BOEM-2023-0011-0125
Comment Summary 7: A commenter felt that the EIS did not include the high-quality baseline data necessary to make a determination.
Response: Please refer to response to comment BOEM-2023-0011-0091-0014.
Submission ID contributing to comment summary: BOEM-2023-0011-0089
Comment Summary 11: A commenter asked to clarify the total kilovolt output as a result of the conversion from alternating current (AC) to direct current (DC) and reducing from five cables to three under Alternative F.
Response: Please refer to response to comment BOEM-2023-0011-0091-0005.
Submission ID contributing to comment summary: BOEM-2023-0011-0175

N.7.4 Air Quality

General Comment Summaries and Responses
Comment Summary 1: Commenters generally affirmed the purpose and need for the Project, noting that the Project provides an opportunity for the Northeast United States to transition away from the use of fossil fuels and toward the generation and use of renewable, clean offshore wind energy to meet energy demand while reducing GHG emissions. Commenters noted the essential role of this transition in meeting applicable climate goals and preventing worsening impacts of climate change. Some commenters highlighted the potential for offshore wind to provide cost-effective and reliable electricity while reducing GHG emissions.
Response: Thank you for your comment. Section 3.4.1 outlines the Project's anticipated air pollutant emissions, including criteria pollutants, VOCs, air toxics or hazardous air pollutants, and GHGs, and resulting air quality impacts. As discussed in EIS Section 3.4.1.5, once operational, the Proposed Action would result in annual avoided emissions of 692 tons of NO_X, 313 tons of SO_2, and 4,038,482 tons of carbon dioxide (CO_2). The avoided CO_2 emissions represent about 8 percent of the required GHG emissions reduction from 1990 levels by 2030 in Massachusetts or about 72 percent of the required GHG emissions reduction from 1990 levels by 2035 in Rhode Island. In addition, the avoided CO_2 emissions are equivalent to the emissions generated by about 800,000 passenger vehicles in a year. Even when accounting for construction, maintenance, and decommissioning emissions, the Proposed Action would result in a net decrease in overall emissions over the region compared to installing a traditional fossil-fueled power facility. Please refer to Chapter 1, *Introduction*, regarding the purpose and need for the Proposed Action, including to provide a commercially viable offshore wind energy project for offshore wind energy generation, supporting the attainment of the goals outlined by Executive Order (EO) 14008, "Tackling the Climate Crisis at Home and Abroad," issued January 27, 2021. Please refer to EIS Section 3.6 regarding the impacts related to socioeconomic conditions and cultural resources, including demographics, employment, and economics, respectively.
Submission IDs contributing to comment summary: BOEM-2023-0011-0028-0002; BOEM-2023-0011-0028-0004; BOEM-2023-0011-0139-0001.
Comment Summary 2: Commenters generally questioned the conclusions of the air quality analysis contained in the EIS. Some commenters noted that implementation of the Proposed Action would generate air pollutant and GHG emissions. Other commenters challenged the EIS' analysis of accidental releases.
Response: Thank you for your comment. Section 3.4.1 outlines the Project's anticipated air pollutant emissions, including criteria pollutants, VOCs, air toxics or hazardous air pollutants, and GHGs, and resulting air quality impacts. As discussed in Section 3.4.1.5, although there would be some short-term air quality impacts due to various activities associated with construction, maintenance, and eventual decommissioning, these emissions would be relatively small and limited in duration. Moreover, the Proposed Action would provide up to 2,400 MW of clean, renewable wind energy to the northeast United States, thereby potentially avoiding some GHG emissions associated with fossil-fueled energy generation. Although there is no standard technical definition for clean energy, the term generally refers to sources of energy that result in minimal or no effect with respect to air pollutant or GHG emissions. As a result, operation of the Proposed Action would offset emissions related to its construction and eventual decommissioning (within different time periods of operation depending on the pollutant), and the Proposed Action would result in air quality-related health effects avoided in the region. When compared to the installation of a traditional fossil-fueled power facility, the Proposed Action would result in a net decrease in overall emissions over the region. To further minimize air pollutant emissions,

General Comment Summaries and Responses
SouthCoast Wind has also proposed measures to reduce emissions through compliance with applicable fuel-efficiency, fuel sulfur content, and emissions standards. Furthermore, as described in Section 3.4.1.5, air quality impacts from accidental releases would be short term and limited to the local area at and around the accidental release location. BOEM anticipates that a major spill is very unlikely due to vessel and offshore wind energy industry safety measures, as well as the distributed nature of the material. Impacts from accidental releases would also be reduced through implementation of a Stormwater Pollution Prevention Plan (SWPPP) and a Spill Prevention, Control, and Countermeasure (SPCC) Plan. Impacts from accidental releases are therefore anticipated to be negligible. As stated in Section 3.4.1.5, because of the amounts of emissions, the fact that emissions would be spread out in time (7 years for construction and then lesser emissions annually during operation), and the large geographic area over which they would be dispersed (throughout the 127,388-acre [51,552-hectare] Lease Area and the vessel routes from the onshore facilities), air pollutant concentrations associated with the Proposed Action are not expected to exceed the national and Massachusetts ambient air quality standards.
Submission IDs contributing to comment summary: BOEM-2023-0011-0132-0017; BOEM-2023-0011-0132-0020; BOEM-2023-0011-0132-0024; BOEM-2023-0011-0132-0030; BOEM-2023-0011-0132-0066; BOEM-2023-0011-0137-0118.
Comment Summary 3: Commenter highlighted the need for an assessment of SF_6 emissions resulting from the Proposed Action.
Response: Thank you for your comment. The EIS has been revised to include an assessment of SF_6 emissions resulting from switchgear on the OSPs.
Submission ID contributing to comment summary: BOEM-2023-0011-0132-0030.

N.7.5 Water Quality

General Comment Summaries and Responses
Comment Summary 1: A few commenters asked about the risk minimization planned for accidental releases and if funding has been set aside for potential cleanup.
Response: SouthCoast Wind has developed an OSRP to address 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. Please refer to Appendix AA, *Oil Spill Response Plan (OSRP)*, of the COP to review the OSRP in full.
Submission IDs contributing to comment summary: BOEM-2023-0011-0015, BOEM-2023-0011-0073
Comment Summary 2: Commenters voiced concern about how the placement of Project components, including export cables and WTG foundations, would affect water quality through leaching or resuspension of toxic compounds as a result of dredging. A commenter also voiced concern about the effects of the proposed HVDC cooling system.
Response: As described in Section 3.4.2.5, *Impacts of Alternative B – Proposed Action on Water Quality*, of the Final EIS, resuspension of sediment as a result of cable emplacement activities is anticipated to be localized adjacent to the trench and temporary in nature due to the known hydrodynamic conditions

General Comment Summaries and Responses
within the Project area and the use of best management practices associated with jet plowing technologies. Impacts on water quality as a result of potential leaching and weathering of Project components is discussed in Section 3.4.2.3, *Impacts of Alternative A – No Action on Water Quality*, of the FEIS under the *Presence of Structures* IPF. Additional information on the potential effects of the HVDC converter OSP was added to Section 3.4.2.5, *Impacts of Alternative B – Proposed Action on Water Quality*, of the Final EIS under the *Discharges/Intakes* IPF.
Submission IDs contributing to comment summary: BOEM-2023-0011-0083, BOEM-2023-0011-0086, BOEM-2023-0011-0107
Comment Summary 3: A commenter indicated that conclusion in the Draft EIS that effects would only exist for the duration of the Proposed Action was incorrect because the intention is to leave foundations in the seabed after the Project has been decommissioned.
Response: As described in the COP Volume I, Section 3.3.1.7, SouthCoast Wind anticipates removal of scour protection during decommissioning. Prior to the end of the life of the Project, a detailed decommissioning application would be submitted to BSEE for review, which would describe the facilities SouthCoast Wind plans to remove or proposes to leave in place. As required by 30 CFR 285.910, all facilities must be removed to 15 feet below the mudline unless otherwise authorized by BSEE. BOEM's regulations have a broad definition of what constitutes a facility: "Facility means an installation that is permanently or temporarily attached to the seabed of the OCS. Facilities include any structures; devices; appurtenances; gathering, transmission, and distribution cables; pipelines; and permanently moored vessels. Any group of OCS installations interconnected with walkways, or any group of installations that includes a central or primary installation with one or more satellite or secondary installations, is a single facility. BOEM and BSEE may decide that the complexity of the installations justifies their classification as separate facilities."
Submission ID contributing to comment summary: BOEM-2023-0011-0132

N.7.6 Bats

General Comment Summaries and Responses
Comment Summary 1: Commenters voiced concerns that the WTGs may significantly reduce bat populations through turbine strikes and altering the flight paths.
Response: Migration disturbance and turbine strikes are impacts on bats that could result from the presence of structures in the OCS and are described in detail in Final EIS Section 3.5.1.3, *Impacts of Alternative A – No Action on Bats*. The presence of structures on the OCS is anticipated to have a negligible impact on bat populations because bat presence in the Lease Area is limited.
Submission IDs contributing to comment summary: BOEM-2023-0011-0081, BOEM-2023-0011-0132

N.7.7 Benthic Resources

General Comment Summaries and Responses
Comment Summary 1: Commenters asked for additional information on the impacts on fish and shellfish as a result of burying the offshore export cable and if the cable placement would disrupt heavy metals or destroy benthic habitat that serves as fish sanctuaries.
Response: Additional information on the impacts of cable emplacement as a result of the Proposed Action was added to Section 3.5.5.5, *Impacts of Alternative B – Proposed Action on Finfish, Invertebrates, and Essential Fish Habitat*.
Submission IDs contributing to comment summary: BOEM-2023-0011-0015, BOEM-2023-0011-0107
Comment Summary 2: A commenter expressed concern about the long-term cumulative impact of EMF on marine life and migratory birds.
Response: A detailed analysis of the long-term cumulative impacts of EMFs and cable emplacement on marine life and birds are included in Sections 3.5.3, 3.5.5, 3.5.6, and 3.5.7 of the Final EIS.
Submission ID contributing to comment summary: BOEM-2023-0011-0091
Comment Summary 3: A commenter asked for additional justification about why offshore structures were being placed in sandy environments.
Response: Sediment samples from within the Lease Area were primarily classified as Coastal and Marine Ecological Classification Standard Subclass Fine Unconsolidated Substrate, or dominated by sand or finer sediment size (< 5 percent gravel). Sand waves within the Lease Area and export cable corridors may be disturbed during cable emplacement; however, due to their mobility, it is expected that the sand wave profiles would rapidly return after cable installation. Additionally, mitigation measures have been proposed to limit save wave leveling and boulder clearance during construction through micrositing to avoid these areas.
Submission ID contributing to comment summary: BOEM-2023-0011-0132
Comment Summary 4: A commenter indicated they were concerned that the wind energy area would not be restored to its prior condition after decommissioning and that large amounts of materials could remain in the ocean, representing a permanent conversion of soft sediment areas to those with hard structure.
Response: As described in the COP Volume I, Section 3.3.1.7, SouthCoast Wind anticipates removal of scour protection during decommissioning. Prior to the end of the life of the Project, a detailed decommissioning application would be submitted to BSEE for review, which would describe the facilities SouthCoast plans to remove or proposes to leave in place. As required by 30 CFR 285.910, all facilities must be removed to 15 feet below the mudline unless otherwise authorized by BSEE. BOEM's regulations have a broad definition of what constitutes a facility: "Facility means an installation that is permanently or temporarily attached to the seabed of the OCS. Facilities include any structures; devices; appurtenances; gathering, transmission, and distribution cables; pipelines; and permanently moored vessels. Any group of OCS installations interconnected with walkways, or any group of installations that includes a central or primary installation with one or more satellite or secondary installations, is a single facility. BOEM and BSEE may decide that the complexity of the installations justifies their classification as separate facilities."
Submission ID contributing to comment summary: BOEM-2023-0011-0136

N.7.8 Birds

General Comment Summaries and Responses
Comment Summary 1: Many commenters voiced concerns about how WTGs would affect birds through bird strikes and changing the spatial distribution of prey. Commenters asked how those impacts, including bird mortality, would be monitored.
Response: As described in Draft EIS and Final EIS Section 3.5.3, bird presence in the offshore environment is relatively low. The primary impacts of the Proposed Action that would affect birds are habitat loss and collision-induced mortality from rotating WTGs, and permanent habitat loss and conversion from onshore construction (see Final EIS Section 3.5.3.5, *Impacts of Alternative B – Proposed Action on Birds*). SouthCoast Wind has developed a Draft Avian and Bat Post-Constructing Monitoring Framework (included as Attachment G-2 of Appendix G of the Final EIS). However, if the reported post-construction bird monitoring results indicate bird impacts deviate substantially from the impact analysis included in this EIS, then SouthCoast Wind must make recommendations for new mitigation measures or monitoring methods as part of the adaptive bird and bat mitigation measure.
Submission IDs contributing to comment summary: BOEM-2023-0011-0039, BOEM-2023-0011-0085, BOEM-2023-0011-0091, BOEM-2023-0011-0132, BOEM-2023-0011-0132
Comment Summary 2: Commenters indicated that the Draft EIS does not adequately address the direct, indirect, or cumulative impacts of the Proposed Action on birds and does not adequately support the conclusion that the Proposed Action would have beneficial impacts on birds.
Response: The cumulative impact analysis for the No Action Alternative considers the impacts of ongoing activities and other reasonably foreseeable planned activities, excluding the Proposed Action, as described in Final EIS Appendix D, *Planned Activities Scenario*. The cumulative impact analysis of the Proposed Action considers approval of the SouthCoast Wind Project in combination with other reasonably foreseeable planned activities, including planned offshore wind activities, within the geographic analysis area for each Chapter 3 resource topic. For mobile resources, including birds, the geographic analysis area for these mobile resources is the general range of the species. The purpose is to capture the cumulative impacts on each of those resources that would be affected by the Proposed Action, as well as the impacts that would still occur under the No Action Alternative. As summarized in Final EIS Section 3.5.3.5, the Proposed Action is anticipated to result in potential minor adverse and minor beneficial impacts on birds.
Submission IDs contributing to comment summary: BOEM-2023-0011-0117, BOEM-2023-0011-0158, BOEM-2023-0011-0137, BOEM-2023-0011-0175

N.7.9 Coastal Habitat and Fauna

None.

N.7.10 Finfish, Invertebrates, and Essential Fish Habitat

General Comment Summaries and Responses
Comment Summary 1: Several commenters expressed their concern with the impact of noise and soundwaves resulting from construction and installation activities, including pile driving.
Response: Final EIS Section 3.5.5.5 has been expanded to include discussions on the effects of noise on behavior, communication, and spawning of fish and invertebrate species. As described in that section, geophysical surveys, vessel activity, seabed preparation, UXO removal, pile driving, and WTG operation are expected to produce noise effects during the pre-construction, construction, and operational phases of the project. However, no population-level impacts on finfish, invertebrate, and EFH resources from noise associated under the Proposed Action are anticipated.
Submission IDs contributing to comment summary: BOEM-2023-0011-0137, BOEM-2023-0011-0107, BOEM-2023-0011-0132
Comment Summary 2: A commenter recommended that the project footprint be limited within the foraging area.
Response: As described in FEIS Section 3.5.5.5, direct impacts on foraging habitat are expected to be localized to the immediate project footprint. Indirect impacts on EFH could occur as a result of sediment suspension, temporarily decreasing foraging success due to increased turbidity. Normal foraging behavior would be expected to resume following completion of installation and settlement of suspended sediments. Additionally, BOEM is analyzing Alternative D, which would result in the removal of WTG positions in the northeastern portion of the Lease Area, which abuts the Nantucket Shoals, and would avoid impacts on foraging finfish in the Nantucket Shoals.
Submission IDs contributing to comment summary: BOEM-2023-0011-0163
Comment Summary 3: A commenter asked for clarification on how species distribution, including micro-organisms, would change as a result of the Proposed Action.
Response: Please refer to response to comment BOEM-2023-0011-0117-0011.
Submission IDs contributing to comment summary: BOEM-2023-0011-0132

N.7.11 Marine Mammals

General Comment Summaries and Responses
Comment Summary 1: Numerous comments raised general concerns regarding adverse effects on marine mammals due to the Proposed Action. Specifically, concerns were raised that the Project would have negative impacts on whales, dolphins, sharks, and bats. Commenters felt that potential oil leaks, use of sonar, increased vessel traffic, turbines and machinery, generators, pile driving, and construction of the Project would negatively impact species' breeding stock, migration patterns, ability to navigate, and cause disorientation, deafness, and mortality. Many commenters expressed concern over the recent dead whales and dolphins washing ashore, claiming that their deaths are likely tied to ongoing surveys. Some commenters stated that NOAA should not consider granting Incidental Harassment Authorization (IHAs) under these circumstances. Others stated that any take of the North Atlantic Right Whale was unacceptable under the current circumstances, specifically given the species' population decline.

General Comment Summaries and Responses
Many commenters expressed that they were concerned that there is not enough existing information or completed studies, including studies analyzing similar scenarios in term of wind turbine generator number, size, and density, allowing for too many unknowns. Commenters specifically expressed that there was not enough information as to how the Project would impact the marine environment and marine mammals, specifically the North Atlantic Right Whale. Several commenters expressed that what information is known shows that the Project would result in negative impacts and that negative impacts are already being seen. A number of commenters expressed that more studies need to be conducted before the Project moves forward. Some commenters asked that the Project be either slowed down or stopped completely. A few commenters stated that the proposed mitigation measures were inadequate and that negative impacts did not appear to be adequately addressed. One commenter asked that the project schedule be altered to avoid construction during the North Atlantic Whale migration season and another stated that the benefits of the project did not outweigh the negative impacts.
Response: Thank you for your comments. Draft EIS Section 3.5.6, *Marine Mammals*, discusses potential impacts on marine mammals from the Proposed Action, alternatives, and ongoing and planned activities in the geographic analysis area. BOEM addressed impacts on marine mammals through the following IPFs: noise, presence of structures, traffic, accidental releases, EMF and cable heat, cable emplacement and maintenance, port utilization, lighting, and gear utilization. These IPFs address the direct and indirect impacts on marine mammals. Included in the analysis for the proposed Project are applicant-proposed avoidance, minimization, and mitigation measures (AMMs) to avoid, reduce, mitigate, or monitor impacts on marine mammals. These AMMs are included in Table G-1 of Appendix G, as well as described in detail in section 3.5.6.8 of the Draft EIS, and are assessed as part of the Proposed Action. Potential effects on federally listed threatened and endangered species, including the North Atlantic Right Whale (NARW), are discussed in Section 3.5.6 of the Draft EIS. In addition to working in consultation with NOAA Fisheries, BOEM is preparing a Biological Assessment (BA) pursuant to Section 7 of the Endangered Species Act (ESA) that will provide a detailed discussion of ESA-listed species and potential impacts of the Project. Results of ESA consultation with the U.S. Fish and Wildlife Service (USFWS) will be included in the Final EIS. BOEM also continues to consult with NMFS on potential impacts on federally listed threatened and endangered marine mammals.
Submission IDs contributing to comment summary: 0006-0001; 0010-0001; 0015-0001; 0015-0005; 0015-0011; 0015-0012; 0021-0001; 0049-0001; 0051-0002; 0051-0004; 0055-0007; 0059-0001; 0071-0002; 0074-0001; 0077-0001; 0081-0005; 0085-0003; 0086-0007; 0088-0003; 0089-0002; 0089-0003; 0091-0008; 0091-0010; 0093-0001; 0095-0001; 0107-0005; 0122-0011; 0132-0036; 0132-0037; 0132-0038; 0132-0039; 0132-0044; 0132-0050; 0132-0052; 0132-0058; 0132-0059; 0138-0002; 0142-0002; 0150-0001; 0158-0001; 0163-0003; 0171-0001; 0175-0003
Comment Summary 2: One commenter expressed that they felt the Project would have a positive impact on marine mammals, including the North Atlantic Right Whale, stating that renewable energy projects like the SouthCoast Wind Project would contribute to the transition away from fossil fuels, in turn helping to stop the negative impacts of climate change felt by marine mammals. Another expressed that they believed the mitigation measures outlined in the Project's proposal were sufficient in minimizing negative impacts, specifically to the North Atlantic Right Whale.
Response: Thank you for your comment. BOEM acknowledges your support for the Project.
Submission IDs contributing to comment summary: 0027-0001; 0135-0004

N.7.12 Sea Turtles

None.

N.7.13 Wetlands

None.

N.7.14 Commercial Fisheries and For-Hire Recreational Fishing

General Comment Summaries and Responses
Comment Summary 1: Commenters expressed general concern for the level of potential impacts on commercial fisheries as a result of the Proposed Action. Commenters also highlighted specific space use conflicts between commercial trawl gear and offshore export cables and concerns regarding diminished catch levels.
Response: As described in Section 3.6.1.5, *Impacts of Alternative B – Proposed Action on Commercial Fisheries and For-Hire Recreational Fishing*, the Proposed Action could affect port and fishing access, as well as transit and harvesting activities, fishing gear interactions, and target species catch. BOEM anticipates the adverse impacts of the Proposed Action on commercial fisheries and for-hire recreational fishing would vary by fishery and fishing operation due to differences in target species abundance in the Offshore Project area, gear type, and predominant location of fishing activity. For potential impacts on commercial trawl gear as a result of offshore export cables, please refer to response to comment BOEM-2023-0011-0106-0003.
Submission IDs contributing to comment summary: BOEM-2023-0011-0081, BOEM-2023-0011-0106, BOEM-2023-0011-0132
Comment Summary 2: A commenter emphasized the need to incorporate mitigation measures under consideration fully as part of alternatives analysis.
Response: All proposed mitigation measures by BOEM and developed through agency coordination are included in the Final EIS. Section 3.6.1.11, *Proposed Mitigation Measures*, was added to describe mitigation measures and analyze their potential to avoid or lessen impacts on commercial fisheries and for-hire recreational fishing.
Submission ID contributing to comment summary: BOEM-2023-0011-0136

N.7.15 Cultural Resources

General Comment Summaries and Responses
Comment Summary 1: Several commenters cite the analysis of IPFs and impact levels on the Nantucket Historic District National Historic Landmark.
Response: Please refer to responses to comments BOEM-2023-0011-0132-0084, BOEM-2023-0011-0132-0086, and BOEM-2023-0011-0128-0014.
Submission IDs contributing to comment summary: BOEM-2023-0011-0132-0083, BOEM-2023-0011-0132-0087, BOEM-2023-0011-0132-0088

N.7.16 Demographics, Employment, and Economics

General Comment Summaries and Responses
Comment Summary 1: Commenters expressed the benefits of the Project ranging from lower utility rates from renewable energy to the positive addition to the economy.
Response: BOEM agrees that this Project will have a positive economic impact.
Submission IDs contributing to comment summary: BOEM-2023-0011-0027, BOEM-2023-0011-0139
Comment Summary 2: Individuals commented that the Project would add many jobs to the Massachusetts economy.
Response: Information regarding the number of jobs added by this Project can be found in EIS Section 3.6.3.5. FTE job-years created in Massachusetts for this Project are 14,860 direct jobs, 4,300 indirect jobs, and 7,780 induced jobs, totaling 26,940.
Submission IDs contributing to comment summary: BOEM-2023-0011-0019, BOEM-2023-0011-0117, BOEM-2023-0011-0139, BOEM-2023-0011-0143, BOEM-2023-0011-0147, BOEM-2023-0011-0164, BOEM-2023-0011-0173
Comment Summary 3: Commenters expressed some potential negatives associated with the Project such as that property values may decline, historic neighborhoods would be negatively affected, tourism jobs will be lost, dark skies may be compromised, and popular beaches may need to be temporarily shut down.
Response: The closest WTG to the shore is approximately 23 miles and could theoretically affect shore-side property values; however, the WTG would not dominate the view even in the best atmospheric conditions (COP Volume II, Section 12.2; SouthCoast Wind 2024). Neighborhoods and beaches within the landfalls may be temporarily affected during construction in the short term. Impacts on night skies would depend on if an ADLS is implemented. SouthCoast Wind proposes to implement an ADLS to automatically turn the aviation obstruction lights on and off in response to the presence of aircraft in proximity to the wind farm. Such a system may reduce the amount of time that the lights are on, thereby potentially minimizing the visibility of the WTGs from shore and related effects on land use (COP Volume 1, Section 3.3.12; SouthCoast Wind 2024).
Submission IDs contributing to comment summary: BOEM-2023-0011-0011, BOEM-2023-0011-0091, BOEM-2023-0011-0132, BOEM-2023-0011-0133, BOEM-2023-0011-0144

N.7.17 Environmental Justice

General Comment Summaries and Responses
Comment Summary 1: BOEM should discuss methods for continued public engagement and include any requests made by the public in the Final EIS, and SouthCoast Wind should publish employment opportunities as they become available over the course of the Project to environmental justice communities.
Response: BOEM has facilitated effective public outreach throughout the EIS process as demonstrated through broad participation in scoping meetings and public hearings and substantial public input received through comments submitted on regulations.gov or through verbal testimony at public meetings during scoping and the public review period for the Draft EIS. Any comments made by the public in reference to the Project can be found on regulations.gov by

General Comment Summaries and Responses
searching on docket number BOEM-2021-0062 for scoping comments and docket number BOEM-2023-0011 for Draft EIS public comments. SouthCoast Wind's webpage (https://southcoastwind.com/) includes a "Work With Us" link that contains information on employment opportunities for the Project.
Submission IDs contributing to comment summary: BOEM-2023-0011-0121-0016, BOEM-2023-0011-0121-0020, BOEM-2023-0011-0100-0004
Comment Summary 2: The Final EIS should consider effects on environmental justice communities outside of the United States.
Response: EO 12898, which directs the conduct of environmental justice analyses, does not direct analyses to include considerations of communities in countries outside of the United States.
Submission ID contributing to comment summary: BOEM-2023-0011-0137-0062
Comment Summary 3: The Final EIS should ensure environmental justice communities are not disproportionately adversely affected by IPFs, including impacts on subsistence fishing and pollutants.
Response: Sections 3.4.1, *Air Quality*, 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*, and 3.6.3, *Demographics, Employment, and Economics,* discuss the baseline conditions and potential impacts of the Project on factors including fishing and pollutants. Section 3.6.4, *Environmental Justice*, discusses these impacts in relation to environmental justice communities, and finds no major disproportionately adverse impacts on environmental justice communities with the exception of major impacts on Tribally important TCPs.
Submission IDs contributing to comment summary: BOEM-2023-0011-0140-0024, BOEM-2023-0011-0117-0024

N.7.18 Land Use and Coastal Infrastructure

General Comment Summaries and Responses
Comment Summary 1: Commenters raised concerns about adverse health impacts from cables and electrical fluids associated with the Project.
Response: Discussion on adverse human health impacts from cables can be found in Section 3.6.5 under the *EMF* IPF discussion of the Proposed Action. There are no anticipated adverse effects on human health.
Submission IDs contributing to comment summary: BOEM-2023-0011-0004, BOEM-2023-0011-0047, BOEM-2023-0011-0144, BOEM-2023-0011-0167
Comment Summary 2: Commenters stated that the onshore wind cables may need a Special Permit and approval from the Falmouth Zoning Board, and that SouthCoast Wind has not complied with local zoning requirements.
Response: As described in Final EIS Section 3.6.5.5, SouthCoast Wind has applied for an exemption from the operation of the zoning bylaws of the Town of Falmouth.
Submission IDs contributing to comment summary: BOEM-2023-0011-0004, BOEM-2023-0011-0029, BOEM-2023-0011-0073
Comment Summary 3: Commenters stated that the proposed landfall site in Falmouth is on deeded parkland from the town's founders and is protected under Article 97 from obstruction. Commenters also raised concern about the HVDC lines across Aquidneck Island.

General Comment Summaries and Responses
Response: EIS section 3.6.5 states that the three proposed Falmouth landfalls are in locations zoned as Public Use by the Town of Falmouth, including Worcester Park, Central Park, and the Surf Drive Beach public parking area. This zoning designation does not allow the installation of electrical transmission infrastructure, and any landfall option would likely require obtaining an easement from the Town of Falmouth and a zoning exemption from the state of Massachusetts. Regarding the lines across Aquidneck Island, a majority of the transmission route options are in existing ROWs and are not anticipated to present any zoning issues.
Submission IDs contributing to comment summary: BOEM-2023-0011-0034, BOEM-2023-0011-0091, BOEM-2023-0011-0138, BOEM-2023-0011-0163, BOEM-2023-0011-0166

N.7.19 Navigation and Vessel Traffic

General Comment Summaries and Responses
Comment Summary 1: Commenters expressed concerns about how the presence of WTGs and their impact on vessel radar systems would affect navigational safety in the region, especially during periods of inclement weather.
Response: Please refer to response to comment BOEM-2023-0011-0065-0019 regarding potential impacts on vessel radar systems. Information has been added to Section 3.6.6.3 under the *Presence of Structures* IPF in the Final EIS.
Submission IDs contributing to comment summary: BOEM-2023-0011-0085, BOEM-2023-0011-0107

N.7.20 Other Uses

None.

N.7.21 Recreation and Tourism

General Comment Summaries and Responses
Comment Summary 1: Commenters expressed concern with the proposed location of the onshore export cables, indicating that tourism will be affected by the construction activities at Falmouth Beach and that routes will cut through parks and a ballfield that are used for recreational activities.
Response: As described in Section 3.6.8.5, *Impacts of Alternative B – Proposed Action on Recreation and Tourism*, construction of onshore components is expected to result in temporary road and/or lane closures (and potential traffic congestion) during installation. SouthCoast Wind will work with the towns of Falmouth, Somerset, and Portsmouth (and others as may be needed) to develop and implement a construction period traffic management plan to avoid and/or minimize disruptions to residents, visitors, commercial uses, and recreational areas in the vicinity of construction activities (Table G-1, Appendix G). Such a traffic management plan will help identify/implement detours where needed.

General Comment Summaries and Responses
Submission IDs contributing to comment summary: BOEM-2023-0011-0167; BOEM-2023-0011-0004
Comment Summary 2: Several commenters expressed concern about potential impacts on tourism as a result of the presence of WTGs and associated lighting.
Response: The potential impacts on recreation and tourism from visual changes to the landscape as a result of WTGs and lighting are discussed throughout Final EIS Section 3.6.8, *Recreation and Tourism*. Additional information specific to anticipated impacts of the Proposed Action on visual resources can be found in Final EIS Section 3.6.9, *Visual Resources*.
Submission IDs contributing to comment summary: BOEM-2023-0011-0081; BOEM-2023-0011-0132
Comment Summary 3: A commenter indicated that there is a space-use conflict between the WTGs associated with the Proposed Action and recreational activities such as sailing regattas and recreational fishing activities.
Response: Please refer to response to comment BOEM-2023-0011-0117-0020. Information was added to the Final EIS regarding sailing and recreational fishing activities.
Submission ID contributing to comment summary: BOEM-2023-0011-0081

N.7.22 Scenic and Visual Resources

General Comment Summaries and Responses
Comment Summary 1: Commenters discussed that FAA lighting may be obtrusive, that red lights may be flashing at night, and that an ADLS is promised, but there are no instances in the United States where an ADLS has been successfully implemented near an airport.
Response: Field observations associated with visibility of FAA hazard lighting under clear-sky conditions indicate that FAA hazard lighting may be visible at a distance of 40 miles or more from the viewer. However, SouthCoast Wind has committed to using an ADLS on WTGs, which would only activate the hazard lighting when aircraft are present, resulting in shorter impacts on seascape, open ocean, landscape, and viewers. Additionally, it is estimated that the reduced time of FAA hazard lighting resulting from an implemented ADLS would reduce the duration of potential impacts of nighttime aviation lighting to less than 1 percent of the normal operating time that would occur without using an ADLS. BOEM has added a visual monitoring requirement to the Final EIS, which would require SouthCoast Wind to monitor the visual effects of the wind farm during construction and O&M (daytime and nighttime) and monitor the effectiveness of the ADLS (refer to measure SV-1 in Table G-2 of Appendix G, *Mitigation and Monitoring*). This measure would ensure that the ADLS is being implemented effectively and would determine whether the actual visual lighting impacts from the Project during construction and O&M correspond to the impacts described in the COP and EIS.
Submission IDs contributing to comment summary: BOEM-2023-0011-0074, BOEM-2023-0011-0081, BOEM-2023-0011-0132
Comment Summary 2: Commenters expressed that the simulations are concerning and that they are only taken from one vantage point at ground level even though property owners, the public, and visitors to NHL properties such as lighthouses experience different vantage points.

General Comment Summaries and Responses
Response: As stated in Appendix T of the COP, KOPs were selected to adequately represent views of the Project from multiple angles, distances, vantages, and viewer types (residents, tourists, economic interests), and that simulation viewpoints were selected to represent key views that highlight a diversity of viewer experiences from different vantage points, view angles, or site characteristics.
Submission IDs contributing to comment summary: BOEM-2023-0011-0085, BOEM-2023-0011-0128
Comment Summary 3: One commenter said that they have no concerns about the visual impact they may experience at Mount Hope Bay. Other commenters, however, suggested visual impacts on other areas such as Nantucket will be major, not moderate or minor; that the view will be obstructed; and that anything other than placing WTGs 43 miles offshore is unacceptable from a visual standpoint.
Response: Impact levels for the Proposed Action range from minor to major. Some IPFs may have minor impacts on visual and scenic resources, such as land disturbance or accidental releases, while others may have major impacts, such as presence of structures or lighting. Impact levels are also defined in Table 3.6.9-12, and the impacts for individual IPFs and the conclusions are consistent with the impact level definitions listed in this table.
Submission IDs contributing to comment summary: BOEM-2023-0011-0100, BOEM-2023-0011-0128, BOEM-2023-0011-0132, BOEM-2023-0011-0132

N.7.23 Project Design Envelope

General Comment Summaries and Responses
Comment Summary 1: Commenters requested additional information on the Project decommissioning process. Specific questions included how the operational lifespan of the Project was determined and which entity would pay for removal of Project components.
Response: SouthCoast Wind's lease with BOEM (Lease OCS-A 0521) has an operational term of 33 years that commences on the date of COP approval (https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/Lease-OCS-A-0521.pdf; see also 30 CFR 585.235(a)(3)). SouthCoast Wind would need to request an extension of its operational term from BOEM to operate the proposed Project for 35 years. For the purposes of the maximum-case scenario and to ensure NEPA coverage if BOEM grants such an extension, the Final EIS analyzes a 35-year operational term. The lessee would be responsible for all decommissioning costs. If the COP is approved or approved with modifications, SouthCoast Wind would have to submit a bond (or another form of financial assurance) prior to installation that would be held by the U.S. government to cover the cost of decommissioning the entire facility in the event that SouthCoast Wind would not be able to decommission the facility. Please refer to response to comment BOEM-2023-0011-0065-0024 and Final EIS Chapter 2 for additional information on the decommissioning process.
Submission IDs contributing to comment summary: BOEM-2023-0011-0015, BOEM-2023-0011-0055, BOEM-2023-0011-0132, BOEM-2023-0011-0136, BOEM-2023-0011-0153, BOEM-2023-0011-0158
Comment Summary 2: A commenter expressed concern regarding the estimated number of vessel trips anticipated as a result of the Proposed Action and asked how NARW and recreation would be affected as a result.

General Comment Summaries and Responses
Response: Please refer to response to comment BOEM-2023-0011-0132-0031. An analysis of the potential impacts of vessel trips associated with construction and O&M of the Project on NARW and recreation is included in Final EIS Section 3.5.6, *Marine Mammals*, and Section 3.6.8, *Recreation and Tourism*.
Submission ID contributing to comment summary: BOEM-2023-0011-0132
Comment Summary 3: A commenter expressed concern regarding potential security vulnerabilities of the Project infrastructure.
Response: A description of potential impacts of terrorist attacks on Project infrastructure is included in Section 2.4, *Non-Routine Activities and Low-Probability Events*, of the Final EIS.
Submission ID contributing to comment summary: BOEM-2023-0011-0085
Comment Summary 4: A commenter pointed out that existing onshore infrastructure is not capable of transmitting the amount of electricity that would be generated by the Project.
Response: The comment is noted; however, BOEM has received no information from SouthCoast Wind that its proposed POIs are incapable of receiving the power that would be produced by the Project. However, due to uncertainty around ISO-NE grid capacity and the extent and timing of necessary grid upgrades on Cape Cod where the Falmouth POI is located, SouthCoast Wind revised its COP following the release of the Draft EIS to identify Brayton Point as the preferred POI for both Project 1 and Project 2 and Falmouth as the variant POI for Project 2. In the event that technical, logistical, grid interconnection, or other unforeseen challenges arise during the design and engineering phase that prevent Project 2 from making interconnection at Brayton Point, Project 2 will make landfall and interconnect in Falmouth, Massachusetts, under the Falmouth variant scenario. This change is reflected in the Final EIS.
Submission ID contributing to comment summary: BOEM-2023-0011-0055
Comment Summary 5: A commenter expressed support for ecological design elements, such as using ecological concrete, to be incorporated into the offshore wind infrastructure, specifically of scour and cable protection, to encourage the growth of marine flora and fauna.
Response: Comment noted. The PDE, as provided in the COP, currently includes rock, concrete mattresses, sandbags, artificial seaweed/reefs/frond mats, or self-deploying umbrella systems (typically used for suction-bucket jackets) as types of scour protection considered.
Submission ID contributing to comment summary: BOEM-2023-0011-0024
Comment Summary 6: A commenter asked how maintenance issues would be addressed.
Response: As described in Final EIS Chapter 2, *Alternatives*, the proposed Project would include a comprehensive maintenance program, including preventative maintenance based on statutory requirements, original equipment manufacturers' guidelines, and industry best practices. SouthCoast Wind would inspect WTGs, OSPs, foundations, interarray cables, submarine and onshore export cables, and other parts of the proposed Project using methods appropriate for the location and element.
Submission ID contributing to comment summary: BOEM-2023-0011-0015
Comment Summary 7: A commenter asked that the impacts of pile driving into the ocean floor to secure turbines and offshore substations be described.

General Comment Summaries and Responses
Response: An analysis of the potential impacts from pile driving can be found throughout Final EIS Chapter 3, including in Section 3.5.3, *Birds*; Section 3.5.2, *Benthic Resources*; Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*; Section 3.5.6, *Marine Mammals*; and Section 3.6.4, *Environmental Justice*.
Submission ID contributing to comment summary: BOEM-2023-0011-0015

N.7.24 Mitigation and Monitoring

General Comment Summaries and Responses
Comment Summary 1: Commenters expressed support for employing an adaptive ecosystem-based management approach and mitigation measures that support the health of marine mammals and the marine ecosystem.
Response: Many best practices are described in Appendix G, *Mitigation and Monitoring*, regarding benthic resources and shellfish, finish and invertebrates, wetlands and waterbodies, coastal habitats, and sea turtles, among others.
Submission IDs contributing to comment summary: BOEM-2023-0011-0023, BOEM-2023-0011-0038, BOEM-2023-0011-0052
Comment Summary 2: Science-based best-practice mitigation measures were mentioned as needed, especially as the permitting process moves forward to protect NARW and other species.
Response: Appendix G, *Mitigation and Monitoring*, describes the mitigation measures proposed to minimize impacts on wildlife species.
Submission IDs contributing to comment summary: BOEM-2023-0011-0130, BOEM-2023-0011-0135
Comment Summary 3: A commenter requested that speed restrictions include all Project-related vessels.
Response: Mitigation measures regarding speed restrictions are in place for all vessel operators.
Submission ID contributing to comment summary: BOEM-2023-0011-0132

N.7.25 Cumulative Impacts

General Comment Summaries and Responses
Comment Summary 1: Commenters felt that analysis in the Draft EIS did not properly take into account the totality of all proposed offshore wind developments in the area and emphasized that the SouthCoast Wind Project is just one of many planned wind farms in the region.
Response: The EIS appropriately analyzes the individual effects and the cumulative effects from the Project when added to other past, present, and reasonably foreseeable actions, including offshore wind and non-offshore wind activities, consistent with the CEQ NEPA implementing regulations.
Submission IDs contributing to comment summary: BOEM-2023-0011-0053, BOEM-2023-0011-0080, BOEM-2023-0011-0081, BOEM-2023-0011-0088, BOEM-2023-0011-0091, BOEM-2023-0011-0128, BOEM-2023-0011-0132

General Comment Summaries and Responses
Comment Summary 2: A commenter asked how the cumulative analysis for Vineyard Wind 1 compared to the analysis completed for the SouthCoast Wind Project and if the same data were used for both projects.
Response: The methodology for developing the planned activity scenario for the Project described in Appendix D is the same as for the Vineyard Wind 1 project and details of the scenario development are described in the Vineyard Wind 1 Final EIS. The details for other planned offshore wind activities included in Table D2-1 in Appendix D, *Planned Activities Scenario*, of the Final EIS have been updated throughout the development of this NEPA document as the PDEs for these projects are refined.
Submission ID contributing to comment summary: BOEM-2023-0011-0091

N.7.26 National Environmental Policy Act/Public Involvement Process

General Comment Summaries and Responses
Comment Summary 1: One commenter expressed concern with the Project's location, stating that it was poorly sited with regard to NARW populations. The commenter stated that the Project area is the only known year-round habitat and winter foraging grounds for NARWs; therefore, critical habitat should be established to protect the NARW population.
Response: Thank you for your comment. Section 3.5.6, *Marine Mammals*, of the Draft EIS analyzes impacts on marine mammals, including NARW, in more detail. Appendix G identifies measures to mitigate impacts from the Proposed Action and alternatives on marine mammals. Critical habitat is a designation under the ESA that, in the case of NARW, would be established by NMFS. There is currently no designated critical habitat for NARW overlapping the Project area. Establishing critical habitat is outside the scope of this EIS.
Submission ID contributing to comment summary: 0132-0040; 0132-0042
Comment Summary 2: Multiple commenters urged BOEM to ensure the Project is developed responsibly and that benefits are maximized and negative impacts are minimized. Commenters stated that positive impacts, including jobs, community benefits, and domestic manufacturing expansion, must be delivered equitably and with special attention given to environmental justice communities and that the Project uses the best available science to inform decision making and minimize, mitigate, and avoid negative impacts on marine life. Commenters also requested that the Project meaningfully engage communities and stakeholder groups, including underrepresented and disadvantaged communities and Tribal Nations.
Response: Thank you for your comment. BOEM has analyzed the Project according to NEPA implementing regulations to consider reasonably foreseeable environmental, social, economic, historic, and cultural impacts that could result from the construction and installation, O&M, and conceptual decommissioning of the Project. Appendix A, *Required Environmental Permits and Consultations*, provides an overview of BOEM's public and agency outreach, including public scoping, cooperating agency involvement, and distribution of the Draft EIS for public review and comment.
Submission IDs contributing to comment summary: 0121-0004; 0121-0022; 0130-0003; 0172-0001
Comment Summary 3: One commenter expressed concern with the fact that SouthCoast Wind is a limited liability corporation, stating that they do not believe the company has a track record of trustworthiness or that the areas affected by the Project will benefit from interaction with the company.

General Comment Summaries and Responses
Response: Thank you for your comment.
Submission ID contributing to comment summary: 0182-0003

N.7.27 USACE Permitting

None.

N.8 List of Commenters by Commenter Type and Submission Number

Table N.8-1. Federal agencies

Submission No.	Agency
BOEM-2023-0011-0056	U.S. Environmental Protection Agency
BOEM-2023-0011-0062	U.S. Coast Guard
BOEM-2023-0011-0184	U.S. Army Corps of Engineers New England District
BOEM-2023-0011-0185	National Marine Fisheries Service

Table N.8-2. Tribes and Native Organizations

Submission No.	Tribe or Native Organization
BOEM-2023-0011-0134	Wampanoag Tribe of Gay Head (Aquinnah)

Table N.8-3. State agencies

Submission No.	Agency
BOEM-2023-0011-0070	The Massachusetts Office of Coastal Zone Management
BOEM-2023-0011-0119	Rhode Island Historical Preservation and Heritage Commission (RISHPO)
BOEM-2023-0011-0123	Rhode Island Department of Environmental Management

Table N.8-4. Local government/agencies

Submission No.	Government/Agency
BOEM-2023-0011-0048	Cape Cod Chamber of Commerce
BOEM-2023-0011-0126	New Bedford Port Authority
BOEM-2023-0011-0128	Town of Nantucket, MA

Table N.8-5. Colleges and universities

Submission No.	Government/Agency
BOEM-2023-0011-0087	Bristol Community College - Institution of Higer Education/National Offshore Wind Institute

Table N.8-6. Businesses and organizations

Submission No.	Business/Organization
BOEM-2023-0011-0024	ECOncrete
BOEM-2023-0011-0032	US Sailing
BOEM-2023-0011-0035	National Wildlife Federation et al.
BOEM-2023-0011-0037	Millwrights Local 1121, North Atlantic States Regional Council of Carpenters (NASRCC)
BOEM-2023-0011-0050	North Atlantic Regional Council of Carpenters (Carpenters Union)
BOEM-2023-0011-0052	Association to Preserve Cape Cod, Inc.

Submission No.	Business/Organization
BOEM-2023-0011-0053	The Town Dock
BOEM-2023-0011-0054	SouthCoast Community Foundation
BOEM-2023-0011-0057	Iron Workers Local 37
BOEM-2023-0011-0060	International Brotherhood of Electrical Workers Local Union 223
BOEM-2023-0011-0065	Seafreeze Shoreside, Seafreeze Ltd.
BOEM-2023-0011-0066	Battleship Cove
BOEM-2023-0011-0082	Renewable Energy Vermont
BOEM-2023-0011-0091	Falmouth Heights - Maravista Neighborhood Association
BOEM-2023-0011-0092	Local Union 56 Pile Drivers and Divers
BOEM-2023-0011-0096	The American Waterways Operators
BOEM-2023-0011-0097	Massachusetts Building Trades Unions
BOEM-2023-0011-0106	Long Island Commercial Fishing Association
BOEM-2023-0011-0112	New England Fishery Management Council and Mid-Atlantic Fishery Management Council
BOEM-2023-0011-0117	Green Oceans
BOEM-2023-0011-0121	BlueGreen Alliance
BOEM-2023-0011-0122	TurbineHub
BOEM-2023-0011-0124	Oceana
BOEM-2023-0011-0125	Ocean Winds North America
BOEM-2023-0011-0127	Business Network for Offshore Wind
BOEM-2023-0011-0129	Marine Mammal Commission
BOEM-2023-0011-0130	New England for Offshore Wind
BOEM-2023-0011-0131	Massachusetts American Federal of Labor and Congress of Industrial Organizations (AFL-CIO) and Climate Jobs Massachusetts
BOEM-2023-0011-0132	Nantucket Residents Against Turbines
BOEM-2023-0011-0133	Nantucket Maria Mitchell Association
BOEM-2023-0011-0139	SouthCoast Wind Energy LLC
BOEM-2023-0011-0135	Shell New Energies US LLC
BOEM-2023-0011-0136	Responsible Offshore Development Alliance
BOEM-2023-0011-0137	Sea Life Conservation, Save the Whales, Ocean Conservation Research
BOEM-2023-0011-0140	National Wildlife Federation, Natural Resources Defense Council, Conservation Law Foundation, et al.
BOEM-2023-0011-0143	Local 56
BOEM-2023-0011-0149	Millwrights Local 1121
BOEM-2023-0011-0156	Mass Audubon
BOEM-2023-0011-0159	Environmental League of Massachusetts

Submission No.	Business/Organization
BOEM-2023-0011-0161	Creation Care Ministry at First Baptist Church Chelmsford
BOEM-2023-0011-0164	Local 56
BOEM-2023-0011-0165	Oak Grove Cemetery
BOEM-2023-0011-0172	Blue Green Alliance
BOEM-2023-0011-0175	Falmouth Heights Vista Neighborhood Association
BOEM-2023-0011-0179	Millwrights Local 1121
BOEM-2023-0011-0180	Sea Freeze

Table N.8-7. Individuals

Submission No.	Government/Agency
BOEM-2023-0011-0004	Frank Haggerty
BOEM-2023-0011-0005	Jean Publieee
BOEM-2023-0011-0006	Jeffrey Cameron
BOEM-2023-0011-0007	Seth Engelbourg
BOEM-2023-0011-0008	Peter Laird
BOEM-2023-0011-0009	Trev Doyl
BOEM-2023-0011-0010	Jeffrey Cameron
BOEM-2023-0011-0011	Cheryl Severini
BOEM-2023-0011-0012	Alexis Michel
BOEM-2023-0011-0013	Anonymous
BOEM-2023-0011-0014	Dianna Harris
BOEM-2023-0011-0015	Whitney Stanbury
BOEM-2023-0011-0016	Dave Baldwin
BOEM-2023-0011-0017	Regina Littwin
BOEM-2023-0011-0018	Lynn Petrulio
BOEM-2023-0011-0019	Carl Borchert
BOEM-2023-0011-0020	Randi Allfather
BOEM-2023-0011-0021	Renee Cameron
BOEM-2023-0011-0022	Charlotte DuHamel
BOEM-2023-0011-0023	Glen Rokicki
BOEM-2023-0011-0025	Mary Martin
BOEM-2023-0011-0026	Charlotte DuHamel
BOEM-2023-0011-0027	Andrew Reed
BOEM-2023-0011-0028	Jackie Apel
BOEM-2023-0011-0029	Jim Barrile
BOEM-2023-0011-0030	Daniela Faibes

Submission No.	Government/Agency
BOEM-2023-0011-0031	Daniel Webb
BOEM-2023-0011-0033	Gregory Mazmanian
BOEM-2023-0011-0034	Edward Jalowiec
BOEM-2023-0011-0036	Dennis DiTullio
BOEM-2023-0011-0038	David Dow
BOEM-2023-0011-0039	Amitie Davis
BOEM-2023-0011-0040	William Harney
BOEM-2023-0011-0041	Marita Ducharme
BOEM-2023-0011-0042	Eleanor Ling
BOEM-2023-0011-0043	Wendell Bishop
BOEM-2023-0011-0044	Larry D'Oench
BOEM-2023-0011-0045	Elizabeth Dobricki
BOEM-2023-0011-0046	Robert Michler
BOEM-2023-0011-0047	Moira Powers
BOEM-2023-0011-0049	Mara Laird
BOEM-2023-0011-0051	Edward Jalowiec
BOEM-2023-0011-0055	Ann Capozzi
BOEM-2023-0011-0058	David Shanker
BOEM-2023-0011-0059	William Spring
BOEM-2023-0011-0061	Allan LaFrance
BOEM-2023-0011-0063	Hilary Cunniff
BOEM-2023-0011-0064	Renata Shapovalova
BOEM-2023-0011-0067	K Tyree
BOEM-2023-0011-0068	Anonymous
BOEM-2023-0011-0069	D Gricus
BOEM-2023-0011-0071	Mary Chalke
BOEM-2023-0011-0072	Michael Kane
BOEM-2023-0011-0073	Ken Peal
BOEM-2023-0011-0074	Tom Harty
BOEM-2023-0011-0075	Patrice Tullai
BOEM-2023-0011-0076	Carl van Warmerdam
BOEM-2023-0011-0077	Michelle Jones
BOEM-2023-0011-0078	Mary Ellen Martin
BOEM-2023-0011-0079	Samuel Dahl
BOEM-2023-0011-0080	Edward Jalowiec

Submission No.	Government/Agency
BOEM-2023-0011-0081	E. A. Pedro
BOEM-2023-0011-0083	Chris Carceller
BOEM-2023-0011-0084	Clayton Commons
BOEM-2023-0011-0085	Katherine Scott
BOEM-2023-0011-0086	Karen Gleason
BOEM-2023-0011-0088	Bruce Buch
BOEM-2023-0011-0089	Kenan Foley
BOEM-2023-0011-0090	Anonymous
BOEM-2023-0011-0093	Sylvia Lockwood
BOEM-2023-0011-0094	Susan Ayd
BOEM-2023-0011-0095	Colleen Oconnell
BOEM-2023-0011-0098	Anonymous
BOEM-2023-0011-0099	Dennis Koski
BOEM-2023-0011-0100	Lloyd Mendes
BOEM-2023-0011-0101	Anonymous
BOEM-2023-0011-0102	Nancy Erikson
BOEM-2023-0011-0103	Otto Graves
BOEM-2023-0011-0104	Anne Graves
BOEM-2023-0011-0105	Jennifer Sarafin
BOEM-2023-0011-0107	Anthony and Carolyn Moutinho
BOEM-2023-0011-0108	Jean Publiee
BOEM-2023-0011-0109	Pamela Erwin
BOEM-2023-0011-0110	Donald Burnham
BOEM-2023-0011-0111	Christine Gadbois
BOEM-2023-0011-0113	Joyce McMahon
BOEM-2023-0011-0114	Peter Pappas
BOEM-2023-0011-0115	Amy Kvistad
BOEM-2023-0011-0116	Paul Ouellette
BOEM-2023-0011-0118	Carlos Munoz Royo
BOEM-2023-0011-0120	Doug Rose
BOEM-2023-0011-0138	David Howard
BOEM-2023-0011-0141	Pendery Haines
BOEM-2023-0011-0142	Frank Haggerty
BOEM-2023-0011-0144	Larry Cali
BOEM-2023-0011-0145	Jim Kendall

Submission No.	Government/Agency
BOEM-2023-0011-0146	Sharon McGinnis
BOEM-2023-0011-0147	Lori Favata
BOEM-2023-0011-0148	Susan Richman
BOEM-2023-0011-0150	Walter Kazmierczak
BOEM-2023-0011-0151	Jeanne Seligowski
BOEM-2023-0011-0152	Sherrie Trefry
BOEM-2023-0011-0153	Chris Mutti
BOEM-2023-0011-0154	Rosemary Carey
BOEM-2023-0011-0155	Costello Nodd
BOEM-2023-0011-0157	Michelle Bachman
BOEM-2023-0011-0158	Larry Cali
BOEM-2023-0011-0160	Gary Breitbord
BOEM-2023-0011-0162	Julia Costello
BOEM-2023-0011-0163	Doug Brown
BOEM-2023-0011-0166	David Buzanoski
BOEM-2023-0011-0167	James Barrile
BOEM-2023-0011-0168	Taylor Pettine
BOEM-2023-0011-0169	Danielle D
BOEM-2023-0011-0170	Eleanor Ling
BOEM-2023-0011-0171	Chris Mutti
BOEM-2023-0011-0173	Brett Sexton
BOEM-2023-0011-0174	Todd Jackson
BOEM-2023-0011-0176	Stephen Buckley
BOEM-2023-0011-0177	Veronica Bonnet
BOEM-2023-0011-0178	Jim Kendall
BOEM-2023-0011-0181	Tom David
BOEM-2023-0011-0182	Jeanne Seligowski
BOEM-2023-0011-0183	Jane and William Doyle

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Appendix O

Assessment of Resources with Moderate (or Lower) Impacts

Contents

List of Tables

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O.1 Introduction

To focus on the impacts of most concern in the main body of this Final EIS, BOEM has included the analysis of resources with no greater than **moderate** adverse impacts below. These include air quality; water quality; bats; benthic resources; birds; coastal habitat and fauna; finfish, invertebrates, and essential fish habitat; sea turtles; wetlands; demographics, employment, and economics; land use and coastal infrastructure; navigation and vessel traffic; and recreation and tourism. Those resources with potential impact ratings greater than **moderate** are included in Chapter 3, *Affected Environment and Environmental Consequences,* of the Final EIS. Locating environmental resource sections with no greater than moderate adverse impacts in Appendix O supports the 300-page limits of the body of the EIS (40 CFR § 1502.7).

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3.4 Physical Resources

3.4.1 Air Quality

This section discusses potential impacts on air quality from the proposed Project, alternatives, and ongoing and planned activities in the air quality geographic analysis area. The air quality geographic analysis area, as shown on Figure 3.4.1-1, includes the airshed within 25 miles (40 kilometers) of the Lease Area and the airshed within 15.5 miles (25 kilometers) of onshore construction areas and ports that may be used for the Project. The geographic analysis area encompasses the geographic region subject to USEPA review as part of an OCS permit for the Project under the Clean Air Act (CAA) (42 USC 7409). The geographic analysis area also considers potential air quality impacts associated with the onshore construction areas and the marshalling port(s) outside of the OCS permit area. 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 (25-kilometer) distance to provide a reasonable buffer.

3.4.1.1 Description of the Affected Environment

The geographic analysis area for air quality covers most of Rhode Island, southeastern Massachusetts eastward across Cape Cod, southward across Martha's Vineyard, and over the open ocean south and west of Martha's Vineyard. This includes the air above the Wind Farm Area and adjacent OCS area, the offshore export cable routes and onshore cable routes, the onshore converter stations/substations, the construction staging areas, the onshore construction and proposed Project-related sites, and the ports used to support proposed Project activities. COP Volume 2, Table A-1 (SouthCoast Wind 2024), provides further description of the air quality geographic analysis area. Appendix B, *Supplemental Information and Additional Figures and Tables*, provides information on climate and meteorological conditions in the Project area and vicinity.

Air quality within a region is measured in comparison to the National Ambient Air Quality Standards (NAAQS), which are standards established by USEPA pursuant to the CAA for several common pollutants, known as criteria pollutants, to protect human health and welfare. The criteria pollutants are carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter 10 microns or less in diameter (PM_{10}), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). Massachusetts has established ambient air quality standards (AAQS) that are similar to the NAAQS. Table 3.4.1-1 shows the NAAQS. Emissions of lead from Project-associated sources would be negligible because lead is not a component of liquid or gaseous fuels; accordingly, lead is not analyzed in this EIS. Ozone is not emitted directly but is formed in the atmosphere from precursor chemicals, primarily nitrogen oxides (NO_X) and volatile organic compounds (VOCs), in the presence of sunlight. Potential impacts of a project on ozone levels are evaluated in terms of NO_X and VOC emissions.

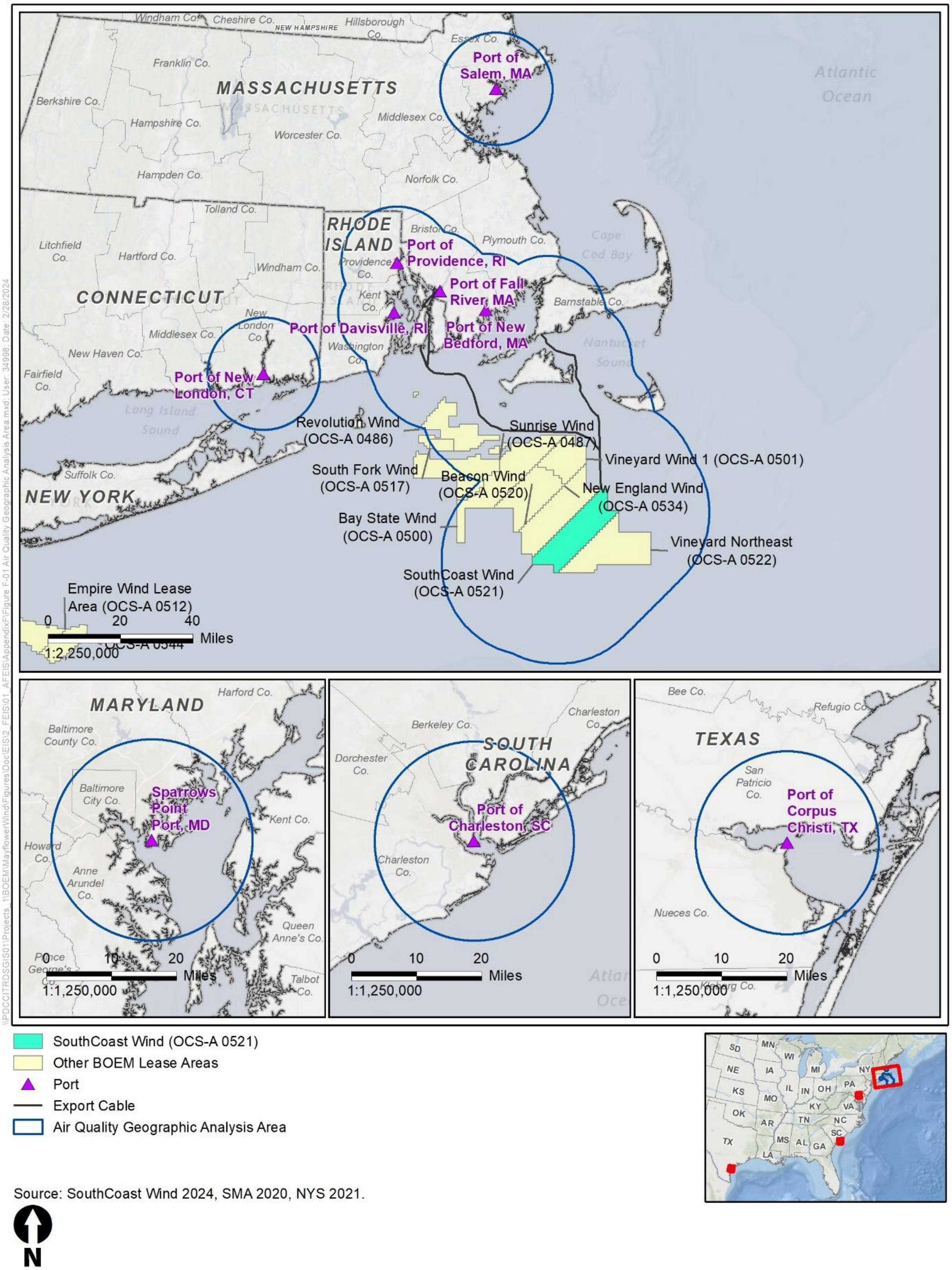

Figure 3.4.1-1. Air quality geographic analysis area

Table 3.4.1-1. National Ambient Air Quality Standards

Criteria Pollutant	Primary/ Secondary	Averaging Time	Level	Form of Standard
Carbon monoxide (CO)	Primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	Primary and secondary	Rolling 3-month average	0.15 µg/m^3 [a]	Not to be exceeded
Nitrogen dioxide (NO_2)	Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and secondary	1 year	53 ppb [b]	Annual mean
Ozone (O_3)	Primary and secondary	8 hours	0.070 ppm [c]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle pollution (PM) — $PM_{2.5}$	Primary	1 year	9.0 µg/m^3	Annual mean, averaged over 3 years
	Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
	Primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
Particle pollution (PM) — PM_{10}	Primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide (SO_2)	Primary	1 hour	75 ppb [d]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Source: 40 CFR 50.

[a] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

[b] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[c] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O_3 standards.

[d] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is a USEPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

µg/m^3 = micrograms of pollutant per cubic meter of air; ppb = parts per billion; ppm = parts per million.

USEPA designates all areas of the country as being in attainment or nonattainment, or as unclassified for each criteria pollutant. An attainment area is an area where all criteria pollutant concentrations are within all NAAQS. A nonattainment area does not meet the NAAQS for one or more pollutants. Unclassified areas are those where attainment status cannot be determined based on available information and are regulated as attainment areas. An area can be in attainment for some pollutants and nonattainment for others. If an area was in nonattainment at any point in the last 20 years but is currently in attainment or is unclassified, then the area is designated a maintenance area.

Nonattainment and maintenance areas are required to prepare a State Implementation Plan, which describes the region's program to attain and maintain compliance with the NAAQS. The attainment status of an area can be found at 40 CFR 81 and in the USEPA Green Book, which the agency revises from time to time (USEPA 2021a). Attainment status is determined through evaluation of air quality data from a network of monitors.

All of southeastern Massachusetts is currently designated as unclassifiable or in attainment for all criteria pollutants, except for Dukes County on Martha's Vineyard, which is designated as marginally in nonattainment for the 2008 ozone NAAQS of 75 parts per billion (ppb). In August 2018, USEPA designated Dukes County as attainment for the current, more stringent 2015 ozone NAAQS of 70 ppb. Monitored ozone values in Dukes County have remained below the NAAQS of 70 ppb since 2018. However, the nonattainment designation for Dukes County for the 2008 ozone standard remains in effect. The entire state of Rhode Island is currently in attainment for all criteria pollutants.

SouthCoast Wind is considering multiple ports for construction including New Bedford, Fall River, and Salem, Massachusetts; Davisville and Providence, Rhode Island; New London, Connecticut; Sparrows Point, Maryland; Charleston, South Carolina; and Corpus Christi, Texas as well as some international ports. Project components may be delivered from international ports including ports in Mexico (Altamira), Canada (Sheet Harbor, Sydney, Argentia), and Europe and Asia. O&M vessel trips would originate primarily from the ports of New Bedford and Fall River, Massachusetts; New London, Connecticut; or Providence, Rhode Island, with the potential for occasional repair and supply delivery trips originating from ports in Davisville and Providence, Rhode Island; Salem, Massachusetts; Sparrows Point, Maryland; and Charleston, South Carolina.

The attainment status of these ports varies. The potential ports in the New England region are in attainment areas except for the Port of New London, Connecticut, which is in a nonattainment area for the ozone NAAQS. Sparrows Point, Maryland is in nonattainment areas for the SO_2 and ozone NAAQS. Charleston, South Carolina and Corpus Christi, Texas are in attainment areas. Figure 3.4.1-1 shows the locations of all these ports.

The CAA prohibits federal agencies from approving any activity that does not conform to a State Implementation Plan. This prohibition applies only with respect to nonattainment or maintenance areas (i.e., areas that were previously in nonattainment and for which a maintenance plan is required). Conformity to a State Implementation Plan means conformity to a State Implementation Plan's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The activities for which BOEM has authority are outside of any nonattainment or maintenance area and, therefore, not subject to the requirement to show conformity.

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 (100 kilometers) of a Project[1] (USEPA 1992). The federal land manager identifies appropriate air quality–related values for the Class I area and evaluates the impact of the Project on air quality–related values. Air quality–related values identified by the federal land manager for a particular Class I area may include criteria pollutants, visibility, and acidic deposition. The nearest Class I area is the Lye Brook Wilderness, Vermont, which is approximately 130 miles (210 kilometers) from the nearest Project component (the Brayton Point HVDC Converter Stations, which are nearer to the Lye Brook Wilderness than is the Wind Farm Area). This distance is greater than the 100-kilometer distance within which USEPA recommends that the federal land manager of the Class I area be notified about a project that requires a federal air quality permit.

The CAA amendments directed USEPA to establish requirements to control air pollution from OCS oil- and gas-related activities along the Pacific, Arctic, and Atlantic Coasts and along the U.S. Gulf Coast off of Florida, east of 87° 30′ west longitude. The OCS Air Regulations (40 CFR 55) establish the applicable air pollution control requirements, including provisions related to permitting, monitoring, reporting, fees, compliance, and enforcement for facilities subject to the CAA. These regulations apply to OCS sources that are beyond state seaward boundaries. Projects within 25 nm 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.

3.4.1.2 Impact Level Definitions for Air Quality

Definitions of potential impact levels are provided in Table 3.4.1-2. Impact levels are intended to serve NEPA purposes only, and they are not intended to establish thresholds or other requirements with respect to permitting under the CAA.

Table 3.4.1-2. Impact level definitions for air quality

Impact Level	Type of Impact	Definition
Negligible	Adverse	Increases in ambient pollutant concentrations due to Project emissions would not be detectable.
	Beneficial	Decreases in ambient pollutant concentrations due to Project emissions would not be detectable.
Minor to Moderate	Adverse	Increases in ambient pollutant concentrations due to Project emissions would be detectable but would not lead to violation of the NAAQS.
	Beneficial	Decreases in ambient pollutant concentrations due to Project emissions would be detectable.
Major	Adverse	Increases in ambient pollutant concentrations due to Project emissions could cause or contribute to violation of the NAAQS.
	Beneficial	Decreases in ambient pollutant concentrations due to Project emissions would be larger than for minor to moderate impacts.

[1] The 100-kilometer distance applies to notification and is not a threshold for use in evaluating impacts. Impacts at Class I areas at distances greater than 100 kilometers may need to be considered for larger emission sources if there is reason to believe that such sources could affect the air quality in the Class I area (USEPA 1992).

3.4.1.3 Impacts of Alternative A – No Action on Air Quality

When analyzing the impacts of the No Action Alternative on air quality, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for air quality. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D, *Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for air quality described in Section 3.4.1.1, *Description of the Affected Environment and Future Baseline Conditions* 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 are generally associated with onshore impacts, including residential, commercial, industrial, and transportation activities as well as construction. These activities and associated impacts are expected to continue at current trends and have the potential to affect air quality through their emissions. Impacts associated with climate change could affect ambient air quality through increased formation of ozone and particulate matter associated with increasing air temperatures.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on air quality include ongoing construction of the Vineyard Wind 1 project (62 WTGs and 1 OSP) in OCS-A 0501, the South Fork project (12 WTGs and 1 OSP) in OCS-A 0517, and the Revolution Wind project (65 WTGs and two OSPs) in OCS-A 0486. Ongoing construction of the Vineyard Wind 1, South Fork, and Revolution Wind projects would have the same type of impacts on air quality that are described in *Cumulative Impacts of the No Action Alternative* for all ongoing and planned offshore wind activities in the geographic analysis area but would be of lower intensity.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action). The Massachusetts Global Warming Solutions Act of 2008 sets out a series of requirements for how the state is to achieve GHG emissions reductions by mid-century. One of the requirements is for the state to set an emissions limit for 2030 and develop an implementation plan to achieve that limit. Massachusetts has set its GHG emissions reduction target for the next decade at a 45 percent reduction below the 1990 level in 2030. The Massachusetts Clean Energy and Climate Plan for 2025 and 2030 establishes a blueprint for achieving this limit equitably and affordably, with major new initiatives advancing decarbonization of the Commonwealth’s buildings, transportation, and electricity sectors (EEA 2022). Similarly, Rhode Island EO 20-01 of 2020 set a goal to meet 100 percent of Rhode Island’s electricity demand with renewable energy by 2030. The Rhode Island State Energy Plan demonstrates that Rhode Island can increase sector fuel diversity, produce net economic benefits, and reduce GHG emissions by 45 percent by the year 2035. The plan proposes advanced policies and strategies to achieve those goals (OER 2015).

Impacts from fossil-fueled power facilities are expected to be mitigated partially by implementation of other offshore wind projects near the geographic analysis area, including in the regions off New England, New York, New Jersey, Delaware, and Maryland to the extent that these wind projects would result in a reduction in emissions from fossil-fueled power facilities. Other planned activities that could contribute to air quality impacts include construction of undersea transmission lines, gas pipelines, and other submarine cables; marine minerals use and ocean-dredged material disposal; military use; marine transportation; oil and gas activities; and onshore development activities (see Appendix D, Section D.2 for a complete description of planned activities).

The sections below summarize the potential impacts of ongoing and planned offshore wind activities (other than the Proposed Action) on air quality during construction, O&M, and decommissioning of the projects. The air quality geographic analysis area overlaps with most, but not all, of the offshore wind lease areas in the Massachusetts and Rhode Island region (Figure 3.4.1-1). BOEM conservatively assumed in its analysis of air quality impacts that all 901 WTGs estimated for the Massachusetts/Rhode Island region (except for the Proposed Action) associated with OCS-A-0486, OCS-A-0487, OCS-A-0500, OCS-A 0501, OCS-A 0517, OCS-A-0520, OCS-A 0522, OCS-A 0534 would be sited within the air quality geographic analysis area (Appendix D, Table D2-1).

BOEM expects offshore wind activities to affect air quality through the following primary IPFs.

Air emissions: Most air pollutant emissions and air quality impacts from offshore wind projects would occur during construction, potentially from multiple projects occurring simultaneously. Construction activity would occur at different locations and could overlap temporally with activities at other locations, including operational activities at previously constructed projects. All projects would be required to comply with the CAA. Primary emissions sources would include increased public and commercial vehicular traffic, air traffic, combustion emissions from construction equipment, and fugitive emissions from construction-generated dust. During operations, emissions from future offshore wind projects in the air quality geographic analysis area would overlap temporally, but operations would contribute few criteria pollutant emissions compared to construction and decommissioning. Operational emissions would result largely from commercial vessel traffic and emergency diesel generators. The aggregate operational emissions for all projects in the air quality geographic analysis area would vary by year as successive projects begin operation. As wind energy projects come online, power-generation emissions overall could decrease and the region as a whole could realize a net benefit to air quality.

The offshore wind projects other than the Proposed Action that may result in air pollutant emissions and air quality impacts in the air quality geographic analysis area include projects within all or portions of the following lease areas: OCS-A-0486, OCS-A-0487, OCS-A-0500, OCS-A 0501, OCS-A 0517, OCS-A-0520, OCS-A 0522, OCS-A 0534 (Appendix D, Table D2-4). If fully developed, projects proposed in these lease areas would produce 14 GW of renewable power from the installation of 901 WTGs (Appendix D, Table

D2-1). Based on the assumed offshore construction schedule in Table D2-1, the projects in the geographic analysis area would be in construction between 2023 and 2031.

During the construction phase, the total emissions of criteria pollutants and ozone precursors from offshore wind projects other than SouthCoast Wind proposed within the air quality geographic analysis area, summed over all construction years, are estimated to be 34,496 tons of CO, 165,807 tons of NO_X, 8,808 tons of PM_{10}, 5,589 tons of $PM_{2.5}$, 4,441 tons of SO_2, 5,732 tons of VOCs, and 11,228,498 tons of carbon dioxide (CO_2) (Appendix D, Table D2-4). Most emissions would occur from diesel-fueled construction equipment, vessels, and commercial vehicles. The magnitude of the emissions and the resulting air quality impacts would vary spatially and temporally during the construction phases. Construction activity would occur at different locations and could overlap temporally with activities at other locations, including operational activities at previously constructed projects. As a result, air quality impacts would be minor, shifting spatially and temporally across the geographic analysis area.

During operations, emissions from offshore wind projects in the geographic analysis area would overlap temporally, but operations would contribute few criteria pollutant emissions compared to construction and decommissioning. Operational emissions would come largely from commercial vessel traffic and emergency diesel generators. The aggregate operational emissions for all projects in the analysis area would vary by year as successive projects begin operation. Estimated operational emissions would be 1,297 tons per year of CO, 5,073 tons per year of NO_X, 152 tons per year of PM_{10}, 137 tons per year of $PM_{2.5}$, 75 tons per year of SO_2, 100 tons per year of VOCs, and 412,263 tons per year of CO_2 (Appendix D, Table D2-4). Operational emissions would result in negligible air quality impacts because emissions would be intermittent, localized, and dispersed throughout the combined lease areas and vessel routes from the onshore O&M facility.

Offshore wind energy development could help displace emissions from fossil fuels, potentially improving regional air quality and reducing GHG emissions. An analysis by Barthelmie and Pryor (2021) calculated that, depending on global trends in GHG emissions and the amount of wind energy expansion, development of wind energy could reduce predicted increases in global surface temperature by 0.3 to 0.8 degrees Celsius (°C) (0.5–1.4 degrees Fahrenheit [°F]) by 2100. The displacement of fossil fuels by wind energy is highly influenced by how individual power plants respond to the introduction of wind energy. For example, the process of changing the plant's output may temporarily increase the plant's emissions (Katzenstein and Apt 2009).[2]

Estimations and evaluations of potential health and climate benefits from offshore wind activities for specific regions and project sizes rely on information about the air pollutant emissions contributions of

[2] Katzenstein and Apt (2009) modeled a system of two types of natural gas generators, four wind farms, and one solar farm. The power output of wind and solar facilities can vary relatively rapidly as meteorological conditions change, and the natural gas generators vary their power output accordingly to meet electrical demand. When gas generators change their power output their emissions rates may increase above their steady-state levels. As a result, the net emissions reductions realized from gas generators reducing their output in response to wind and solar power can be less than the reduction that would be expected based solely on the amount of wind and solar power. The study found that reductions in CO_2 emissions would be about 80 percent, and in NO_X emissions about 30 to 50 percent, of the emissions reductions expected if the power fluctuations caused no additional emissions.

the existing and projected mixes of power generation sources, and generally estimate 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).

The potential health benefits of avoided emissions can be evaluated using USEPA's CO-Benefits Risk Assessment (COBRA) health impacts screening and mapping tool (USEPA 2020a). COBRA is a tool that estimates the health and economic benefits of clean energy policies. COBRA was used to analyze the avoided emissions that were calculated for development of 36 GW of reasonably foreseeable wind power on the OCS from ongoing and planned offshore wind projects (Appendix D, Table D2-1). Table 3.4.1-3 presents the estimated monetized health benefits and avoided mortality for this scenario.

Table 3.4.1-3. COBRA estimate of annual avoided health effects with 36 GW reasonably foreseeable offshore wind power

Discount Rate [a] (2023)	Monetized Total Health Benefits (million U.S. dollars/year)		Avoided Mortality (cases/year)	
	Low Estimate [b]	High Estimate [b]	Low Estimate [b]	High Estimate [b]
3%	$232	$523	21	47
7%	$203	$460	21	47

Source: USEPA 2020a.
[a] The discount rate is used to express future economic values in present terms. Not all health effects and associated economic values occur in the year of analysis. Therefore, COBRA accounts for the "time value of money" preference (i.e., a general preference for receiving economic benefits now rather than later) by discounting benefits received later (USEPA 2020b).
[b] The low and high estimates are derived using two sets of assumptions about the sensitivity of adult mortality and non-fatal heart attacks to changes in ambient $PM_{2.5}$ levels. Specifically, the high estimates are based on studies that estimated a larger effect of changes in ambient $PM_{2.5}$ levels on the incidence of these health effects (USEPA 2020b).

BOEM anticipates that the air quality impacts associated with offshore wind activities other than the Proposed Action in the geographic analysis area would result in minor adverse impacts due to emissions of criteria pollutants, VOCs, air toxics or hazardous air pollutants (HAPs), and GHGs, mostly released during construction and decommissioning. Impacts would be minor because these emissions would incrementally increase ambient pollutant concentrations, though not by enough to cause a violation of the NAAQS or Massachusetts AAQS. Offshore wind projects likely would lead to reduced emissions from fossil-fueled power facilities and consequently minor to moderate beneficial impacts on air quality.

Accidental releases: Offshore wind activities could release VOCs and HAPs because of accidental chemical spills in the geographic analysis area. Section 3.4.2, *Water Quality*, discusses the nature of releases anticipated. Based on Appendix D, Table D2-3, up to about 1,833,481 gallons (6.9 million liters) of coolants, 6,835,448 gallons (25.9 million liters) of oils and lubricants, and 1,729,064 gallons (6.5 million liters) of diesel fuel would be contained in the 920 wind turbine and substation structures for the wind energy projects in the geographic analysis area. If accidental releases occur, they would be most likely during construction but could occur during operation and decommissioning of offshore wind facilities. These may lead to short-term periods (hours to days)[3] of HAP emissions through surface

[3] For example, small diesel fuel spills (500–5,000 gallons) usually will evaporate and disperse within a day or less (NOAA 2006).

evaporation. HAP emissions would consist of VOCs, which may be important for ozone formation. 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 (12.1 million and 30.3 million liters). Tankers are relatively common in these waters, and the total WTG chemical storage capacity in the geographic analysis area is much less than the volume of hazardous liquids transported by ongoing activities (U.S. Energy Information Administration 2014). BOEM expects air quality impacts from accidental releases would be negligible because impacts would be short term and limited to the area near the accidental release location. Accidental spills would occur infrequently over a 33-year period with a higher probability of spills during future project construction, but they would not be expected to contribute appreciably to overall impacts on air quality.[4]

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, air quality would continue to reflect current regional trends and respond to IPFs introduced by other ongoing activities. Additional, higher-emitting, fossil-fueled power facilities could be built, or could be kept in service, to meet future power demand, fired by natural gas, oil, or coal. These impacts would be partially mitigated once the approved Vineyard Wind 1, South Fork, and Revolution Wind offshore wind projects are operational. BOEM expects ongoing non-offshore wind activities and offshore wind activities to have continuing regional air quality impacts primarily through air pollutant emissions, accidental releases, and climate change. BOEM anticipates that the impacts of ongoing activities, such as air pollutant emissions and GHGs, would be **minor to moderate adverse**.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue to affect air quality in the geographic analysis area. Planned non-offshore wind activities would contribute to impacts on air quality because air pollutant and GHG emissions would increase through construction and operation of new energy generation facilities to meet future power demands. Although there are no such energy generation facilities planned to occur in the geographic analysis area, continuation of current regional trends in energy development could include new power plants that could contribute to air quality and GHG impacts in Massachusetts and the other New England states.

Planned and ongoing offshore wind activities would contribute to air quality impacts due to emissions of criteria pollutants, VOCs, HAPs, and GHGs, mostly released during construction and decommissioning. Impacts would be minor because these emissions would incrementally increase ambient pollutant concentrations, though not by enough to cause a violation of the NAAQS or Massachusetts AAQS.

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[4] SouthCoast Wind's lease with BOEM (Lease OCS-A 0521) has an operational term of 33 years that commences on the date of COP approval (BOEM 2019); see also 30 CFR 585.235(a)(3)). SouthCoast Wind would need to request an extension of its operational term from BOEM to operate the proposed Projects for 35 years. For the purposes of maximum-case scenario and to ensure NEPA coverage if BOEM grants such an extension, the Final EIS analyzes a 35-year operational term for all resource impact analyses except for air quality. The air quality impact analysis assumes a 33-year operational term to provide a conservative assessment of emissions offsets during the operational term of the Proposed Action.

Pollutant emissions during operations would be generally lower and more transient. Most air pollutant emissions and air quality impacts would occur during multiple overlapping project construction phases from 2023 through 2030. Once operational, offshore wind projects likely would lead to beneficial impacts on air quality through reduced emissions from fossil-fueled power facilities.

Overall, BOEM anticipates the cumulative impacts of the No Action Alternative on air quality from ongoing and planned activities would be **minor to moderate adverse**, largely driven by emissions from fossil-fueled power facilities, other ongoing and planned non-offshore wind emissions, and emissions from construction and decommissioning of offshore wind projects. Because offshore wind projects likely would lead to reduced emissions from fossil-fueled power facilities, BOEM also anticipates the cumulative impacts of the No Action Alternative would result in **minor** to **moderate beneficial** impacts on regional air quality.

Construction and operation of offshore wind projects would produce GHG emissions that would contribute incrementally to climate change. CO_2 is relatively stable in the atmosphere and, for the most part, mixed uniformly throughout the troposphere and stratosphere. As such, the impact of GHG emissions does not depend on the source location. Increasing energy production from offshore wind projects would likely reduce regional GHG emissions by displacing energy from fossil fuels. This reduction would more than offset the relatively small GHG emissions from offshore wind projects. Regional reductions in GHG emissions would support states in meeting their renewable energy and emissions goals and would reinforce ongoing trends toward electrifying transportation and heating, as the climate benefits of electrification of these sectors depend on renewable electricity as a lower-emissions source of energy than fossil fuels. In all, the 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.

3.4.1.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the following sections. The following PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on air quality.

- Emissions ratings of construction equipment and vehicle engines.
- Location of construction laydown areas.
- Choice of cable-laying locations and pathways.
- Choice of marine traffic routes to and from the Wind Farm Area and offshore export cable routes.
- Soil characteristics at excavation areas, which may affect fugitive emissions.
- Emissions control strategy for fugitive emissions due to excavation and hauling operations.

Changes to the design capacity of the WTGs would not alter the maximum potential air quality impacts for the proposed Project and alternatives because the maximum-case scenario involves the maximum number of WTGs (147) allowed in the PDE.

SouthCoast Wind has committed to measures to minimize impacts on air quality. Low sulfur fuels would be used to the extent practicable. Low-NO_X engines designed to reduce air pollution would be used when practicable. SouthCoast Wind would implement an onshore construction schedule to minimize effects on neighboring land uses to the extent feasible. Best management practices would be implemented throughout the Project phases to reduce potential air quality effects. Impacts from accidental releases would be reduced through implementation of a Stormwater Pollution Prevention Plan (SWPPP) and a Spill Prevention, Control, and Countermeasure Plan. The SWPPP also would include measures to control fugitive dust that may be generated as a result of soil disturbance and construction vehicle traffic (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

3.4.1.5 Impacts of Alternative B - Proposed Action on Air Quality

The Proposed Action may generate emissions and affect air quality in the Massachusetts region and nearby coastal waters during construction, O&M, and decommissioning activities. Onshore emissions would occur in the onshore export cable corridors and at points of interconnection, potentially including the Falmouth Tap substation in Falmouth, Massachusetts, and the National Grid substation at Brayton Point in Somerset, Massachusetts.[5] Offshore emissions would be within the OCS, including state offshore waters. Offshore emissions would occur in the Lease Area and the offshore export cable corridors. COP Volume 1, Section 3.3 (SouthCoast Wind 2024) provides additional information on land use and proposed ports.

Air quality in the geographic analysis area may be affected by emissions of criteria pollutants from sources involved in the construction or maintenance of the Proposed Action and, potentially, during operations. These impacts, while generally localized to the areas near the emissions sources, may occur at any location associated with the Proposed Action, be it offshore in the Wind Farm Area or at any of the onshore construction or support sites. Ozone levels in the region also could be affected.

The Proposed Action's WTGs, substations, and offshore and onshore cable corridors would not themselves generate air pollutant emissions during normal operations. However, air pollutant emissions from equipment used in the construction, O&M, and decommissioning phases could affect air quality in the geographic analysis area and nearby coastal waters and shore areas. Most emissions would occur temporarily during construction, offshore in the Wind Farm Area, onshore at the landfall sites, along the offshore and onshore export cable routes, at the onshore substation and converter station sites, and at the construction staging areas. Additional emissions related to the Proposed Action could also occur at the ports used to transport material and personnel to and from the Project area. However, the Proposed Action would provide beneficial impacts on air quality in the vicinity of the Project and the surrounding

[5] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action,* Brayton Point is the preferred ECC for both Project 1 and Project 2, and Falmouth is the variant ECC for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

region to the extent that energy produced by the Proposed Action would displace energy produced by fossil-fueled power facilities.

The majority of air pollutant and GHG emissions from the Proposed Action alone would come from the main engines, auxiliary engines, and auxiliary equipment on marine vessels used during offshore construction activities. Fugitive dust emissions would occur as a result of excavation and hauling of soil during onshore construction activities. Emissions from the OCS source, as defined in the CAA, would be permitted as part of SouthCoast Wind's OCS permit.

The emissions estimates in this section do not include emissions from raw material extraction, material processing, and component manufacturing, i.e., a full life-cycle analysis. However, recently published studies have analyzed the life-cycle impacts of offshore wind (Ferraz de Paula and Carmo 2022; Rueda-Bayona et al. 2022; Shoaib 2022). These studies concluded that the materials having the greatest impact on life-cycle emissions generally are steel and concrete and that material recycling rates have a large influence on life-cycle emissions. The National Renewable Energy Laboratory harmonized approximately 3,000 life cycle assessment studies with around 240 published life-cycle analyses of land-based and offshore wind technologies (NREL 2021). Though wind has higher upstream emissions than many other generation methods, its life-cycle GHG emissions are orders of magnitude lower. NREL (2021) estimated that the central 50 percent of GHG estimates reviewed were in the range of 9.4–14 grams of CO_2e per kilowatt-hour (g CO_2-eq/kWh) while life-cycle GHG estimates for coal and natural gas are on the scale of 1,000 g CO_2-eq/kWh (Dolan and Heath 2012) and 480 g CO_2-eq/kWh (O'Donoughue 2014), respectively.

Air Emissions – Construction

Fuel combustion, earthmoving, and solvent use would cause construction-related emissions. The air pollutants would include criteria pollutants, VOCs, HAPs, and GHGs. During the construction phase, the activities of additional workers, increased traffic congestion, additional commuting miles for construction personnel, and increased air-polluting activities of supporting businesses also could have impacts on air quality. Construction equipment would comply with all applicable fuel-efficiency, fuel sulfur content, and emissions standards to minimize combustion emissions and associated air quality impacts. The total estimated construction emissions of each pollutant are summarized in Table 3.4.1-4. BOEM anticipates that air quality impacts from construction of the Proposed Action would be minor.

Table 3.4.1-4. SouthCoast Wind total construction emissions (criteria pollutants and VOCs in U.S. tons; GHGs in metric tons)

Year [a]	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2	CH_4	N_2O	CO_2e
2025	1,183	5,709	414	224	222	227	337,863	1.7	12.7	341,282
2026	1,183	5,709	414	224	222	227	337,863	1.7	12.7	341,282
2027	1,183	5,709	414	224	222	227	337,863	1.7	12.7	341,282
2028	1,183	5,709	414	224	222	227	337,863	1.7	12.7	341,282
2029	1,183	5,709	414	224	222	227	337,863	1.7	12.7	341,282
2030	1,183	5,709	414	224	222	227	337,863	1.7	12.7	341,282

Year [a]	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2	CH_4	N_2O	CO_2e
2031	1,183	5,709	414	224	222	227	337,863	1.7	12.7	341,282
Total	8,284	39,964	2,897	1,566	1,556	1,589	2,365,042	12	89	2,388,972

Source: COP, Appendix G, Table 5-1; SouthCoast Wind 2024.
Sum of individual values may not equal total due to rounding.
[a] SouthCoast Wind has revised its construction schedule to 7 years from 4 years; however, SouthCoast Wind COP Appendix G (the source for the emissions data in Table 3.4.1-4) reflects 4 years of construction emissions. BOEM expects that total construction emissions over a 7-year period, as shown in the table, would be similar to the totals shown in COP Appendix G, but that maximum annual emissions would be less than in COP Appendix G because construction would be spread out over 7 years instead of 4.

Offshore Construction

Emissions from potential construction activities would vary throughout the construction and installation of offshore components. Emissions from offshore activities would occur during pile driving and scour-protection installation, offshore cable laying, turbine installation, and substation installation. Offshore construction-related emissions also would come from diesel-fueled generators used to temporarily supply power to the WTGs and substations so that workers could operate lights, controls, and other equipment before cabling is in place. There also would be emissions from engines used to power pile-driving hammers and air compressors used to supply compressed air to noise-mitigation devices during pile driving (if used). Emissions from vessels used to transport workers, supplies, and equipment to and from the construction areas would result in additional air quality impacts. The Proposed Action may need emergency generators at times, potentially resulting in increased emissions for limited periods. SouthCoast Wind has proposed measures to reduce emissions including compliance with applicable fuel-efficiency, fuel sulfur content, and emissions standards (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

The majority of air pollutant and GHG emissions from the Proposed Action alone would come from the main engines, auxiliary engines, and auxiliary equipment on marine vessels used during offshore construction activities. Fugitive dust emissions would occur as a result of excavation and hauling of soil during onshore construction activities. Emissions from the OCS source, as defined in the CAA, would be permitted as part of the OCS permit for which SouthCoast Wind is currently in the application process. The Project must demonstrate compliance with the NAAQS. The OCS air permitting process includes air dispersion modeling of emissions to demonstrate compliance with the NAAQS. The CAA also provides protection of air quality in Class I wilderness areas by means of the NAAQS and the Prevention of Significant Deterioration (PSD) program and gives federal land managers a responsibility to protect the air quality–related values of Class I areas from the adverse impacts of air pollution. If emissions from the Project would cause or contribute to adverse impacts on the air quality–related values of a Class I area, the permitting authority (i.e., USEPA) can deny the permit. As part of the air quality–related values analysis, the Project must demonstrate that significant visibility degradation would not occur.

NAAQS and PSD Dispersion Modeling

As part of the *SouthCoast Wind Outer Continental Shelf Air Permit Application* (OCS Application) (SouthCoast Wind 2023), SouthCoast Wind conducted dispersion modeling to demonstrate that construction of the Proposed Action will show modeled compliance with the NAAQS and PSD increments. Construction activities were divided among 11 scenarios (e.g., Seabed Prep/Scour Protection), which were selected based on consideration of the locations in which they are expected to occur as well as the likelihood that activities could take place simultaneously. The OCS Application, *Appendix C – OCS Permit Air Quality Modeling Report*, Section 4.4, *Modeling Scenarios* (SouthCoast Wind 2023), provides further description of the air quality modeling scenarios.

For the purposes of modeling, it was assumed that the worst-case year (resulting in the highest air emissions) will include up to 85 potential WTGs constructed and 1 OSP constructed within that year. Short-term construction modeling assumed all construction scenarios except OSP installation occurring simultaneously during a single day in the Lease Area but at separate/adjacent WTG locations. The overlap of impacts from an adjacent WTG location was accounted for by adding a representative concentration from another scenario (SouthCoast Wind 2023: Appendix C, Section 4.0).

Dispersion modeling was conducted in accordance with USEPA's *Guideline on Air Quality Models*, which is contained in 40 CFR Part 51, Appendix W, *Guidance for Ozone and Fine Particulate Matter Permit Modeling*, and MassDEP's *Modeling Guidance for Significant Stationary Sources of Air Pollution* (SouthCoast Wind 2023: Appendix C, Section 4.0). The USEPA's AERMOD-AERCOARE model was used to estimate criteria pollutant concentrations for comparison to the NAAQS and PSD increments (SouthCoast Wind 2023: Appendix C, Section 4.2). Three years (2018–2020) of Weather Research and Forecasting prognostic model data obtained from USEPA were selected for use in developing the overwater data required by AERCOARE. The Mesoscale Model Interface Program (MMIF–Version 4.0) was used to extract the meteorological data from a grid point located nearest to the Lease Area centroid (SouthCoast Wind 2023: Appendix C, Section 4.3). Emissions of secondary pollutants (particulate matter and ozone formed in the atmosphere from reactions of precursor chemicals) were estimated using USEPA's *Guidance on the Development of Modeled Emission Rates for Precursors as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program* (SouthCoast Wind 2023: Appendix C, Section 4.10).

Table 3.4.1-5 and Table 3.4.1-6 present a summary of model results for comparison to the NAAQS and PSD increments, respectively. The maximum modeled impact includes the contribution from nearby simultaneous-emissions scenarios where applicable. As shown in the tables, all pollutants and averaging periods are less than the NAAQS and PSD increments.

Table 3.4.1-5. Estimated pollutant concentrations during construction compared to NAAQS

Pollutant	Averaging Period	Rank [a]	Modeled Design Conc. [b] (µg/m³)	Background Conc. (µg/m³)	Total Conc. (µg/m³)	NAAQS (µg/m³)	% of NAAQS
CO	1-hour	H2H	3,085	1,803	4,888	40,000	12%
CO	8-hour	H2H	1,799	1,146	2,945	10,000	29%
NO_2	1-hour	98^{th} %ile	183.1	Included [c]	183.1	188	97%
NO_2	Annual	Max	15.5	12.38	19.4	100	19%
PM_{10}	24-hour	H2H	12.6	26	38.6	150	26%

Pollutant	Averaging Period	Rank [a]	Modeled Design Conc. [b] (µg/m³)	Background Conc. (µg/m³)	Total Conc. (µg/m³)	NAAQS (µg/m³)	% of NAAQS
$PM_{2.5}$	24-hour	98th %ile	5.73 [d]	16.2	21.9	35	63%
$PM_{2.5}$	Annual	Max	0.69 [d]	6.61	7.30	12	61%
SO_2	1-hour	99th %ile	74.4	7.86	82.3	196	42%

Source: SouthCoast Wind 2023, Appendix C – OCS Permit Air Quality Modeling Report, Table 5-3.
[a] H2H = highest second-highest, 98th %ile = 98th percentile, 99th %ile = 99th percentile, Max = Maximum annual concentration.
[b] Maximum modeled design concentration over all construction scenarios. Contributions from nearby simultaneous scenarios are included, where applicable.
[c] Seasonal and hourly varying background concentrations were included directly in AERMOD.
[d] Includes $PM_{2.5}$ secondary concentration.
µg/m³ = micrograms of pollutant per cubic meter of air; Conc. =Concentration.

Table 3.4.1-6. Estimated pollutant concentrations during construction compared to Prevention of Significant Deterioration increments

Pollutant	Averaging Period	Rank [a]	Modeled Design Concentration [b] (µg/m³)	PSD Increment (µg/m³)	% of PSD Increment
NO_2	Annual	Max	15.5	25	62%
PM_{10}	24-hour	H2H	12.6	30	42%
$PM_{2.5}$	24-hour	H2H	8.6[c]	9	96%
$PM_{2.5}$	Annual	Max	0.69[c]	4	17%
SO_2	3-hour	H2H	76.1	512	15%
SO_2	24-hour	H2H	30.3	91	33%

Source: SouthCoast Wind 2023, Appendix C – OCS Permit Air Quality Modeling Report, Table 5-5.
[a] H2H = highest second-highest, Max = Maximum annual concentration.
[b] Maximum modeled design concentration over all construction scenarios. Contributions from nearby simultaneous scenarios are included, where applicable.
[c] Includes $PM_{2.5}$ secondary concentration.
µg/m³ = micrograms of pollutant per cubic meter of air.

Class 1 Wilderness Area Dispersion Modeling

Potential SouthCoast Wind Project impacts at Lye Brook Wilderness (Class 1 area) were estimated by scaling impacts at the same location presented by the nearby Vineyard Wind 1 project as a supplemental analysis to their OCS air permit application. Impacts for 24-hour PM_{10}, 24-hour $PM_{2.5}$, and annual NO_2 reported by Vineyard Wind 1 were scaled proportionally according to the ratio of SouthCoast Wind emissions to Vineyard Wind 1 emissions (and PSD increments) (SouthCoast Wind 2023: Appendix C, Section 5.4.1). The SouthCoast Wind emissions were based on the worst-case annual construction emissions for Project 1, as shown in Table 3-1 of Appendix C of the SouthCoast Wind OCS Permit Application (SouthCoast Wind 2023). The worst-case annual construction emissions include activities related to a buildout of up to 84 WTGs and one OSP in one year (for Project 1). As shown in Table 3.4.1-7, the estimated impacts due to the SouthCoast Wind Project are less than the USEPA Class I significant impact levels (SILs). USEPA considers that no further analysis is necessary for impacts that are less than the SILs.

Table 3.4.1-7. Estimated impacts due to the Project at Lye Brook Wilderness (Class 1 Area)

Pollutant	Averaging Period	SouthCoast Wind Conc. (μg/m³) [a]	Class 1 SIL (μg/m³)
NO_2	Annual	0.013	0.1
PM_{10}	24-hour	0.049	0.3
$PM_{2.5}$	24-hour	0.24	0.27

Source: SouthCoast Wind 2023, Appendix C – OCS Permit Air Quality Modeling Report, Table 5-7.
[a] Scaled proportionally according to the ratio of SouthCoast Wind emissions to Vineyard Wind 1 emissions.
μg/m³ = micrograms of pollutant per cubic meter of air.

Soil, Vegetation, and Growth Analysis

Based on the modeled concentrations in the OCS Application (SouthCoast Wind 2023: Appendix C, Section 5.4.3), it was determined that impacts on soils and vegetation would be lower than applicable thresholds. The Proposed Action would have an overall positive effect on employment and the economy of the region, while few effects on population and housing are expected. SouthCoast Wind will implement certain measures to further reduce the likelihood of any negative effects and promote potential positive effects on regional demographics, employment, and economics (SouthCoast Wind 2023: Appendix C, Section 5.4.4). For further discussion of economic impacts see Section 3.6.3, *Demographics, Employment, and Economics*.

Visibility Analysis

The visibility analysis is an estimate of the impacts due to Project emissions on the visual quality in the area. The USEPA's VISCREEN screening model was used to assess visibility impairment at Class II vistas at Nantucket. As explained in the OCS Application (SouthCoast Wind 2023: Appendix C, Section 5.4.3), the VISCREEN user's guide (USEPA 1992) indicates the maximum short-term emission rates expected during the course of a year should be input to the model. A conservative characterization of O&M emissions was used to represent the most regularly occurring annual activity for the Project. The total emissions from both the daily O&M scenario as well as the major repair scenario were used.

The visibility (plume blight) analysis was conducted for Class II vistas at Nantucket. Plume perceptibility and contrast values modeled for the Class II areas were conservatively compared to Class I criteria because there are no established Class II criteria (SouthCoast Wind 2023: Appendix C, Section 5.4.2). The modeling results in the OCS Application indicate that plume blight and contrast are less than Class I criteria for all viewing angles. Values less than the criteria indicate that the visual impact is not considered adverse and no further visibility analysis is required. Table 3.4.1-8 summarizes the visibility assessment results. Because short-term emission rates during construction would be less than during O&M, visibility impacts during construction would be less than shown in Table 3.4.1-8 and would be less than the Class I impact criteria. USEPA considers that no further analysis is necessary for impacts that are less than the impact criteria.

Table 3.4.1-8. Estimated visibility impacts due to the Project

Light Scattering Angle (degrees)	Perceptibility (ΔE)		Contrast (C_{plume})	
	Modeled Value	Class I Criterion	Modeled Value	Class I Criterion
10	1.808	2	-0.006	±0.05
140	0.656	2	-0.007	±0.05

Source: SouthCoast Wind 2023: Appendix C, Table 5-9.
ΔE = Color difference parameter used to characterize the perceptibility of the difference between two colors. It is used to characterize the perceptibility of a plume on the basis of the color difference between the plume and a viewing background such as the sky, a cloud, or a terrain feature.
C_{plume} = Contrast of a plume against a viewing background such as the sky or a terrain feature.

Onshore Construction

Onshore activities of the Proposed Action would consist primarily of HDD, duct-bank construction, cable-pulling operations, and substation construction. Emissions would be primarily from operation of diesel-powered equipment and vehicle activity, such as bulldozers, excavators, and diesel trucks, and fugitive particulate emissions from excavation and hauling of soil. SouthCoast Wind has proposed measures to reduce emissions including compliance with applicable fuel-efficiency, fuel sulfur content, and emissions standards (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

These emissions would be highly variable and limited in spatial extent at any given period and would result in minor impacts because they would be temporary in nature. Fugitive particulate emissions would vary depending on the spatial extent of the excavated areas, soil type, soil moisture content, and magnitude and direction of ground-level winds.

Air Emissions – Operations and Maintenance

Offshore O&M

During O&M, air quality impacts are anticipated to be smaller in magnitude compared to construction and decommissioning. Offshore O&M activities would consist of WTG operations, planned maintenance, and unplanned emergency maintenance and repairs. The WTGs operating under the Proposed Action would have no pollutant emissions. Emergency generators on the WTGs and the substations would operate only during emergencies or testing, so emissions from these sources would be small and transient. Pollutant emissions from O&M 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 Wind Farm Area for inspections, routine maintenance, and repairs. Jack-up vessels, multipurpose offshore support vessels, and rock-dumping vessels would travel infrequently to the Wind Farm Area for significant maintenance and repairs. The Proposed Action's contribution would be additive with the impact(s) of any and all other operational activities, including offshore wind activities, that occur in the geographic analysis area. COP Volume 2, Section 3.5 (SouthCoast Wind 2024), provides a more detailed description of offshore and onshore O&M activities, and COP Appendix G, Section 5 (SouthCoast Wind 2024) summarizes emissions during O&M. The annual estimated emissions for O&M are summarized in Table 3.4.1-9.

Table 3.4.1-9. SouthCoast Wind operations and maintenance emissions (criteria pollutants and VOCs in U.S. tons; GHGs in metric tons)

Period	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2	CH_4	N_2O	SF_6	CO_2e
Annual	180	729	24	19	28	13	42,569	0.3	2.0	0.1	46,428
Lifetime (33 years)	5,940	24,057	792	627	924	429	1,404,805	9	64	2	1,505,224

Source: COP Appendix G, Table 5-2 (SouthCoast Wind 2024).

BOEM anticipates that air quality impacts from O&M of the Proposed Action would be minor, occurring for short periods of time several times per year during the proposed 33 years.

NAAQS and PSD Dispersion Modeling

As part of the OCS Application (SouthCoast Wind 2023), SouthCoast Wind conducted dispersion modeling to demonstrate that O&M of the Proposed Action will show modeled compliance with the NAAQS and PSD increments. O&M activities were categorized as either O&M Daily Inspection/Routine Maintenance or WTG and OSP Major Repair. The analysis conservatively assumed worst-case short-term and annual operating conditions and accounted for activities that can occur simultaneously in the Lease Area, but at separate/adjacent WTG locations (SouthCoast Wind 2023: Appendix C, Section 4.0). Dispersion modeling was conducted using the models and guidance summarized above for *Offshore Construction*. Table 3.4.1-10 and Table 3.4.1-11 present the summary of model results for comparison to the NAAQS and PSD increments, respectively. The maximum modeled impact includes the contribution from nearby simultaneous-emissions scenarios where applicable. As shown in the tables, results for all pollutants and averaging periods are less than the NAAQS and PSD increments.

Table 3.4.1-10. Estimated pollutant concentrations during O&M compared to NAAQS

Pollutant [a]	Averaging Period	Rank [b]	Modeled Design Conc. [c] (μg/m^3)	Background Conc. (μg/m^3)	Total Conc. (μg/m^3)	NAAQS (μg/m^3)	% of NAAQS
NO_2	1-hour	98th %ile	35.90	Included [d]	35.90	188	19%
PM_{10}	24-hour	H2H	10.25	26	36.25	150	24%
$PM_{2.5}$	24-hour	98th %ile	6.55 [e]	16.2	22.75	35	65%
SO_2	1-hour	99th %ile	163.4	7.86	171.21	196	87%
SO_2	3-hour	H2H	141.0	8.65	149.64	1,300	12%

Source: SouthCoast Wind 2023, Appendix C – OCS Permit Air Quality Modeling Report, Table 5-4.

[a] Modeling performed as part of the OCS Application indicates that only 24-hour $PM_{2.5}$ and 1-hour and 24-hour SO_2 are greater than their respective SILs (SouthCoast Wind 2023: Appendix C, Section 5.1.2). Therefore, these are the only pollutants and averaging periods that required additional analysis to demonstrate compliance with the NAAQS. All other pollutants and averaging periods are excluded from the table.

[b] H2H = highest second-highest, 98th %ile = 98th percentile, 99th %ile = 99th percentile

[c] Maximum modeled design concentration over both O&M scenarios. Contributions from nearby simultaneous-emissions scenarios are included.

[d] Seasonal and hourly varying background concentrations were included directly in AERMOD.

[e] Includes $PM_{2.5}$ secondary concentration.

μg/m^3 = micrograms of pollutant per cubic meter of air; Conc. = Concentration.

Table 3.4.1-11. Estimated pollutant concentrations during O&M compared to Prevention of Significant Deterioration increments

Pollutant [a]	Averaging Period	Rank [b]	Modeled Design Concentration [c] (μg/m³)	PSD Increment (μg/m³)	% of PSD Increment
PM_{10}	24-hour	H2H	10.73	30	36%
$PM_{2.5}$	24-hour	H2H	8.4 [d]	9	93%
SO_2	3-hour	H2H	144.3	512	28%
SO_2	24-hour	H2H	64.0	91	70%

Source: SouthCoast Wind 2023, Appendix C – OCS Permit Air Quality Modeling Report, Table 5-6.

[a] Modeling performed as part of the OCS Application indicates that only 24-hour $PM_{2.5}$ and 1-hour and 24-hour SO_2 are greater than their respective SILs (SouthCoast Wind 2023: Appendix C, Section 5.1.2). Therefore, these are the only pollutants and averaging periods that required additional analysis to demonstrate compliance with PSD increments. All other pollutants and averaging periods are excluded from the table.

[b] H2H = highest second-highest

[c] Maximum modeled design concentration over both O&M scenarios. Contributions from nearby simultaneous scenarios are included.

[d] Includes $PM_{2.5}$ secondary concentration.

μg/m³ = micrograms of pollutant per cubic meter of air.

Class 1 Wilderness Area Dispersion Modeling

Potential Project construction impacts at Lye Brook Wilderness (Class 1 area) were estimated by scaling impacts at the same location presented by the Vineyard Wind 1 project as a supplemental analysis to their OCS air permit application. The results of the analysis are summarized in Table 3.4.1-7. Because emissions during O&M would be much less than during construction, impacts at the Lye Brook Wilderness during O&M would be less than shown in Table 3.4.1-7 and would be less than the applicable thresholds.

Soil, Vegetation, and Growth Analysis

Based on the modeled concentrations in the OCS Application (SouthCoast Wind 2023: Appendix C, Sections 5.4.3 and 5.4.4), it was determined that impacts on soils and vegetation would be lower than applicable thresholds and that O&M of the Proposed Action would lead to only limited growth and emissions. For further discussion of economic impacts see Section 3.6.3, *Demographics, Employment, and Economics*.

Visibility Analysis

Based on the modeled concentrations in the OCS Application (SouthCoast Wind 2023: Appendix C, Section 5.4.2), it was determined that O&M impacts from plume blight and contrast would be lower than applicable thresholds, as shown in Table 3.4.1-8.

Onshore O&M

Emissions from onshore O&M activities would be limited to periodic use of construction vehicles and equipment. Onshore O&M 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. SouthCoast Wind intends to primarily use port facilities at New Bedford and/or Fall River, Massachusetts or New London area, Connecticut, or Providence, Rhode Island to support O&M activities. BOEM anticipates that air quality impacts due to onshore O&M from the Proposed Action alone would be minor, intermittent, and occurring for short periods.

Avoided Emissions

Increases in renewable energy could lead to reductions in emissions from fossil-fueled power facilities. SouthCoast Wind used the USEPA Avoided Emissions and Generation Tool (AVERT) (USEPA 2021b) to estimate the emissions avoided as a result of the Proposed Action. Once operational, the Proposed Action would result in annual avoided emissions of 692 tons of NO_X, 313 tons of SO_2, and 4,038,482 tons of CO_2 (COP Appendix G, Table 6-1; SouthCoast Wind 2024). The avoided CO_2 emissions represent about 8 percent of the required GHG emissions reduction from 1990 levels by 2030 in Massachusetts (EEA 2022) or about 72 percent of the required GHG emissions reduction from 1990 levels by 2035 in Rhode Island (OER 2015). The avoided CO_2 emissions are equivalent to the emissions generated by about 800,000 passenger vehicles in a year (USEPA 2020c). Accounting for construction emissions and assuming decommissioning emissions would be the same, and including emissions from future operations, operation of the Proposed Action would offset emissions related to its construction and eventual decommissioning within different time periods of operation depending on the pollutant: SO_2 would be offset in approximately 10 years of operation, and CO_2 in approximately 1 year. (NO_X emissions would not be offset during the project lifetime.) If emissions from future operations and decommissioning were not included, the times required for emissions to “break even” would be shorter. From that point, the Project would be offsetting emissions that would otherwise be generated from another source.

The potential health benefits of avoided emissions can be evaluated using USEPA’s COBRA health impacts screening and mapping tool as discussed in Section 3.4.1.3, *Impacts of Alternative A – No Action on Air Quality*. COBRA was used to analyze the avoided emissions that were calculated for the Proposed Action (COP Appendix G; SouthCoast Wind 2024). Table 3.4.1-12 presents the results.

Table 3.4.1-12. COBRA estimate of annual avoided health effects with Proposed Action

Discount Rate [a] (2023)	Monetized Total Health Benefits (million U.S. dollars/year)		Avoided Mortality (cases/year)	
	Low Estimate [a]	High Estimate [b]	Low Estimate [b]	High Estimate [b]
3%	$15.6	$35.1	1.400	3.167
7%	$13.6	30.9	1.400	3.167

[a] The discount rate is used to express future economic values in present terms. Not all health effects and associated economic values occur in the year of analysis. Therefore, COBRA accounts for the “time value of money” preference (i.e., a general preference for receiving economic benefits now rather than later) by discounting benefits received later (USEPA 2020b).
[b] The low and high estimates are derived using two sets of assumptions about the sensitivity of adult mortality and non-fatal heart attacks to changes in ambient $PM_{2.5}$ levels. Specifically, the high estimates are based on studies that estimated a larger effect of changes in ambient $PM_{2.5}$ levels on the incidence of these health effects (USEPA 2020b).

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 greenhouse gases" (SC-GHG)—are estimates of the monetized damages associated with incremental increases in GHG emissions in a given year.

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. In January 2023, CEQ issued interim guidance (CEQ 2023) that updates its 2016 guidance document (CEQ 2016) on consideration of GHGs and climate change under NEPA. The interim guidance recommends that agencies provide context for GHG emissions, including through the use of SC-GHG estimates, to translate climate impacts into the more accessible metric of dollars.

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 (IWG) on SC-GHG 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 effects; and monetary estimates of the market and nonmarket values of these effects. 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 effects 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 effects. This is a low-probability but high-damage scenario and represents an upper bound of damages within the 3-percent discount rate model. The estimates below follow the IWG recommendations.

Table 3.4.1-13 presents the SC-GHG associated with estimated emissions from the Proposed Action. These estimates represent the present value of future market and nonmarket costs associated with CO_2, methane, and nitrous oxide emissions. 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 SouthCoast Wind's estimates of emissions in each year. In Table 3.4.1-13, negative values represent social benefits of avoided GHG emissions. The negative values for net SC-GHG indicate that the impact of the Proposed Action on GHG emissions and climate would be a net benefit in terms of SC-GHG.

Table 3.4.1-13. Estimated social cost of GHGs associated with the Proposed Action

Description	Social Cost of GHGs (2020$) [a]			
	Average Value, 5% discount rate	Average Value, 3% discount rate	Average Value, 2.5% discount rate	95th Percentile Value, 3% discount rate
SC-CO_2				
Construction, operation, and decommissioning	$60,000,000	$248,000,000	$384,000,000	$754,000,000
Avoided emissions [b]	-$1,108,000,000	-$4,781,000,000	-$7,446,000,000	-$14,654,000,000
Net SCC-CO_2	-$1,048,000,000	-$4,533,000,000	-$7,062,000,000	-$13,900,000,000
SC-CH_4				
Construction, operation, and decommissioning	$0	$0	$0	$0
Avoided emissions	-$4,000,000	-$11,000,000	-$16,000,000	-$31,000,000
Net SCC-CH_4	-$4,000,000	-$11,000,000	-$16,000,000	-$31,000,000
SC-N_2O				
Construction, operation, and decommissioning	$1,000,000	$4,000,000	$6,000,000	$10,000,000
Avoided emissions	-$4,000,000	-$18,000,000	-$28,000,000	-$48,000,000
Net SCC-N_2O	-$3,000,000	-$14,000,000	-$22,000,000	-$38,000,000
SC-SF_6				
Construction, operation, and decommissioning	$1,000,000	$3,000,000	$4,000,000	$8,000,000
Avoided emissions	$0	$0	$0	$0
Net SCC-SF_6	$1,000,000	$3,000,000	$4,000,000	$8,000,000

Description	Social Cost of GHGs (2020$) [a]			
	Average Value, 5% discount rate	Average Value, 3% discount rate	Average Value, 2.5% discount rate	95th Percentile Value, 3% discount rate
SC-GHG[3]				
Construction, operation, and decommissioning	$62,000,000	$255,000,000	$394,000,000	$772,000,000
Avoided emissions	-$1,116,000,000	-$4,810,000,000	-$7,490,000,000	-$14,733,000,000
Net SC-GHG	-$1,054,000,000	-$4,555,000,000	-$7,096,000,000	-$13,961,000,000

Estimates are the sum of the social costs for CO_2, methane, nitrous oxide, and SF_6 over the Project lifetime.
Estimates are rounded to the nearest $1,000,000.
[a] The following calendar years were assumed in calculating SC-GHG: construction 2025–2031, operation (33 years) 2032–2064, and decommissioning 2065–2066.
[b] Negative cost values indicate benefits.

Table 3.4.1-14 presents the annual emissions, avoided emissions, and net emissions of CO_2e over the operational lifetime of the Proposed Action. Net emissions are the Proposed Action emissions minus the avoided emissions. The No Action Alternative would result in no emissions during construction and O&M because no project would be built, but would also offer no avoided emissions, resulting in higher GHG emissions over the project duration due to not displacing fossil-fueled power generation via offshore wind. The emissions not avoided, 3,663,630 metric tons per year of CO_2e (Table 3.4.1-14), would be equivalent to about 800,000 additional passenger vehicles per year. These estimates are relative to the 2018 grid configuration, but the actual annual quantity of avoided emissions attributable to this proposed facility is expected to diminish over time if the electric grid becomes lower-emitting due to the addition of other renewable energy facilities and retirement of high-emitting generators.

Air Emissions–Decommissioning

SouthCoast Wind would decommission the Proposed Action at the end of the Proposed Action's operational lifetime. SouthCoast Wind anticipates that all structures above the seabed level or aboveground would be completely removed. The decommissioning sequence would generally be the reverse of the construction sequence, involve similar types and numbers of vessels, and use similar equipment.

The dismantling and removal of the turbine components (blades, nacelle, and tower) and other offshore components would largely be a "reverse installation" process subject to the same constraints as the original construction phase. Onshore decommissioning activities would include removing facilities and equipment and restoring the sites to pre-Project conditions where warranted. Emissions from decommissioning were not quantified but are expected to be less than for construction. SouthCoast Wind anticipates pursuing a separate OCS air permit for those activities because it is assumed that marine vessels, equipment, and construction technology will change substantially in the next 33 years and in the future will have lower emissions than current vessels and equipment. SouthCoast Wind anticipates minor and temporary air quality impacts from the Proposed Action due to decommissioning.

Accidental Releases

The Proposed Action could release VOCs or HAPs because of accidental chemical spills. The Proposed Action would have up to about 75,000 gallons (284,000 liters) of coolants, 1,188,650 gallons (4.5 million liters) of oils and lubricants, and 332,300 gallons (1.3 million liters) of diesel fuel in its wind turbine and substation structures. Accidental releases including spills from vessel collisions and allisions may lead to short-term periods of VOC and HAP emissions through evaporation. VOC emissions also would be a precursor to ozone formation. Air quality impacts would be short term and limited to the local area at and around the accidental release location. BOEM anticipates that a major spill is very unlikely due to vessel and offshore wind energy industry safety measures, as well as the distributed nature of the material. BOEM anticipates that these activities would have a negligible air quality impact as a result of the Proposed Action alone.

Table 3.4.1-14. Net Emissions of CO_2e for Each Alternative

Alternative	CO_2e Emissions (metric tons) [a,b]												
	Construction 2025–2031								Operation 2032–2064		Construction + Operation 2025–2064		
	2025	2026	2027	2028	2029	2030	2031	Total Construction	O&M Emissions (Annual)	Avoided Emissions (Annual)	Net Emissions [c] (Annual)	Operational Lifetime Net Emissions	Total Lifetime Net Emissions
A (No Action)	0	0	0	0	0	0	0	0	0	0	3,617,202 [d]	0	128,227,054 [d]
B (Proposed Action) and alternatives C through H [e]	376,201	376,201	376,201	376,201	376,201	376,201	376,201	2,388,972	46,428	-3,663,630	-3,617,202	-126,602,085	-124,213,113

[a] Positive values are emissions increases; negative values are emissions decreases.

[b] Emissions from decommissioning are not included.

[c] Annual net emissions equal O&M minus avoided emissions.

[d] Represents emissions from the grid in the absence of the Project, relative to the Proposed Action.

[e] Emissions for Alternatives B through H are estimated as the same as for the Proposed Action based on the maximum number of WTGs for each alternative.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind and offshore wind activities.

Air emissions – offshore construction: Air quality impacts due to offshore wind projects occurring in the geographic analysis area are anticipated to be small relative to larger emissions sources, such as fossil-fueled power facilities. The largest air quality impacts are anticipated during construction, with smaller and more infrequent impacts anticipated during decommissioning. During the construction phase, the total emissions of criteria pollutants and ozone precursors from all offshore wind projects, including the Proposed Action, proposed to occur in the geographic analysis area, summed over all construction years, are estimated to be 42,780 tons of CO, 205,771 tons of NO_X, 11,705 tons of PM_{10}, 7,155 tons of $PM_{2.5}$, 5,997 tons of SO_2, 7,321 tons of VOCs, and 13,835,524 tons of CO_2 (Appendix D, Table D2-4). Most emissions would occur from diesel-fueled construction equipment, vessels, and commercial vehicles. The magnitude of the emissions and the resulting air quality impacts would vary spatially and temporally during the construction phases.

The Proposed Action would incrementally contribute to the cumulative air quality impacts from ongoing and planned activities associated with offshore construction, which would be moderate during construction. The Proposed Action would add an average of approximately 22 percent of the total offshore wind project emissions that may generate impacts, depending on pollutant, due to construction activities occurring in the geographic analysis area. This suggests that most of the air quality impacts resulting from offshore wind development would not be due to the Proposed Action, and the addition of the Proposed Action would represent between one-fifth and one-quarter of the total air quality impacts. Construction activity would occur at different locations and could overlap temporally with activities at other locations, including operational activities at previously constructed project locations. As a result, air quality impacts would shift spatially and temporally across the geographic analysis area. The largest combined air quality impacts from offshore wind activities would occur during overlapping construction and decommissioning of multiple offshore wind projects. Construction of the Proposed Action is anticipated to overlap with up to 10 other offshore wind projects, depending on the year, between 2025 and 2031 (Appendix D, Table D2-4). Most air quality impacts would occur offshore because the highest emissions would occur in the offshore region. Air quality impacts onshore would be less because of the distance from the Wind Farm Area to the nearest onshore areas (Martha's Vineyard and Nantucket). Although air quality offshore is subject to the NAAQS in federal waters and the OCS permit area, the amount of human exposure offshore is typically very low. Ozone and some particulate matter are formed in the atmosphere from precursor emissions and can be transported longer distances, potentially over land. Cumulative impacts would be greatest during overlapping construction activities, but these effects would be short term in nature because the overlap in the geographic analysis area would be limited in time.

Air emissions – onshore construction: The contribution of the Proposed Action to cumulative air quality impacts from ongoing and planned activities associated with onshore construction would be minor. Emissions from ongoing and planned activities, including the Proposed Action, would be highly variable and limited in spatial extent at any given period. Fugitive particulate emissions would vary depending on the spatial extent of the excavated areas, soil type, soil moisture content, and magnitude and direction of ground-level winds.

Air emissions – O&M: The contribution of O&M emissions of the Proposed Action to cumulative air quality impacts from ongoing and planned activities would be minor. O&M from ongoing and planned activities could begin in 2024. Emissions would largely be due to the same source types as for the Proposed Action, including commercial vessel traffic, air traffic (such as helicopters), and operation of emergency diesel generators. Such activity would result in short-term, intermittent, and widely dispersed emissions. Ongoing and planned activities, including the Proposed Action, are estimated to emit 1,477 tons per year of CO, 5,802 tons per year of NO_X, 176 tons per year of PM_{10}, 156 tons per year of $PM_{2.5}$, 103 tons per year of SO_2, 113 tons per year of VOCs, and 459,188 tons per year of CO_2 when all projects are operating (Appendix D, Table D2-4). Anticipated impacts on air quality from O&M emissions would be transient, small in magnitude, and localized. Additionally, some emissions associated with O&M activities could overlap with other projects' construction-related emissions. Comparison of the combined emissions from all offshore wind projects to the emissions contributions from the Proposed Action alone shown in Table 3.4.1-9 shows that the increases in air quality impacts from the Proposed Action would be small for most pollutants relative to those of the combined total of the other planned offshore wind projects. In summary, the largest magnitude air quality impacts and largest spatial extent would result from the overlapping operations activities from the multiple offshore wind projects occurring in the geographic analysis area. A net improvement in air quality is expected on a regional scale as wind projects begin operation and displace emissions from fossil-fueled sources.

Air emissions – decommissioning: The contribution of decommissioning of the Proposed Action to the cumulative air quality impacts from ongoing and planned activities would be minor. The decommissioning process for all offshore wind projects is expected to be similar to that for SouthCoast Wind, and impacts would be similar to those of SouthCoast Wind decommissioning. Because the emissions related to onshore activities would be widely dispersed and transient, BOEM expects all air quality impacts to occur close to the emitting sources. If decommissioning activities for projects overlap in time, then impacts could be greater for the duration of the overlap.

Accidental releases: Based on Appendix D, Table D3-3, there would be up to about 1,908,481 gallons (7.2 million liters) of coolants, 8,024,098 gallons (30.3 million liters) of oils and lubricants, and 2,061,364 gallons (7.8 million liters) of diesel fuel contained in the 1,069 structures among the Proposed Action and ongoing and planned activities in the geographic analysis area. In context of reasonably foreseeable environmental trends, the Proposed Action would contribute to the combined accidental release impacts on air quality from ongoing and planned activities including offshore wind activities, which would be negligible due to the short-term nature and localized potential effects. Accidental spills would occur infrequently over the 33-year period with a higher probability of spills during construction of projects. However, these spills would not be expected to contribute appreciably to overall impacts on air quality, as the total storage capacity in the geographic analysis area is considerably less than the existing volumes of hazardous liquids being transported by ongoing activities and is distributed among many different locations and containers.

Conclusions

Impacts of the Proposed Action: The Proposed Action would result in a net decrease in overall emissions over the region compared to the installation of a traditional fossil-fueled power facility. Although there would be some short-term 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 Proposed Action would result in air quality-related health effects avoided in the region due to the reduction in emissions associated with fossil-fueled energy generation (Table 3.4.1-12). As stated, the impact from air pollutant emissions is anticipated to be minor, and the impact from accidental releases is expected to be negligible. Considering all of the IPFs together, **minor to moderate adverse** air quality impacts would be anticipated for a limited time during construction, maintenance, and decommissioning, but there would be a **minor to moderate beneficial** impact on air quality near the Wind Farm Area and the surrounding region overall to the extent that energy produced by the Proposed Action would displace energy produced by fossil-fueled power facilities. SouthCoast Wind has proposed measures to reduce emissions including compliance with applicable fuel-efficiency, fuel sulfur content, and emissions standards (COP Volume 2, Table 16-1; SouthCoast Wind 2024). Because of the amounts of emissions, the fact that emissions would be spread out in time (7 years for construction[6] and then lesser emissions annually during operation), and the large geographic area over which they would be dispersed (throughout the 127,388-acre [51,552-hectare] Lease Area and the vessel routes from the onshore facilities), air pollutant concentrations associated with the Proposed Action are not expected to exceed the NAAQS and Massachusetts AAQS.

Cumulative Impacts of the Proposed Action: BOEM anticipates that the cumulative impacts on air quality in the geographic analysis area would be **minor to moderate adverse** and **minor to moderate beneficial**. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by the Proposed Action to the cumulative impacts on air quality would be noticeable. The main driver for this impact rating is emissions related to construction activities increasing commercial vessel traffic, air traffic, and truck and worker vehicle traffic. Combustion emissions from construction equipment and fugitive emissions would be higher during overlapping construction activities but short term in nature, because the overlap would be limited in time. Therefore, the adverse impact on air quality would likely be moderate because, while emissions would incrementally increase ambient pollutant concentrations, they are not expected to exceed the NAAQS and Massachusetts AAQS. The Proposed Action and other offshore wind projects would benefit air quality in the region surrounding the projects to the extent that energy produced by the projects would displace energy produced by fossil-fueled power facilities. Though the benefit is regional, BOEM anticipates a moderate beneficial impact because the magnitude of the potential reduction in emissions from displacing fossil-fueled-generated power would be small relative to total energy generation emissions in the area.

[6] As noted in Table 3.4.1-4, South Coast Wind has revised its construction schedule to 7 years from 4 years; however, the SouthCoast Wind COP Appendix G (the source for the emissions data in the EIS analysis) reflects 4 years of construction emissions. BOEM expects that impacts in each year of a 7-year construction schedule would be less than with a 4-year construction schedule because construction would be spread out over 7 years instead of 4 years.

3.4.1.6 Impacts of Alternative C on Air Quality

Impacts of Alternative C: Both Alternative C-1 and Alternative C-2 would reduce the offshore export cable route distance and increase the onshore export cable route distance, though the total cable route distances would be similar to those of the Proposed Action. Alternative C-1 would reduce the offshore export cable route by 9 miles (14 kilometers) and increase the onshore export cable route by 9 miles (14 kilometers), while Alternative C-2 would reduce the total offshore export cable route by 12 miles (19 kilometers) and increase the total onshore export cable route by 13 miles (21 kilometers). Mile for mile, onshore construction has greater potential for localized air quality impacts than offshore construction because exposure of the public to emissions close to construction activities is much more likely onshore than offshore. As a result, with respect to cable construction, Alternative C-1 could have greater potential for air quality impacts onshore than the Proposed Action, and Alternative C-2 could have greater potential for air quality impacts onshore than Alternative C-1.

Alternative C would have the same number of WTGs and OSSs and the same onshore facilities as the Proposed Action, so the potential for accidental releases with Alternative C would be the same as for the Proposed Action.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, the cumulative impacts of Alternative C would be similar to those of the Proposed Action.

Conclusions

Impacts of Alternative C: The overall impacts of Alternative C on air quality, climate, and accidental releases would be similar to those of the Proposed Action. The same construction, O&M, and decommissioning activities as under the Proposed Action would still occur. Therefore, expected impacts associated with Alternative C alone would be **minor to moderate adverse**. Alternative C-1 could have greater potential for air quality impacts onshore than the Proposed Action, and Alternative C-2 could have greater potential for air quality impacts onshore than Alternative C-1. However, the change in emissions associated with Alternative C-1 or Alternative C-2 would not change the impact magnitude. As under the Proposed Action, Alternative C would result in **minor to moderate beneficial** impacts on air quality and climate overall due to reduced emissions from fossil-fueled power plants.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, the cumulative impacts on air quality associated with Alternative C-1 and Alternative C-2 would be similar to the Proposed Action and result in **minor to moderate adverse** and **minor to moderate beneficial** impacts.

3.4.1.7 Impacts of Alternative D (Preferred Alternative) on Air Quality

Impacts of Alternative D: Alternative D would install six fewer WTGs than the Proposed Action and, therefore, could have slightly lower emissions from offshore construction and operation compared to the Proposed Action. Avoided emissions and the associated benefits, including net reductions in regional GHG emissions, also could be less than for the Proposed Action due to the reduction in the number of

WTGs. Additionally, Alternative D could have a slightly lower potential for accidental releases from offshore construction and operation compared to the Proposed Action as a result of the reduced number of WTGs.

Cumulative Impacts of Alternative D: In context of reasonably foreseeable environmental trends, cumulative impacts of Alternative D would be similar to those of the Proposed Action.

Conclusions

Impacts of Alternative D: The overall impacts of Alternative D on air quality, climate, and accidental releases would be similar to those of the Proposed Action. While Alternative D could have slightly fewer impacts from offshore construction and operation compared to the Proposed Action due to the reduction in the number of WTGs, the change in emissions would not change the impact magnitude. Therefore, expected impacts associated with Alternative D alone would be **minor to moderate adverse.** As under the Proposed Action, Alternative D would result in **minor to moderate beneficial** impacts on air quality and climate overall due to reduced emissions from fossil-fueled power plants.

Cumulative Impacts of Alternative D: In context of reasonably foreseeable environmental trends, the cumulative impacts on air quality associated with Alternative D would be similar to the Proposed Action and result in **minor to moderate adverse** and **minor to moderate beneficial** impacts.

3.4.1.8 Impacts of Alternatives E and F on Air Quality

Impacts of Alternatives E and F: The air quality impacts associated with Alternative E would be generally similar to those of the Proposed Action. This alternative would have the same number of WTGs and same onshore facilities as the Proposed Action but would use different types of WTG and OSP foundation structures. Alternative E-1 would use piled foundations (monopile or piled jacket), Alternative E-2 would use suction bucket jackets, and Alternative E-3 would use GBS foundations. Construction emissions could differ among these foundation types because of differences in the types of equipment used, the numbers of vessel trips, and the duration of certain construction tasks. However, BOEM expects that emissions from foundation construction would not differ substantially among Alternative E-1, Alternative E-2, and Alternative E-3 and would be similar to the Proposed Action.

Alternative F would have the same number of WTGs as the Proposed Action, and all other Project components would be the same as with the Proposed Action. Reducing the number of Falmouth offshore export cables to up to three may slightly reduce emissions associated with cable-laying activities, but the emissions would not differ substantively from the Proposed Action and would not change the impact magnitude. Thus, the air quality and climate impacts associated with Alternative F would be approximately the same as those of the Proposed Action.

Cumulative Impacts of Alternatives E and F: In context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives E and F on air quality would be similar to those of the Proposed Action.

Conclusions

Impacts of Alternatives E and F: The overall impacts of Alternative E on air quality, climate, and accidental releases would be generally similar to those of the Proposed Action because the only differences would be in the construction activity associated with offshore foundation installation. Expected impacts associated with Alternative E alone would be **minor to moderate adverse**. The total offshore construction emissions are not expected to differ substantially among Alternative E-1, Alternative E-2, and Alternative E-3 from the offshore construction emissions for the Proposed Action. As under the Proposed Action, Alternative E would result in **minor to moderate beneficial** impacts on air quality and climate overall due to reduced emissions from fossil-fueled power plants.

The overall impacts of Alternative F on air quality, climate, and accidental releases would be approximately the same as those of the Proposed Action because the reduction in the number of individual offshore cables along the same cable route are not anticipated to have a substantive reduction in emissions. As a result, Alternative F would have the same **minor to moderate adverse** impacts on air quality as the Proposed Action. As under the Proposed Action, Alternative F would result in **minor to moderate beneficial** impacts on air quality and climate overall due to reduced emissions from fossil-fueled power plants.

Cumulative Impacts of Alternatives E and F: In context of reasonably foreseeable environmental trends, the cumulative impacts on air quality associated with Alternative E and F would be similar to the Proposed Action and result in **minor to moderate adverse** and **minor to moderate beneficial** impacts.

3.4.1.9 Comparison of Alternatives

This section provides a summary comparison of the anticipated impacts of ongoing activities, planned activities, and Project impacts.

Under the No Action Alternative, air quality would continue to follow current regional trends and respond to IPFs introduced by other ongoing and planned activities. Ongoing and planned non-offshore wind activities and offshore wind activities would have continuing regional impacts primarily through air pollutant emissions and accidental releases. Combined impacts of ongoing and planned non-offshore wind activities as well as offshore wind activities, including air pollutant emissions and GHGs, would be minor to moderate adverse because the emissions would incrementally increase ambient pollutant concentrations, though not by enough to cause a violation of the NAAQS or Massachusetts AAQS. Offshore wind projects likely would lead to reduced emissions from fossil-fueled power-generating facilities and consequently minor to moderate beneficial impacts on air quality and climate.

Under the Proposed Action, air quality impacts would occur due to emissions associated with construction, O&M, and eventual decommissioning, but these impacts are not expected to lead to violation of the NAAQS or Massachusetts AAQS. Impacts would be minor to moderate adverse because the emissions would incrementally increase ambient pollutant concentrations, though not by enough to cause a violation of the NAAQS or Massachusetts AAQS. There would be a minor to moderate beneficial impact on air quality in the region overall to the extent that energy produced by the Projects would displace energy produced by fossil-fueled power plants. The Proposed Action would result in air quality–related health effects avoided in the region due to the reduction in emissions associated with fossil-fueled energy generation.

Alternative C would have impacts similar to those of the Proposed Action. Therefore, expected impacts associated with Alternative C alone would be minor to moderate adverse. Alternative C-1 could have greater potential for air quality impacts onshore than the Proposed Action, and Alternative C-2 could have greater potential for air quality impacts onshore than Alternative C-1. As under the Proposed Action, Alternative C would result in minor to moderate beneficial impacts on air quality and climate overall due to reduced emissions from fossil-fueled power plants.

Alternative D would install up to six fewer WTGs than the Proposed Action and, therefore, could have slightly lower emissions from offshore construction and operation compared to the Proposed Action. Avoided emissions and the associated benefits, including net reductions in regional GHG emissions, also could be less than for the Proposed Action due to the reduction in the number of WTGs. Also, Alternative D could have a slightly lower potential for accidental releases from offshore construction and operation compared to the Proposed Action as a result of the reduced number of WTGs.

Alternative E would have generally similar air quality impacts to those of the Proposed Action. This alternative would have the same number of WTGs and same onshore facilities as the Proposed Action but would use different types of WTG and OSP foundation structures. BOEM expects that emissions from foundation construction would not differ substantially among Alternative E-1, Alternative E-2, and Alternative E-3 and would be similar to those of the Proposed Action.

Alternative F would have the same number of WTGs as the Proposed Action, and all other Project components would be the same as with the Proposed Action. Reducing the number of Falmouth offshore export cables to up to three could slightly reduce emissions associated with cable-laying activities, but the emissions would not differ substantively from the Proposed Action and would not change the impact magnitude. Thus, the air quality and climate impacts associated with Alternative F would be approximately the same as those of the Proposed Action.

In context of other reasonably foreseeable environmental trends, and considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with the impacts from ongoing and planned activities including offshore wind would be minor to moderate adverse and minor to moderate beneficial. The overall adverse impact on air quality would likely be moderate because pollutant concentrations are not expected to exceed the NAAQS or Massachusetts AAQS. The Proposed Action and other offshore wind projects would benefit air quality in the region surrounding the Project to the extent that energy produced by the Project would displace energy produced by fossil-fueled power plants. BOEM anticipates an overall minor to moderate beneficial impact because the magnitude of this potential reduction would be small relative to total energy generation emissions in the area. Overall impacts with Alternatives B, C, E, and F would be similar to those with the Proposed Action. Alternative D could have slightly fewer impacts from offshore construction and operation compared to the Proposed Action due to the reduction in the number of WTGs.

3.4.1.10 Proposed Mitigation Measures

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix G, Tables G-2 through G-4 and summarized and assessed in Table 3.4.1-15. If one or more of the measures analyzed here are adopted by BOEM or cooperating agencies, some adverse impacts on bats could be further reduced.

Table 3.4.1-15. BOEM or agency-proposed measures (also identified in Appendix G, Table G-3): air quality

Measure	Description	Effect
Engines that meet or exceed emission control requirements	Use engines manufactured and installed to meet or exceed emissions control requirements. Engine manufacturers will incorporate pollution control measures into their designs. Techniques used could include ensuring complete combustion in the engines by controlling combustion air, controlling fuel flow, ensuring complete mixing, and staging combustion; avoiding hot spots in the combustion process that can form NO_X by staging combustion, injecting water, recirculating flue gas, and otherwise cooling the system; and using post-combustion controls to remove air pollutants after they have formed by adding particulate filters, oxidation catalysts, and selective catalytic reduction systems.	Measure will reduce emissions by ensuring that all engines meet or exceed emission control requirements.
Vessel engines that meet or exceed applicable marine engine standards	Vessel engines will use a combination of combustion and post-combustion controls to meet or exceed applicable marine engine standards, including the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI (for foreign vessels); 40 CFR 89 (for Tier 1 and 2 domestic marine diesel engines smaller than 37 kW); Control of Emissions from Marine Compression-Ignition Engines; 40 CFR 94 (for Tier 1 and 2 domestic marine diesel engines larger than 37 kW); and Control of Emissions from New and In-Use Marine Compression-Ignition Engines and Vessels, 40 CFR 1042 (for Tier 3 and 4 domestic marine diesel engines). Onroad engines, nonroad engines, and aircraft engines will meet or exceed similar standards.	Measure will reduce emissions by ensuring that all vessel engines meet or exceed applicable marine engine standards.
Best available engines/fuels	Use the best available engines/fuels. Construction vessels will be supplied by contractors for temporary use on the Project. For O&M, SouthCoast Wind can specify the vessel used through long-term contracting or outright purchase. Nonroad engine emissions will be minimized using engines compliant with 40 CFR 1039, Control of Emissions from	Measure will reduce emissions by ensuring use of best available engines/fuels.

Measure	Description	Effect
	New and In-Use Nonroad Compression-Ignition Engines, i.e., "Tier 4" engines, where practicable.	
Marine diesel fuel will comply with the fuel sulfur limit of 15 ppm	Marine diesel fuel will comply with the fuel sulfur limit of 15 ppm per 40 CFR 80, which is the same limit as onshore ULSD. For heavier residual fuel oils used in Category 2 and Category 3 engines, and for engines on foreign vessels, the Project will comply with the fuel oil sulfur content limit of 1,000 ppm set in MARPOL VI and corresponding USEPA regulations. Nonroad engines will use ultra-low sulfur diesel. The use of clean fuels will minimize emissions from fuel impurities and allow for cleaner combustion.	Measure will reduce emissions of sulfur oxides from marine vessels by requiring compliance with fuel sulfur limit.
BMPs, innovative tools and/or technologies to minimize emissions from vessel operations	Implement BMPs and investigate the use of innovative tools and/or technologies to minimize air emissions from vessel operations. Specifically, SouthCoast Wind will optimize construction and O&M activities to minimize vessel operating times and loads. This will include weather monitoring, forecasting, and Project tracking to minimize emissions resulting from non-productive time, and incentives for contractor fuel savings.	Measure will reduce emissions by ensuring that BMPs are implemented and innovative tools and/or technologies are investigated.
Meet or exceed permit requirements and comply with all applicable air quality regulatory requirements	Air permit requirements will be met or exceeded, and SouthCoast Wind will comply with all applicable air quality regulatory requirements. A key element will be obtaining the OCS air permit. SouthCoast Wind will comply with other air- related regulatory requirements by using engines manufactured and maintained in compliance with the appropriate standards, which include New Source Performance Standards, National Emissions Standards for Hazardous Air Pollutants, and federal standards for nonroad and marine diesel engines. If onshore stationary equipment triggers any requirement to obtain a Massachusetts or Rhode Island air permit, as applicable (including obtaining coverage under a general permit), SouthCoast Wind will obtain the required permit.	Measure will reduce emissions by ensuring that permit requirements are met or exceeded and SouthCoast Wind complies with all applicable air quality regulatory requirements.
Document in OCS air permit compliance with air quality requirements	Any required OCS air permit will address documentation of compliance with ambient air standards, documentation of no adverse impact on air quality related values at Class I Areas, control technology review, and emissions offsets.	Measure will reduce emissions by ensuring that all air quality requirements specified in the OCS air permit are met.
Use SF_6-free switchgear	This mitigation measure requires that the applicant use SF_6-free switchgear. BOEM is proposing additional mitigation requirements to minimize SF_6 emissions in the event that the applicant is not able to use SF_6-free switch gear. The additional mitigation is as follows: • Follow manufacturer recommendations for limiting leaks and for service and repair of the affected breakers and switches. • Perform repairs promptly when significant leaks are detected.	Measure will reduce GHG emissions by ensuring that SF_6 is not used or that emissions would be minimized in the event that SouthCoast Wind is not able to use SF_6-free switch gear.

Measure	Description	Effect
	• Conduct visual inspections of the switchgear and monitoring equipment according to manufacturer recommendations. • Create alarms based on the pressure readings in the breakers and switches, so leaks can be detected when substantial SF_6 leakage occurs. Upon a detectable pressure drop that is greater than 10% of the original pressure (accounting for ambient air conditions), perform maintenance to fix seals as soon as feasible. If an event requires removal of SF_6, the affected major component(s) will be replaced with new component(s). • Capture and recycle any SF_6 removed from breakers and switches during maintenance. Keep a log of all detected leaks and maintenance procedures potentially affecting SF_6 emissions from circuit breakers/switches.	

Measures Incorporated in the Preferred Alternative

BOEM has identified the measures in Table 3.4.1-15, to be incorporated in the Preferred Alternative. These measures, if adopted, would reduce or eliminate GHG emissions from SF_6 leakage and would result in the coordinated development and implementation of preventive and compensatory mitigation measures intended to offset air quality impacts. Adoption of these measures would increase the beneficial GHG impacts of the Preferred Alternative or other action alternatives because GHG emissions from SF_6 leakage would be reduced or eliminated.

3.5 Biological Resources

3.5.1 Bats

This section discusses the potential impacts on bat populations from the proposed Project, alternatives, and ongoing and planned activities in the bat geographic analysis area. The bat geographic analysis area, as shown on Figure 3.5.1-1, includes the United States coastline from Maine to Florida, and extends 100 miles (161 kilometers) offshore and 5 miles (8 kilometers) inland to capture the movement range for species in this group. The geographic analysis area for bats was established to capture most of the movement range for migratory species. The offshore limit was established to capture the migratory movement of most species in this group, while the onshore limits cover onshore habitats used by species that may be affected by onshore and offshore components of the proposed Project.

3.5.1.1 Description of the Affected Environment

The number of bat species in the geographic analysis area varies by state, ranging from eight species (Rhode Island, New Hampshire, and Maine) to 17 (Virginia and North Carolina) (RIDEM n.d.; Maine Department of Inland Fisheries and Wildlife 2021; New Hampshire Fish and Game n.d.; Virginia Department of Wildlife Resources 2021; North Carolina Wildlife Resources Commission 2017).

There are nine species of bats known to occur in Massachusetts and Rhode Island, eight of which may be present in the immediate Project area and six that are year-round residents. These species can be broken down into cave-hibernating bats and migratory tree bats based on their wintering strategy. Bats are terrestrial species that spend almost their entire lives on or over land. On occasion, tree bats can occur offshore during spring and fall migration and under very specific conditions like low wind and high temperatures. Recent studies, combined with historical anecdotal accounts, indicate that 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 2016a). However, unlike tree bats, the likelihood of detecting a *Myotis* species or other cave bat is substantially less in offshore areas (Pelletier et al. 2013). Table 3.5.1-1 shows the bats that are present in Massachusetts and Rhode Island and their associated conservation status.

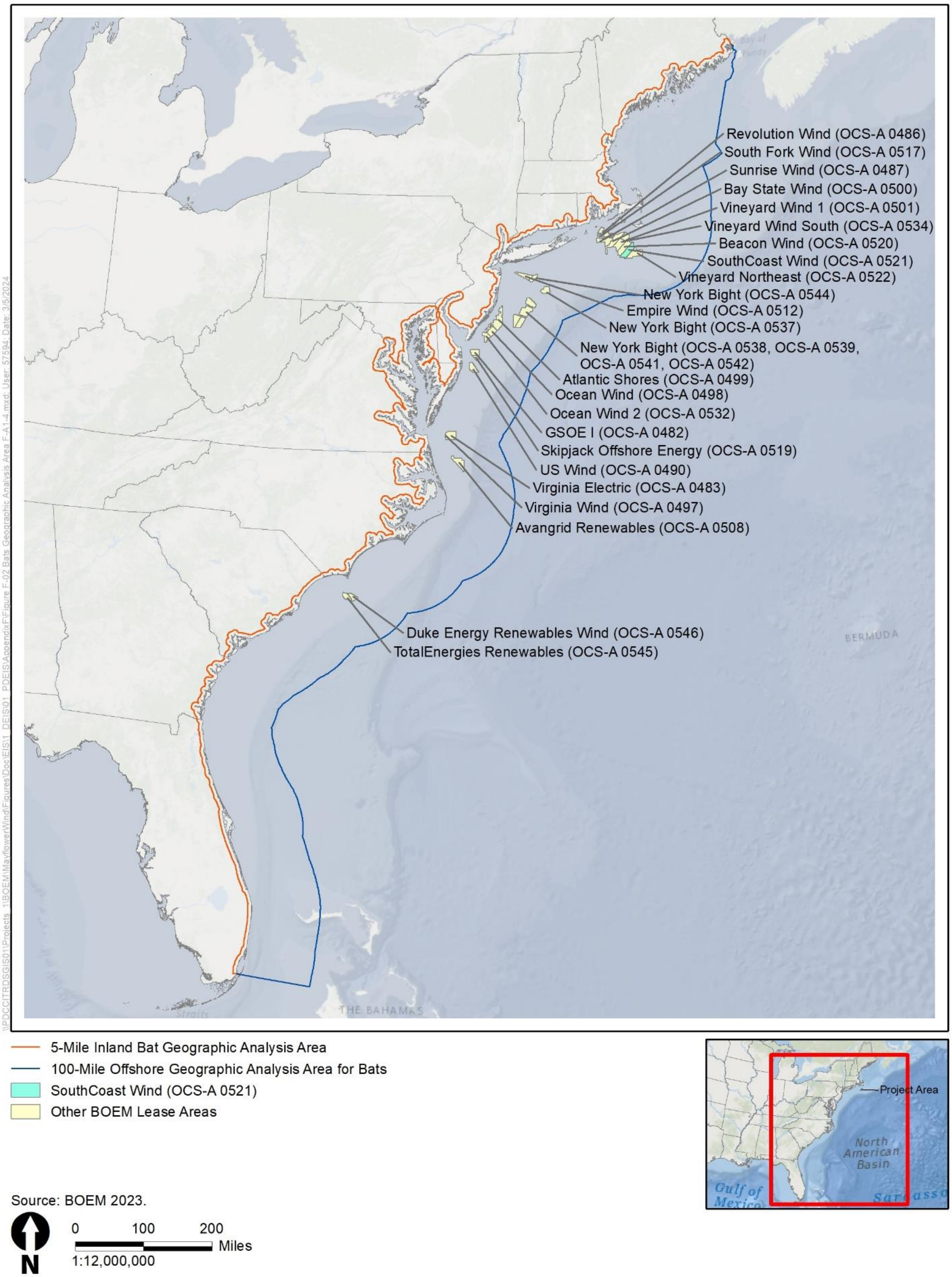

Figure 3.5.1-1. Bats geographic analysis area

Table 3.5.1-1. Bats present in Massachusetts and Rhode Island and their conservation status

Common Name	Scientific Name	Massachusetts State (MESA)	Rhode Island State (RI Natural History Survey)	Federal Status
Cave-Hibernating Bats				
Eastern small-footed bat	*Myotis leibii*	Endangered	SGCN	-
Little brown bat	*Myotis lucifugus*	Endangered	SGCN	Under Review [d]
Northern long-eared bat [a]	*Myotis septentrionalis*	Endangered	SGCN	Endangered
Indiana bat [b]	*Myotis sodalist*	Endangered	-	Endangered
Tricolored bat [c]	*Perimyotis subflavus*	Endangered	SGCN	Under Review [e]
Big brown bat	*Eptesicus fuscus*	-	SGCN	-
Migratory Tree Bats				
Eastern red bat	*Lasiurus borealis*	-	SGCN	-
Hoary bat	*Lasiurus cinereus*	-	SGCN	-
Silver-haired bat	*Lasionycteris noctivagans*	-	SGCN	-

Source: SouthCoast Wind 2024; USFWS 2021; Massachusetts Endangered Species Act 2017; RIDEM 2015.
[a] On November 29, 2022, USFWS announced its intention to reclassify the northern long-eared bat as endangered. The new rule pertaining to the further conservation of the species took effect on March 31, 2023.
[b] Range does not indicate species presence in the Project area.
[c] USFWS proposed to list the species as endangered as of September 14, 2022, and a final determination is anticipated in Fiscal Year 2024.
[d] Currently under a USFWS discretionary status review. Results of the review may be to propose listing, make a species a candidate for listing, provide notice of a not warranted candidate assessment, or other action as appropriate.
[e] Currently under a USFWS discretionary status review. Results of the review may be to list the species as threatened instead of endangered, or that the species does not warrant listing as either an endangered species or a threatened species.
SGCN = Species of Greatest Conservation Need

Bat species can be classified as migratory tree-roosting bats (tree bats) or cave-hibernating bats based on their wintering strategy. Tree-roosting bats with continental migratory patterns that may occur in the Project area include the silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), and hoary bat (*Lasiurus cinereus*). Cave-hibernating bats that may occur in the Project area include the big brown bat (*Eptesicus fuscus*), tricolored bat (*Perimyotis subflavus*), and three *Myotis* species: the eastern small-footed bat (*Myotis leibii*), little brown bat (*Myotics lucifugus*), and northern long-eared bat (*Myotis septentrionalis*). The tricolored bat and the three *Myotis* species are listed as endangered under the Massachusetts ESA. In addition, the northern long-eared bat was listed by USFWS as federally threatened in 2015 and recently reclassified as endangered (effective January 30, 2023) (USFWS 2022), the tricolored bat has been petitioned for federal listing, and the little brown bat federal listing is under review. All eight bat species in the Project area are listed as Species of Great Conservation Need (SGCN) in the 2015 State Wildlife Action Plan for Rhode Island (SouthCoast Wind 2024).

The presence of bats has been documented in the offshore marine environment in the United States (Cryan and Brown 2007; Stantec 2016a; Dowling et al. 2017; Hatch et al. 2013; Pelletier et al. 2013). Bats have been documented temporarily roosting on structures (i.e., lighthouses) on nearshore islands

(Dowling et al. 2017), and there is evidence of eastern red bats migrating offshore in the Atlantic. In a mid-Atlantic study conducted during the spring and fall of 2009 and 2010, the maximum distance that bats were detected from shore was 13.6 miles (21.9 kilometers) with an average distance of 5.2 miles (8.4 kilometers), and the eastern red bat represented 78 percent of all bat detections offshore (Sjollema et al. 2014). In Maine, bats were detected on islands up to 25.8 miles (41.6 kilometers) from the mainland. In addition, eastern red bats were detected in the mid-Atlantic up to 27.3 miles (44 kilometers) offshore by high-definition video aerial surveys (Hatch et al. 2013). At this time, there is some uncertainty regarding the level of bat use of the OCS. However, available data indicate that bat activity levels are generally greater onshore compared to offshore (Hein et al. 2021). For example, a bat migration study in the North Sea off Belgium found that the number of bat detections was up to 24 times higher at onshore locations compared to the offshore locations within a wind farm (Brabant et al. 2021).

Cave-hibernating bats overwinter regionally in caves, mines, and other structures (e.g., buildings) and feed primarily on insects in terrestrial and fresh-water habitats. These species generally display lower activity in the offshore environment than the migratory tree bats (Sjollema et al. 2014), with movements mainly during the fall months. In the mid-Atlantic, the maximum distance *Myotis* bats were detected offshore was 7.2 miles (11.5 kilometers) (Sjollema et al. 2014). A recent nano-tracking study on Martha's Vineyard recorded little brown bat movements off the island in late August and early September, with one individual flying from Martha's Vineyard to Cape Cod (Dowling et al. 2017). These findings are supported by an acoustic study conducted on islands and buoys off the Gulf of Maine that demonstrated the highest percentage of activity occurs during the months of July through October (Peterson et al. 2014). Offshore acoustic bat surveys were conducted in the Lease Area (OCS-A 0499) in 2020 and 2021 (Table 3.5.1-2). During these surveys, 26 big brown bats, 5 tricolored bats, and 3 bats belonging to *Myotis* spp. were detected. Due to insufficient information, which otherwise would allow for a species identification, 478 recordings were categorized into the big brown/silver bat group. Cave-hibernating bats were likely among those categorized in this group; however, based on the number of positively identified silver-haired bats (80) compared to the number of positively identified big brown bats (26), big brown bats likely only proportionally account for one-third (an estimated 157 recordings) of the recordings in this group. Given the use of coastlines as migratory routes by cave-hibernating bats is likely limited to their fall migration period, that acoustic studies indicate lower use of the offshore environment, and that cave-hibernating bats do not habitually feed on insects over the ocean, exposure to the proposed Project is likely low for cave-hibernating bats.

Tree bats are more likely to be detected in the offshore environment than cave-hibernating bats. Tree bats migrate long distances to overwinter and have been documented using coastlines and islands offshore during migration (Normandeau Associates 2014; Hatch et al. 2013; Johnson et al. 2011). Eastern red bats have been detected migrating from Martha's Vineyard late in the fall, with one bat tracked as far south as Maryland (Dowling et al. 2017). During a long-term study of bat movements conducted from 2012 to 2014 in the coastal, nearshore, and offshore environments of the Northeast, mid-Atlantic, and Great Lakes (Stantec 2016a; Pelletier et al. 2014), bat calls were detected from 3–80 miles (5–130 kilometers) offshore with detections approximately 9–30 miles (14–49 kilometers) southeast of Montauk and Block Island, west of the Offshore Project area. Eastern red bats and other migrants represented the most frequently observed species with peak activity during the spring and fall migrations. Use of the Offshore Project area is expected to be primarily limited to migration periods.

Onshore coastal areas throughout the geographic analysis area provide habitats that support a diversity of bat species. All bat species present in Massachusetts and Rhode Island (migratory and non-migratory) are nocturnal insectivores that use a variety of forested and open habitats (e.g., waterways, lakes, other waterbodies, agricultural fields) during the summer for foraging and forested habitats for roosting. Roost selection is species-dependent, and while some of these species roost solely in the foliage of trees, others select dead and dying trees where they roost in peeling bark or inside crevices. The Falmouth onshore Project area is within the Atlantic coastal pine barren region and includes natural vegetation consisting of stunted oaks (Quercus spp.; primarily scrub oak [*Quercus ilicifolia*]) and pines (*Pinus* sp.; primarily pitch pine [*Pinus rigida*]) (Swain 2020). The Brayton Point onshore Project area is located within the Northeastern Coastal Zone region and natural communities are limited as the Project is routed within/underneath developed areas, maintained recreational areas, and road services. Aquidneck Island is within the Narragansett/Bristol Lowland region and vegetation varies with oak-pine forests and oak-hickory due to coastal influences, with cranberry bogs and wetlands abundant within the mixed forest (SouthCoast Wind 2024). See COP Appendix I2, *Bat Risk Assessment*, Tables 4-1 and 4-2 for a complete list of natural communities within the Falmouth onshore Project area and Brayton Point onshore Project area, respectively.[1]

There are two buildable substation site options under consideration for the Falmouth onshore Project area, which would require up to 26.0 acres (10.5 hectares) of land. Both substation site options would be located in previously disturbed areas, which are not likely to provide suitable habitat for summer foraging and/or roosting. The Aquidneck Island cable landfall locations are in Portsmouth, Rhode Island and all onshore underground export cable system route options and landfall locations consist of developed land, developed recreation, impervious surfaces (roads), and wetlands. The Brayton Point cable landfall locations are in Somerset, Massachusetts and all landfall options are devoid of natural communities as the area consists of roads and former industrial uses. Up to two converter stations would be constructed at Brayton Point, and each converter station would occupy up to 7.5 acres (3.0 hectares) of primarily disturbed and developed land. Although there are no bat data available specific to the onshore Project area, several mist-netting, acoustic and telemetry surveys at Camp Edwards Joint Base Cape Cod located 8.1 miles (13.1 kilometers) from the Falmouth POI and proposed onshore substation site confirmed the presence of the northern long-eared bat, eastern small-footed bat, little brown bat, and tricolored bat; no roosts were identified within 0.25 mile (0.4 kilometer) of the onshore Project area (COP Volume 2, Section 6.2.1.2, SouthCoast Wind 2024). However, the RIDEM did not identify any presence of northern long-eared bat, eastern small-footed bat, little brown bat, and tricolored bat in the Rhode Island portions of the Brayton Point export cable corridor (Jordan 2021).

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[1] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action,* Brayton Point is the preferred POI for both Project 1 and Project 2, and Falmouth is the variant POI for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

Caves and mines provide key habitat for cave-hibernating bats. These locations serve as winter hibernacula, fall swarm locations (areas where mating takes place in the fall months), and summer roosting locations for some individuals. For a bat hibernaculum to be occupied within a cave or mine, suitable conditions for temperature, humidity and airflow and minimal disturbance must be met (McAney 1999). The locations for the onshore substation and/or converter stations are not expected to contain caves or mines suitable for winter hibernacula for any cave-hibernating bat species.

The northern long-eared bat is the only bat species listed under the ESA that may occur in the Project area (USFWS 2021). Several mist-netting and acoustic and telemetry surveys at Camp Edwards Joint Base Cape Cod confirmed the presence of northern long-eared bats on Cape Cod and portions of the onshore Project components in Falmouth overlap Massachusetts Priority Habitat 213. However, the Brayton Point onshore Project area is sited within an existing industrial area and the isolated and fragmented nature of the nearby forest lowers the likelihood of northern long-eared bat presence. The nearest maternity colonies are located 34.8 miles (56.0 kilometers) east near Sandwich, Massachusetts, and the nearest hibernaculum is located 40.4 miles (65.0 kilometers) north in Wellesley, Massachusetts (SouthCoast Wind 2024). It is, therefore, not expected that northern long-eared bats would be exposed to the offshore Wind Farm Area. A recent tracking study on Martha's Vineyard (July–October 2016) did not record any offshore movements (Dowling et al. 2017). If northern long-eared bat were to migrate over water, movements would likely be near the mainland. The related little brown bat has been documented to migrate from Martha's Vineyard to Cape Cod, and northern long-eared bat may likewise migrate to mainland hibernacula from these islands in August and September (SouthCoast Wind 2024). Given that there is little evidence of use of the offshore environment by northern long-eared bat, exposure to the proposed Wind Farm Area, if it occurs, is anticipated to be minimal. BOEM prepared a Biological Assessment (BA) for the Project, which provides a detailed discussion of ESA-listed species and potential impacts on these species as a result of the Project (BOEM 2023). Results of ESA consultation with USFWS are included in Section 3.5.1.5, *Impacts of Alternative B – Proposed Action on Bats.*

Cave bat species, including the northern long-eared bat, are experiencing drastic declines due to White Nose Syndrome (WNS) caused by the fungus *Pseudogymnoascus destructans* (MassWildlife 2022). WNS was confirmed as present in Massachusetts in 2008, and Rhode Island in 2016 (Whitenosesyndrome.org 2022; USFWS 2018). Declines in populations of the northern long-eared bat are ongoing as the disease continues to spread throughout the species range (USFWS 2015). Other cave-hibernating species with confirmed presence of WNS include the big brown bat, eastern small-footed bat, little brown bat, and the tricolored bat (USFWS 2018). Proposed Project-related impacts have the potential to affect cave bat populations already affected by WNS. The unprecedented mortality of more than 5.5 million bats in northeastern North America as of 2015 reduces the likelihood of many individuals being present within the onshore portions of the proposed Project area (USFWS 2015). However, given the drastic reduction in cave bat populations in the region, the biological significance of mortality resulting from the proposed Project, if any, may be increased.

3.5.1.2 Impact Level Definitions for Bats

The definitions of potential adverse impact levels for bats are provided in Table 3.5.1-2. There would be no beneficial impacts on bats.

Table 3.5.1-2. 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 effects or threaten overall habitat function.
Major	Adverse	Impacts would result in severe, long-term habitat or population-level effects on species.

3.5.1.3 Impacts of Alternative A - No Action on Bats

When analyzing the impacts of the No Action Alternative on bats, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for bats. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D*, Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for bats described in Section 3.5.1.1, *Description of the Affected Environment and Future Baseline Conditions*, 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 in the geographic analysis area that contribute to impacts on bats are generally associated with onshore construction and climate change. Onshore construction activities and associated impacts are expected to continue at current trends and have the potential to affect bat species through temporary and permanent habitat removal and temporary noise impacts, which could cause avoidance behavior and displacement. Mortality of individual bats could occur, but population-level effects would not be anticipated. Impacts associated with climate change have the potential to reduce reproductive output and increase individual mortality and disease occurrence.

The following ongoing offshore wind activities in the geographic analysis area contribute to impacts on bats.

- Continued O&M of the Block Island project (five WTGs) installed in state waters.
- Continued O&M of the CVOW-Pilot Project (two WTGs) installed in OCS-A 0497.
- Ongoing construction of multiple offshore wind projects: the Vineyard Wind 1 project (62 WTGs and 1 OSP) in OCS-A 0501, South Fork project (12 WTGs and 1 OSP) in OCS-A 0517, Revolution Wind

project (65 WTGs and two OSPs) in OCS-A 0486, Ocean Wind 1 (98 WTGs and three OSPs) in OCS-A 0498, Empire Wind (147 WTGs and two OSPs) in OCS-A 0512, and CVOW-Commercial (176 WTGs and three OSPs) in OCS-A 0483.

Ongoing O&M of Block Island and CVOW-Pilot projects and ongoing construction of multiple offshore wind projects would affect bats through the primary IPFs of noise, presence of structures, and land disturbance. Ongoing offshore wind activities would have the same type of impacts from noise, presence of structures, and land disturbance that are described in *Cumulative Impacts of the No Action Alternative* for ongoing and planned offshore wind activities, but the impacts would be of lower intensity.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impact of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Other planned non-offshore wind activities that may affect bats include new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and installation of new structures on the OCS (Appendix D, *Planned Activities Scenario*, for a complete description of planned activities). These activities may result in temporary or permanent displacement and injury or mortality to individual bats, but population-level effects would not be expected.

The following sections summarize the potential impacts of ongoing and planned offshore wind activities on bats during construction, O&M, and decommissioning of the projects. Planned offshore wind activities include offshore wind energy development activities on the Atlantic OCS other than the Proposed Action determined by BOEM to be reasonably foreseeable (see Appendix D, Attachment 2 for a complete description of planned offshore wind activities).

Offshore wind activities may affect bats through the following primary IPFs.

Noise: Anthropogenic noise associated with offshore wind development, including noise from pile-driving and construction activities offshore and construction activities onshore, has the potential to result in impacts on bats. BOEM anticipates that noise impacts would be negligible because noise would be temporary and highly localized. In the planned activities scenario (Appendix D, *Planned Activities Scenario*), the construction of 2,940 offshore structures (other than the Proposed Action) and associated OSPs would create noise and may temporarily affect migrating tree bats, if conducted at night during the spring or fall migration periods.

The greatest impact of noise would likely be caused by pile-driving activities during installation of foundations for offshore wind structures. Noise from pile driving would occur during installation of foundations for offshore structures at a frequency of 4 to 6 hours per day at a time, over an 8-year period. Noise from construction activity would be short-term, temporary, and highly localized. Auditory impacts are not expected to occur, because 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 likely be limited to behavioral avoidance of pile-driving or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016). However, these impacts are highly unlikely to occur, as little use of the OCS is expected, and only during spring and fall migration.

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 likely be limited to behavioral avoidance of pile-driving or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016). However, these impacts are highly unlikely to occur because little use of the OCS is expected by tree bats, and only during spring and fall migration.

Potential for short-term, temporary, localized habitat impacts arising from onshore construction of required offshore wind development infrastructure noise exists; however, no auditory impacts on cave-hibernating or tree bats would be expected to occur. Recent literature suggests that bats are less susceptible to temporary or permanent hearing loss from exposure to intense sounds (Simmons et al. 2016), and bats are tolerant to anthropogenic noise as documented instances have shown bats roosting in noisy environments near airports and highways (Brack et al. 2004). However, nighttime work outside of normal hours may be required on an as-needed basis. Some temporary displacement or avoidance of potentially suitable foraging habitat could occur, but these impacts would not be expected to be biologically significant. Some 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 the construction noise. This would not be expected to result in any impacts, because 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 as long as repair or remediation activities were necessary to address 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 to occur as a result of onshore or offshore noise associated with offshore wind development, and so overall impacts would be negligible.

Presence of structures: Offshore wind-related activities would add up to 2,940 WTGs and OSPs on the OCS that could result in potential impacts on bats. Cave bats are less likely to fly offshore (even during fall migration) (Sjollema et al. 2014); therefore, exposure to construction vessels during construction or maintenance activities, or the rotor-swept zone (RSZ) of operating WTGs in the wind lease areas, is expected to be negligible, if exposure occurs at all (BOEM 2015; Pelletier et al. 2013). Tree bats, however, may pass through the offshore wind lease areas during the fall migration with potential to encounter vessels during construction and decommissioning of WTGs, OSPs, and offshore export cable corridors. During the installation of WTGs at the Block Island Wind Farm, some unidentified bats were observed roosting on the vessels during daytime hours. One photo taken by a crew member during this time captured an eastern red bat roosting below an elevated deck in August (Stantec 2016b).

As discussed above, while bats have been documented on offshore islands, relatively little bat activity has been documented over open-water habitat similar to the conditions in the Lease Area. Several authors, such as Cryan and Barclay (2009), Cryan et al. (2014), and Kunz et al. (2007), discuss several hypotheses as to why bats may be attracted to WTGs. Many of these, including the creation of linear corridors, altered habitat conditions, or thermal inversions, would not apply to WTGs on the Atlantic OCS (Cryan and Barclay 2009; Cryan et al. 2014; Kunz et al. 2007). Solick and Newman (2021) suggest the offshore structures may serve as shelter from adverse weather conditions or provide an area to rest from a long flight. Other hypotheses associated with the Atlantic OCS regarding bat attraction to WTGs include bats perceiving the WTGs as potential roosts, potentially increased prey base, visual attraction, disorientation due to electromagnetic fields (EMF) or decompression, or attraction due to mating strategies (Arnett et al. 2008; Cryan 2007; Kunz et al. 2007). However, no definitive answer as to why bats appear to be attracted to WTGs has been postulated, despite intensive studies at onshore wind facilities. Smallwood and Bell (2020) found that bats were twice as likely to travel through the RSZ of active WTGs than inactive ones and were more likely to experience flight interruptions or be struck by blades from active WTGs onshore. As such, it is possible that some migrating bats may encounter, and perhaps be attracted to, operational WTGs and interact with turbine blades in the RSZ (Ahlén et al. 2007; Arnett et al. 2008; Cryan et al. 2014; Cryan and Barclay 2009), in addition to OSP and non-operational WTG towers to opportunistically roost or forage. However, bats' echolocation abilities and agility make it unlikely that these stationary objects (OSP and non-operational WTGs) or moving vessels would pose a collision risk to migrating individuals; this assumption is supported by the evidence that bat carcasses are rarely found at the bases 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, hoary bat, and silver-haired bat. Offshore O&M 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 relatively very low (Stantec 2016b). Furthermore, unlike with terrestrial migration routes, there are no landscape features that would concentrate bats and thereby increase exposure to the offshore wind lease areas. Given the expected infrequent and limited use of the OCS by migrating tree bats, very few individuals would be expected to encounter operating WTGs or other structures associated with offshore wind development. With the proposed up to 1-nm (1.9-kilometer) spacing between structures associated with offshore wind development in the Massachusetts and Rhode Island lease areas and the distribution of anticipated projects, individual bats migrating over the OCS within the RSZ of project WTGs would likely pass through projects with only slight course corrections, if any, to avoid operating WTGs. Unlike with terrestrial migration routes, there are no landscape features that would concentrate migrating tree bats and increase exposure to offshore wind lease areas 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. For example, bat activity is associated with relatively low wind speeds and warm temperatures (Arnett et al. 2008; Cryan and Brown 2007; Fiedler 2004; Kerns et al. 2005). Given the rarity of tree bats in the offshore environment, WTGs being widely spaced, and the patchiness of projects, the likelihood of collisions is expected to be low and impacts on bats would be negligible. Additionally, the likelihood of a migrating individual encountering one or more operating WTGs during adverse weather conditions would be extremely low, because bat activity is suppressed during periods of strong winds, low temperatures, and rain (Arnett et al. 2008; Erickson et al. 2002).

Land disturbance (onshore construction): Onshore construction of offshore wind development infrastructure would be required over the next 8 years and has the potential to result in impacts due to habitat loss or fragmentation. However, onshore construction would be expected to account for only a very small increase in development relative to other ongoing development activities. Construction would be expected to require only small amounts of habitat removal, if any, and would occur in previously disturbed areas to the extent possible. As such, onshore construction impacts associated with offshore wind development would be short term and minor and no injury or mortality of individual bats would be expected. Furthermore, no individual or population-level effects are expected to occur. As such, onshore construction impacts associated with offshore wind development would not be expected to appreciably contribute to overall impacts on bats.

In addition to electrical infrastructure, some amount of habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures. The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly and require some conversion of undeveloped land to meet port demand. This conversion will result in permanent habitat loss for local bat populations. However, the incremental increase from offshore wind development would be a minimal contribution in the port expansion required to meet increased commercial, industrial, and recreational demand (BOEM 2019).

Impacts of Alternative A on ESA-Listed Species

The northern long-eared bat is the only bat species listed under the ESA that may be affected by offshore wind activities. As described above, northern long-eared bats are not expected to use the OCS in any significant numbers, if at all. The IPFs described previously for all bats would also apply to the northern long-eared bat. Any future federal activities that could affect the northern long-eared bat would need to comply with ESA Section 7 to ensure that the proposed activities do not jeopardize the continued existence of the species.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, bats would continue to be affected by existing environmental trends and ongoing activities. Ongoing activities are expected to have continuing temporary and permanent impacts (disturbance, displacement, injury, mortality, and habitat conversion) on bats primarily through the onshore construction impacts, the presence of structures, and climate change. Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration and given that cave bats do not typically occur on the OCS, ongoing offshore wind activities would not appreciably contribute to impacts on bats. Temporary disturbance and permanent loss of habitat onshore may occur as a result of offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the geographic analysis area. The No Action Alternative would result in **minor adverse** impacts on bats.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and bats would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to the impacts on bats due to habitat loss from increased onshore construction. Due to limited anticipated bat presence on the OCS and minimal expected onshore bat habitat impacts, BOEM anticipates cumulative impacts of the No Action Alternative would likely be **minor adverse** because any impacts on bats would be too small to be measurable.

3.5.1.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project buildout as defined in the PDE would result in impacts similar to or less than those described in the following sections. The following proposed PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on bats.

- The onshore substation/converter station sites, which could require the removal of forested habitat.
- The number, size, and location of WTGs.
- The routing variants within the selected onshore cable export route.
- The time of year during which construction occurs.

Variability of the proposed project design exists as outlined in Appendix C. Below is a summary of potential variances in impacts.

- Number of WTGs, size, and location: the level of hazard related to WTGs is proportional to the number of WTGs installed; fewer WTGs would present less hazard to bats.
- Onshore export cable routes and substation/converter stations footprints: the route chosen (including variants within the general route) and substation/converter stations footprint would determine the amount of habitat affected.
- Season of construction: the active season for bats in this area is from April through October. Construction outside of this window would have a lesser impact on bats than construction during the active season.

SouthCoast Wind has committed to measures to minimize impacts on bats, including avoiding locating onshore facilities near known hibernacula and roosting colonies, minimizing lighting to reduce potential attraction of bats to vessels and vehicles during construction, and developing and implementing a Post-

Construction Monitoring Plan to evaluate and mitigate for potential collision risk for bat species (Appendix G, *Mitigation and Monitoring*). SouthCoast Wind's *Draft Post-Construction Avian and Bat Monitoring Framework* is provided as Attachment G-3 in Appendix G.

3.5.1.5 Impacts of Alternative B - Proposed Action on Bats

The following sections summarize the potential impacts of the Proposed Action on bats during construction, O&M, and decommissioning phases.

Noise: Pile-driving noise and onshore and offshore construction noise associated with the Proposed Action alone is expected to result in short-term, temporary, negligible, and highly localized impacts. The Proposed Action would include a maximum of 149 WTG/OSP positions. Each WTG requires one monopile or three to eight pin piles, and each OSP requires one monopile or up to 27 pin piles with each pin pile or monopile requiring 2 or 4 hours of driving to install, respectively. Auditory impacts are not expected to occur; recent research has shown that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Impacts, if any, are expected to be limited to behavioral avoidance of pile-driving or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016).

Normal operation of the substation/converter stations may generate a small amount of noise into the surrounding environment. Operational noise, however, is expected to be significantly less than noise associated with construction and bats are not likely to be sensitive to such disturbances. COP Appendix U1, *In-Air Acoustic Assessment*, Table 5-1 and Table 5-2 provides the primary noise sources and reference levels for substation sites and HDD operations, respectively. To avoid, mitigate, and minimize noise impacts during onshore construction activities, SouthCoast Wind would require construction equipment to be operated such that the construction-related noise levels comply with applicable sections of the MassDEP Air Quality Regulation at 310 CMR 7.10, which would minimize impacts on bats (COP Appendix U1, In-Air Acoustic Assessment Report, Section 5.2.3).

Presence of structures: Migration disturbance and turbine strikes are impacts on bats that could result from the presence of structures in the OCS and are described in detail in Section 3.5.1.3, *Impacts of Alternative A – No Action on Bats*. Up to 149 WTG/OSP positions on the OCS could contain structures resulting from the Proposed Action where few currently exist. The structures and associated bat impacts would have the potential to occur until decommissioning is complete. There is currently some uncertainty regarding the level of bat use of the OCS and the ultimate consequences of mortality, if any, associated with operating WTGs. However, existing data from meteorological buoys provide the best opportunity to further define bat use of open-water habitat far from shore where SouthCoast Wind would site the Proposed Action's WTGs. Relatively few (372) bat passes were detected at meteorological buoy sites, and use was sporadic when compared to sites on offshore islands (Stantec 2016b). In addition, recent data from 3 years of post-construction monitoring around Block Island Wind Farm found relatively low numbers of bats present only during the fall, and no recorded presence of northern long-eared bats (Stantec 2020). While many of the bats that were detected around Block Island Wind Farm were present at wind speeds below SouthCoast Wind's proposed WTG cut-in speed of 5.6–8.9

miles per hour, there were a number of bats present at or above the cut-in speed, which could indicate vulnerability for bats when WTG blades are turning. However, as previously mentioned, available data indicate that bat activity levels are generally lower offshore compared to onshore (Hein et al. 2021). Migratory tree-roosting bats have been recorded 21.0 and 27.0 miles (33.8 and 44.5 kilometers) offshore but are unlikely to be exposed to WTGs within the Lease Area, which is 29.8 miles (48.0 kilometers) south of Martha's Vineyard, 23.0 miles (37.0 kilometers) south of Nantucket, and 44.7 miles (72.0 kilometers) from the mainland at Nobska Point in Falmouth, Massachusetts. Therefore, because bat presence on the OCS is limited, BOEM anticipates the presence of structures to have a negligible impact on bat populations.

Land disturbance (onshore construction): Impacts associated with construction of onshore elements of the Proposed Action could occur if construction activities occur during the active season (generally, April through October). These impacts may result in displacement or direct injury or death of bat species in the onshore Project area through tree trimming or removal, or the disruption of bat activity resulting in roost abandonment or significant energy expenditure during pup-rearing or migratory periods. Tree trimming and clearing could potentially cause injury or mortality of individuals, particularly juveniles who are unable to flush from a roost, if occupied by bats at the time of removal. Additionally, there would be some potential loss of potentially suitable roosting or foraging habitat. However, impacts to bat habitat from onshore construction would be limited because SouthCoast Wind's facilities would follow previously disturbed areas, which would result in no further additional habitat fragmentation, significant new open spaces, or open corridors. Where necessary, construction of onshore facilities may require clearing and permanent removal of some trees along the edge of the construction corridor. The sites of the HVDC Brayton Point converter stations and, if Falmouth is selected as the POI for Project 2, the Falmouth substation would be located in previously disturbed areas, which are not likely to provide suitable habitat for summer foraging and/or roosting. Overall, onshore construction disturbances are expected to be short-term for bats but would have permanent effects including new aboveground structures and lost habitat from limited tree clearing required for the onshore substation and/or converter stations. Additionally, routine ground disturbance would likely occur during O&M near the onshore converter stations/substation. This would result in permanent alteration of natural habitats, which were disturbed prior during the construction phase. To avoid and minimize impacts on bats, SouthCoast Wind proposes siting onshore infrastructure away from key habitat locations for cave-hibernating species. Onshore export cables would be underground from the landfall locations to the onshore substation and/or converter stations, and the onshore substation and/or converter stations would be constructed in open areas where tree clearing is expected to be minimal. SouthCoast Wind would coordinate as necessary with USFWS, the Massachusetts Division of Fish and Wildlife, and RIDEM to determine appropriate mitigation measures, and by adhering to seasonal restrictions, the risk of direct mortality or injury during construction would be avoided.

BOEM anticipates that impacts would be minor given the limited amount of habitat removal and that any potential impact would be avoided or significantly reduced due to SouthCoast Wind's proposed Project's AMMs. Therefore, impacts would not result in individual fitness or population-level effects.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind and offshore wind activities. Ongoing and planned non-offshore wind activities related to submarine cables and pipelines, onshore construction, marine minerals extraction, and port expansions would contribute to impacts on bats through the primary IPFs of noise, presence of structures, and land disturbance. The construction, O&M, and decommissioning of both onshore and offshore infrastructure for offshore wind activities across the geographic analysis area would also contribute to the primary IPFs of noise, presence of structures, and land disturbance. Given the infrequent and limited anticipated use of the OCS by migrating tree bats and given that cave bats do not typically occur on the OCS, offshore wind activities would not appreciably contribute to impacts on bats. Temporary disturbance and permanent loss of onshore habitat may occur as a result of constructing onshore infrastructure such as onshore substations and onshore export cables for offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness of population-level effects in the geographic analysis area. Ongoing and planned offshore wind activities in combination with the Proposed Action would result in an estimated 2,940 WTGs and OSPs, of which the Proposed Action would contribute 149 or about 5 percent.

The cumulative impacts on bats would likely be minor because the occurrence of bats offshore is low, and onshore habitat loss is expected to be minimal. In the context of reasonably foreseeable environmental trends, the Proposed Action would contribute an undetectable increment to the cumulative noise, presence of structures, and land disturbance impacts on bats.

Impacts of Alternative B on ESA-Listed Species

The northern long-eared bat is the only bat species listed under the ESA that may be affected by the proposed Project. As stated previously, the presence of northern long-eared bat on the offshore environment would generally be limited, with more potential effects from onshore activities. BOEM prepared a BA analyzing the effects of the Project on USFWS federally listed species. There is no critical habitat designated for northern long-eared bat in the action area defined in the BA. Consultation with USFWS pursuant to Section 7 of the ESA concluded on September 1, 2023, and results of the consultation are included in the following *Conclusion* section.

Conclusions

Impacts of the Proposed Action: BOEM anticipates construction and installation, O&M, and conceptual decommissioning of the Proposed Action would have overall **minor** impacts on bats, especially if tree clearing is conducted outside the active season. The primary risks would be from potential onshore removal of habitat and operation of the offshore WTGs, which could lead to negligible to minor long-term impacts in the form of mortality, although BOEM anticipates this to be rare. Noise effects from construction are expected to be limited to temporary and localized behavioral avoidance of pile-driving or construction activity that would cease once construction is complete.

BOEM prepared a BA assessing the potential effects on federally listed species (BOEM 2023). Consultation with USFWS pursuant to Section 7 of the ESA was concluded September 1, 2023. In USFWS's transmittal letter for the Biological Opinion, USFWS concurred with BOEM's determination of may affect, but is not likely to adversely affect, for the northern long-eared bat (endangered) and the tricolored bat (proposed endangered) (USFWS 2023).

Cumulative Impacts of the Proposed Action: The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned activities, including offshore wind activities. The contribution of the Proposed Action to the cumulative impacts of individual IPFs resulting from ongoing and planned activities would be expected to be minor. The primary IPFs are noise, presence of structures, and land disturbance. Considering all the IPFs together, due to the limited anticipated bat presence on the OCS and minimal expected onshore bat habitat impacts, BOEM anticipates that the cumulative impacts on bats in the geographic analysis area would be **minor** because any impacts on bats would be too small to be measurable. Impacts of Alternative C on Bats

Impacts of Alternative C: Under Alternative C, the export cable route to Brayton Point would be rerouted onshore to avoid sensitive fish habitat in the Sakonnet River. The new overland portions of Alternative C-1 and Alternative C-2 would largely be sited in public road ROWs to the extent possible.

Alternative C-1 would increase the total onshore export cable route by 9 miles (14 kilometers) compared to the Proposed Action. The increase of land disturbance would require a longer construction schedule due to the complexity of working in developed areas with multiple property owners along the proposed route. Additionally, Alternative C-1 would pass through coastal communities that are popular tourist destinations in the summer months which may lead to seasonal limitations on construction. The combination of a slower rate of progress and seasonal restrictions would result in a significantly longer construction period for onshore cable runs.

The primary impacts of Alternative C affecting bats would be habitat loss from tree disturbance, which would result in both temporary and permanent impacts. In addition to the forest area disturbed under the Proposed Action, 4.95 acres, 2.59 acres, and 15.46 acres of forest habitat could be disturbed under Alternative C-1 (eastern variation), Alternative C-1 (western variation), and Alternative C-2, respectively (refer to Section 3.5.4, *Coastal Habitat and Fauna*). This impact may affect bat foraging, roosting, or maternity colonies. While the area of forest disturbance would be greater than the Proposed Action, the potential impact on bats would remain minor.

Cumulative Impacts of Alternative C: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C would be similar to those described under the Proposed Action.

Impacts of Alternative C on ESA-Listed Species

Under Alternative C, the impact conclusion for the northern long-eared bat is the same as the Proposed Action. Under Alternative C, potential impacts on the northern long-eared bat include habitat loss from forest disturbance, which may be used by this species for foraging, roosting, or maternity colonies.

While the area of forest disturbance would be slightly greater under Alternative C compared to the Proposed Action, it is not anticipated to change the overall impact level.

Conclusions

Impacts of Alternative C: The anticipated minor impacts associated with the Project would not change substantially under Alternative C. While Alternative C would result in a greater area of forest disturbance along the onshore export cable routes than the Proposed Action, the overall affected area would be small and the same construction, O&M, and decommissioning impacts would still occur. Alternative C would have overall **minor adverse** impacts on bats.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C to the cumulative impacts on bats would be similar to the Proposed Action and would be **minor adverse**. This impact rating is driven primarily by ongoing activities, as well as minor disturbance and habitat removal associated with onshore construction of Alternative C.

3.5.1.6 Impacts of Alternatives D (Preferred Alternative), E, and F on Bats

Impacts of Alternatives D, E, and F: Impacts on bats resulting from construction and installation, O&M, and decommissioning of the Project under Alternatives D, E, and F would be the same as those described for the Proposed Action. Under Alternative D, potential impacts on bats from the presence of structures could be reduced with the removal of six WTGs, but any such differences compared to the Proposed Action would likely be immeasurable. None of the differences between Alternatives E and F and the Proposed Action would have the potential to significantly reduce or increase impacts on bats from the analyzed IPFs. Given the infrequent and limited use of the OCS by bats during the spring and fall migration, BOEM does not anticipate impacts to be materially different than those described for the Proposed Action.

Cumulative Impacts of Alternatives D, E, and F: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternatives D, E, and F would be similar to those described for the Proposed Action.

Impacts of Alternatives D, E, and F on ESA-Listed Species

Under Alternatives D, E, and F, the impact conclusion for the northern long-eared bat is the same as the Proposed Action for the same reasons described for all bats above. Northern long-eared bats are not expected to use the OCS in any significant numbers, if at all, and BOEM does not anticipate impacts to be measurably different than those described for the Proposed Action.

Conclusions

Impacts of Alternatives D, E, and F: All conclusions reached for the Proposed Action regarding impacts on bats and the ESA-listed northern long-eared bat would also apply to Alternatives D, E, and F. Alternative D would reduce the number of WTGs and noise impacts compared to the Proposed Action in the northern Lease Area but would have similar overall impacts on bats. Alternatives E and F would have the same WTG number and overall Wind Farm Area footprint as the Proposed Action and would have similar impacts on bats. Therefore, the overall **minor adverse** impacts would be similar among the Proposed Action and Alternatives D, E, and F.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, cumulative impacts of Alternatives D, E, and F would be similar to those described for the Proposed Action and would be **minor adverse** due to the anticipated bat presence on the OCS and minimal expected onshore bat habitat impacts, and because any impacts on bats would be too small to be measurable.

3.5.1.7 Comparison of Alternatives

Potential impacts on bats from the other action alternatives would be the same or substantially similar to each other and to the Proposed Action. Therefore, none of the differences among the different alternatives and the Proposed Action would have the potential to significantly increase or decrease impacts on bats onshore or offshore.

3.5.1.8 Proposed Mitigation Measures

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix G, Tables G-2 through G-4 and summarized and assessed in Table 3.5.1-3. If one or more of the measures analyzed here are adopted by BOEM or cooperating agencies, some adverse impacts on bats could be further reduced. The Draft EIS analyzed two BOEM-proposed bird and bat mitigation measures, that were subsequently incorporated into the ESA consultation and are now reflected in Appendix G, Table G-2 (i.e., adaptive mitigation for birds and bats, and annual bird and bat mortality reporting).

Table 3.5.1-3. Mitigation and Monitoring Measures Resulting from Consultations (also identified in Appendix G, Table G-2): bats

Measure	Description	Effect
Conservation Measures and Reasonable and Prudent Measures from Terms and Conditions from the USFWS Biological Opinion	USFWS Conservation Recommendations, Reasonable and Prudent Measures, and Terms and Conditions were transmitted by letter dated September 1, 2023. Conservation Recommendations under BOEM, BSEE, and USFWS jurisdiction include light impact reduction, Avian and Bat Post-Construction Monitoring Plan, and Incidental Mortality and Reporting.	Measures required through the ESA consultation would likely result in reduced potential impacts on bats. Should post-construction monitoring show impacts on bats deviate substantially from the impact analysis in the EIS, measures would be implemented to address the specific impact reported.

Measures Incorporated in the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.5.1-3 and Tables G-2 through G-4 in Appendix G are incorporated in the Preferred Alternative. These measures would further define how the effectiveness and enforcement of environmental protection measures would be ensured and improve accountability for compliance with environmental protection measures by requiring monitoring, reporting, and adaptive management of potential bat impacts on the OCS. However, given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration, and given that cave bats do not typically occur on the OCS, offshore wind activities are unlikely to appreciably contribute to impacts on bats regardless of measures intended to address potential offshore bat impacts. In the onshore environment, tree-clearing restrictions and post-construction monitoring and reporting would ensure impacts on bats and their habitats would be avoided and minimized to the extent practicable. Because these measures ensure the effectiveness of and compliance with environmental protection measures that are already analyzed as part of the Proposed Action, these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.5.1.5, *Impacts of Alternative B – Proposed Action on Bats*.

3.5 Biological Resources

3.5.2 Benthic Resources

This section discusses potential impacts on benthic resources, other than fishes and commercially important benthic invertebrates, from the proposed Project, alternatives, and ongoing and planned activities in the geographic analysis area. The benthic geographic analysis area, as shown on Figure 3.5.2-1 includes both a 10-mile (16.1-kilometer) radius/buffer around the Wind Farm Area and a 330-foot (100-meter) buffer around each ECC. Finfish, invertebrates, and essential fish habitat are addressed in Section 3.5.5.

3.5.2.1 Description of the Affected Environment

The description of benthic resources in this section is supported by studies conducted by SouthCoast Wind, as well as other studies reviewed in the literature (COP Section 6.6, Appendix M, and Appendix K; SouthCoast Wind 2024). Seasonal benthic surveys were conducted in the Lease Area and along the Falmouth ECC to characterize the benthic resources in the Offshore Project area (SouthCoast Wind 2024). Benthic habitat surveys conducted for the proposed Project included Sediment Profile Imaging (SPI)/Plan View (PV) imagery data, and benthic grab samples throughout the Offshore Project area. Benthic epifaunal and infaunal species abundance were analyzed using benthic grabs as well as seafloor imagery captured by the benthic survey SPI/PV camera and a video camera that was affixed to the benthic grab apparatus. Submerged aquatic vegetation (SAV) surveys consisting of single-beam echo sounding, side-scan sonar, and underwater towed video were completed at three landfall location options in Falmouth, Massachusetts (SouthCoast Wind 2024). Two landfall locations are under consideration for the Brayton Point ECC where a previously unmapped section of interpreted SAV was identified near the shoreline closest to the Aquidneck Island landfall (COP Appendix E; SouthCoast Wind 2024).[1]

A larger-scale, non-Project-specific study was also undertaken that characterized offshore wind lease areas in the northeast WEAs (Guida et al. 2017). This study compiled data from numerous sources, including from NOAA-National Centers for Environmental Information for bathymetric data, NEFSC for physical and biological oceanography, NEFSC fisheries independent trawl survey for demersal fish and shellfish, and USGS usSEABED data for surficial sediment data (USGS 2005).

[1] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action,* Brayton Point is the preferred ECC for both Project 1 and Project 2, and Falmouth is the variant ECC for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

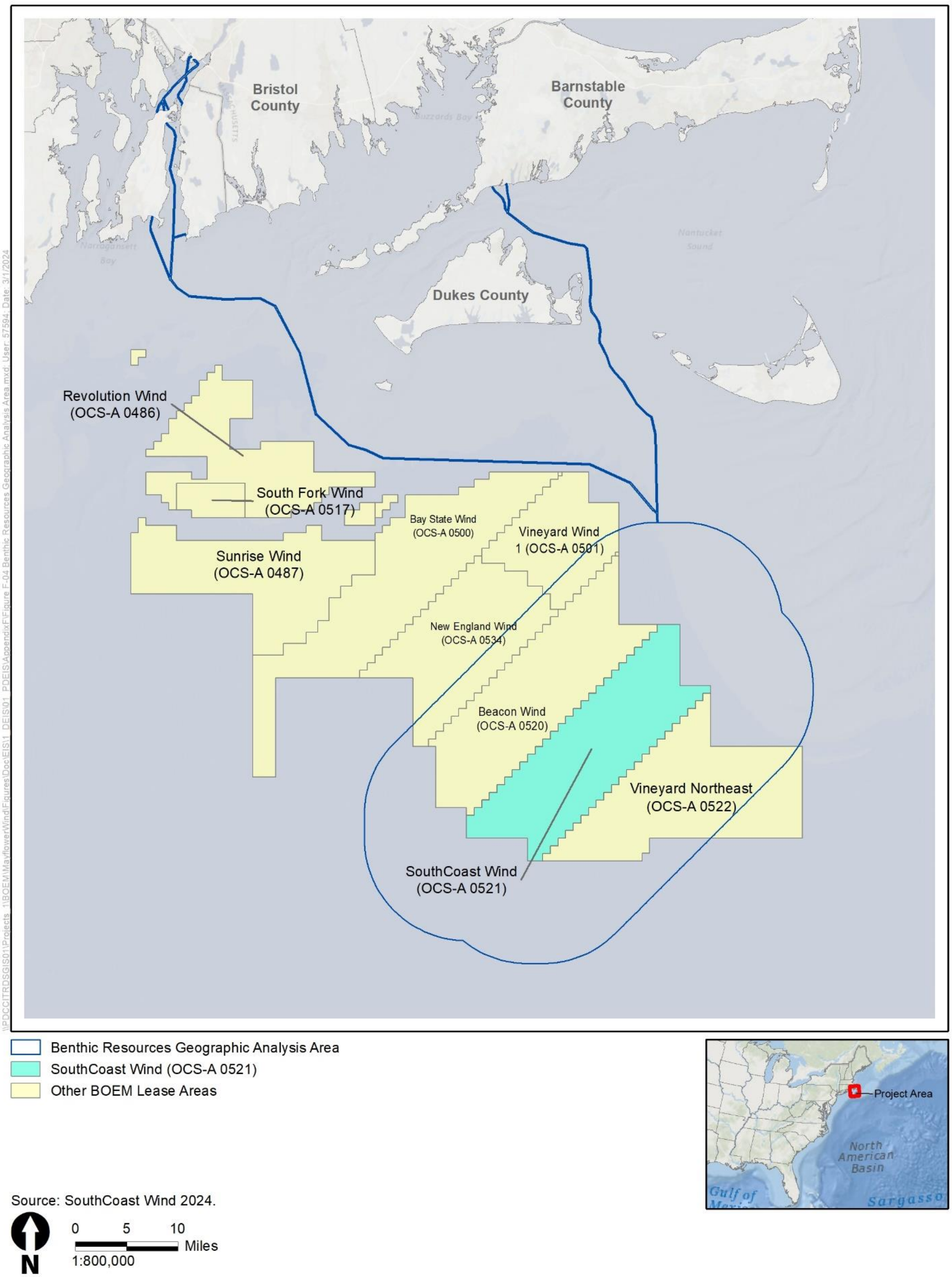


Figure 3.5.2-1. Benthic resources geographic analysis area

Offshore Project Area

The Wind Farm Area covers approximately 127,388 acres (51,552 hectares) on the Northeast Outer Continental Shelf off the southern coast of Massachusetts (SouthCoast Wind 2024), with up to two ECCs extending from the Wind Farm Area to Brayton Point in Somerset, Massachusetts, and to the Falmouth, Massachusetts, coastline. The seafloor of the Wind Farm Area is mostly flat with gentle slopes ranging from less than 1.0° to 4.9°. The central section of the Lease Area comprises ridges with moderate slopes (5.0° to 9.9°) and shallow channels (SouthCoast Wind 2024). Water depths within the Lease Area range from 121.72 feet (37.1 meters) to 208.3 feet (63.5 meters), with deeper waters in the southwestern portion. The average depth is 164.0 feet (50.0 meters), and the deepest depth is 206.7 feet (63.1 meters) (SouthCoast Wind 2024). There are no hard corals within the vicinity of the Lease Area according to the NOAA Deep-Sea Coral Data Portal (NOAA 2022), and only sea pens were documented in the 1960s south of the Lease Area in deeper waters (SouthCoast Wind 2024).

Benthic resources include the seafloor, substrate, and communities of bottom-dwelling organisms that live within these habitats. Benthic habitats include soft-bottom (i.e., unconsolidated sediments) and hard-bottom (e.g., cobble and boulder) habitats, as well as consolidated sediment (i.e., pavement), which can occur in scour zones, and biogenic habitats (e.g., eelgrass and worm tubes) created by structure-forming species. Sediments from grab samples in the Lease Area were largely classified as Coastal and Marine Ecological Classification Standard (CMECS) Subclass Fine Unconsolidated Substrate, or dominated by sand or finer sediment size (<5 percent gravel). Only one sample was classified as Coarse Unconsolidated Substrate (≥5 percent gravel; SouthCoast Wind 2024). The Lease Area was mainly soft-bottom habitat with little relief and no complex habitat-forming features. Total organic carbon (TOC) was low with the majority of samples containing less than 1 percent TOC.

Benthic epifauna were sampled by beam trawl across the Massachusetts offshore wind Lease Area with sand shrimp and sand dollars comprising 88 percent of individuals collected (Guida et al. 2017). Mobile crustaceans and mollusks were dominant in 2020 benthic samples and are commonly associated with the soft sediments of the Lease Area (SouthCoast Wind 2024). Infaunal communities of the Lease Area consisted mainly of soft-sediment burrowing infauna, with the eastern portion consisting of clam beds and tube-building *Ampelisca* beds (SouthCoast Wind 2024). The western portion of the Lease Area also contained *Ampelisca* beds, as well as small surface-burrowing polychaete worm beds. Results of a seagrass and macroalgae evaluation of the Offshore Project area found no SAV in the Lease Area. Refer to Table 3.5.5-2 in Section 3.5.5 for types and acres of habitat in the Lease Area.

Inshore Project Area

The Falmouth ECC extends from the Lease Area through Muskeget Channel and ends at one of the two proposed landfall locations in Falmouth, Massachusetts (Worcester Avenue with alternate sites at Shore Street and Central Park). The Brayton Point ECC extends from the Lease Area through the Rhode Island Sound, up the Sakonnet River, over Aquidneck Island, and into Mount Hope Bay before making landfall at one of the two proposed locations in Somerset, Massachusetts.

Similar to the Lease Area, the southern portion of the Falmouth ECC (between the Lease Area and the Muskeget Channel) consisted mainly of fine and soft sediments. Samples in this southern section were mainly Fine Unconsolidated sediment, with three samples as Coarse Unconsolidated sediment (≥5 percent gravel; SouthCoast Wind 2024). Most samples (approximately 90 percent) were sand, with three samples consisting of Muddy Sand (COP Appendix M; SouthCoast Wind 2024). Further sand classification indicated a transition of Fine/Very Fine Sand to Medium and Very Coarse/Coarse Sand as sampling occurred more north and away from the Lease Area. The only complex habitats observed were from three gravelly samples just south of the Muskeget Channel along the Falmouth ECC from stations 031 (41.30701, -70.33827), 032 (41.29463, -70.33827), and 124 (41.23198, -70.31761) (COP Appendix M3). TOC was less than 1 percent in all samples (COP Appendix M; SouthCoast Wind 2024).

The northern Falmouth ECC sediment samples were more variable, with a further transition to coarser sediments as the corridor proceeds north through the Muskeget Channel toward the Nantucket Sound and landfall. Gravelly samples dominated the Muskeget Channel and south of the Nantucket Sound Main Channel, with a transition to soft-bottom habitat as all samples within the Nantucket Sound Main Channel were classified as sand (SouthCoast Wind 2024). Complex habitat was observed in the remaining samples north of the Nantucket Main Channel, with two samples classified as Biogenic Shell Substrate (*Crepidula* reef). Some Gravel Pavement was noted in the SPI/PV images, and Gravel/Gravelly samples were observed throughout the northern section of the Falmouth ECC. TOC was undetectable in the majority of samples, with one sample containing slightly above 1 percent.

A benthic survey was conducted along the Brayton Point ECC in Summer 2021 and Spring 2022. Sediments followed similar patterns as the Falmouth ECC, with finer sediments in the southern section near the Lease Area becoming coarser as sampling proceeded north. In federal waters, over 90 percent of benthic habitat was mapped as sand or finer (Appendix M.3; SouthCoast Wind 2024). Gravelly Sand to Sandy Gravel, including Boulders, were present in the Rhode Island Sound where an area of glacial till southwest of Martha's Vineyard provides heterogeneous substrate and hard-bottom substrate (COP Volume 2, Section 6.6.1.6.4; SouthCoast Wind 2024). Sand or finer sediments dominated Rhode Island state waters as well making up 88 percent of the benthic habitat. Coarse sediments consisting of Mixed-Sized Gravel in Muddy Sand/Sand followed at 8.5 percent while Glacial Moraine A and Bedrock made up 3.1 and 0.1 percent of benthic habitats, respectively (Appendix M.3; SouthCoast Wind 2024). Additionally, 22.2 percent of the Rhode Island state waters had Crepidula Substrate as a CMECS Substrate classifier, and 3.1 percent had Boulder Field(s) as a Substrate classifier (Appendix M.3; SouthCoast Wind 2024). Sediments in the Sakonnet River were finer sands to silts with areas of boulders, including anthropogenic rock dumps that provide hard-bottom habitat, and isolated mounds associated with *Crepidula* reefs (SouthCoast Wind 2024; USGS 2005).

The infauna sampled along the southern Falmouth ECC closely matched the eastern Lease Area, dominated by clam beds and large tube-building fauna. The northern Falmouth ECC had a heterogeneous array of species including soft-sediment bryozoans and mobile burrowing crustaceans (SouthCoast Wind 2024). Sampling within the Brayton Point ECC showed soft-sediment fauna was the dominant CMECS biotic subclass observed along the entire Brayton Point ECC, characterized by clam beds, larger tube-building, mobile crustaceans, and surface-burrowing fauna, with much more diversity in the southern portion of the ECC.

SAV beds were identified at the Falmouth landfall areas from a review of eelgrass field surveys completed in August 2020 (SouthCoast Wind 2024). The seagrass and macroalgae characterization surveys did not identify SAV in the southern portion of the Falmouth ECC, but macroalgae was identified in approximately two-thirds of the survey locations during benthic grabs of the northern section of the Falmouth ECC (COP Appendix K and Appendix M; SouthCoast Wind 2024). A previously unmapped section of interpreted SAV was identified near the Aquidneck Island landfall of the Brayton Point ECC (COP Appendix E; SouthCoast Wind 2024). Refer to Section 3.5.5, Table 3.5.5-2 to Table 3.5.5-5 for types and acres of habitat in the ECCs.

3.5.2.2 Impact Level Definitions for Benthic Resources

Impact level definitions for benthic resources are provided in Table 3.5.2-1.

Table 3.5.2-1. Definitions of impact levels for benthic resources

Impact Level	Type of Impact	Definition
Negligible	Adverse	Impacts on species or habitat would be adverse, but so small as to be unmeasurable.
	Beneficial	Impacts on species or habitat would be beneficial, but so small as to be unmeasurable.
Minor	Adverse	Most adverse impacts on species would be avoided. Adverse impacts on sensitive habitats would be avoided; adverse impacts that do occur would be temporary or short term in nature.
	Beneficial	If beneficial impacts occur, they may result in a benefit to some individuals and would be temporary to short term in nature.
Moderate	Adverse	Adverse impacts on species would be unavoidable but would not result in population-level effects. Adverse 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 effects on species that rely on them.
	Beneficial	Beneficial impacts on species would not result in population-level effects. Beneficial impacts on habitat may be short term, long term, or permanent, but would not result in population-level benefits to species that rely on them.
Major	Adverse	Adverse impacts would affect the viability of the population and would not be fully recoverable. Adverse impacts on habitats would result in population-level impacts on species that rely on them.
	Beneficial	Beneficial impacts would promote the viability of the affected population or increase population resiliency. Beneficial impacts on habitats would result in population-level benefits to species that rely on them.

3.5.2.3 Impacts of Alternative A – No Action on Benthic Resources

When analyzing the impacts of the No Action Alternative on benthic resources, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for benthic resources. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D*, Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for benthic resources described in Section 3.5.2.1, *Description of the Affected Environment and Future Baseline Conditions,* 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 in the geographic analysis area that contribute to impacts on benthic resources are generally associated with inshore dredging, coastal development, offshore construction, including bottom disturbance and habitat conversion, and climate change. Regular vessel anchoring related to ongoing military, survey, commercial, and recreational activities would continue to cause temporary to permanent direct (injury to or mortality of organisms and physical damage to habitats) and indirect (increased turbidity) impacts in the immediate area where anchors and chains meet the seafloor. Cable emplacement and maintenance activities cause infrequent disturbance to benthic resources and short-term increases in suspended fine sediments as well as sediment deposition. EMFs continuously emanate from existing undersea telecommunication and electrical power transmission cables, and new cables are infrequently installed in the geographic analysis area. Underwater noise impacts occur due to pile driving, which periodically occurs in nearshore areas during construction and repair of piers, bridges, pilings, and seawalls. The presence of structures can be detrimental to benthic organisms due to habitat conversion and lost fishing gear, which can cause disturbance, injury, and loss, or could be beneficial by serving to provide relief and habitat to structure-oriented fishes and invertebrates. Ongoing commercial and recreational fishing for finfish and shellfish that disturbs the seafloor (e.g., trawling and dredging) would continue to affect benthic resources in the foreseeable future. Increased port utilization and expansion would result in more numerous vessel visits and cause increased vessel noise and increased suspended sediment concentrations. Ongoing sediment dredging for navigational purposes and other activities that cause seabed profile alterations would result in fine sediment resuspension and deposition, habitat alteration, and injury to and mortality of benthic resources.

Impacts associated with climate change (ocean acidification and warming, sea level rise, altered habitat/ecology) have the potential to alter species distributions and increase individual mortality and disease occurrence. Increased sea temperatures have been shown to affect the natural ecology of the ocean, including benthic resources. Sea surface temperatures along the Atlantic coast increased by 1°C (34°F) since 1960 (Friedland and Hare 2007) and continue to rise. Ocean acidification caused by atmospheric CO_2 may contribute to reduced settlement, growth, and reproduction of benthic resources such as echinoderms, crustaceans, corals, and bivalves (Kurihara 2008). Warming of ocean waters is expected to influence the distribution and migration of benthic resources and may influence the frequencies of various diseases (Hoegh-Guldberg and Bruno 2010; Brothers et al. 2016).

The geographic analysis area overlaps a portion of the Vineyard Wind 1 project in OCS-A 0501, which has an approved COP. Ongoing construction of the Vineyard Wind 1 project would affect benthic resources through the primary IPFs of accidental releases, cable emplacement and maintenance, noise, and land disturbance. Ongoing offshore wind activities would have the same type of impacts that are described in *Cumulative Impacts of the No Action Alternative* for ongoing and planned offshore wind activities, but the impacts would be of lower intensity. Regarding benthic impacts specific to Muskeget Channel, after BOEM's COP approval of Vineyard Wind 1, Vineyard Wind 1 selected the Eastern Muskeget route for the offshore export cable route. Hard/complex bottoms cover much of the Muskeget area (BOEM 2021a). The maximum total area of hard/complex bottom and rugged seafloor that exists within the installation corridor in Muskeget Channel for the Eastern Muskeget route is approximately 1,520 acres (615 hectares) (BOEM 2021a). The total disturbance area of hard-bottom/coarse deposits, complex seafloor/sand waves, and biogenic surfaces within the Eastern Muskeget route is 28.8 acres (11.7 hectares), or a relatively small subset of this area (BOEM 2021a). The total temporarily disturbed area of hard-bottom/coarse deposits, complex seafloor/sand waves, and biogenic surfaces within the Eastern Muskeget route is 1,424 acres (576 hectares), which is estimated as sediment deposition greater than 1 millimeter that may extend up to 328 feet (100 meters) from the proposed cable installation (BOEM 2021a).

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impact of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Planned non-offshore wind activities that may affect benthic resources include new submarine cables and pipelines, oil and gas activities, marine minerals extraction, port expansions, and installation of new structures on the OCS (see Appendix D, *Planned Activities Scenario*, for a complete description of planned activities). Impacts from planned non-offshore wind activities would be similar to those from ongoing activities and may include temporary and permanent impacts on benthic resources from disturbance, injury, mortality, habitat degradation, and habitat conversion. While these impacts would have localized effects on benthic resources, population-level effects would not be expected.

The following sections summarize the potential impacts of ongoing and planned offshore wind activities in the geographic analysis area on benthic resources during construction, O&M, and decommissioning of the projects. In addition to the ongoing construction of the Vineyard Wind 1 project, the geographic analysis area overlaps other planned and ongoing offshore wind activities including the entirety of OCS-A 0520 (Beacon Wind) and portions of OCS-A 0534 (New England Wind) and OCS-A 0522 (Vineyard Wind Northeast). BOEM expects other offshore wind activities to affect benthic resources through the following primary IPFs.

Accidental releases: Accidental releases may increase due to offshore wind activities, with gradually increasing vessel traffic over the next 35 years. The risk of any type of accidental release would be increased primarily during construction, but also during operations and decommissioning of offshore wind facilities. Accidental releases of hazardous materials mostly consist of fuels, lubricating oils, and other petroleum compounds. Because most of these materials tend to float in seawater, they are unlikely to contact benthic resources. The chemicals with potential to sink or dissolve rapidly are predicted to dilute to non-toxic levels before they reach benthic resources (BOEM 2021a). In most cases, the corresponding impacts on benthic resources are unlikely to be detectable unless there is a catastrophic spill (e.g., an accident involving a tanker ship). Large-scale spills may be accompanied by the use of chemical dispersants during post-spill response. Crude oil treated with dispersants (specifically Corexit 9500A) has been shown to have higher toxicity to marine zooplankton and meroplankton than either the crude oil or dispersant alone (Rico-Martinez et al. 2012; Almeda et al. 2014a, 2014b). Benthic resources with planktonic larval stages may be susceptible to this toxicity, which may affect subsequent recruitment.

Nonnative or invasive species can be accidentally released in the discharge of ballast water and bilge water during vessel activities. Increased vessel traffic throughout the construction phase of offshore wind projects would increase the risk of accidental releases of invasive species. Vessels are required to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and USEPA National Pollutant Discharge Elimination System Vessel General Permit standards, both of which aim at least in part to prevent the release and movement of invasive species. Adherence to these regulations would reduce the likelihood of discharge of ballast or bilge water contaminated with invasive species. Invasive species also have the potential to use foundations, scour protection, and any other novel hard substrate as steppingstones to expand their geographic range (Adams et al. 2014). Ten invasive species were observed to expand their range using foundations at an operational wind farm in Europe, with the majority occurring in the intertidal and only two invasive species observed in the subtidal (De Mesel et al. 2015). Although the likelihood of invasive species becoming established due to offshore wind-related activities is low, the impacts of invasive species could be strongly adverse, widespread, and permanent if the species were to become established and out-compete native fauna. Indirect impacts could result from competition with invasive species for food or habitat, and/or loss of foraging opportunities if preferred prey is no longer available due to competition with invasive species. The increase in this risk related to the offshore wind industry would be small in comparison to the risk from ongoing activities (e.g., trans-oceanic shipping). Accidental releases of trash and debris may occur from vessels primarily during construction, but also during operations and decommissioning. BOEM assumes all vessels would comply with laws and regulations to minimize releases. If a release were to occur, it would be an accidental, localized event in the vicinity of work areas. The greatest likelihood of releases would be associated with nearshore project activities (e.g., transmission cable installation and transport of equipment and personnel from ports). However, there is no evidence that the anticipated volumes and extents would have detectable impacts on benthic resources.

The overall impacts of accidental releases on benthic resources are likely to be minor because large-scale releases are unlikely and impacts from small-scale releases would be localized and short term, resulting in little change to benthic resources. As such, accidental releases from offshore wind development would not be expected to appreciably contribute to overall impacts on benthic resources.

Anchoring: Offshore wind activities would increase vessel anchoring during survey activities and during construction, installation, maintenance, and decommissioning of offshore components. In addition, anchored or moored meteorological towers or buoys could also increase in number. Anchoring would result in increased levels of turbidity and would have the potential to cause mortality of some benthic resources through physical contact. Using the assumptions in Appendix D, Table D2-2, anchoring could affect up to 1,008 acres (408 hectares) of seabed from ongoing and planned offshore wind projects in the geographic analysis area. Most impacts would be minor because impacts would be localized, turbidity would be temporary, and mortality of benthic resources from contact would be recovered in the short-term. Degradation of sensitive habitats and resources, such as eelgrass beds and hard-bottom habitats, if it occurs, could be long-term to permanent, resulting in moderate impacts.

Cable emplacement and maintenance: New construction of offshore submarine cables would cause short-term disturbance of seafloor habitats and injury and mortality of benthic resources in the immediate vicinity of the cable emplacement activities. The cable routes for other offshore wind projects have not been fully determined at this time. However, at least one other ongoing offshore wind project will be installing export cables through complex habitats within Muskeget Channel – New England Wind. As stated in the final EIS for New England Wind, New England Wind's offshore export cable corridor is largely the same as the corridor already approved by BOEM for Vineyard Wind 1 (see *Impacts of the No Action Alternative*). As such, impacts on benthic habitats are anticipated to be similar to Vineyard Wind 1. Both export and interarray cables are anticipated to be constructed through 2030 for other offshore wind projects with lease areas that are within or overlap the geographic analysis area (Appendix D, Table D2-1). The total area disturbed from new cable emplacement would be a small fraction of available habitat in the geographic analysis area and would be expected to recover relatively quickly. Impacts associated with cable emplacement in sensitive habitats such as areas with SAV or complex habitat such as cobble and boulders, where present, may take longer to recover. No SAV disturbance is expected from Vineyard Wind 1 or New England Wind cable installations (BOEM 2021a, 2022). While direct disturbance of eelgrass would be avoided, sedimentation impacts may occur, which would be temporary and potentially mitigated with the use of turbidity curtains.

Seafloor preparations made prior to installation of structures and cables, and as a result of dredging and mechanical trenching during cable installation, can cause localized, short-term impacts (e.g., habitat alteration, injury, mortality) on benthic resources through seabed profile alterations and sediment deposition. The level of impact from seabed profile alterations could depend on the time of year that they occur, especially if these alterations overlap with times and places of high benthic organism abundance or reproductive activity. However, recolonization rates of benthic habitats are driven by the types of benthic communities inhabiting the area surrounding the affected region. Benthic communities that are well adapted to disturbance within their habitats (e.g., mobile soft sediments) are likely to quickly recolonize a disturbed area. However, communities that are not well adapted to frequent disturbance (e.g., deep boulder epifaunal communities) may take upward of a year to begin recolonization and/or for seabed recovery to occur, and likely more than a year to reach the level of community diversity that existed prior to disturbance. Associated seabed recovery is defined here as the natural infilling of sediment in construction trenches and associated recolonization of epifaunal and benthic infaunal communities to support pre-disturbance ecological function, which will vary by species and nature of the disturbance. For example, benthic communities disturbed by sand mining was examined on the East Coast of the United States, and Brooks et al. (2006) found that seabed recovery and/or recolonization ranged from 3 months to 2.5 years.

Locations, amounts, and timing of dredging for offshore wind projects are not known at this time. The need for dredging depends on local seafloor conditions, assuming the areal extent of such impacts is proportional to the length of cable installed. Dredging typically occurs only in sandy or silty habitats, which are abundant in the geographic analysis area and are quick to recover from disturbance, although full recovery of the benthic faunal assemblage may require several years (Wilber and Clarke 2007). Mechanical trenching, used in more resistant sediments (e.g., gravel and cobble), causes seabed profile alterations during use, although the seabed is typically restored to its original profile after utility line installation in the trench. Coarser sand and gravel substrates typically take longer to recover to pre-disturbance conditions than habitats with finer grain sizes (Wilber and Clarke 2007). The installation of WTG foundations and hard surfaces such as scour and cable protection will alter local hydrodynamic patterns. This may have a resulting impact on local sedimentation and sediment migration patterns. Impacts would be minor because seabed profile alterations, while locally intense, have little impact on benthic resources in the geographic analysis area.

Cable emplacement and maintenance activities (including dredging) in or near the geographic analysis area could cause sediment suspension during periods of active construction or maintenance, after which the sediment would be deposited on the seafloor. Sediment deposition can result in adverse impacts on benthic resources, including smothering and changes to sediment quality profiles. The tolerance of benthic organisms to being covered by sediment (sedimentation) varies among species. Demersal winter flounder eggs were shown to have delayed hatching with as little as 0.04 inch (1 millimeter) of sedimentation (Berry et al. 2011). The sensitivity to sedimentation for shellfish varies by species and life stage. Some sessile shellfish may only tolerate 0.4–0.8 inch (1–2 centimeters) while other benthic organisms can survive burial in upward of 8 inches (20 centimeters) (Essink 1999). Areas closest to the disturbance would receive higher percentages of coarser, more rapidly settling sediments, while finer sediments would settle over greater distances and be more diffused. The greatest impacts would, therefore, be at the smallest spatial scales. The level of impact from sediment deposition and burial could depend on the time of year that it occurs, especially if it overlaps with times and places of high benthic organism abundance or reproductive activity.

Increased turbidity would occur during cable emplacement activities over the course of the construction of the wind farms in the geographic analysis area. Disturbed seafloor from construction of these projects may affect benthic resources. Assuming other offshore wind projects use installation procedures similar to those proposed in the COP, the duration and extent of impacts would be limited and short term, and benthic assemblages would recover from disturbance. In routes that intersect sensitive or complex habitat, impacts may be long term to permanent. For SAV, damage to seagrass blades may be more quickly recovered; however, damage to or uprooting of rhizomes may take years to recover from (Orth et al. 2017). Modeled simulations of dragging impacts on eelgrass further suggested recovery of eelgrass beds may take 6 years, and 20 years or longer under conditions less conducive to eelgrass growth (Neckles et al. 2005). Increased turbidity due to bottom disturbances associated with cable emplacement would reduce light availability to SAV. This short- to long-term impact would be most pronounced in the immediate vicinity of the disturbance. However, while mitigating impacts on SAV including eelgrass presents challenges, mitigation measures taken in or near the geographic analysis area may include HDD and/or turbidity curtains.

When new cable emplacement and maintenance causes resuspension of sediments, increased turbidity could also have an adverse impact on filter-feeding fauna such as bivalves. Within the Massachusetts/Rhode Island lease areas, sand is the predominant sediment type, which would settle out of the water column quickly (Guida et al. 2017). There are lower percentages of finer sediments (mud) that would stay suspended longer and, therefore, travel farther. The impact of increased turbidity on benthic fauna depends on both the concentration of suspended sediment and the duration of exposure. Plume modeling for other wind development projects in the region and with similar sediment characteristics (Vineyard Wind 1, Block Island Wind Farm, and Virginia Offshore Wind Technology Advancement) predict suspended sediment should usually settle well before 12 hours have elapsed. BOEM expects relatively little impact from increased turbidity (separate from the impact of sediment deposition).

Some types of cable installation equipment use water withdrawals, which can entrain planktonic larvae of benthic fauna (e.g., larval polychaetes, mollusks, crustaceans) with assumed 100 percent mortality of entrained individuals. Due to the surface-oriented intake, water withdrawal could entrain pelagic eggs and larvae but would not affect resources on the seafloor. However, the rate of egg and larval survival to adulthood for many species is very low (MMS 2009). Due to the limited volume of water withdrawn, BOEM does not expect population-level impacts on any given benthic species. If the sediment that would be disturbed by construction activities contains elevated levels of toxic contaminants, sediment disturbances could affect water quality and the physiology of benthic organisms. Contaminated sediments are not known to be a problem in the geographic analysis area for benthic resources.

Cable routes for other offshore wind projects have not been fully determined at this time. Cables for other offshore wind projects in the geographic analysis area would likely be emplaced between 2025 and 2030. Locations, amounts, and timing of dredging for offshore wind projects are not known at this time. Increased sediment deposition may occur during multiple years. The area with a greater sediment deposition from simultaneous or sequential activities would be limited, as most of the affected areas would only be lightly sedimented (less than 0.04 inch [1 millimeter]) and would recover naturally in the short term. Dredged material disposal during construction, if any occurs in the geographic analysis area, would cause localized, temporary turbidity increases and long-term sedimentation or burial of benthic organisms at the immediate disposal site. The impacts of burial would be mostly short term with less potential for long-term impacts. Sediment deposition and burial impacts on benthic resources from cable emplacement for other offshore wind projects would, therefore, be moderate.

Overall, impacts through this IPF would be minor to moderate because they would be localized, turbidity would be present during construction for brief periods, and mortality from contact would be recovered in the short term. Any necessary dredging prior to cable installation could also contribute additional impacts.

Discharges/intakes: There would be increased potential for discharges from vessels during construction, operations, and decommissioning. Offshore-permitted discharges would include uncontaminated bilge water and treated liquid wastes. There would be an increase in discharges, particularly during construction and decommissioning when vessel traffic would be highest, and the discharges would be staggered over time and localized. Impacts would be negligible because there does not appear to be evidence that the volumes and extents anticipated would have any impact on benthic resources.

EMFs: The marine environment continuously generates a variable ambient EMFs. EMFs would also emanate from new offshore ECCs and interarray cables constructed for offshore wind projects. Offshore wind projects in the geographic analysis area will add 2,285 miles (3,677 kilometers) of cable that would produce EMFs in the immediate vicinity of cables for each project during operation (Appendix D, Table D2-1). Offshore export cable design options for Vineyard Wind 1 include either a 220–275 kV HVAC or one bundled 320–500 kV HVDC. Vineyard Wind 1 also plans to use a 66–132 kV HVAC cable design for interarray cables. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operation. Remedial protection measures would be installed wherever the target burial depths cannot be met. EMF and substrate heating effects from these projects on benthic habitats would vary in extent and significance depending on overall cable length, the proportion of buried versus exposed cable segments, project-specific transmission design (e.g., HVAC or HVDC, transmission voltage), and the proximity of the affected habitat to the cable. For example, species with life stages that are surface-oriented or use pelagic habitats would not be exposed to EMF effects and would experience no effects on this habitat component. In contrast, species that use bottom or near-bottom habitats along the potential cable paths during one or more life stages may be exposed to EMF effects. The significance of these potential effects is dependent on habitat use (i.e., likelihood of exposure) and species-specific sensitivity to magnetic and electrical fields and heating effects. EMF strength diminishes rapidly with distance, and the area around submarine power cables with elevated EMF levels extends less than approximately 33 feet (10 meters) around each cable (CSA Ocean Sciences, Inc. and Exponent 2019). When submarine cables are laid, installers typically maintain a minimum separation distance of at least 330 feet (100 meters) from other known cables to avoid inadvertent damage during installation, which also precludes any additive EMF effects from adjacent cables.

Impacts of EMFs on benthic habitats is an emerging field of study; as a result, there is a high degree of uncertainty regarding the nature and magnitude of effects on all potential receptors (Gill and Desender 2020). Recent reviews by Bilinski (2021), Gill and Desender (2020), Albert et al. (2020), and Snyder et al. (2019) on the effects of EMF on marine organisms in field and laboratory studies concluded that, though minimal, measurable effects can occur for some species, but not at the relatively low EMF intensities representative of marine renewable energy projects. Behavioral impacts from EMFs, observed at higher levels than are representative of offshore wind projects, were documented for lobsters near a direct current cable (Hutchison et al. 2018) and a domestic electrical power cable (Hutchison et al. 2020), which included subtle changes in activity (e.g., broader search areas, subtle effects on positioning, and a tendency to cluster near the EMF source). There was no evidence of the cable acting as a barrier to lobster movement, and no effects were observed on lobster movement speed or distance traveled. Additionally, responses to EMFs by benthic marine fauna include attraction to the source, interference with navigation that relies on natural magnetic fields, predator/prey interactions, avoidance or attraction behaviors, increased burrowing by polychaetes, increased exploratory and foraging behavior, and physiological and developmental effects (Bilinski 2021; Jakubowska et al. 2019; Hutchison et al. 2018; Taormina et al. 2018; Normandeau et al. 2011). Burrowing infauna may be exposed to stronger EMFs, but little information is available regarding the potential consequences. Non-mobile infauna would be unable to move to avoid EMFs. Any effects, however, would be local and would not have population-level impacts due to the small scale of the impact relative to the available benthic habitat in the geographic analysis area.

Other studies, however, have found that EMFs do not affect invertebrate behavior. For example, Schultz et al. (2010) and Woodruff et al. (2012, 2013) conducted laboratory experiments exposing American lobster (*Homarus americanus*) and Dungeness crab (*Metacarcinus magister*) to EMFs ranging from 3,000 to 10,000 milligauss and found that EMFs did not affect their behavior. Assuming the other wind projects with HVAC cables in the geographic analysis area have similar array and export cable voltages as the Proposed Action, the induced magnetic field levels expected for the offshore wind projects are two to three orders of magnitude lower than those tested by Schultz et al. (2010) and Woodruff et al. (2012, 2013). Similarly, a field experiment in Southern California and Puget Sound, Washington, found no evidence that the catchability of two crab species was influenced by the animals crossing an energized low-frequency alternating-current submarine power cable (35 and 69 kV, respectively) to enter a baited trap. Whether the cables were unburied or lightly buried did not influence the crab responses (Love et al. 2017). While these voltages are between two and eight times lower than those expected for the offshore wind projects, the array and export cables would be shielded and buried at depth to reduce potential EMFs during cable operation.

EMF levels would be highest at the seabed near cable segments that cannot be fully buried and are laid on the bed surface under protective rock or concrete blankets. Invertebrates in proximity to these areas could experience detectable EMF levels and minimal associated behavioral effects. These unburied cable segments would be short and widely dispersed. CSA Ocean Sciences, Inc. and Exponent (2019) found that offshore wind energy development as currently proposed would have negligible effects, if any, on bottom-dwelling species. The information presented above indicates that EMF impacts on benthic fauna would be biologically insignificant, highly localized, and limited to the immediate vicinity of cables, and would be undetectable beyond a short distance; however, localized impacts would persist as long as cables are in operation (anticipated to be around 35 years or until decommissioning). The affected area would represent an insignificant portion of the available benthic habitat; therefore, EMF impacts from other offshore wind activities on benthic resources would be minor.

Gear utilization: Benthic and fisheries monitoring surveys are usually conducted pre-, during, and post-construction of offshore wind projects as part of their Benthic and Fisheries Monitoring Plans. These surveys can have direct impacts on benthic habitats. Bottom-disturbing trawls can alter the composition and complexity of soft-bottom benthic habitats. For example, when trawl gear contacts the seabed it can flatten sand ripples, remove epifaunal organisms and biogenic structures like worm tubes, and expose anaerobic sediments (BOEM 2022). Fishing activity used in some fish surveys can damage benthic invertebrates on hard-bottom benthic habitat, resulting in long-term effects on community composition and complexity (Tamsett et al. 2010). Towed sampling dredges often used for clam surveys would cause localized and direct impacts on both hard- and soft-bottom habitat, resulting in potentially long-term effects on community composition. Soft-bottom impacts would be short term and expected to recover quickly. Because the affected area would represent a small area of the available benthic habitat in the geographic analysis area, cumulative impacts from gear utilization on benthic resources would be negligible to minor.

Noise: Sound from offshore wind activities includes sound pressure, particle motion, and vibration. Sound pressure is the fluctuation in the density of the medium (e.g., sediments) due to the sound, particle motion refers to the movement of particles that make up the medium during that sound, and vibrations are initiated by direct contact of a sound source with the substrate, such as during pile driving, and by sound energy entering the substrate through the water from intense sources, such as seismic air guns (Popper et al. 2022). Most fishes, including all elasmobranchs and likely all sound-detecting invertebrates, primarily detect sound via particle motion (Popper et al. 2022; Carroll et al. 2017). Fishes and aquatic invertebrates that live in, on, or close to the substrate (e.g., the seabed) may also be affected by vibrations. Sound pressure and particle motion can also emanate from the substrate back into the water column as a result of such vibrations (Hawkins et al. 2021). In a review of potential impacts of sound on fishes and aquatic invertebrates from offshore wind activities, Popper et al. (2022) identified substantial gaps in the understanding of these effects and concluded these gaps preclude an assessment of the potential impacts of sound from offshore development.

The current body of research and existing regulations have mostly focused on sound pressure as opposed to particle motion. Guidelines based on sound pressure may not be applicable for most fishes and invertebrates, especially in shallow water (Popper and Hawkins 2018). Measures of sound pressure cannot be used to reliably describe particle motion, especially in a complex acoustic environment such as the ocean. Because of this focus on sound pressure, modeling of sound propagation has a notable data gap, especially when dealing with fish and invertebrates (Hawkins and Popper 2017).

Numerous invertebrate species have been found to be sensitive to noise. Many species sense noise through the use of a statolith organ, which detects particle motion through a dense statocyst. Anthropogenic sound exposure has been found to result in delayed hatching and impaired embryonic development in crustaceans, bivalves, and gastropods. Permanent high-level exposure to sound has also been found to cause a significant reduction in the rate of growth and reproduction in invertebrate groups (Sole et al. 2023) and physiological stress in echinoderms (Vazzana et al. 2020). Bivalves have been found to close their valves and burrow deeper when subjected to noise and vibration stimuli, reducing respiration and other processes, and potentially causing mortality (Roberts et al. 2016). With impulse impacts, such as those from pile driving, physiological sound thresholds may be exceeded for some species, resulting in injury or mortality, especially for affected species in the immediate vicinity of the activity. However, the duration of pile driving and its small radius of potential effects on infaunal organisms are expected to last on the order of hours. Noise transmitted through water or the seabed sediments would also be expected to affect benthic invertebrates. However, data are not available to adequately quantify these impacts (Popper et al. 2022).

Noise from construction, pile driving, G&G survey activities, O&M, and trenching/cable burial could contribute to impacts on benthic resources. The most impactful noise is expected to result from pile driving. Noise from pile driving would occur during installation of foundations for offshore structures. This noise would be produced intermittently during installation of each foundation. One or more projects may install more than one foundation per day, either sequentially or simultaneously. Construction of offshore wind facilities in the geographic analysis area would likely occur over an assumed 5-year construction period, with up to 585 WTGs (Appendix D, Table D2-1). Noise transmitted through water and through the seabed can cause injury to or mortality of benthic resources in a limited area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. The extent depends on pile size, hammer energy, and local acoustic conditions. The affected areas would likely be recolonized in the short-term. In the planned activities scenario, noise from pile driving that causes behavioral changes could affect the same populations or individuals multiple times in a year or in sequential years, although impacts are expected to be minor.

Noise from G&G surveys of cable routes and other site characterization surveys for offshore wind facilities could also disturb benthic resources in the immediate vicinity of the investigation and cause temporary behavioral changes. G&G noise would occur intermittently over an assumed 5-year construction period (Appendix D, Table D2-1). G&G noise resulting from offshore wind site characterization surveys is less intense than G&G noise from seismic surveys used in oil and gas exploration. While seismic surveys create high-intensity, impulsive noise to penetrate deep into the seabed, offshore wind site characterization surveys typically use sub-bottom profiling technologies that generate less-intense sound waves for shallow penetration of the seabed. Seismic surveys are not expected in the geographic analysis area. Detectable impacts of G&G noise on benthic resources would rarely, if ever, overlap from multiple sources, but may overlap with behavioral impacts of pile-driving noise if two projects were being developed concurrently. Overlapping sound sources are not anticipated to result in a greater, more-intense sound; rather, the louder sound prevents the softer sound from being detected. Noise from G&G surveys is therefore expected to have a minor impact on benthic resources.

Noise from trenching/cable burial, O&M, and construction activities other than pile driving is expected to occur but would have little impact on benthic resources. Noise from interarray and export cable trenching would be temporary and localized and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise are typically less prominent than the impacts of the physical disturbances discussed under the *Cable emplacement and maintenance* IPF. Finally, while noise associated with operational WTGs may be audible to some benthic fauna, this would only occur at relatively short distances from the WTG foundations and could cause avoidance responses (English et al. 2017). Proximity to the individual turbines is the strongest predictor of SPLs over factors such as wind speed and turbine size (Tourgaard et al. 2020). Vibration is also produced by operation of WTGs.

Vibrations are transmitted into the water and seabed by the WTG support structure. The substrate vibration can be continuous when the wind turbine is operating, though the area affected by the particle motion is restricted to an area close to the wind turbine (Hawkins et al. 2021). Noise from construction activities other than pile driving may occur; however, little of that noise propagates for any substantial distance through the water, and, therefore, impacts on benthic resources are expected to be minor.

Port utilization: Increases in port utilization due to other offshore wind projects would lead to increased vessel traffic over the next 35 years. This increase in vessel traffic would be at its peak during construction activities between 2023 and 2030 and would decrease during operations but increase again during decommissioning (Appendix D, Table D2-1). In addition, any port-expansion and construction activities related to the additional offshore wind projects would add to the total amount of disturbed benthic area resulting in disturbance and mortality of individuals and short-term to permanent habitat alteration. Existing ports are heavily modified and have impaired benthic environments. Future port projects would likely implement BMPs to minimize impacts on benthic habitats (e.g., stormwater management and turbidity curtains). The degree of impacts on benthic resources would likely be undetectable outside the immediate vicinity of the port-expansion activities. Increased vessel traffic around ports would also increase physical impacts of vessel operation, including impacts of wakes on shallow and shoreline habitats as well as erosion, scour, and turbidity impacts from vessels operating in shallower inshore waters.

Impacts of port utilization associated with planned wind-related activities would be localized and range from short term and minor (for water quality and vessel noise impacts) to permanent and moderate (for port-expansion activities that heavily modify benthic environments).

Presence of structures: The presence of structures can lead to impacts on benthic resources through fishing gear entanglement, hydrodynamic disturbance, fish aggregation resulting in increased predation on benthic resources, and habitat conversion. Invasive species also have the potential to use foundations as steppingstones to expand their geographic range (Adams et al. 2014). These impacts may arise from foundations and scour/cable protection. Ongoing and planned offshore wind development would add up to 944 acres (382 hectares) of foundation and scour protection and 772 acres (312 hectares) of new hard protection atop cables (Appendix D, Table D2-2). In the geographic analysis area, structures are anticipated predominantly on sandy bottom, with the exception of cable protection, which is more likely to be needed where cables pass through hard-bottom habitats. The potential locations of cable protection for other offshore wind activities have not been fully determined at this time; however, any addition of scour protection/hard-bottom habitat would represent substantial new hard-bottom habitat, as the geographic analysis area is predominantly composed of fine substrates. Installation of these structures would result in direct mortality of benthic organisms within the footprint of disturbance, suspension of sediments, increased turbidity, and burial of benthic organisms in immediate proximity to foundations or below scour/cable protection.

The presence of structures would increase the risk of gear loss or damage by entanglement. Fishing gear potentially entangled or lost on underwater structures includes mesh from trawls or other similar nets, traps, and angling gear (e.g., fishing line, hooks, lures with hooks). Lost gear actively continues to fish and may drift with currents. Marine organisms may become trapped or ensnared in lost or drifting gear, also known as "ghost" fishing gear, leading to injury or mortality. The intermittent impacts at any one location would likely be localized and short-term, although the risk of occurrence would persist as long as the structures and debris remain.

Human-made structures, especially tall vertical structures such as foundations, alter local water flow (hydrodynamics) at a fine scale by potentially reducing wind-driven mixing of surface waters or increasing vertical mixing as water flows around the structure (Carpenter et al. 2016; Cazenave et al. 2016; Segtnan and Christakos 2015). Increased mixing may also result in warmer bottom temperatures, increasing stress on some shellfish and fish at the southern or inshore extent of the range of suitable temperatures. Finfish aggregate trends along the mid-Atlantic shelf have been shifting northeast into deeper waters (NOAA 2022); the presence of structures may reinforce these trends. The consequences for benthic resources from hydrodynamic disturbances are anticipated to be undetectable to small, localized, and vary seasonally. Additional, detailed discussion of the hydrodynamic effects of offshore wind structures is contained in Section 3.5.5.3, *Impacts of Alternative A – No Action on Benthic Resources*. Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon vertical relief in a mostly soft-bottom landscape. Structure-oriented fishes would be attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes could adversely affect benthic communities in the immediate vicinity of the structure. These impacts are expected to be local and to persist as long as the structures remain. Depending on the balance of attraction and production, newly placed structures may affect the distribution of fish and shellfish among existing natural habitat, artificial reef sites, and newly emplaced structures.

The presence of structures would also result in new hard surfaces that could provide new habitat for recruitment of hard-bottom species (Daigle 2011). The increased local density of fish and shellfish may result in changes to sediment quality through the bio-deposition of organic matter and sloughing off of shells and attached organisms from the structures. New structures also have the potential to facilitate range expansion of both native and nonnative aquatic species through the stepping-stone effect. Colonization and recruitment of marine fauna to structures can result in the dispersion and propagation of nonnative species, especially in nearshore habitats. Like other biofouling organisms, nonnative species might be transported to WTGs via construction and maintenance vessels (Bray et al. 2017; Wilding et al. 2017). Structures may serve as "stepping stones" that connect otherwise unconnected areas and provide a means for nonnative species to disperse and colonize new areas that may have previously been inaccessible due to biogeographical barriers (Adams et al. 2014; Wilding et al. 2017; Bray et al. 2017). Connectivity created among structures, especially where nonnative and invasive species may be present, can alter habitats and adversely affect native species, including federally protected species. At the scale of planned offshore wind activities, the artificial reef effect could lead to regional changes, including a shift from soft-sediment to hard-substrate communities and, potentially, intertidal communities (Causon and Gill 2018). Due to the pre-existing network of artificial reefs in the mid-Atlantic OCS, however, it is unlikely that additional structures would measurably increase the potential for this effect.

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). The potential effects of wind farms on offshore ecosystem functioning have been studied using simulations calibrated with field observations (Raoux et al. 2017; Pezy et al. 2018). These studies found increased biomass for benthic fish and invertebrates. However, some impacts such as the loss of soft-bottom habitat and increased predation pressure on forage species near the structures, may be moderate adverse to moderate beneficial depending on the receptor. In light of the above information, BOEM anticipates that the impacts associated with the presence of structures may be minor to moderately beneficial. The impacts on benthic resources resulting from the presence of structures would persist at least as long as the structures remain.

Impacts of Alternative A on ESA-Listed Species

No benthic species in the geographic analysis area are ESA-Listed; therefore, there will be no impacts on ESA-Listed species from Alternative A.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, benthic resources would continue to be affected by existing environmental trends and ongoing activities. BOEM expects ongoing activities to have continuing short-term, long-term, and permanent impacts (e.g., disturbance, injury, mortality, habitat degradation, habitat conversion) on benthic resources primarily through regular maritime activity, offshore construction impacts, cable emplacement, presence of structures, and climate change. Offshore wind activities are expected to involve several IPFs, primarily new cable emplacement and the presence of structures (i.e., foundations and scour/cable protection). However, habitat disturbance from offshore construction is expected to be minimal, and recovery of benthic communities is expected over time. BOEM anticipates the No Action Alternative to result in **moderate adverse** impacts on benthic resources.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and benthic resources would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to the impacts on benthic resources through pile-driving noise, anchoring, new cable emplacement, the presence of structures during operations of offshore facilities (i.e., foundations, cable, and scour protection), climate change, and ongoing seafloor disturbances caused by sediment dredging and fishing using bottom-tending gear. Considering all of the IPFs together, BOEM anticipates that the No Action Alternative, when combined with planned non-offshore wind activities and other offshore wind activities would result in **moderate adverse** impacts and could potentially include **moderate beneficial** impacts resulting from emplacement of structures (conversion of habitat from soft to hard bottom).

3.5.2.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following proposed PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on benthic resources.

- The total amount of scour protection for the foundations, interarray cables, and offshore ECCs that results in long-term habitat alteration.
- The installation method of the export cable in the offshore ECCs and for interarray and interlink cables in the Wind Farm Area and the resulting amount of habitat temporarily altered.
- The number and type of foundations used for the WTGs and OSPs.
- The methods used for cable laying and landfalls, as well as the types of vessels used and the amount of anchoring.
- The amount of pre-cable-laying dredging or preparation, if any, and its location.
- The time of year when foundation and cable installations occur.

Variability of the proposed Project design exists as outlined in Appendix C. Below is a summary of potential variances in impacts.

- The number, size, location, and amount of scour protection for WTG and OSP foundations: The level of impact related to foundations is proportional to the number of foundations installed; fewer foundations would present less hazard to benthic organisms.
- Offshore ECCs footprints: The route chosen (including variants within the general route) would determine the amount of habitat affected.
- Season of construction: Spring and summer are the primary spawning seasons for many benthic invertebrates and fish that lay demersal eggs. Project activities during these seasons would likely have greater impacts due to localized disruption of these processes and impacts on reproductive processes and sensitive early life stages.

SouthCoast Wind has committed to measures to minimize impacts on benthic resources, including employing industry standard cable burial and cable shielding methods to reduce potential effects on benthic resources, burying cables, where possible, to allow for benthic recolonization after construction is complete, and designing scour protection to reduce sedimentation (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

3.5.2.5 Impacts of Alternative B – Proposed Action on Benthic Resources

The sections below summarize the potential impacts of the Proposed Action on benthic resources during the various phases of the Proposed Action. Routine activities would include construction, O&M, and decommissioning of the Project, as described in Chapter 2, *Alternatives*.

Accidental releases: As discussed in Section 3.5.2.3, *Impacts of Alternative A,* non-routine events such as oil or chemical spills, potentially amplified by the use of chemical dispersants, can have adverse or lethal effects on marine life. However, modeling by Bejarano et al. (2013) predicts that the impact of smaller spills on benthic fauna would be low. Larger spills are unlikely but could have a larger impact on benthic fauna due to adverse effects on water quality (Section 3.4.2, *Water Quality*). The Proposed Action would comply with all laws regulating at-sea discharges of vessel-generated waste to reduce the likelihood of an accidental release. Further, SouthCoast Wind has developed an OSRP with measures to avoid accidental releases and a protocol to respond to such a release. Therefore, accidental releases are considered unlikely and would be quickly mitigated if one were to occur. The increase in vessel traffic associated with the Proposed Action would increase the risk of accidental releases of invasive species. The risk of this type of release would be increased by the additional vessel traffic associated with the Proposed Action, especially traffic from foreign ports, primarily during construction. In total, the Proposed Action would generate approximately 6,600 vessel trips during the construction and installation phase. However, vessels would be required to adhere to existing state and federal regulations related to ballast and bilge water discharge, and adherence to these regulations would reduce the likelihood of discharge of ballast or bilge water contaminated with invasive species. Overall, the potential impacts on benthic resources as described in Section 3.5.2.3, *Impacts of Alternative A – No Action on Benthic Resources,* from accidental releases due to the Proposed Action, should any occur, is expected to be moderate.

Anchoring: Vessel anchoring from the Proposed Action would cause short-term impacts in the immediate area where anchors and chains meet the seafloor, resulting in up to 441.8 acres (178.8 hectares) of seabed disturbance. Impacts on benthic resources would be greatest for sensitive benthic habitats (e.g., eelgrass beds, hard-bottom habitats). All impacts would be localized, turbidity would be temporary, and mortality from physical contact would be recovered in the short-term. Where eelgrass is present within all three landfall locations under consideration for the Falmouth ECC, HDD is proposed to avoid impacts with a punchout location deeper than the deepest eelgrass extent. While anchor placement and chain sweep may damage seagrass blades, anchor drag and retrieval may damage or uproot seagrass rhizomes, which may take years to recover (Orth et al. 2017). While avoidance of impacts on sensitive habitats from anchoring may not always be possible, to minimize anchoring impacts, SouthCoast Wind has committed to avoiding habitat loss to benthic resources during construction by selecting lower impact construction methods, where possible, which would include avoiding anchoring on sensitive habitat (COP Volume 2, Section 16, Table 16-1; SouthCoast Wind 2024). Impacts are anticipated to be minor to moderate.

Cable emplacement and maintenance: Cable emplacement activities would result in mortality, injury, or displacement of benthic fauna in the path of construction as well as possible damage to sensitive habitats such as SAV. SouthCoast Wind would use HDD for the installation of the offshore export cables beneath the shallower nearshore areas at all landfall locations, which is expected to substantially reduce impacts of sediment disturbance on SAV resources and avoid direct physical disturbance to eelgrass at the offshore export cable approach to the Falmouth landfalls. The final cable corridor selection and cable micro-routing within the selected corridor in the northern portion of the Falmouth ECC and Muskeget Channel will further seek to avoid complex habitats that may be expected to have a slower recovery to preconstruction conditions. The presence of eelgrass beds would be considered in the evaluation of export cable corridor landfall locations, and while HDD exit pit dredging is anticipated to disturb the seabed, it would be located outside of eelgrass beds and planned to only disturb 0.10 acre

(404.7 square meters) of benthic area per HDD exit pit (SouthCoast Wind 2024). Based on modeling, turbidity levels associated with the HDD exit pit dredging in Falmouth had concentrations exceeding 100 mg/L (0.0008 lb/gal) at a maximum distance of 188 feet (36 meters) and affecting a cumulative area not exceeding 1 acre (0.4 hectare; SouthCoast Wind 2024). Modeling of HDD exit pit dredge impacts for Brayton Point revealed concentrations exceeding 100 mg/L at a maximum distance of 0.75 mile (1.2 kilometers) and contained within an average of 29 acres (12 hectares). Although an eelgrass burial experiment has shown that increased mortality can occur with sediment burial of 25 percent of the eelgrass blade height over multiple weeks (Mills and Fonseca 2003), the small area of sediment disturbance of each HDD exit pit would have far less sedimentation and would occur temporarily. Eelgrasses are known to tolerate short-term periods of naturally increased turbidity during storm events (Lewis and Erftemeijer 2006), and suspended sediments from HDD are not expected to negatively affect adjacent eelgrass beds.

Within the Project area, SAV presence was found in the northern portion of the Falmouth, Massachusetts ECC and near the shoreline closest to the southern Aquidneck Island landfall. No eelgrass or macroalgae were found to be present in the southern part of the ECCs or the Lease Area (SouthCoast Wind 2024). Under the Proposed Action, there are three landfall locations under consideration for the Falmouth ECC: Worcester Avenue (preferred), Central Park, and Shore Street, with varying degrees of potential impacts on SAV. Continuous SAV bed coverage, consisting primarily of eelgrass was identified on the approach to both Mill Road and the Shore Street landfall sites. SAV at the Worcester Avenue approach was sparsely distributed in comparison with Mill Road and Shore Street with several large areas devoid of SAV. However, shallower depths present at the Worcester Avenue approach allows SAV to extend farther offshore (SouthCoast Wind 2024).

Cable laying and construction would also result in the resuspension and nearby deposition of sediments as discussed in the COP Volume 2, Section 6.6.2.2.1 (SouthCoast Wind 2024). In areas where displaced sediment is thick enough, organisms may be buried, which could result in mortality of benthic organisms through smothering, irritation to respiratory structures, or a reduction in feeding success. However, benthic species have a range of susceptibility to sedimentation based on life stage, mobility, and feeding mechanisms. To assess the potential impacts from cable emplacement (including HDD exit pit), Scour Modeling and Sediment Plume Impact Modeling were conducted (COP Appendix F1 and Appendix F3; SouthCoast Wind 2024). Within all simulated scenarios, the maximum total suspended solids level dropped below 10 mg/L within 2 hours and below 1 mg/L after less than 4 hours (SouthCoast Wind 2024). The redeposition of sediment in the Lease Area and offshore export cable corridors is expected to occur relatively locally. A majority of the released mass is expected to settle quickly and not be transported for long by currents. Deposition thickness which exceeds 0.20 inch (5 millimeters) is limited to a maximum width of 79 feet (24 meters) around each cable route. Within the vicinity of the interarray cables and in deeper sections of the offshore export cable routes, a thicker layer of deposits was observed over a smaller area due to lower current speeds leading to decreased rates of sediment transport away from the cable installation site.

The seafloor would be disturbed by cable trenches, dredging (if required), anchoring, and cable protection. Offshore construction could also cause adverse impacts on benthic communities from loss or conversion of habitat. Based on the activities described in the COP, the Proposed Action may affect SAV at the Falmouth ECC landfall site; however, HDD allows for the cable to go into a punchout location deeper than the deepest extent of eelgrass observed in SAV surveys and avoid direct impacts on any areas with potential to support SAV beds (SouthCoast Wind 2024). Habitat features in the form of ridges and troughs, sand waves, and boulders (greater than 20 inches [50 centimeters]) are present in the Lease Area and ECCs; however, disturbance for cable emplacement would be temporary and short term. Estimates of maximum seabed preparation impacts is estimated as 5 percent sand wave dredging, 10 percent boulder clearance, and a grapnel run over all cable routes within the Lease Area (refer to the EFH Assessment for more detail). This would occur over a total of 302 acres (122 hectares) within the Lease Area between the interarray cable routes (99 acres [40 hectares]) and the two ECCs (203 acres [82 hectares]). Furthermore, cable emplacement and maintenance activities may flatten depressions and small sand waves, temporarily reducing benthic habitat suitability for species within the cable footprint. Prey organisms that use these habitats would also be displaced, potentially affecting habitat suitability for fish species. Trenching may leave behind temporary depressions. The extent of these natural features is difficult to quantify, as they are continually reshaped by natural sediment transport processes. Natural recovery from anthropogenic disturbance is likely to occur within several months of the disturbance, depending on timing relative to winter storm events. Due to their mobility, it is expected that the sand wave profiles would rapidly return after cable installation. Although it is anticipated that hydrodynamics would be altered by the presence of structures, it is not expected that this would be to a degree that prevents the processes of sand wave formation and migration.

Substantial impacts on seagrass outside of the immediate vicinity of the cable routes due to sedimentation from the one-time installation of cables are unlikely. Seagrasses have vertical structure that can accommodate a degree of burial greater than would be expected from the one-time resuspension and settling of dredged material (Lewis and Erftemeijer 2006). In most locations, the affected areas are expected to recover naturally, and impacts associated with jet plow cable installation are expected to recover in a matter of weeks, allowing for rapid recolonization (MMS 2009). Mechanical trenching, which could be used in coarser sediments, could result in more-intense disturbances and a greater width of the impact corridor, and corresponding seabed scars are expected to recover naturally. As with other impacts related to disturbance of benthic habitat, benthic assemblages would be expected to recover in the short term, resulting in negligible impacts on benthic resources.

BOEM expects the Proposed Action to lead to unavoidable, short- to long-term impacts on benthic resources from this IPF. Despite unavoidable mortality, damage, or displacement of invertebrate organisms, the area affected by the construction footprint for interarray cable emplacement would be just 1 percent of the 127,388-acre (51,552-hectare) Lease Area, and the area affected within the ECCs would similarly represent a small fraction of available benthic habitat. BOEM does not expect population-level impacts on benthic species (i.e., generally accepted ecological and fisheries methods would be unable to detect a change in population, which is the number of individuals of a particular species that live within the geographic analysis area) as a result of the Proposed Action. Benthic fauna would recolonize disturbed areas that have not been displaced by new structures in the short term (Byrnes et al. 2004). Impacts may also result from associated sediment deposition and burial. Recovery of seagrass following benthic disturbance may occur over longer time frames, extending into long-term impacts over multiple years.

Sediment in the Lease Area is largely classified as CMECS Subclass Fine Unconsolidated Substrate (Section 3.5.2.1, *Description of the Affected Environment and Future Baseline Conditions*). Array cables in the Lease Area would be installed via hydroplow where possible, with alternative methods to include use of a jetting tool (jetting ROV or jetting sled), vertical injection, mechanical cutting ROV system, and plowing (pre-cut and mechanical). Several of these methods use water withdrawals that could entrain benthic larvae (MMS 2009). Due to the limited duration and area involved, BOEM does not expect population-level impacts. The consequences of increased turbidity caused by this IPF are discussed in Section 3.4.2, *Water Quality*.

Benthic recovery processes are relevant to understanding the likely duration of impacts on benthic resources. Neighboring benthic communities that have similar habitats and assemblages would recolonize disturbed areas. Succession would begin with more mobile, early colonizer species with progression toward a mature assemblage over time. The restoration of marine soft-sediment habitats occurs through a range of physical (e.g., currents, wave action) and biological (e.g., bioturbation, tube building) processes (Dernie et al. 2003). Impacts and recovery times would vary depending on habitat types, which can generally be separated into the high-energy oceanic environment versus the low-energy estuarine environment. In general, physical processes are more important in high-energy environments, while biological processes dominate in low-energy environments. In high-energy environments, repopulation can often be largely attributed to bedload transport of adult and juvenile organisms. Recovery of invertebrate communities in low-energy environments is more dependent upon larval settlement and recruitment and adult migration. Therefore, rates of recolonization and succession can vary considerably among benthic communities. Recovery of the benthic species would likely require several months to a year or more (Dernie et al. 2003; Lewis et al. 2002). Recovery to a preconstruction state may take 2 to 4 years or more (Van Dalfsen and Essink 2001; Boyd et al. 2005). Fauna in dynamic environments are prone to natural sediment movement and deposition due to strong tidal currents and waves. Therefore, they are able to recover from disturbances more rapidly. Benthic meiofauna are known to recover from sediment disturbances more rapidly than the macrobenthos; recolonization up to pre-disturbance densities has occurred within weeks or less, and entire assemblages have recovered within 90 days (MMS 2009). Within the Offshore Project area, benthic communities are expected to recolonize post-construction activities within months to years following disturbances (SouthCoast Wind 2024). Benthos in coarse sediment and hard-bottom areas of the ECCs are expected to recover slower than the flatter, noncomplex areas in the Lease Area and soft-bottom portions of the ECCs. Therefore, recolonization of benthic organisms in the complex habitat area of the northern Falmouth ECC (beginning in the Muskeget Channel) is expected to occur over a longer period of time. Similarly, the complex glacial moraine habitat within the Rhode Island Sound portion of the Brayton Point ECC will likely be recolonized more slowly than the soft-bottom areas of the northern Brayton Point ECC and Lease Area.

During construction, seabed profile alterations resulting from the Proposed Action could lead to short-term impacts including habitat alteration, injury, and mortality. Under the Proposed Action alone, the impacts on benthic resources from seabed profile alterations, including injury, mortality, and short-term habitat disturbance, would be negligible. Overall impacts of cable emplacement on benthic habitats are anticipated to be negligible to moderate, depending on the location and the method of cable emplacement. Most adverse impacts would be avoided, and adverse impacts that do occur would be temporary or short term in nature.

Non-routine activities that could affect benthic resources include intensive corrective maintenance that would require exposing the cable or foundations for maintenance or require extensive anchoring. This would require the same tools used in installation and would have similar impacts via disturbance to the seafloor (e.g., mortality, sedimentation). However, the disturbance would not exceed that caused by the initial installation, and the affected area should be substantially smaller.

Discharges/intakes: There would be increased potential for discharges from vessels during construction, operations, and decommissioning. Offshore-permitted discharges would include uncontaminated bilge water and treated liquid wastes. There would be an increase in discharges, particularly during construction and decommissioning, and the discharges would be staggered over time and localized. Impacts on benthic resources from vessel discharges, if any, would be localized, short-term, and negligible.

During operation, there would be increased intake and discharge from the HVDC converter OSP(s) in the Lease Area, which requires continuous cooling water withdrawals and subsequent discharge of heated effluent back into receiving waters. SouthCoast Wind developed a NPDES permit application for one offshore HVDC converter OSP in the Lease Area for Project 1 (Appendix B, Figure B-2) (TetraTech and Normandeau Associates, Inc. 2023). If SouthCoast Wind selects HVDC technology for Project 2, the parameters and modeling results from the NPDES permit application for Project 1, described below, would be representative of a HVDC converter OSP for Project 2 located in the southern portion of the Lease Area.

The HVDC converter OSP is expected to withdraw cooling water from the ocean at a rate of approximately 9.9 million gallons per day and maintain an intake velocity of 0.5 feet per second or less. Raw seawater will be withdrawn through up to three intake pipes located 81 feet (24.7 meters) above the seafloor and 74 feet (22.6 meters) below the surface. Seawater intake pipes are fitted with an in-built pump strainer with a typical outer screen size of 0.375 inch (9.5 millimeters) intended to protect the seawater lift pump impeller from debris in the water column. Each OSP pump flowline is also equipped with a dedicated filter (typical mesh size of 250 micrometers), intended to protect the equipment and ensure reliable operation of the CWIS (TetraTech and Normandeau Associates, Inc. 2023).[2]

The potential effects on benthic resources may occur during water withdrawals and would include the entrainment of eggs and larval life stages. In the absence of site-specific plankton densities, SouthCoast

[2] Additional characteristics of the Cooling Water Intake System at the SouthCoast Wind OSP Converter Station are included in the NPDES permit application submitted to the USEPA in October 2022 and revised in August 2023 (TetraTech and Normandeau Associates, Inc. 2023).

Wind, in their NPDES permit application, evaluated an impact assessment for the Northeast Gateway Project where a bioenergetic model was used to address impacts of the removal of zooplankton and small fish. While the model was ultimately used to assess removal of excessive biomass of prey items beyond natural variability and recovery rates, the Northeast Gateway Project was expected to utilize up to 56 million gallons per day and was found to have negligible impacts on the entrainment of zooplankton. Therefore, SouthCoast Wind OSP operations, which will use considerably less cooling water (up to 9.9 million gallons per day), is expected to entrain proportionally lower numbers of zooplankton. SouthCoast Wind further estimated entrainment abundance of ichthyoplankton from cooling water withdrawal at the OSP using EcoMon plankton data from 1977 through 2019. Given the limitations of recent data immediately in the vicinity of the intake location, the minimum, mean, and maximum larval densities observed within 10 miles (16 kilometers) of the OSP location over the full time series were used to extrapolate the range of entrainment abundance assuming a water withdrawal rate of 9.9 million gallons per day. The annual entrainment abundance of fish larvae was estimated to range from 8.3 million to 174.4 million with a mean estimate of 83.2 million. Based on monthly mean larval densities and excluding unidentified fish, the taxa with the highest estimated larval entrainment annually were hakes (*Urophycis* spp.: 3.9 million), Atlantic herring (*Clupea harengus*: 3.9 million), sand lances (*Ammodytes spp.*: 3.3 million), summer flounder (*Paralichthys dentatus*: 1.3 million) and silver hake (*Merluccius bilinearis*: 0.5 million (TetraTech and Normandeau Associates, Inc. 2023).[3]

The potential effects on benthic resources may also arise from thermal impacts due to subsequent heated discharge effluent released back into receiving waters. SouthCoast Wind modeled the thermal plumes of the discharged cooling seawater from the OSP, and results indicated localized increases in water temperature within the vicinity of the discharge location. Based on the modeling results, however, the effluent discharges were found to be minimal. From four modeled maximum temperature delta scenarios in the fall, winter, spring, and summer (TetraTech and Normandeau Associates, Inc. 2023), the distance from the discharge point where the temperature delta reached 1°C (33.8°F) was found to be 41.9 feet (12.8 meters) in the fall, 84.9 feet (25.9 meters) in the winter, 67.5 feet (20.6 meters) in the spring, and 46.6 feet (14.2 meters) in the summer. The effluent plume area was highest in the winter at 792.1 square feet (73.6 square meters) and lowest in the fall at 407.0 square feet (37.8 square meters). These results indicate that impacts to ocean temperature are minimal when the maximum temperature deltas occur and that the water quality standard allowed for by the Ocean Discharge Criteria is expected to be met well within the 330-foot (100-meter) radius mixing zone for initial dilution of discharges (TetraTech and Normandeau Associates, Inc. 2023). Similar impacts would

[3] As further described in the NPDES application (TetraTech and Normandeau Associates, Inc. 2023), due to limitations in the available data, there are uncertainties in these results. For example, entrainment estimates do not fully capture the annual entrainment abundance of all fish and life stages, as all fish eggs and the larvae of less common taxa are excluded from the publicly available EcoMon data set. Additionally, the estimates assume the 1977–2019 time series is representative of the current and future species composition, and that abundance will remain constant each year. The data also represents sampling of ichthyoplankton at various depths, whereas the OSP intake would withdraw water from a discrete depth in the water column (81 feet [24.7 meters] above the seafloor). This may result in overestimation of larval entrainment, as individuals settling in demersal habitats or floating on the surface may not be susceptible to the intake flow.

be anticipated if SouthCoast Wind selects an additional HVDC converter OSP for the southern portion of the Lease Area for Project 2.

While BOEM expects an increase in discharges and intakes during O&M, impacts on benthic resources from the HVDC converter OSP would be long term and minor.

EMFs: During operation, powered transmission cables would produce EMFs (Taormina et al. 2018). To minimize EMFs generated by cables, all cabling under the Proposed Action would include electric shielding (COP Volume 2, Section 16, Table 16-1; SouthCoast Wind 2024). The strength of the EMF increases with electrical current, but rapidly decreases with distance from the cable (Taormina et al. 2018). SouthCoast Wind proposes to bury interarray and export cables to a target depth of 6 feet (1.8 meters). Due to variable conditions in the Lease Area and along the proposed ECC routes, the anticipated burial depth ranges from 3.2 feet (1.0 meter) to 8.2 feet (2.5 meters) for interarray cables and from 3.2 feet (1.0 meter) to 13.1 feet (4.0 meters) for export cables, well below the aerobic sediment layer where most benthic infauna live. Final burial depths would be determined following detailed design. The SouthCoast Wind PDE includes a maximum-case scenario for up to five export cables of 345 kV HVAC in the Falmouth ECC, if Falmouth is selected for Project 2, and up to six export cables 320 kV HVDC in the Brayton Point ECC. Interarray cables will have a nominal voltage of 60–72.5 kV. In some areas, it is possible that cable would be unable to be buried to the target depth and would instead be placed on or near the seafloor with overlying cable protection. Impacts of EMFs are anticipated to be greater where this occurs, as the distance between the cable and biological receptors would be reduced.

The scientific literature provides some evidence of faunal responses to EMFs by marine invertebrates, including crustaceans and mollusks (Hutchison et al. 2018; Taormina et al. 2018; Normandeau et al. 2011), although some reviews (Gill and Desender 2020 and Albert et al. 2020) indicate the relatively low intensity of EMFs associated with marine renewable projects would not result in impacts. Effects of EMFs may include interference with navigation that relies on natural magnetic fields, predator/prey interactions, avoidance or attraction behaviors, and physiological and developmental effects (Taormina et al. 2018). For example, *Cancer* crabs were attracted to EMFs exposed shelters and showed significant reductions in their time spent roaming (Scott et al. 2021). However, this experiment tested response behaviors at EMF values two to three orders of magnitude greater than those detected from offshore wind submarine cables (Normandeau et al. 2011). Studies on the effects of EMFs on marine animals have mostly been restricted to commercially important species (Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*) and the consequences of anthropogenic EMFs on benthic resources have not been well studied (Gill and Desender 2020; Albert et al. 2020; Snyder et al. 2019). Jakubowska-Lehrmann et al. (2022) examined EMF exposure effects (50 Hz) on the bioenergetics and physiological processes in the cockle (*Cerastoderma glaucum*). Increased protein carbonylation was observed with a significant inhibition of acetylcholinesterase activity indicating neurotoxicity and oxidative damage to the species. Malagoli et al. (2004) exposed the mussel (*Mytilus galloprovincialis*) to EMFs (50 Hz) and observed the expression of heat shock proteins indicating a cellular stress response.

While considered a localized phenomenon, electricity produced during operation may increase temperatures within the direct vicinity of interarray and export cables, specifically, the surrounding sediment and water where benthic resources reside (Riefolo et al. 2016; Tabassum-Abbasi et al. 2014). Thermal impacts are expected to result in a slight increase in temperature a few centimeters from cables and benthic resources within the general vicinity may experience negative effects from the increased temperature (Tabassum-Abbasi et al. 2014). Chemical and physical properties of the substratum may also be affected by increased temperature resulting in spatial changes in benthic community structure, physiological changes to benthic organisms, and an alteration of the oxygen concentration profile, which could then indirectly impact the development of microorganisms (Taormina et al. 2018). The heat emitted by HVAC cables would be higher than that of HVDC cables at an equal transmission rate (Taormina et al. 2018). Further studies need to be completed to accurately assess long-term impacts of EMFs on the surrounding ecosystem as in-situ investigations are lacking.

CSA Ocean Sciences, Inc. and Exponent (2019) found that offshore wind energy development as currently proposed would have minor effects, if any, on benthic resources. Although demersal biota are the most likely to be exposed to the EMFs from power cables, potential exposure would be minimized because an EMF quickly decays with distance from the cable source (CSA Ocean Sciences, Inc. and Exponent 2019). Project-specific modeling confirmed that EMFs diminished rapidly with distance (COP Appendix P1; SouthCoast Wind 2024). In the case of mobile species, an individual exposed to EMFs would cease to be affected when it leaves the affected area. An individual may be affected more than once during long-distance movements; however, there is no information on whether previous exposure to EMFs would influence the impacts of future exposure. Therefore, BOEM expects effects from EMFs due to the Proposed Action to have long-term, localized, and minor impacts on benthic resources.

Gear utilization: SouthCoast Wind's fisheries and benthic monitoring plans (SMAST 2024; INSPIRE 2023a; INSPIRE 2024) propose a variety of survey methods to evaluate the effects of construction and operations on benthic habitat structure and composition and economically valuable fish and invertebrate species. The survey methods are explained in detail in Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, which includes a discussion on the effects of gear utilization on prey species. The proposed survey methods include acoustic telemetry, drop camera, demersal trawl, ventless trap/pot, Neuston net sampling, video/photography surveys, sediment grab sampling, and SPI/PV. In addition to specific requirements for monitoring during the construction period, periodic PAM deployments may occur over the life of the Project for other scientific monitoring needs. All requirements of the Proposed Action will follow BOEM's 2021 Project Design Criteria and Best Management Practices (BOEM 2021c) to limit interactions with protected species.

Impacts from gear utilization related to benthic and fisheries monitoring surveys performed in support of the Proposed Action would likely range from negligible to minor. Impacts from the surveys are expected to be localized, and soft-bottom habitats would be expected to recover fairly quickly from the disturbance in the short term; however, disturbance to hard-bottom habitat would take longer to recover from. The time period for recovery would depend on the mobility and life stage of each species, with sessile organisms less able to avoid impacts and mobile organisms more able to avoid impacts.

Noise: The Proposed Action would result in noise from G&G surveys, WTG O&M, pile driving, and cable burial or trenching. The natures of these sub-IPFs and of their impacts on benthic resources are expected to be similar to that described under the No Action Alternative for other wind farm projects and have been previously described in Section 3.5.2.3, *Impacts of Alternative A – No Action on Benthic Resources*.

The most substantial noise produced from the Proposed Action would be from pile driving during installation of up to 149 foundations. Given that most benthic species in the region are either mobile as adults or planktonic as larvae, disturbed areas (either through injury or mortality) would likely be recolonized naturally. Other sources of noise, including G&G surveys, WTG operation, and cable trenching, would be of lower magnitude and, therefore, less impactful, even if they occur over larger geographic areas. If injury or mortality occurred to benthic organisms, the affected areas would likely be recolonized in the short-term, and no population-level impacts would be expected. Impacts would therefore be localized and short-term, and may be negligible to minor, depending on the duration of activities.

Port utilization: The Proposed Action would not directly result in any port-expansion or construction activities and would therefore not have direct impacts on benthic resources from these activities. Likewise, any port improvements are not dependent on the Proposed Action being analyzed in this EIS. However, multiple projects are proposed to increase port capacity that may support the Proposed Action. Impacts on benthic resources from port construction or upgrades would be local to those ports and would support not just the Proposed Action but other offshore wind projects and general maritime activity as well. Any increase in port utilization would be highest during construction, minor during operation, and moderate during decommissioning. Impacts on benthic resources would be localized and minor.

Presence of structures: Under the Proposed Action, the presence of structures could result in various impacts as described in Section 3.5.2.3. The Proposed Action would install up to 147 WTG foundations, resulting in up to 660.3 acres (271.3 hectares) of temporary and permanent seabed disturbance (combined area of foundation and scour protection), assuming suction bucket jacket foundations (largest of the proposed foundation types) are used for up to 85 WTG positions with the remaining WTG positions using piled jacket foundations. The total permanent footprint for two additional piled jacket foundations for OSPs (combined area of foundation and scour protection) could result in up to 19.6 acres (7.4 hectares) of permanent seabed disturbance.

The presence of structures would increase the risk of gear loss or damage by entanglement. The lost gear, moved by currents, can disturb, injure, or kill benthic resources. The impacts at any one location would likely be localized and short to long-term, although the risk of occurrence would persist if the structures and debris remain. Overall, this is anticipated to have a minor impact on benthic resources.

Once construction is complete, the presence of the WTG and OSP foundations could result in some alteration of local water currents, which could produce sediment scouring and alter benthic habitat. Local changes in scour and sediment transport close to a foundation may alter sediment grain sizes and benthic community structure (Lefaible et al. 2019), though this impact is expected to be minimal due to the use of scour protection for each foundation. These effects, if present, would exist for the duration of the Proposed Action and would be reversed only after the Project has been decommissioned, although they may be permanent if scour protection is left in place.

Results from recent hydrodynamic modeling studies specific to U.S. offshore wind developments in the Southern New England region and the effects of wind farm structures on larval transport and dispersal (Chen et al. 2021; Johnson et al. 2021) found that WTGs alter vertical mixing, horizontal advection, and horizontal turbulent dispersion (Chen et al. 2021) and that the introduction of the offshore wind structures into the offshore WEA modifies the oceanic responses of current magnitude, temperature, and wave heights by (1) reducing the current magnitude through added flow resistance, (2) influencing the temperature stratification by introducing additional mixing, and (3) reducing current magnitude and wave height by extracting energy from the wind (Johnson et al. 2021). Both studies found discernable changes in larval dispersion and settlement for their target species (Chen et al. 2021: Atlantic sea scallop; Johnson et al. 2021: Atlantic sea scallop, silver hake, summer flounder) resulting from the hydrodynamic effects of wind turbine structures. However, these localized impacts were not considered to be biologically significant at population levels for species like hake and scallops that spawn over broad areas across the Southern New England region (Johnson et al. 2021). As model results from Chen et al. (2021) and Johnson et al. (2021) are limited by their temporal, spatial, or species-specific input parameters, future modeling studies should focus on assessing impacts over multiple years and spawning seasons to reveal long-term structural shifts in larval settlement patterns, analyzing additional species and life stages, and evaluating impacts from multiple offshore wind development scenarios and locations (Hogan et al. 2023).

Vertical structures in the water column would also create turbulence that can transport nutrients upward toward the surface. The introduction of nutrients from deep waters into the surface mixed layer can lead to a local increase in primary production (Floeter et al. 2017). These changes have been reported to increase food availability for filter feeders such as blue mussels (Slavik et al. 2019) on and near the structures, which, in turn, leads to increased densities of mobile invertebrates (e.g., crabs, lobsters), attraction and diet modification of pelagic and demersal fish, and foraging opportunities for marine mammals (Coates et al. 2014; Dannheim et al. 2020; English et al. 2017).

The presence of structures would also result in new hard surfaces that could provide new habitat for recruitment of hard-bottom species and structure-oriented communities (Daigle 2011). The addition of new substrate could provide steppingstones for invasive species colonization (Coolen et al. 2020). Nonnative benthic invertebrates found within the vicinity of the Project area include but are not limited to *Ascidiella aspersa*, *Botrylloides violaceus*, *Diplosoma listerianum*, *Styela clava, Botryllus schlosseri, Bugula neritina, Tricellaria inopinata, Membranipora membranacea, Ostrea edulis,* and *Diadumene lineata* (Agius 2007; Mass.gov 2022). The invasive tunicate *Didemnum vexillum* (*D. vexillum*) has additionally been expanding its presence in New England waters and was identified within the Project area (COP, Appendix M.2; SouthCoast Wind 2024). Benthic monitoring at the Block Island Wind Farm has shown that this species is part of a diverse faunal community on morainal deposits and is an early colonizer along the edges of anchor scars left in mixed sandy gravel with cobbles and boulders

(Guarinello and Carey 2020). Four years after construction at the Block Island Wind Farm*, D. vexillum* was common on WTG structures (HDR 2020). Studies have shown that activities that cause fragmentation of *D. vexillum* colonies can facilitate its distribution (Lengyel et al. 2009; Morris and Carman 2012). Turbine and cable installation within hard-bottom habitat where *D. vexillum* is present could fragment the invasive colonies (Morris and Carman 2012). The addition of new artificial substrate used for cable and scour protection and the presence of WTG structures may provide habitat for this invasive tunicate.

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). Studies have found increased diversity and biomass for benthic fish and invertebrates around foundation structures in the offshore environment (Lefaible et al. 2019; Raoux et al. 2017; Pezy et al. 2018). In addition to providing new habitat for hard-substrate organisms, Tong et al. (2022) showed that novel artificial substrate like WTG foundations provide excellent bacterial colonization and that these new structures display higher bacterial diversity than 10-year-old structures and control sites. This indicates that offshore wind farms can generate some beneficial impacts on local ecosystems. Studies show that 95 percent of biomass on artificial structures is composed of suspension-feeding species, many of which are resource flexible (Coolen et al. 2020; Mavraki et al. 2020a). This abundance of suspension feeders can cause a “biofilter” effect and decrease overall turbidity and increase light penetration (Reichart et al. 2017; Mavraki et al. 2020b). These communities are also known to contribute larger deposition of fecal pellets (Maar et al. 2009), which ultimately decreases sediment pore size and increases humic acid and sulfide concentrations from increased bacterial decomposition, which can affect sediment pH (Tong et al. 2022). However, some impacts such as the loss of soft-bottom habitat may be adverse depending on the resource affected. Similar effects would be expected from the use of scour protection and concrete mattresses for cable protection at cable-crossing locations. SouthCoast Wind anticipates a maximum of 16 cable-crossing locations along the Brayton Point ECC potentially requiring up to nine concrete mattresses each. Interarray cable crossings may also require cable protection; however, cable-crossing locations along the interarray cable layout have not yet been identified. Colonization of concrete mattresses used for cable protection by epifouling taxa, mobile invertebrates, and benthic fishes has been found to occur in European wind farms. A recent study on artificial hard-substrate colonization at the Hywind Scotland Pilot Park floating offshore wind farm (Karlsson et al. 2022) found species of hydroids, sea stars, crab, lobster, flatfish, and ling inhabiting concrete mattresses used for cable protection 3 years post-construction. It is expected that epifaunal colonization, species succession, and reef effects would also occur on concrete mattresses used within the SouthCoast Wind Project area; however, the magnitude of effects may vary by location and season. BOEM anticipates that the impacts associated with the presence of structures would be long-term and minor to moderate beneficial. The impacts on benthic resources resulting from the presence of structures would persist as long as the structures remain.

Impacts of Alternative B on ESA-Listed Species

No benthic species in the region are ESA-Listed; therefore, no impacts are expected.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind and offshore wind activities. Ongoing and planned non-offshore wind activities that affect benthic resources in the geographic analysis area include dredging, coastal development, offshore construction, submarine cables and pipelines, oil and gas activities, marine minerals extraction, port expansions, and climate change.

The cumulative impacts of accidental releases from ongoing and planned activities on benthic resources would likely range from negligible, localized, and short term (for fuels, hazardous materials, trash/debris) to moderate, possibly widespread, and long term (for invasive species). BOEM assumes all vessels would comply with laws and regulations to properly dispose of marine debris and minimize releases of fuels/fluids/hazardous materials. Additionally, large-scale releases are unlikely and impacts from small-scale releases would be localized and short term, resulting in little change to benthic resources. Most of the risk of accidental releases of invasive species comes from ongoing activities, and the impacts (mortality, decreased fitness, disease) due to other types of accidental releases are expected to be negligible and short-term.

Anchoring impacts from ongoing and planned activities would be localized, short term, and minor due to the relatively small size of the affected areas compared to the remaining area of the open ocean within the geographic analysis area and short-term nature of the impacts. Additionally, Project-related anchoring activity would be limited, as the construction/decommissioning phases would occur over a relatively short window.

There would be increased potential for discharges from vessels during construction, operations, and decommissioning activities related to the Proposed Action and other offshore wind projects; however, it is expected that these discharges would be staggered over time and localized. Many discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated. Cumulative impacts of discharges resulting from ongoing and planned activities would be short term, local, and minor.

Export and interarray cables from the Proposed Action and other offshore wind development would add an estimated 3,961 miles (6,375 kilometers) of buried cable to the geographic analysis area, of which the Proposed Action represents 42 percent, producing EMF in the immediate vicinity of each cable during operation. EMF effects from these projects on benthic habitats could be behavioral or physiological and would vary in extent and significance depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage). BOEM would require planned submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operation. Cumulative impacts of EMFs from ongoing and planned activities in the geographic analysis area would likely be minor and localized based on current research; however, more research is needed to better understand the effects of EMFs on benthic organisms.

Cable emplacement of export and interarray cables would result in mostly short-term impacts from disturbance, injury, and mortality of benthic resources during installation activities. In most locations, the affected areas are expected to recover naturally; for example, seabed scars associated with jet plow cable installation are expected to recover in a matter of weeks, allowing for rapid recolonization (MMS 2009). The Proposed Action in combination with the other offshore wind development within the geographic analysis area is estimated to result in 10,328 acres (4,179 hectares) of seabed disturbance from cable emplacement in the geographic analysis area, of which the Proposed Action represents 38 percent. Simultaneous construction of export and interarray cables from nearby offshore wind projects would have an additive effect, although it is assumed that only a portion of a project's cable system would be undergoing installation or maintenance at any given time. Substantial areas of open ocean are likely to separate simultaneous offshore export and interarray cable installation activities for other offshore wind projects. BOEM expects that the cumulative impacts of cable emplacement and maintenance on benthic resources would be minor to moderate.

Other offshore wind activities would generate comparable types of noise impacts to those of the Proposed Action. The most significant sources of noise are expected to be pile driving. The Proposed Action would contribute 149 structures, or 20 percent, of the total 747 foundations that would be installed within the geographic analysis area. If multiple piles are driven simultaneously and within close proximity to one another, the areas of potential injury or mortality may overlap but that is anticipated to be unlikely and, as described for the Proposed Action, benthic organisms are anticipated to recover quickly. Cumulative noise impacts of the Proposed Action in combination with ongoing and planned activities would be localized, short term, and minor.

Cumulative impacts of port utilization associated with offshore wind-related activities would primarily result in water quality and vessel noise impacts but could also result in habitat alteration associated with port-expansion activity. The Proposed Action would not contribute to port expansion and would have no appreciable change in port utilization. In context of reasonably foreseeable environmental trends, the cumulative impacts on benthic resources from port utilization would be minor.

The Proposed Action, in combination with the other offshore wind activity, would add up to 747 foundations in the geographic analysis area. The presence of these structures could affect local hydrodynamics, increase the risk of gear entanglement and loss, convert soft-bottom habitat to hard-bottom habitat, and increase the risk of establishment of invasive species. Cumulative impacts on benthic resources from presence of structures would be long term and moderate adverse to moderate beneficial.

Conclusions

Impacts of the Proposed Action: Activities associated with the construction and installation, O&M, and conceptual decommissioning in the Wind Farm Area and ECCs would affect benthic resources by causing temporary habitat disturbance; permanent habitat conversion; and behavioral changes, injury, and mortality of benthic fauna. BOEM anticipates the impacts resulting from the Proposed Action would range from negligible to moderate, including the presence of structures, which may result in moderate beneficial impacts. The most prominent IPFs are expected to be new cable emplacement, noise from pile driving, anchoring (particularly where it may affect SAV), and the presence of structures. In general, the impacts are likely to be local and are not likely to alter the overall character of benthic resources in the geographic analysis area. The Proposed Action would result in overall **moderate adverse** impacts on benthic resources, despite benthic resource mortality and short-term or permanent habitat alteration, the resources would likely recover naturally over time. The Proposed Action would also result in **moderate beneficial** impacts associated with the presence of structures and associated addition of structurally complex hard-bottom habitat.

Cumulative Impacts of the Proposed Action: Cumulative impacts from the Proposed Action when combined with impacts from ongoing and planned activities including offshore wind would be moderate adverse and moderate beneficial for benthic resources in the geographic analysis area. The main drivers for this impact rating are bottom disturbance including the emplacement of cables/structures and the long-term presence of structures and scour/cable protection. The Proposed Action would contribute to the cumulative impact rating primarily through temporary impacts due to new cable emplacement and permanent impacts from the presence of structures (i.e., cable protection measures and foundations). BOEM has considered the possibility of a significant impact resulting from invasive species and considers it unlikely; this level of impact could occur if an invasive species were to adversely affect benthic ecosystem health or habitat quality at a regional scale. While it is an impact that should be considered, it is also unlikely to occur, and the incremental increase in this risk due to the Proposed Action is negligible. Although some of the proposed activities and IPFs analyzed could overlap, BOEM does not anticipate that this would alter the overall impact rating. Considering all IPFs together, BOEM anticipates the cumulative impacts on benthic resources from ongoing and planned activities, including the Proposed Action, would be **moderate adverse**, with some **moderate beneficial** impacts because they would not result in population-level effects.

3.5.2.6 Impacts of Alternative C on Benthic Resources

Impacts of Alternative C: Under Alternative C, the Brayton Point offshore export cable would be routed onshore (through Aquidneck Island, Rhode Island under and through Little Compton/Tiverton, Rhode Island under Alternative C-2) to avoid fisheries impacts in the Sakonnet River. Alternative C-1 would make landfall at Sachuest Beach on Aquidneck Island and reduce the offshore portion of the Brayton Point ECC by 9 miles (14 kilometers). This 10 percent decrease in offshore cable length would result in approximately 52 fewer acres (21 hectares) of seabed disturbance compared to the Proposed Action (Table 3.5.2-2). Alternative C-2 would reduce the offshore portion of the Brayton Point ECC by approximately 12 miles (19 kilometers). This 12.7 percent decrease in offshore cable mileage would result in 70 fewer acres (28 hectares) of seabed and benthic habitat disturbance compared to the Proposed Action (Table 3.5.2-2).

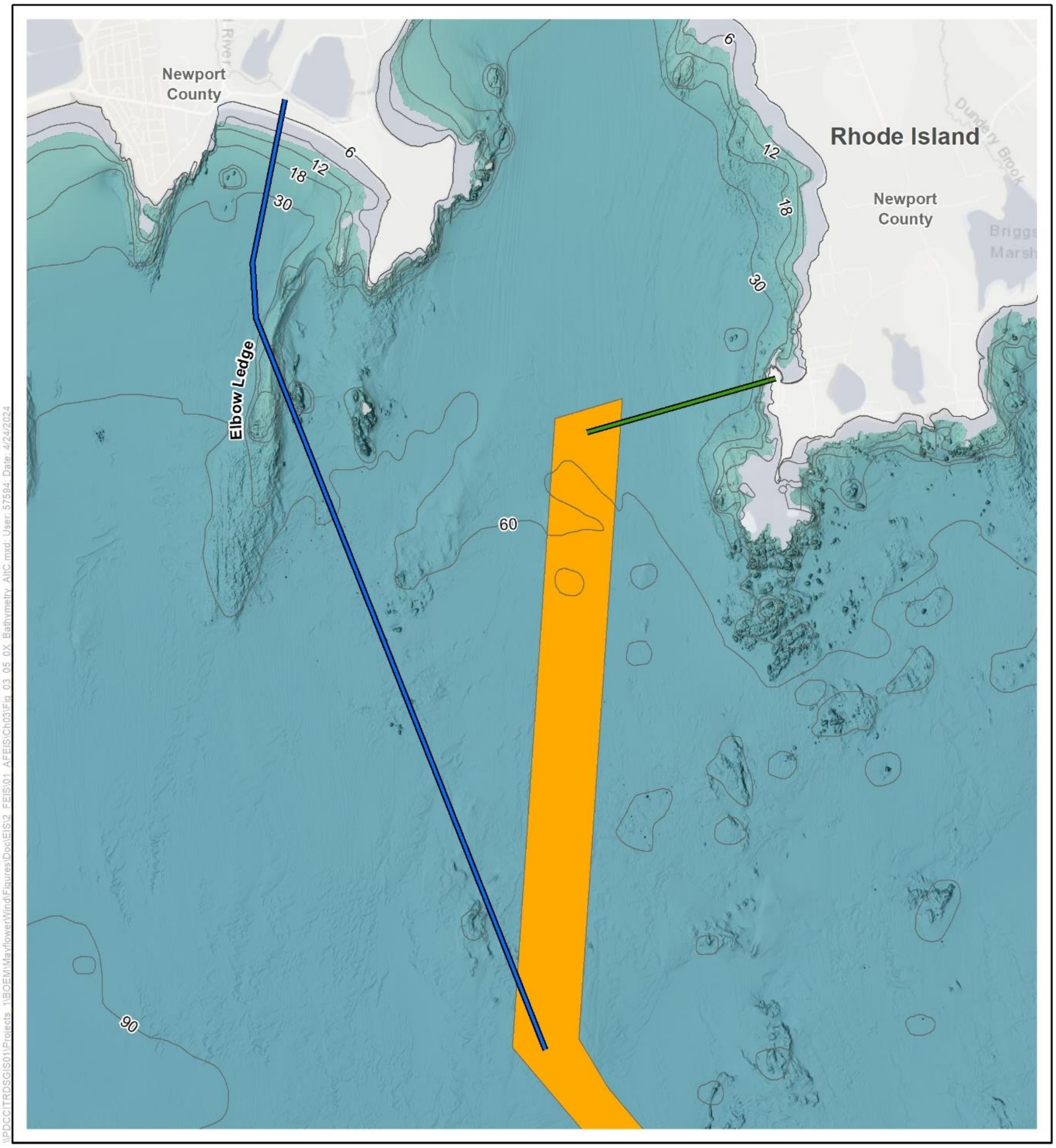
The Sakonnet River contains a mix of soft-bottom and complex substrates, which can be important benthic habitats for fish and invertebrates. In a few locations, live *Crepidula* reefs or *Crepidula* shell hash were found on the sediment surface overlying reduced silt (COP Appendix M.2; SouthCoast Wind 2024), which is a biogenic habitat that also adds complexity to the seafloor. Of the Brayton Point ECC within

Rhode Island state waters, of which the majority is within the Sakonnet River and Mount Hope Bay, 62 percent of benthic sediments are sand or finer. *Crepidula* substrate was also mapped exclusively within the Sakonnet River and Mount Hope Bay across 1,305 acres (528 hectares) or 22 percent of all Rhode Island state waters. This complex habitat along with some boulder fields in Mount Hope Bay are EFH for many species, and Alternatives C-1 and C-2 would reduce impacts on benthic resources by reducing the length of offshore cable and there would be fewer impacted acres. Because the cables would be routed onshore (Chapter 2, Figure 2-6), Alternative C would completely avoid impacts on these habitats in the Sakonnet River. The area of estuarine benthic disturbance would also decrease under both Alternative C-1 and Alternative C-2. However, the long-term effects of avoiding construction through these habitats is difficult to quantify. Impacts associated with cable emplacement in complex or sensitive habitats such as areas with *Crepidula* reefs, cobbles, or boulders, may impose long-term or permanent impacts where these habitats are present within the cable route.

While Alternative C would reduce the total area of benthic habitat disturbance, cable emplacement activity would still occur along the rest of the offshore export cable and result in localized sediment suspension and habitat disturbance. The portions of Alternative C-1 and Alternative C-2 cable corridors that occur outside of the Proposed Action's cable corridor (approximately 6 miles [9.7 kilometers] under Alternative C-1 and 4 miles [6.4 kilometers] under Alternative C-2) have not been surveyed for the Project, and, therefore, the specific benthic resources that would be affected are not fully known at this time. However, to support BOEM's analysis of the alternatives, SouthCoast Wind commissioned a geohazard desktop study that evaluated geological features and other constraints associated with both Alternative C-1 and Alternative C-2 (TetraTech 2023) and a desktop benthic study using available site-specific and regional benthic data for Alternative C-1 (INSPIRE 2023b). No SAV beds were found proximate to the Alternative C-1 landfall site. Within the 6-mile portion of the Alternative C-1 route toward the Aquidneck Island landfall, all of the over 20 USGS benthic grab samples consisted of Muddy Sand and Sand, except for one Gravel sample near the landfall location at Sachuest Beach (INSPIRE 2023b). However, the Alternative C-1 route would pass through Elbow Ledge, a high relief bathymetric feature with complex habitat composed of sand and gravel to the south of Sachuest Bay (Figure 3.5.2-2) that likely provides hard substrate for attached fauna to grow and supports benthic and demersal species (INSPIRE 2023b). Installing export cable across this shoal would adversely impact this complex habitat and benthic organisms. Impacts on this complex benthic feature under Alternative C-1 and Alternative C-2 could result in greater impacts than the Proposed Action.

Overall, it is anticipated that the impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Project under Alternative C would be similar to those described under the Proposed Action.

Cumulative Impacts of Alternative C: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C would be similar to those described under the Proposed Action.



Alternative C-1 Offshore Export Cable Route
Alternative C-2 Offshore Export Cable Route
Brayton Point Offshore Export Cable Corridor

Source: BOEM 2022, EPA 2022, MAEEA 2022.

N 0 1 2 Miles
1:60,000

Figure 3.5.2-2. Alternatives C-1 and C-2 bathymetry

Impacts of Alternative C on ESA-Listed Species

No benthic species within the region are ESA-Listed; therefore, no impacts are expected.

Conclusions

Impacts of Alternative C: Alternative C-1 and Alternative C-2 would result in a 10 to 12.7 percent reduction in the length of the Brayton Point offshore ECC and fewer acres of disturbed seabed, respectively. However, the construction and installation, O&M, and decommissioning of Alternative C would still result in similar overall impacts as the Proposed Action. Alternative C would result in **moderate adverse** impacts and could include potentially **moderate beneficial** impacts.

Cumulative Impacts of Alternative C: In the context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with Alternative C would be similar to the Proposed Action, and result in **moderate adverse** and **moderate beneficial** impacts on benthic resources in the geographic analysis area because they would not result in population-level effects. Although a measurable impact is anticipated, benthic resources would likely recover completely following decommissioning.

3.5.2.7 Impacts of Alternative D (Preferred Alternative) on Benthic Resources

Impacts of Alternative D: Alternative D would eliminate six WTGs in the northeastern portion of the Lease Area to reduce impacts on foraging habitat along the western edge of Nantucket Shoals. Nantucket Shoals is relatively shallow (less than 164 feet [50 meters]) and an area of high biological productivity (Townsend et al. 2006). This broad area extends south, southeast, and east of Nantucket and contains complex, dunelike topography, which reflects the strong tidal currents (PCCS 2005). This would lead to a reduction of 15.1 acres (6.1 hectares) of total foundation footprint contacting the seabed (combined area of foundation and scour protection) compared to the Proposed Action, assuming monopile foundations. The amount of seabed disturbance from interarray cable installation would also be reduced, with less benthic surface level cable crossings. A roughly 4 percent reduction in WTGs under Alternative D would result in approximately 20 miles (32 kilometers) less interarray cable length in the Lease Area. The removal of up to six WTGs would proportionally reduce the interarray cable footprint of impact by an estimated 56.7 acres (22.9 hectares) from the total 1,408 acres (570 hectares) of impact from the Proposed Action. This would reduce total long-term benthic habitat impacts (Table 3.5.2-2), but the impact magnitude would be the same as the Proposed Action.

Cumulative Impacts of Alternative D: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative D would be similar to those described under the Proposed Action, although with a slightly reduced footprint.

Impacts of Alternative D on ESA-Listed Species

No benthic species in the region are ESA-Listed; therefore, no impacts are expected.

Conclusions

Impacts of Alternative D: Impacts of Alternative D would be reduced compared to impacts of the Proposed Action because of reductions in noise impacts and total seabed and benthic habitat disturbance. Construction and installation, O&M, and decommissioning of Alternative D would result in the same **moderate adverse** impacts as the Proposed Action and could include potentially **moderate beneficial** impacts.

Cumulative Impacts of Alternative D: In the context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with Alternative D would be similar to the Proposed Action and result in **moderate adverse** and **moderate beneficial** impacts on benthic resources in the geographic analysis area. Although a measurable impact is anticipated, benthic resources would likely recover completely following decommissioning.

3.5.2.8 Impacts of Alternative E on Benthic Resources

Impacts of Alternative E: Alternative E includes the use of all piled (Alternative E-1), all suction bucket (Alternative E-2), or all GBS (Alternative E-3) foundations for WTGs and OSPs. Installation activities would not differ between the Proposed Action and Alternative E-1, which assumes pile driving would be used for all foundations with corresponding noise impacts. Under Alternative E-2 and Alternative E-3, no pile driving would occur; therefore, there would be no underwater noise impacts on benthic resources due to pile driving. The avoidance of pile-driving noise impacts would reduce overall construction and installation impacts on benthic resources under Alternative E-2 and Alternative E-3 compared to the Proposed Action.

Of the 149 total foundations, benthic habitat impacts were calculated based on 147 WTGs and two OSPs (Table 3.5.2-2). Under Alternative E-1, 403.3 acres (163.2 hectares) of benthic habitat would be disturbed from 2.6 acres (1.1 hectares) per WTG and 9.8 acres (3.9 hectares) per OSP using piled foundations. Under Alternative E-2, 730.1 acres (295.5 hectares) of benthic habitat would be disturbed from 4.9 acres (2.0 hectares) per WTG and 4.9 acres (2.0 hectares) per OSP using suction bucket foundations. Under Alternative E-3, 1,719.7 acres (695.9 hectares) of benthic habitat would be disturbed from 11.6 acres (4.7 hectares) per WTG and 10.9 acres (4.4 hectares) per OSP using GBS. The maximum total dredging volume of all foundations combined for GBS installation would be 111,973,203 cubic feet (3,170,728 cubic meters).

GBS foundations would lead to the greatest area of habitat conversion from soft sediments to hard vertical structure due to foundation footprint and scour protection. Alternative E-1 would result in a 77 percent reduction in footprint and scour protection, and Alternative E-2 would result in a 58 percent reduction in footprint and scour protection, compared to Alternative E-3. GBS foundations could also increase the risk of spreading invasive species from the increased surface area and scour protection. SouthCoast Wind may use GBS made of concrete, which may be more porous and susceptible to being colonized by marine organisms than piled and suction bucket foundations made of steel (BOEM 2021b). GBS and suction bucket foundations may be built in water within ports and then towed to the Wind

Farm Area (BOEM 2021b), which presents an increased risk of invasive species spread by transporting marine organisms from port locations to the Lease Area. All alternative foundation types compared to monopile foundations would lead to larger artificial reef effects, where the increased surface area would benefit some benthic species. The increase in structure would also cause more aggregation of fish predator species, which may alter benthic invertebrate species composition. Less than 1 percent of soft-bottom habitat loss in the Lease Area is expected from foundation and scour protection installation; therefore, impact levels are not expected to change under this alternative. Given that Alternative E would result in reductions in both adverse and beneficial impacts, impacts on benthic resources under the alternative are not expected to be measurably different from those anticipated under the Proposed Action.

Cumulative Impacts of Alternative E: In the context of reasonably foreseeable environmental trends, the cumulative impacts of Alternative E would be similar to those described under the Proposed Action.

Impacts of Alternative E on ESA-Listed Species

No benthic species within the region are ESA-Listed; therefore, no impacts are expected.

Conclusions

Impacts of Alternative E: The impacts of Alternative E-1 would be the same as the Proposed Action. Construction and installation, O&M, and decommissioning of Alternative E-1 would likewise result in **moderate adverse** impacts and could include potentially **moderate beneficial** impacts.

Impacts of Alternative E-2 and Alternative E-3 would be similar to impacts of the Proposed Action with the most notable difference being the avoidance of pile-driving noise impacts and the increased foundation footprints. Construction and installation, O&M, and decommissioning of Alternative E-2 and Alternative E-3 would result in **moderate adverse** impacts and could include potentially **moderate beneficial** impacts.

Cumulative Impacts of Alternative E: In the context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative E would be the same as the Proposed Action, resulting in **moderate adverse** and **moderate beneficial** impacts on benthic resources in the geographic analysis area. Although a measurable impact is anticipated, benthic resources would likely recover completely following decommissioning.

3.5.2.9 Impacts of Alternative F on Benthic Resources

Impacts of Alternative F: Under Alternative F, the Falmouth offshore export cable route would include the use of up to three ±525kV HVDC cables connected to one HVDC converter OSP, instead of up to five HVAC cables connected to one or more HVAC OSPs as proposed under the Proposed Action, to minimize seabed disturbance to complex habitats in the Muskeget Channel. The additional HVDC converter OSP associated with Falmouth would be located in deeper waters in the southern portion of the Lease Area at a further distance from Nantucket Shoals. Potential effects on benthic resources may occur during water withdrawals by the CWIS, which may lead to the entrainment of eggs and larval life stages of benthic organisms and thermal impacts during the subsequent discharge of heated effluent. BOEM anticipates the same types of impacts on benthic resources as the Proposed Action (which also includes the potential for multiple HVDC OSPs).

In modeling the effects of entrainment on larval dispersal patterns and population dynamics associated with once-through CWISs in power plants in the coastal region of California, White et al. (2010) found that the effects of CWIS entrainment were highly localized in space and had minimal effects on population densities of benthic organisms except when the population had been heavily depleted by other factors. Entrainment effects were also found to be more severe when the CWIS intake was located nearshore as opposed to farther offshore due to the low rates of diffusive movement nearshore. Mitigation measures in the operation of the converter OSP CWIS, such as restricting intake velocities to less than 0.5 feet per second, single pump operation, and dual pump operation at reduced capacity via three-way valve or variable frequency drives have been put in place to minimize potential entrainment impacts (TetraTech and Normandeau Associates, Inc. 2023). With these measures in place, impacts would be minimized, and it is not expected that Alternative F would result in a change in impacts from an additional HVDC converter OSP compared to the Proposed Action (the Proposed Action includes the potential for multiple HVDC converter OSPs).

Under Alternative F, the Falmouth offshore export cable route would include only three HVDC cables compared to up to five HVAC cables under the Proposed Action, which would reduce the total seafloor and benthic habitat disturbance by approximately 700 acres (284 hectares) (Table 3.5.2-2). In comparison, a total of 1,753 acres (709 hectares) would be disturbed by the Falmouth export cables under the Proposed Action. Impacts from cable emplacement and anchoring may be reduced under Alternative F due to fewer cables installed. The cables would be sited in the same corridor as the Proposed Action so it is likely that the same benthic communities would be affected by cable emplacement, but the total area extent of impacts would be less. See Section 3.5.2.1, *Description of the Affected Environment,* for a description of benthic resources that would be affected by cable emplacement under the Proposed Action. Approximately 2,140 acres of complex habitat (coarse sediment, glacial moraine A, and boulder fields) can be found within an 8.2-mile (13.2-kilometer) segment of the Falmouth ECC as it crosses the Muskeget Channel (INSPIRE 2022). The total width of disturbance of the cables would be reduced from 98.5 feet (assuming a 19.7-foot-wide disturbance per cable; COP Volume 1, Table 3-29; SouthCoast Wind 2024) under the Proposed Action to 59.1 feet under Alternative F, reducing the extent of impacts on habitats along this segment of the Falmouth cable corridor from 98 acres to 59 acres. Depending on the final cable placement in the ECC, up to a 40 percent reduction in seabed disturbance from installation of the Falmouth offshore export cables can be anticipated which would reduce impacts on benthic habitats, in particular complex habitats found in the Muskeget Channel and associated benthic resources.

Though fewer DC cables would be installed under Alternative F, the amplitude of EMF generated by DC cables can be up to three times greater than that of AC cables (Hutchison et al. 2020). However, AC and DC EMFs differ in the way they interact with organisms and direct comparisons cannot be made (CSA Ocean Sciences, Inc. and Exponent 2019). Previous studies on DC undersea cables have shown only temporary alterations in mobility and behavior of some fish and invertebrate species with no appreciable effects on overall movement or population health (Hutchison et al. 2018; Wyman et al. 2018; Klimley et al. 2017). Furthermore, the effects of EMFs from undersea cables are substantially reduced when the target cable burial depth of 3.2 to 13.1 feet (1.0 to 4.0 meters) is achieved (CSA Ocean Sciences, Inc. and Exponent 2019). Even with the reduction in cables, the same temporary construction impacts and long-term operational impacts from cable installation would still occur and there would be no change in impacts from other offshore components (e.g., WTGs) under this alternative. As with the Proposed Action, benthic resources would be expected to recover naturally over time. The additional HVDC converter OSP would result in increased impacts from the CWISs and heated effluent, but impacts would remain localized and minor; thus, BOEM expects that there would be no change in the overall impact magnitude to benthic resources under Alternative F.

Cumulative Impacts of Alternative F: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative F would be similar to those described under the Proposed Action.

Impacts of Alternative F on ESA-Listed Species

No benthic species within the region are ESA-Listed; therefore, no impacts are expected.

Conclusions

Impacts of Alternative F: By reducing the number of Falmouth offshore export cables, Alternative F would reduce impacts on benthic resources compared to the Proposed Action, but the overall impact level would remain the same. Construction and installation, O&M, and decommissioning of Alternative F would likewise result in **moderate adverse** impacts on benthic resources and could include potentially **moderate beneficial** impacts.

Cumulative Impacts of Alternative F: In the context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative F would be similar to the Proposed Action and result in **moderate adverse** and **moderate beneficial** impacts on benthic resources in the geographic analysis area. Although a measurable impact is anticipated, benthic resources would likely recover completely following decommissioning.

3.5.2.10 Comparison of Alternatives

The impacts resulting from the Proposed Action would range from negligible to moderate, including the presence of structures, which may result in moderate beneficial impacts. Despite benthic mortality and temporary or permanent habitat alteration, BOEM expects the long-term impact on benthic communities from construction and installation of the Proposed Action to be minor, as the resources would likely recover naturally over time. Alternatives C-1 and C-2 would result in a 10–12.7 percent reduction in the length of the Brayton Point offshore ECC and fewer acres of disturbed seabed, respectively, but the impacts would be similar to those of the Proposed Action. Impacts of Alternative D would be reduced compared to impacts of the Proposed Action because of reductions in noise impacts and total seabed and benthic habitat disturbance. However, construction and installation, O&M, and decommissioning would result in the same impacts as the Proposed Action. Impacts of Alternative E-1 would be the same as the Proposed Action, while Alternative E-2 and Alternative E-3 would result in increased benthic habitat disturbance from use of larger foundation footprints. Under Alternative F, by reducing the number of Falmouth offshore export cables, impacts would be reduced on benthic resources compared to the Proposed Action, but the overall impact would be the same. The difference in benthic area disturbance by alternative is summarized in Table 3.5.2-2.

Table 3.5.2-2. Benthic resource total acres of permanent seabed disturbance from Alternatives C through F compared to the Proposed Action

Alternative	Difference in Area of Benthic Disturbance [a]
C-1: Onshore Aquidneck Island Route	52 acres less
C-2: Onshore Little Compton/Tiverton Route	70 acres less
D: Nantucket Shoals (Removal of up to six WTGs)	72 acres less
E-1: All Piled Foundation Structures	Same as Proposed Action
E-2: All Suction Bucket Foundation Structures	336 acres more
E-3: All Gravity-Based Foundation Structures	1,317 acres more
F: Muskeget Channel Cable Modification	700 acres less

[a] Differences in this table are based on an assumed use of all pin pile foundation for the Proposed Action for purposes of comparison. Physical seabed disturbance is compared within the geographic analysis area.

3.5.2.11 Proposed Mitigation Measures

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix G, Tables G-2 through G-4 and summarized and assessed in Table 3.5.2-3. If one or more of the measures analyzed here are adopted by BOEM or cooperating agencies, some adverse impacts on benthic resources could further be reduced. The Draft EIS analyzed a BOEM-proposed measure for fisheries and benthic habitat monitoring surveys. Fisheries and benthic habitat monitoring survey plans were subsequently developed by the Lessee and are analyzed as part of the Proposed Action in the Final EIS.

Table 3.5.2-3. Mitigation and Monitoring Measures Resulting from Consultations (also identified in Appendix G, Table G-2): benthic resources

Measure	Description	Effect
EFH Conservation Recommendations	EFH Conservation Recommendations from NMFS were transmitted by letter dated September 23, 2024. EFH Conservation Recommendations for activities under BOEM's jurisdiction were provided for WTG and cable installation and relocation (micrositing), anchoring, temperate reef avoidance, spill prevention, anti-corrosion	Implementation of Conservation Recommendations, including micrositing WTGs and cables, scour protection material and avoidance, anchoring avoidance and practices, reduced distance in boulder/cobble relocation, sand bedform removal avoidance, conservation of submarine topography and benthic features, overtrenching and sufficient

Measure	Description	Effect
	measures, habitat alteration minimization, boulder relocation, marine debris removal, scour protection, noise mitigation, contents Implementation of Conservation Recommendations, including micrositing WTGs and cables, scour protection material and avoidance, anchoring avoidance and practices, reduced distance in boulder/cobble relocation, sand bedform removal avoidance, conservation of submarine topography and benthic features, overtrenching and sufficient cable burial depth, cable cross-mapping, and seafloor. EFH Conservation Recommendations for activities under USACE's jurisdiction were provided for inshore/estuarine habitat impact minimization, mitigation of impacts on scientific surveys, temperate reef avoidance and in situ impact monitoring, and provision of locations of relocated boulders, created berms, and scour protection.	cable burial depth, cable cross-mapping, and seafloor surveying and monitoring would minimize known or reasonably foreseeable adverse impacts on benthic habitats and features, sensitive habitats, sand bedforms, Nantucket shoals, NOAA Complex Category habitats, the Sakonnet River, Mount Hope Bay, Southern New England HAPC, and the Narragansett Bay Estuary minimizing the potential for elimination/conversion of existing benthic habitats. Conservation Recommendations for inshore/estuarine and nearshore areas, including the use of HDD, micrositing, and re-rerouting during cable installation, the avoidance of sidecasting and open-water disposal during trenching activities, the use of a closed clamshell/environmental bucket dredge and upland disposal during dredging activities in areas with elevated levels of contaminants, and the restoration of disturbed areas to preconstruction conditions would minimize impacts on inshore/estuarine and nearshore benthic habitats and species. Conservation Recommendations for noise during construction, such as the use of additional noise dampening/mitigation measures during all impact pile driving, mandatory quiet periods during pile driving of at least 4 hours per 24 hours, and noise mitigation protocols in consultation with resource agencies prior to construction activities, would avoid and minimize potential noise impacts on benthic species and habitat. Conservation Recommendations for spill preventative measures, anti-corrosion measures, and marine debris removal would minimize potential impacts from any marine debris collected during pre-lay grapnel runs and chemicals, contaminant emissions, anti-corrosive coatings and sacrificial anodes to benthic habitats and species. Conservation Recommendations to revise the Benthic Habitat Monitoring Plan would benefit benthic habitat and species by ensuring robust experimental design, methods, and data collection/analysis to assess changes in benthic communities in the Project area. The Conservation Recommendation to mitigate impacts on NMFS scientific surveys would ensure that NMFS can continue to monitor the

Measure	Description	Effect
		status and health of trust resources. The Conservation Recommendations to develop a Project-specific in situ Monitoring Program and to perform pre-, during, and post-construction in situ monitoring of temperate reefs would benefit benthic habitat and species by assessing the stressors created by Project operation on benthic communities in the Project area, and stressors created by Project construction and operation on temperate reefs, from the presence of turbines, construction and operational noise, heat and EMF exposure, and oceanic-wind wake effects, as well as monitor impacts on fish behavior, species occurrence, community composition, and density and abundance on temperate reefs. Conservation Recommendations to provide the locations of relocated boulders, created berms, scour protection, and cables requiring wet storage to relevant marine users would minimize impacts on benthic habitat by reducing the potential of gear obstructions, which would disturb benthic habitat. Although the Conservation Recommendations would provide incremental reductions in impacts on sensitive and complex habitats and temperate reefs, reductions in the overall impact rating are not anticipated for any of the Proposed Action's IPFs.

Table 3.5.2-4. BOEM or agency-proposed measures (also identified in Appendix G, Table G-3): benthic resources

Measure	Description	Effect
Pile-driven foundations only	Only monopile or piled jacket foundations may be used in the enhanced mitigation area, which would minimize the overall structure impact on benthic prey species.	This would mean a total reduction in seabed footprint for the WTG in the enhanced mitigation area.
Sand Wave Leveling and Boulder Clearance	Sand wave leveling and boulder clearance should be limited to the extent practicable. Best efforts should be made to microsite to avoid these areas.	Sediments in the Project area may be subjected to disturbance from storms, and natural currents would likely reform natal soft-bottom features such as sand waves in the short term. Hard-bottom habitat such as boulders provides heterogeneity in an area otherwise dominated by soft sediments. This measure would decrease impacts on sand waves and boulders in the Project area; however, this measure will not reduce the impact rating for any of the Proposed Action's IPFs.

Measures Incorporated in the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.5.2-3 and Tables G-2 through G-4 in Appendix G are incorporated into the Preferred Alternative. These measures, if adopted, would have the effect of reducing the potential for interactions with sensitive and complex benthic habitats, inshore/estuarine and nearshore habitats, and temperate reef habitat, as well as reducing impacts on benthic resources related to EMFs, noise, marine debris, contaminant emissions, anti-corrosive measures, anchoring, scour protection, gear obstructions, and cable emplacement and maintenance. While the impact determination for benthic resources described in Section 3.5.2.5, *Impacts of Alternative B – Proposed Action on Benthic Resources,* would not change, these measures would ensure the effectiveness of, and compliance with, environmental protection measures already analyzed as part of the Proposed Action.

3.5 Biological Resources

3.5.3 Birds

This section discusses potential impacts on bird resources from the proposed Project, alternatives, and ongoing and planned activities in the geographic analysis area for birds. The geographic analysis area for birds, as shown on Figure 3.5.3-1, includes the United States coastline from Maine to Florida; the offshore limit is 100 miles (161 kilometers) from the Atlantic shore and the onshore limit is 0.5 mile (0.8 kilometer) inland. The geographic analysis area was established to capture resident species and migratory species that winter as far south as South America and the Caribbean, and those that breed in the Arctic or along the Atlantic Coast that travel through the area. The offshore limit was established to cover the migratory movement of most species in this group. The onshore limit was established to cover onshore habitats used by the species that may be affected by onshore and offshore components of the proposed Project.

3.5.3.1 Description of the Affected Environment

This section discusses bird species that use onshore and offshore habitats, including both resident bird species that use the proposed Project area during all (or portions of) the year and migrating bird species with the potential to pass through the proposed Project area during fall migration, spring migration, or both. Detailed information regarding habitats and bird species potentially present can be found in COP Volume 2, Section 6.1 and Appendix J (SouthCoast Wind 2024). Given the differences in life history characteristics and habitat use between offshore and onshore bird species, the following provides a separate discussion of each group. This section also discusses bald and golden eagles. This section addresses federally listed threatened and endangered birds; BOEM prepared a BA for USFWS analyzing the effects of the Project on listed species per ESA Section 7 requirements (BOEM 2023). Results of ESA consultation with USFWS are presented in Section 3.5.3.5, *Impacts of Alternative B – Proposed Action on Birds*.

The Atlantic Coast plays an important role in the ecology of many bird species. The Atlantic Flyway is a major route for migratory birds in the eastern United States and Canada, which are protected under the Migratory Bird Treaty Act of 1918. Chapter 4.2.4 of the Atlantic OCS Proposed Geological and Geophysical Activities Programmatic EIS (BOEM 2014a) discusses the use of Atlantic Coast habitats by migratory birds. Birds in the geographic analysis area are subject to pressure from ongoing activities, such as onshore construction, marine minerals extraction, port expansions, and installation of new structures in the OCS, but particularly from accidental releases; new cable, transmission line, and pipeline emplacement; interactions with fisheries and fishing gear; 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 in the geographic analysis area.

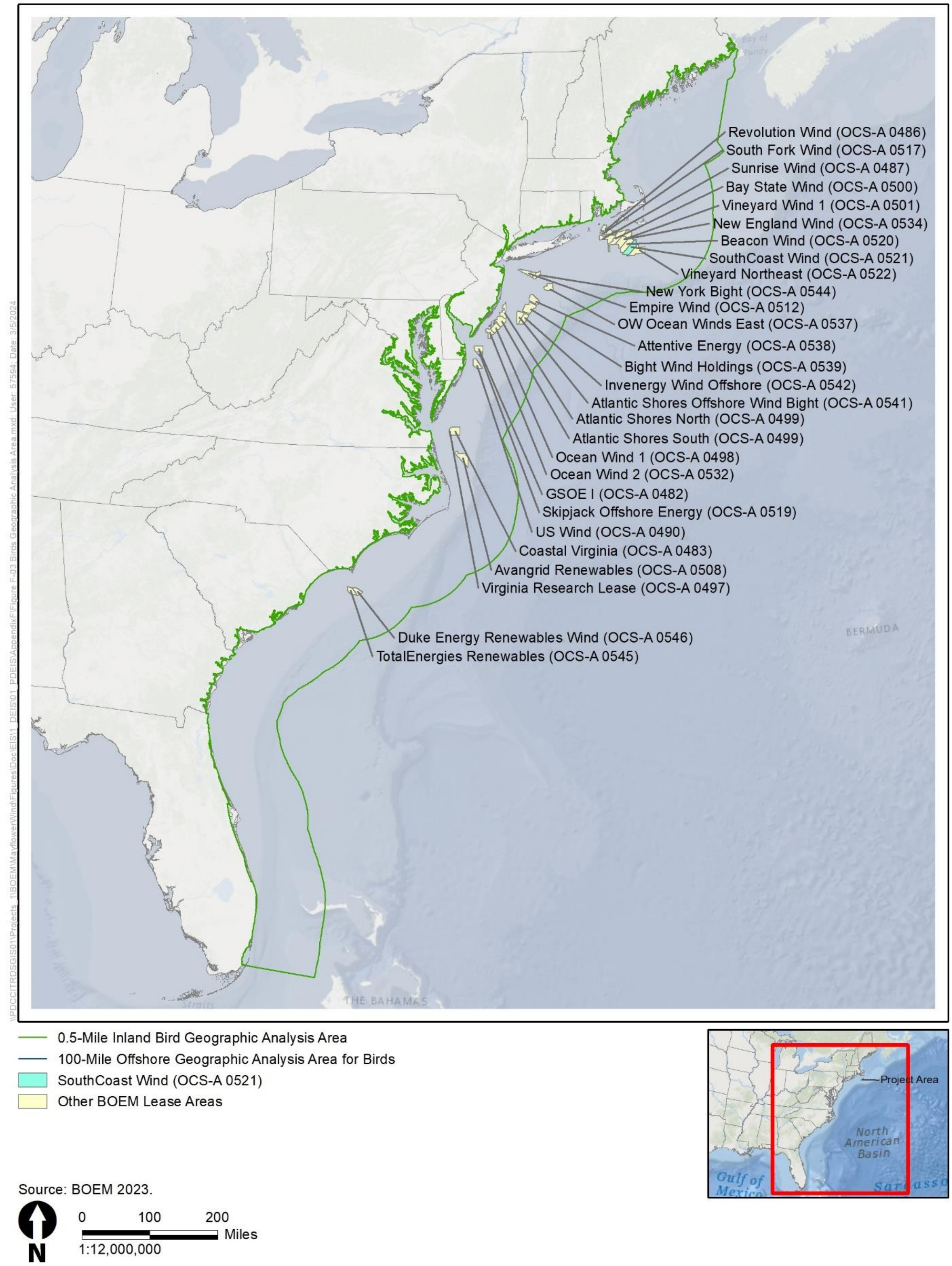


Figure 3.5.3-1. Birds geographic analysis area

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 seaducks are harvested annually [Roberts 2019]), commercial fisheries by-catch (approximately 2,600 seabirds are killed annually on the Atlantic [Hatch 2017; Sigourney et al. 2019]), and climate change, which has the potential for adverse impacts on birds.

According to the North American Bird Conservation Initiative (NABCI), more than half of the offshore bird species (57 percent, 31 species) have been placed on the NABCI watch list as a result of small ranges, small and declining populations, and threats to required habitats. This watch list identified species of high conservation concern based upon high vulnerability to a variety of factors, including population size, breeding distribution, non-breeding distribution, threats to breeding, threats to non-breeding, and population trend (NABCI 2016). Globally, monitored offshore bird populations have declined by nearly 70 percent from 1950 to 2010, which may be representative of the overall population trend of seabirds (Paleczny et al. 2015) including those that forage, breed, and migrate over the Atlantic OCS. Overall, offshore bird populations are decreasing; however, considerable differences in population trajectories of offshore bird families have been documented.

Coastal birds, especially those that nest in coastal marshes and other low-elevation habitats, are vulnerable to sea-level rise and the increasing frequency of strong storms as a result of global climate change. According to NABCI, nearly 40 percent of the more than 100 bird species that rely on coastal habitats for breeding or for migration are on the NABCI watch list. Many of these coastal species have a small population size or restricted distributions, making them especially vulnerable to habitat loss or degradation and other stressors (NABCI 2016). Models of vulnerability to climate change estimate that, throughout Massachusetts, 42 percent of Massachusetts' 252 bird species and, throughout Rhode Island, 28 percent of Rhode Island's 197 bird species are vulnerable to climate change across seasons (Audubon 2019), some of which occur in the geographic analysis area. These ongoing impacts on birds would continue regardless of the offshore wind industry.

A broad group of avian species may pass through the Project area, including migrants (such as raptors and songbirds), coastal birds (such as shorebirds, waterfowl, and waders), and marine birds (such as seabirds and seaducks). Approximately 106 species of birds that are federally or state-listed or are species of conservation concern (i.e., federal Birds of Conservation Concern or state Species of Greatest Conservation Need) were identified as potentially occurring in the Project area based on literature reviews, review of public databases, and results of surveys conducted in and around the Project area, including long-term local or regional survey efforts in the Massachusetts/Rhode Island offshore wind Lease Area (refer to COP Volume 2, Section 6.1.1; SouthCoast Wind 2024), and project-specific surveys to support the Avian Exposure Risk Assessment (COP Appendix I1, Section 2.2.3; SouthCoast Wind 2024). Of these 106 species, 2 are federally listed as threatened, 1 is federally listed as endangered, 1 is protected under the Bald and Golden Eagle Protection Act (BGEPA), 27 are state-listed under the Massachusetts Endangered Species Act (MESA), 61 are listed as MESA Species of Greatest Conservation Need (SGCN), 25 are state-listed in Rhode Island, 51 are SGCN in Rhode Island, and 34 are listed as USFWS Birds of Conservation Concern (BCC) species. There is high diversity of marine birds that may use the Offshore Project area because it is in the Mid-Atlantic Bight, which overlaps with the ranges of both the northern and southern species and falls within the Atlantic Flyway. Migrant terrestrial species may follow the coastline on their annual trips or choose more direct flight routes over expanses of open water. Many marine birds also make annual migrations up and down the Eastern Seaboard (e.g., gannets, loons, and seaducks), taking them directly through the Atlantic region in spring and fall. This results in a complex ecosystem where the community composition shifts regularly, and temporal and geographic patterns are highly variable. The mid-Atlantic supports large populations of birds in summer, some of which breed in the area, such as coastal gulls and terns. Other summer residents, such as shearwaters and storm-petrels, visit from the Southern Hemisphere (where they breed during the austral summer). In the fall, many of the summer residents leave the area and migrate south to warmer climates and are replaced by species that breed farther north and winter in the mid-Atlantic. Table 3.5.3-1 summarizes the bird presence in the Offshore Project area by bird type.

Table 3.5.3-1. Bird presence in the Offshore Project area by bird type

Bird Type	Potential Bird Presence in the Offshore Project Area
Non-Marine Migratory Birds	
Shorebirds	Shorebirds are coastal breeders and foragers and avoid straying out over deep waters during breeding. Of the shorebirds, red phalarope (*Phalaropus fulicarius*) and red-necked phalarope (*Phalaropus lobatus*) have a greater potential to occur in the marine environment as they forage over the open ocean during both non-breeding and breeding seasons. Phalarope species were observed during Aerial HD surveys in the spring and fall. MDAT abundance models and MCEC surveys indicate red phalarope occurrence is uncommon in spring and that red-necked phalarope occurrence is rare in spring in the Lease Area. Overall, exposure of shorebirds to the offshore infrastructure will be limited to migration, and, apart from phalaropes, the offshore marine environment does not provide habitat for shorebirds.
Wading birds	Most long-legged wading birds breed and migrate in coastal and inland areas. Like the smaller shorebirds, wading birds are coastal breeders and foragers and generally avoid straying out over deep waters but may traverse the Wind Farm Area during spring and fall migration periods. No wading birds were recorded in the Lease Area during offshore surveys (Veit et al. 2016) including the 2019–2020 Aerial HD surveys. The USFWS IPaC database identified five bird species that are listed as BCC, and two great blue herons (*Ardea herodia*) were observed during the October–November 2019 boat-based G&G surveys (RPS Group 2020, 2019).
Raptors	Except for falcons, most raptors do not fly in the offshore marine environment due to their wing morphology, which requires thermal column formation to support their gliding flight. Falcons are encountered offshore because they can make large water crossings. Merlins (*Falco sparverius*) and peregrine falcons (*Falco peregrinus*) are commonly observed offshore, fly offshore during migration, and have been observed on offshore oil platforms. Therefore, falcons may pass through the Wind Farm Area during migration. Ospreys fly over open water crossings; however, satellite telemetry data from ospreys in New England and the mid-Atlantic suggest these birds generally follow coastal or inland migration routes. No peregrine falcons were observed in the Lease Area during offshore surveys (Veit et al. 2016) including the 2019–2020 Aerial HD surveys. However, one peregrine falcon was observed during the October–November 2019 boat-based G&G surveys (RPS Group 2020, 2019).

Bird Type	Potential Bird Presence in the Offshore Project Area
Songbirds	Songbirds almost exclusively use terrestrial, freshwater, and coastal habitats and do not use the offshore marine system except during migration. Songbirds regularly cross large bodies of water, and there is some evidence that species migrate over the northern Atlantic. Some birds may briefly fly over the water while others, like the blackpoll warbler (*Setophaga striata*), can migrate over vast expanses of ocean (DeLuca et al. 2015; Faaborg et al. 2010). Evidence for a variety of species suggests that overwater migration in the Atlantic is much more common in fall (than in spring), when the frequency of overwater flights increases perhaps due to consistent tailwinds from the northwest. Overall, the exposure of songbirds to the Wind Farm Area will be limited to migration. Common songbirds that were observed during G&G surveys included mourning dove (*Zenaida macroura*), northern cardinal (*Cardinalis cardinalis*), northern flicker (*Colaptes auratus*), and golden-crowned kinglet (*Regulus satrapa*), among others (RPS Group 2020, 2019). Additionally, during the October–November 2019 G&G surveys, a marsh wren (*Cistothorus palustris*) was observed.
Coastal waterbirds	Coastal waterbirds (including waterfowl) use terrestrial or coastal wetland habitats and rarely use the marine offshore environment. The species in this group are generally restricted to freshwater or use saltmarshes, beaches, and other strictly coastal habitats and are unlikely to pass through the Wind Farm Area. Seaducks are discussed below in the marine bird section.
Marine Birds	
Loons and grebes	Common loons (*Gavia immer*) and red-throated loons (*Gavia stellate*) use the Atlantic OCS in winter. Analysis of satellite-tracked red-throated loons, captured and tagged in the mid-Atlantic area, found their winter distributions to be largely inshore of the mid-Atlantic, and this species is known to use the Nantucket Shoals located northeast of the Lease Area (Gray et al. 2017). The red-throated loon was observed in the Lease Area during spring MCEC surveys and observed in the fall and several observed in spring during Aerial HD surveys. Additionally, portions of the 75% and 95% isopleths overlap the Lease Area. The common loon was observed during the October–November 2019 boat-based G&G surveys. The MDAT abundance models and MCEC surveys indicate that red-throated loons are generally concentrated closer to shore and in the Nantucket Shoals during fall and winter. Grebes occur in nearshore marine environments during the winter in Massachusetts. MDAT models, MCEC surveys, and site-specific surveys indicate the occurrence of horned grebe (*Podiceps auratus*) is expected to be rare and limited to winter.
Seaducks	The seaducks use the Atlantic OCS heavily in winter. Most seaducks forage on mussels and other benthic invertebrates, and generally winter in shallower inshore waters or out over large offshore shoals, where they can access benthic prey. Regional MDAT abundance models and MCEC surveys indicate sea ducks are concentrated close to shore and in the Nantucket Shoals, which is recognized as an important wintering area (Veit et al. 2016; Silverman et al. 2013). Exposure to the Lease Area varies from rare to common with most seaducks occurring in winter and early spring. During Aerial HD surveys, black scoter, common eider, long-tailed duck, surf scooter, and white-winged scooter were observed (COP Appendix I1, Figure 3-45; SouthCoast Wind 2024).
Petrel group	Shearwaters, petrels, and storm-petrels are pelagic seabirds that only occur on land during the breeding season. These species use the Atlantic OCS region heavily, including in the Massachusetts/Rhode Island offshore wind Lease Area in the summer (Veit et al. 2016; Veit et al. 2015; Nisbet et al. 2013). However, the northern fulmar (*Fulmarus glacialis*) is primarily observed during the winter, and the black-capped petrel *(Pterodroma hasitata)* and band-rumped storm-petrel (*Oceanodroma castro*) are rare visitors in the winter. The regional MDAT models and MCEC surveys indicate that the occurrences in the Lease Area for shearwaters, petrels, and storm-petrels range from rare to common, and Cory's shearwater (*Calonectris borealis*), great shearwater (*Ardenna gravis*), and northern fulmar (*Fulmaris glacialis*) occurrence is common. Shearwaters, storm-petrel, and fulmar species were observed during the Aerial HD surveys and

Bird Type	Potential Bird Presence in the Offshore Project Area
	included Cory's shearwater, greater shearwater, sooty shearwater, and northern fulmar. Additionally, during G&G vessel surveys completed in the Lease Area from October–November, the great shearwater was observed (92 observations representing 199 individuals).
Gannets and cormorants	Northern gannets use the Atlantic OCS primarily during winter. They breed in southeastern Canada and winter along the U.S. Atlantic Coast, with concentration observed near the OCS of Massachusetts. The northern gannet was observed in the Lease Area in all seasons during MCEC surveys, and in the spring, winter, and fall during Aerial HD surveys. During the October–November G&G surveys, over 400 individuals were observed in the Lease Area and six were observed during the Project G&G surveys in September 2019. GPS tracking data of the northern gannet did not indicate that core use areas occur in the Lease Area; however, portions of the 75% and 95% isopleths overlap the Lease Area. Based on MDAT abundance models, MCEC surveys, and site-specific surveys, northern gannet occurrence in the Lease Area is common during spring, fall, and winter, and rare in summer. Additionally, unidentified cormorants were observed during Aerial HD surveys in the spring and fall. The double-crested cormorant is commonly observed year-round on coastlines in Massachusetts and Rhode Island, and regional MDAT abundance models and MCEC surveys further corroborate this, indicating that cormorants are concentrated closer to shore and not commonly encountered well offshore.
Gulls, skuas, and jaegers	Several species in this group were observed during Aerial HD surveys and could potentially pass through the Wind Farm Area (COP Appendix I1, Figure 3-48; SouthCoast Wind 2024). Gulls are primarily coastal species but may occur offshore. MCEC surveys documented large gulls such as the herring gulls (*Larus argentatus*) and great-black-backed gull (*Larus marinus*) offshore outside of breeding season (Veit et al. 2016), and G&G vessel surveys completed in the Lease Area during October–November were dominated by the herring gull; (59 observations representing 572 individuals). Jaegers and skuas reside in the marine environment outside of breeding season. The parasite jaeger (*Stercorarius parasiticus*) and pomarine jaeger (*Stercorarius pomarinus*) migrate through the North Atlantic region and breed in the Arctic. Both jaegers and skuas in the Lease Area is rare in spring, summer, and fall.
Terns	Terns generally restrict themselves to coastal waters during breeding, although they may pass through the Wind Farm Area infrequently to forage and during migration. The MDAT abundance models and MCEC surveys indicate that terns are primarily concentrated close to shore. Conventional aerial surveys identified hotspots of roseate tern abundance on the western side of the Nantucket Shoals and in the Muskeget Channel between Martha's Vineyard and Muskeget during the spring (Veit et al. 2016). Migration routes of roseate terns are not well known but are believed to be largely or exclusively pelagic in both spring and fall; therefore, roseate terns may pass through the Lease Area during this period (Veit et al. 2016; Normandeau Associates Inc. 2011). Common terns (*Sterna hirundo*) were observed in the Lease Area during Aerial HD surveys in spring only (SouthCoast Wind 2024) and in two BOEM blocks adjacent to the Lease Area during MCEC surveys. The roseate tern (*Sterna dougalli*) was observed in the Lease Area during Aerial HD surveys in spring only (SouthCoast Wind 2024) and in one BOEM block during summer MCEC surveys. Based on MDAT abundance models, MCEC surveys, and Aerial HD surveys, the occurrence of roseate tern in the Lease Area is expected to be rare in the spring and fall.
Auks	Four species in this group were observed during Aerial HD surveys and could potentially pass through the Wind Farm Area (COP Appendix I1, Figure 3-43; SouthCoast Wind 2024). Auk species present in the region are generally northern or Arctic breeders and are marine species outside of their breeding seasons. Auks may occur in the Lease Area during any season; however, most species are primarily observed during the spring and winter.

Source: SouthCoast Wind 2024.
G&G = geological and geophysical; IPaC = Information for Planning and Consultation; MDAT = Marine-life Data and Analysis Team; MCEC = Massachusetts Clean Energy Center.

Due to the variety of upland, wetland, and coastal habitats in the Falmouth and Brayton Point Onshore Project areas (COP Appendix J, Figures 4-2 through 4-8; SouthCoast Wind 2024) and their location in the Atlantic Flyway, a broad group of avian species utilize these onshore habitats during breeding, wintering, and migration periods. The avian groups found in these habitats include songbirds, shorebirds, raptors, waterfowl, waders, and seabirds. These birds include 55 species that are federally listed as threatened and endangered, USFWS-designated BCC, state-listed threatened and endangered, and state Special Concern birds (COP Appendix J, Table 4-10; SouthCoast Wind 2024). The Onshore Project areas are in Bird Conservation Region 30, which is an area defined by the USFWS to facilitate use and interpretation of USFWS-designated BCC. The JBCC, which is located in proximity to Falmouth Onshore Project features, is designated as a National Audubon Society Important Bird Area. The Brayton Point Onshore Project area is directly adjacent to the Lee and Cole Rivers Important Bird Area, which serves as habitat for a significant population of waterfowl and covers 2,569 acres (1,040 hectares) (Audubon n.d.).

The Falmouth Onshore Project area is located in the USEPA Atlantic Coastal Pine Barren Level III Ecoregion and intersects Massachusetts's Natural Heritage and Endangered Species Program Priority Habitat 945 and Estimated Habitat 756 (MassWildlife 2020). Priority Habitat is based on the known geographical extent of habitat for all state-listed rare species and Estimated Habitats are subsets of the Priority Habitats based on the geographical extent of habitat of state-listed rare wetlands wildlife. See COP Appendix J, Table 4-8 (SouthCoast Wind 2024) for a list of species, including birds, identified in the National Heritage and Endangered Species Program Priority Habitat and Estimated Habitat for the Falmouth Onshore Project area. The Brayton Point Onshore Project area is located within the USEPA Northeastern Coastal Zone. The Onshore Project area in Brayton Point, or portion thereof, is located within Priority Habitat 387 and Estimated Habitat 353 (COP Appendix J; SouthCoast Wind 2024). See COP Appendix J, Table 4-9 (SouthCoast Wind 2024) for a list of Rhode Island Species of Concern identified near the Brayton Point Onshore Project area.

Bald eagles (*Haliaeetus leucocephalus*), which are listed as Threatened under MESA, and as SGCN in Massachusetts and Rhode Island, are federally protected by the BGEPA, 16 USC 668 et seq., as are golden eagles (*Aquila chrysaetos*). Bald eagles are broadly distributed across North America and generally nest and perch in areas associated with water (lakes, rivers, bays) in both freshwater and marine habitats, often remaining largely within roughly 1,640 feet (500 meters) of the shoreline. Bald eagles are present year-round in Massachusetts and can primarily be found in terrestrial environments near water and overwinter along the coast of Cape Cod, Martha's Vineyard, and Nantucket (MassWildlife 2019). The general morphology of bald eagles dissuades long-distance movements in offshore settings, as the species generally relies upon thermal formations, which develop poorly over the open ocean, during long-distance movements. As such, bald eagles are unlikely to fly through the Wind Farm Area. The bald eagle may be present in the Onshore Project areas and immediate vicinity. The statewide breeding population is increasing (MassWildlife 2020), and, in spring 2020, a new bald eagle nest was observed on Cape Cod in Barnstable. However, no known bald eagle nesting sites have been observed in the Onshore Project areas (MassWildlife 2020). In Rhode Island, populations of bald eagles have increased since the 1960s with 100 sightings reported during 2018, 19 of which occurred on

Aquidneck Island (Avenego 2018). Although populations of bald eagles in Rhode Island have increased, Project activities are not expected to interfere with the species.

Golden eagles are found throughout the United States but are rare on the East Coast (Faherty 2016). In Massachusetts, golden eagles are very uncommon to rare fall migrants and winter visitors and are not known to breed within the state (MassAudubon 2022). As with bald eagles, the general morphology of golden eagle dissuades long-distance movements in offshore settings (Kerlinger 1985), as the species generally relies upon thermal formations, which develop poorly over the open ocean, during long-distance movements. As such, golden eagles are unlikely to fly through the Wind Farm Area.

Three species of birds listed as threatened or endangered under the ESA may occur in the Onshore and Offshore Project areas: the threatened piping plover (*Charadrius m. melodus*), endangered roseate tern (*Sterna d. dougallii*), and threatened rufa subspecies of the red knot (*Calidris canutus rufa*) (SouthCoast Wind 2024).

Impacts from reasonably foreseeable offshore wind activities on ESA-listed species will be discussed in detail in subsequent project-specific analysis documents. As is the case with the proposed SouthCoast Wind Project, each proposed project will be required to address ESA-listed species at the individual project scale and cumulatively. Additionally, BOEM is currently working on a programmatic framework for ESA consultation with USFWS to address the potential impacts of the anticipated development of Atlantic offshore wind energy facilities on ESA-listed species.

3.5.3.2 Impact Level Definitions for Birds

Impact level definitions for birds are provided in Table 3.5.3-2.

Table 3.5.3-2. Definitions of impact levels for birds

Impact Level	Type of Impact	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 effects 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 effects.
Major	Adverse	Impacts would result in severe, long-term habitat or population-level effects on species.
	Beneficial	Long-term beneficial population-level effects would occur.

3.5.3.3 Impacts of Alternative A – No Action on Birds

When analyzing the impacts of the No Action Alternative on birds, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for birds. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D*, Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for birds described in Section 3.5.3.1, *Description of the Affected Environment and Future Baseline Conditions,* 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 are generally associated with onshore impacts (including onshore construction and coastal lighting), activities in the offshore environment (e.g., vessel traffic, commercial fisheries), and climate change. Onshore construction activities and associated impacts are expected to continue at current trends and have the potential to affect bird species through temporary and permanent habitat removal or conversion, temporary noise impacts related to construction, collisions (e.g., presence of structures), and lighting effects, which could cause avoidance behavior and displacement, as well as injury or mortality to individual birds. However, population-level effects would not be anticipated. Activities in the offshore environment could result in bird avoidance behavior and displacement, but population-level effects would not be anticipated. Impacts associated with climate change have the potential to result in habitat degradation and loss and shifting of species distribution.

Ongoing offshore wind activities in the geographic analysis area that contribute to impacts on birds include the following.

- Continued O&M of the Block Island project (5 WTGs) installed in State waters.
- Continued O&M of the CVOW-Pilot project (2 WTGs) installed in OCS-A 0497.
- Ongoing construction of multiple offshore wind projects: the Vineyard Wind 1 project (62 WTGs and 1 OSS) in OCS-A 0501 and the South Fork project (12 WTGs and 1 OSS) in OCS-A 0517, Revolution Wind project (65 WTGs and two OSPs) in OCS-A 0486, Ocean Wind 1 (98 WTGs and three OSPs) in OCS-A 0498, Empire Wind (147 WTGs and two OSPs) in OCS-A 0512, and CVOW-Commercial (176 WTGs and three OSPs) in OCS-A 0483.

Ongoing O&M of Block Island and CVOW-Pilot projects and ongoing construction of multiple offshore wind projects would affect birds through the primary IPFs of accidental releases, lighting, cable emplacement and maintenance, noise, presence of structures, traffic (aircraft), and land disturbance. Ongoing offshore wind activities would have the same type of impacts that are described in *Cumulative Impacts of the No Action Alternative* for ongoing and planned offshore wind activities, but the impacts would be of lower intensity.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impact of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Planned non-offshore wind activities that may affect birds include installation of new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and installation of new structures on the OCS (see Appendix D, *Planned Activities Scenario,* Section D.2 for a complete description of planned activities). Similar to ongoing activities, planned non-offshore wind activities may result in temporary and permanent impacts on birds including disturbance, displacement, injury, mortality, habitat degradation, and habitat conversion.

The following sections summarize the potential impacts of ongoing and planned offshore wind activities on birds during construction, O&M, and decommissioning of the projects. Planned offshore wind activities include offshore wind energy development activities on the Atlantic OCS other than the Proposed Action determined by BOEM to be reasonably foreseeable (see Appendix D, *Planned Activities Scenario*, Section D.2, for a complete description of planned offshore wind activities).

BOEM expects offshore wind activities may affect birds through the following primary IPFs.

Accidental releases: Accidental releases of fuel/fluids, other contaminants, and trash and debris could occur as a result of offshore wind activities. The risk of any type of accidental release would be increased primarily during construction but may also be present during operations and decommissioning of offshore wind facilities. Hazardous materials that could be released include coolant fluids, oils and lubricants, and diesel fuels and other petroleum products. Ingestion of fuel and other hazardous contaminants has the potential to result in 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 effects that include changes in flight efficiencies and 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 (Appendix D, Table D2-3), the likely amount of releases associated with offshore wind development would fall within the range of accidental releases that already occur on an ongoing basis from non-offshore wind activities, and would represent a negligible impact on birds.

Vessel compliance with USCG regulations would minimize trash or other debris; therefore, BOEM expects accidental trash releases from offshore wind vessels to be rare and localized in nature. In the unlikely event of a release, 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). Given that accidental releases are anticipated to be rare and localized, BOEM expects that accidental releases of trash and debris would not appreciably contribute to overall impacts on birds.

Light: Nighttime lighting associated with offshore wind structures and vessels could represent a source of bird attraction. Up to 2,940 offshore WTGs and OSPs would have hazard and aviation lighting that would be incrementally added beginning in 2023 and continuing through 2030. Vessel lighting would result in localized and temporary impacts on birds; structure lighting may pose an increased collision or predation risk (Hüppop et al. 2006), although this risk would be localized in extent and minimized through the use of BOEM lighting guidelines (BOEM 2021; Kerlinger et al. 2010). Overall, BOEM anticipates lighting impacts related to offshore wind structures and vessels would be negligible.

Cable emplacement and maintenance: Generally, emplacement of submarine cables would result in increased suspended sediments that may affect diving birds, result in displacement of foraging individuals, or decreased foraging success, and have impacts on some prey species (e.g., benthic assemblages) (Cook and Burton 2010). Impacts associated with cable emplacement would be temporary and localized, and birds would be able to successfully forage in adjacent areas not affected by increased suspended sediments. Any dredging necessary prior to cable installation could contribute to additional impacts. Disturbed seafloor from construction of offshore wind projects may affect some bird prey species; however, assuming future projects use installation procedures similar to those proposed in the SouthCoast Wind COP, the duration and extent of impacts would be limited and short term, and benthic assemblages would recover from disturbance. Section 3.5.2, *Benthic Resources*, and Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, provide more information. Impacts would be negligible because increased suspended sediments would be temporary and generally localized to the emplacement corridor, and no individual fitness or population-level effects on birds would be expected.

Noise: Anthropogenic noise on the OCS associated with offshore wind development, including noise from aircraft, pile-driving activities, G&G surveys, offshore construction, and vessel traffic, has the potential to result in impacts on birds on the OCS. Additionally, onshore construction noise has the potential to result in impacts on birds. BOEM anticipates that noise impacts would be negligible because noise would be localized and temporary. Potential impacts could be greater if avoidance and displacement of birds occurs during seasonal migration periods.

Aircraft flying at low altitudes may cause birds to flush, resulting in increased energy expenditure. Disturbance to birds, if any, would be temporary and localized, with impacts dissipating once the aircraft has left the area. No individual or population-level effects would be expected.

Construction of up to 2,940 offshore structures would create noise and may temporarily affect diving birds. The greatest impact of noise is likely to be caused by pile-driving activities during construction. 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, 2016). Additionally, noise impacts on prey species may affect bird foraging success. 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 on birds.

Onshore noise associated with intermittent construction of required offshore wind development infrastructure may also result in localized and temporary impacts, including avoidance and displacement, although no individual fitness or population-level effects would be expected to occur.

Noise associated with project vessels could disturb some individual diving birds, but they would likely acclimate to the noise or move away, potentially resulting in a temporary loss of habitat (BOEM 2012). However, brief, temporary responses, if any, would be expected to dissipate once the vessel has passed or the individual has moved away. No individual fitness or population-level effects would be expected.

Presence of structures: The presence of structures can lead to impacts, both beneficial and adverse, on birds through fish aggregation and associated increase in foraging opportunities, as well as entanglement and gear loss or damage, migration disturbances, and WTG strikes and displacement. These impacts may arise from buoys, meteorological towers, foundations, scour and cable protections, and transmission cable infrastructure.

The primary threat to birds from the presence of structures would be from collision with WTGs. 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 during annual migrations between wintering and breeding grounds (Watts 2010). Within the Atlantic Flyway along the North American Atlantic Coast, much of the bird activity is concentrated along the coastline (Watts 2010). Waterbirds use a corridor between the coast and several kilometers out onto the 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 may extend considerable distances from shore, the highest diversity and density are centered on the shoreline. Building on this information, Robinson Wilmott et al. (2013) evaluated the sensitivity of bird resources to collision and displacement due to offshore 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), species with high scores for sensitivity for collision include gulls, jaegers, and the northern gannet (*Morus bassanus*). In many cases, high collision sensitivity was driven by high occurrence on the OCS, low avoidance rates with high uncertainty, and time spent in the RSZ. Many of the species addressed in Robinson Willmott et al. (2013) had low collision sensitivity including passerines that spend very little time on the Atlantic OCS during migration and typically fly above the RSZ. As discussed by Watts (2010), 55 bird species occur on the Atlantic OCS at a distance from shore where WTGs could be operating. However, generally the abundance of bird species that overlap with the anticipated development of wind energy facilities on the Atlantic OCS is relatively small (Figure 3.5.3-2). Of the 55 bird species, 47 marine bird species have sufficient survey data to calculate the modeled percentage of a species population that would overlap with the anticipated offshore wind development on the Atlantic OCS (Winship et al. 2018); the relative seasonal exposure is generally very low, ranging from 0.0 to 5.2 percent (Table 3.5.3-3). 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.

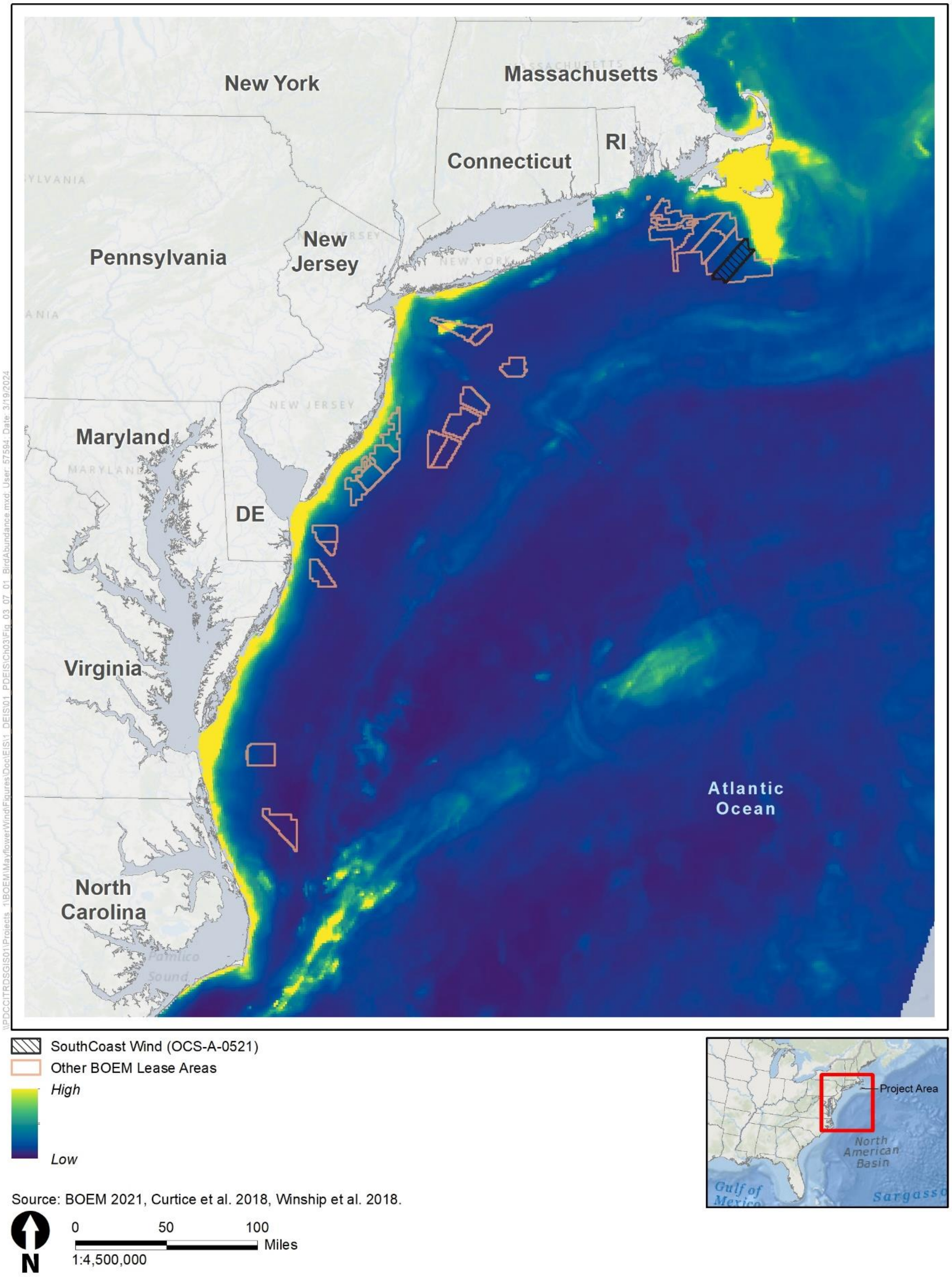


Figure 3.5.3-2. Total avian relative abundance distribution map

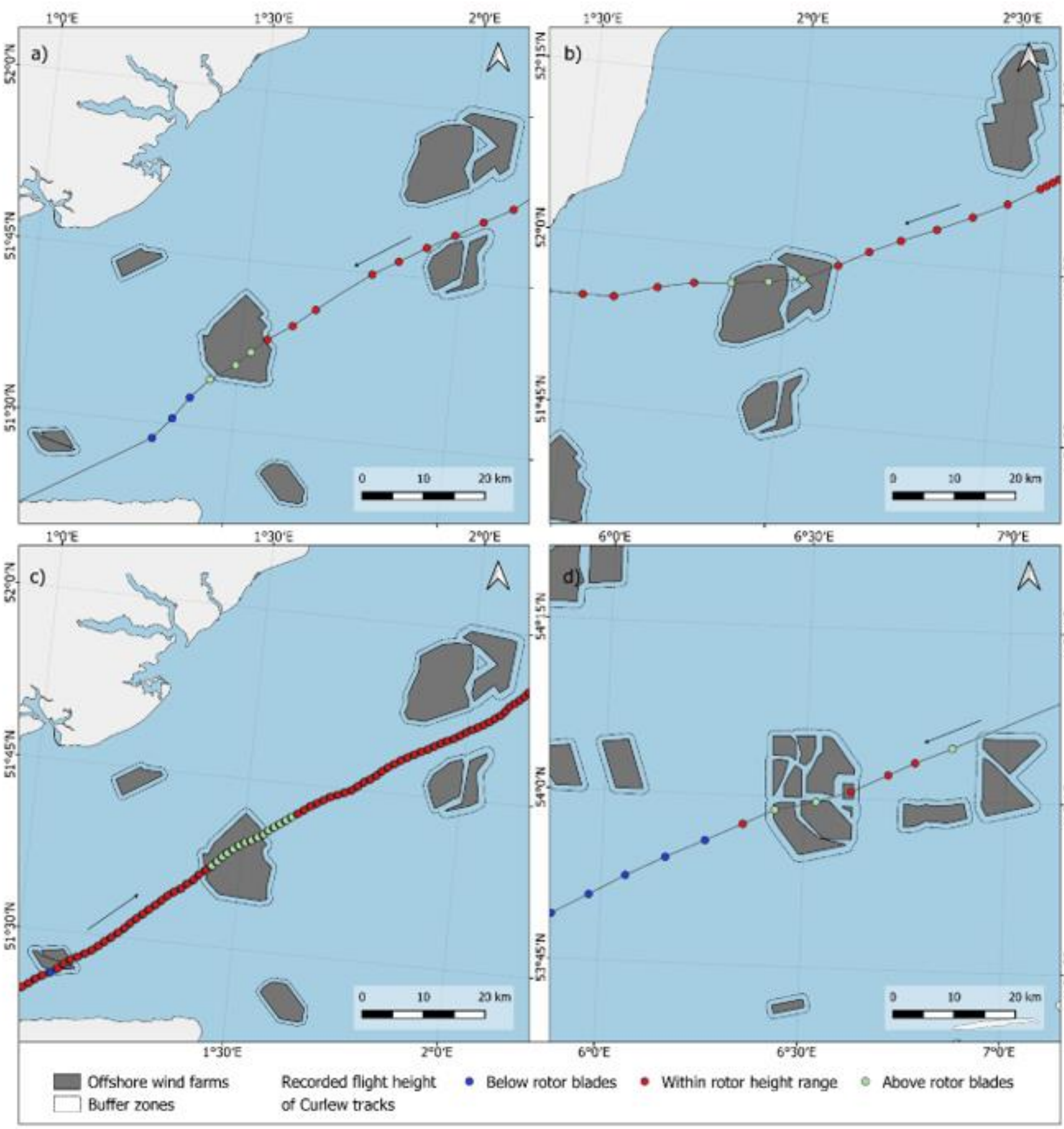
Table 3.5.3-3. Percentage of each Atlantic seabird population that overlaps with anticipated offshore wind energy development on the OCS by season

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*) [b]	0.0	0.0	0.0	0.0
Black-capped petrel (*Pterodroma hasitata*) [b]	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*) [b]	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*) [b]	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, b]	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

Species	Spring	Summer	Fall	Winter
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: Winship et al. 2018.
[a] Species used in collision risk modeling.
[b] Species considered Birds of Conservation Concern by the USFWS (USFWS 2021a).
NA = not applicable.

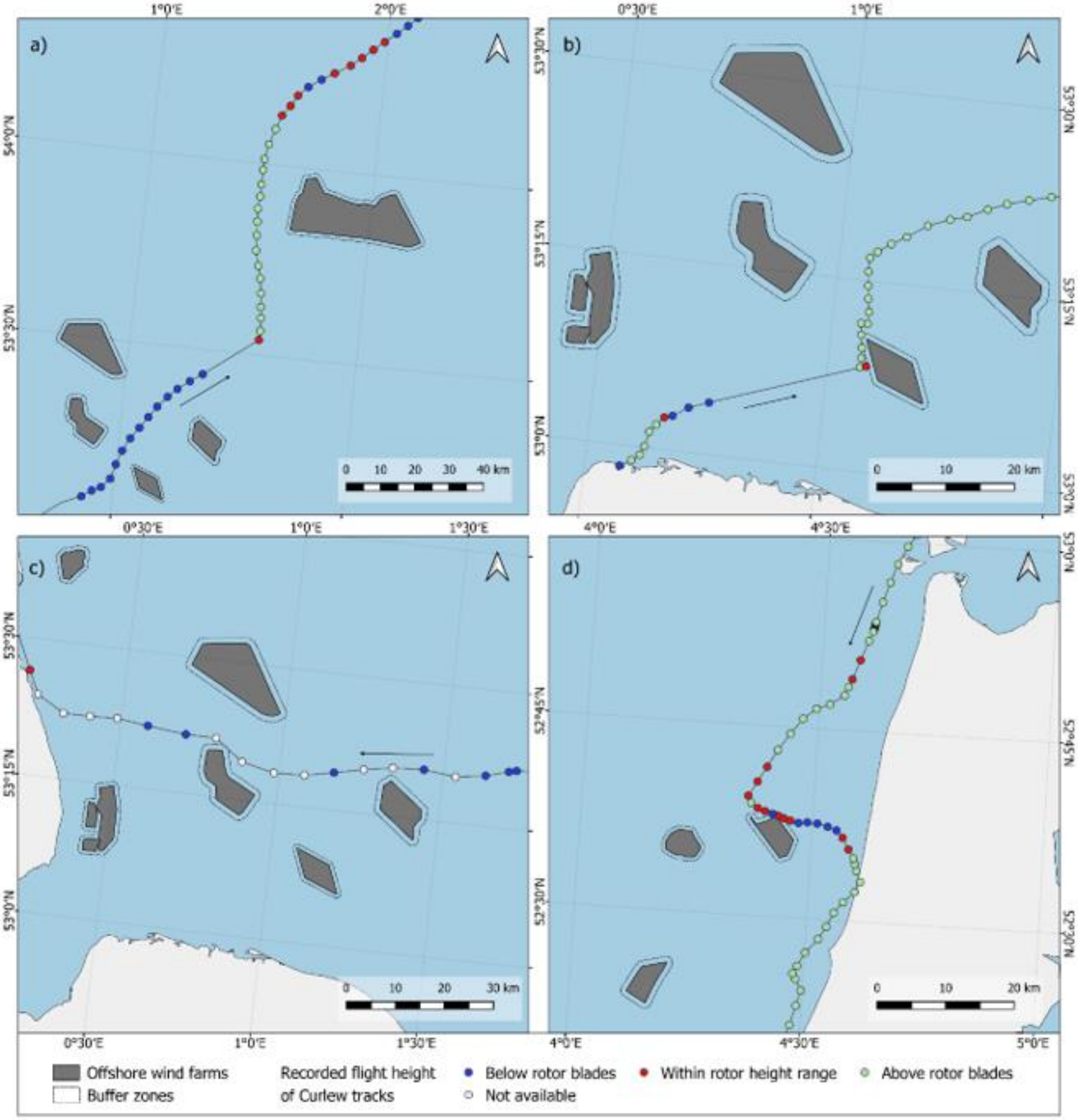
Vattenfall (a European energy company) recently studied bird movements within an offshore wind farm situated 1.9–3 miles (3–4.9 kilometers) off the coast of Aberdeen, Scotland (Vattenfall 2023). The purpose of the study was to improve the understanding of seabird flight behavior inside an offshore wind farm with a focus on the bird breeding period and post-breeding period when densities are highest. The study was robust in that seabirds were tracked inside the array with video cameras and radar tracks, which allowed for measuring avoidance movements (meso- and micro-avoidance) with high confidence and at the species level. Detailed statistical analyses of the seabird flight data were enabled both by the large sample sizes and by the high temporal resolution in the combined radar track and video camera data. Meso-avoidance behavior showed that species avoided the RSZ by flying in between the turbines with very few avoiding by changing their flight altitude to fly either below or above the rotors. The most frequently recorded adjustment under micro-avoidance behavior was birds flying along the plane of the rotor; other adjustments included crossing the rotor either obliquely or perpendicularly, and some birds cross the rotor-swept area without making any adjustments to the spinning rotors. The study concluded that, together with the recorded high levels of micro-avoidance in all species (above 0.96), it is now evident that seabirds would be exposed to very low risks of collision in offshore wind farms during daylight hours. This was substantiated by the fact that no collisions or even narrow escapes were recorded in over 10,000 bird videos during the 2 years of monitoring covering the April–October period. The study's calculated micro-avoidance rate (above 0.96) is similar to Skov et al. (2018). Further evidence supporting turbine avoidance can be found in Schwemmer and others (2023), in which 70 percent of approaching 143 GPS-tracked Eurasian curlews (*Numenius arquata arquata*) demonstrated horizontal avoidance responses when approaching offshore wind farms in the Baltic and North Seas. While most curlews avoided entire wind farms, others changed their flight altitude to fly below or above the rotor-swept zone as they pass through the wind farm (Figures 3.5.3-3, 3.5.3-4, and 3.5.3-5). Given that curlews and red knots are in the same family (Scolopacidae) and are ecologically similar, it is reasonable to expect that red knots would behave similarly to curlews when encountering wind farms and turbines.



Source: Schwemmer et al. 2023: Figure S2.

Note: Four examples of curlews approaching WTAs that show avoidance in the vertical plane by increasing flight altitudes: a) WTA London Array (UK; rotor level: 27–147 meters); b) WTA Galloper and Greater Gabbard (UK; mean rotor level: 26.1–145.9 meters); c) WTA London Array (UK; rotor level 27–147 meters); d) WTA Alpha Ventus, Borkum Riffgrund 1, Borkum Riffgrund 2 Merkur, Triane Windpark, Borkum I and Trianel Windpark Borkum II (Germany; mean rotor level: 27.3–166.2 meters). Different colors of GPS fixes represent different flight altitudes.

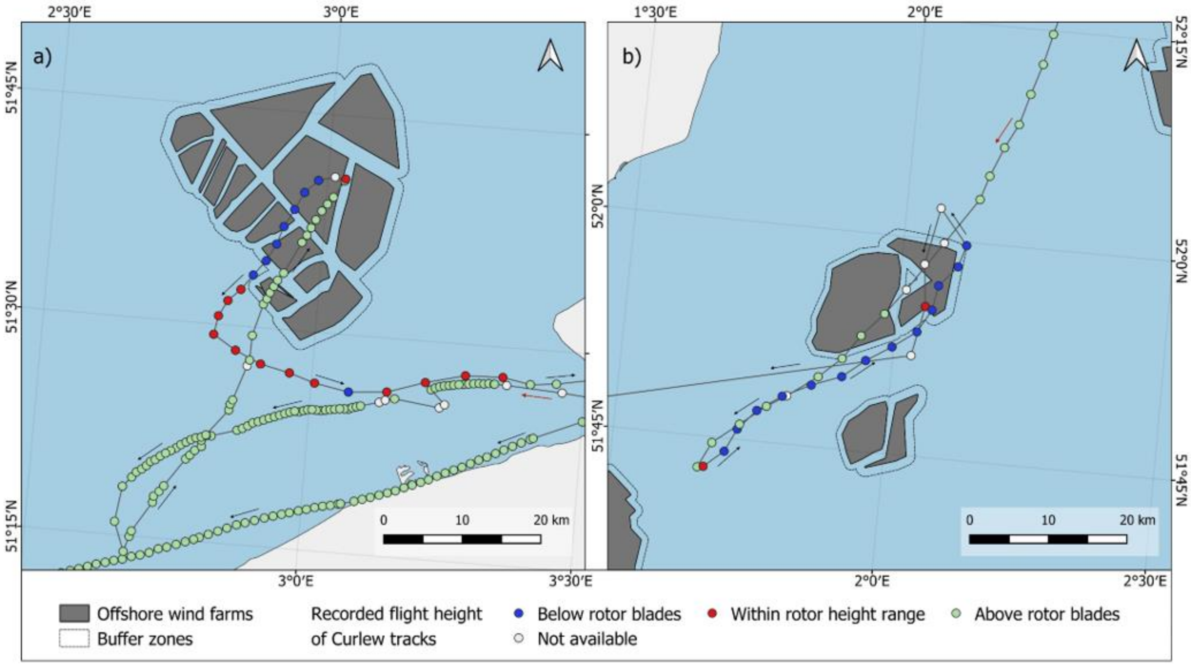
Figure 3.5.3-3. Four examples of curlews approach WTGs that show avoidance in the vertical plane by increasing flight altitudes



Source: Schwemmer et al. 2023: Figure S3.

Note: Four examples of curlews approaching WTAs that show avoidance in the horizontal plane by changing flight directions: a) WTA Hornsea Project One (United Kingdom; rotor level: 36–190 meters); b) WTA Sheringham Shoal (United Kingdom; rotor level: 26.5–133.5 meters); c) WTA Race Bank (United Kingdom; rotor level 23–177 meters); d) WTA Egmond aan Zee (the Netherlands; rotor level: 25–115 meters). Different colors of GPS fixes represent different flight altitudes.

Figure 3.5.3-4. Four examples of curlews approaching WTAs that show avoidance in the horizontal plane by changing flight directions



Source: Schwemmer et al. 2023: Figure S4.
Note: Left panel: WTA cluster belonging to Belgium and the Netherlands. The bird entered the North Sea approaching from the Netherlands, performed a loop in the south, entered the WTA cluster and returned to a roost in the Netherlands where it stayed for 9 days before continuing its journey in a straight track. Right panel: WTA Galloper and Greater Gabbard belonging to the United Kingdom. The bird entered from the north, crossed the WTA cluster performed a circle in the south, entered the WTA cluster again, performed another circle in the north, entered the WTA cluster for a third time and left the area toward the southwest. Arrows depict flight directions.

Figure 3.5.3-5. Non-directional flights within or in the vicinity of two WTAs made by two curlews tagged as breeding in north Germany

The greatest risk to birds associated with offshore wind development would be collision with operating WTGs. Offshore wind development would add up to 2,884 WTGs in the bird geographic analysis area. In the contiguous United States, bird collisions with operating WTGs are relatively rare events, with an estimated 140,000 to 500,000 (mean = 320,000) birds killed annually from about 49,000 onshore wind turbines in 39 states (USFWS 2018). Bird collisions with turbines in the eastern United States is estimated at 6.86 birds per turbine per year (USFWS 2018). Based on this mortality rate, an estimated 19,784 birds could be killed annually from the 2,884 WTGs that would be added for offshore wind development. This represents a worst-case scenario and does not consider mitigating factors, such as landscape and weather patterns, or bird species that are expected to occur. Given that the relative density of birds in the OCS is low, relatively few birds are likely to encounter WTGs (Figure 3.5.3-2). Potential annual bird kills from WTGs would be relatively low compared to other causes of migratory bird deaths in the United States; feral cats are the primary cause of migratory bird deaths in the United States (2.4 billion per year), followed by collisions with building glass (599 million per year), collisions with vehicles (214.5 million per year), poison (72 million per year), collisions with electrical lines (25.5 million per year), collisions with communication towers (6.6 million per year), and electrocutions (5.6 million per year) (USFWS 2021b). Not all individuals that occur or migrate along the Atlantic Coast are expected to encounter the RSZ of one or more operating WTGs associated with offshore wind development. Generally, only a small percentage of a species' seasonal population would potentially encounter operating WTGs (Table 3.5.3-2). 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. Impacts on birds due to the presence of operating WTGs would likely be minor; however, no individual fitness or population-level impacts would be expected to occur.

Because most structures would be spaced 0.6 to 1 nautical mile (1.1 to 1.9 kilometers) apart, ample space between WTGs should allow birds that are not flying above WTGs to fly through individual lease areas without changing course or to make minor course corrections to avoid operating WTGs. The effects of offshore wind farms on bird movement ultimately depend on the bird species, size of the offshore wind farm, spacing of the turbines, and extent of extra energy cost incurred by the displacement of flying birds (relative to normal flight costs pre-construction) and their ability to compensate for this degree of added energy expenditure. Little quantitative information is available on how offshore wind farms may act as a barrier to movement, but Madsen et al. (2012) modeled bird movement through offshore wind farms using bird (common eider) movement data collected at the Nysted offshore wind farm in the western Baltic Sea just south of Denmark. After running several hundred thousand simulations for different layouts/configurations for a 100 WTG offshore wind farm, the proportion of birds traveling between turbines increased as distance between turbines increased. With eight WTG columns at 200 meter (0.1 nm) spacing, no birds passed between the turbines. However, increasing inter-turbine distance to 500 meters (0.27 nm) increases the percentage of birds to more than 20 percent, while a spacing of 1,000 meters (0.54 nm) increased this further to 99 percent. The 0.6 to 1 nm spacing estimated for most structures that will be proposed on the Atlantic OCS is greater than the distance at which 99 percent of the birds passed through in the model. As such, adverse impacts of additional energy expenditure due to minor course corrections or complete avoidance of offshore wind lease areas would not be expected to be biologically significant. Any additional flight distances would likely be small for most migrating birds when compared with the overall migratory distances traveled, and no individual fitness or population-level effects would be expected to occur.

In the Northeast and Atlantic waters, there are 2,570 seabird fatalities through interaction with commercial fishing gear each year; of those, 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 and other wildlife if left to drift until sinking or washing ashore. A reduction in derelict fishing gear (in this case by entanglement with foundations) has a beneficial impact on bird populations (Regular et al. 2013). In contrast, the presence of structures may also lead to an increase in recreational fishing and thus expose individual birds to harm from fishing line and hooks.

The presence of new structures could result in increased prey items for some marine bird species. Offshore wind foundations could increase the mixing of surface waters and deepen the thermocline, possibly increasing pelagic productivity in local areas (English et al. 2017; Dorrell et al. 2022). Additionally, the new structures may create habitat for structure-oriented and hard-bottom species. This reef effect has been observed around WTGs, leading to local increases in biomass and diversity (Causon and Gill 2018). Recent studies have found increased biomass for benthic fish and invertebrates, and possibly for pelagic fish, marine mammals, and birds as well (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. BOEM anticipates that the presence of structures may result in long-term moderate beneficial impacts. Conversely, increased foraging opportunities could attract marine birds, potentially exposing those individuals to increased collision risk associated with operating WTGs.

Traffic (aircraft): General aviation traffic accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). Because aircraft flights associated with offshore wind development are expected to be minimal in comparison to baseline conditions, aircraft strikes with birds are highly unlikely to occur. As such, aircraft traffic impacts would be negligible and not expected to appreciably contribute to overall impacts on birds.

Land disturbance: Onshore construction of offshore wind development infrastructure has the potential to result in some impacts due to habitat loss or fragmentation. However, onshore construction would be expected to account for only a very small increase in development relative to other ongoing development activities. Furthermore, construction would be expected to generally occur in previously disturbed habitats, and no individual fitness- or population-level impacts on birds would be expected to occur. As such, onshore construction impacts associated with offshore wind development would be negligible and would not be expected to appreciably contribute to overall impacts on birds.

Impacts of Alternative A on ESA-Listed Species

Three bird species in the geographic analysis area are either threatened or endangered and protected by the ESA. Impacts of Alternative A on ESA-listed birds are represented in the IPF discussion under *Offshore Wind Activities*. Any future federal activities that could affect federally listed birds in the geographic analysis area would need to comply with ESA Section 7 to ensure that the proposed activities would not jeopardize the continued existence of the species.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, birds would continue to be affected by existing environmental trends and ongoing activities. BOEM expects ongoing activities to have continuing temporary and permanent impacts (disturbance, displacement, injury, mortality, habitat degradation, habitat conversion) on birds primarily through construction and climate change. Given that the amount of bird species that overlap with ongoing wind energy facilities on the Atlantic OCS is relatively small, ongoing wind activities would not appreciably contribute to impacts on birds. Temporary disturbance and permanent loss of habitat onshore may occur as a result of offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects in the geographic analysis area. The No Action Alternative would result in **minor adverse** impacts on birds.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and birds would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to the impacts on birds due to habitat loss from increased onshore construction and interactions with offshore developments.

BOEM anticipates that the impacts associated with offshore wind activities in the geographic analysis area would result in adverse impacts but could potentially include beneficial impacts because of 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 offshore wind lease areas during all or parts of the year would either be exposed to new collision risk or experience long-term functional habitat loss due to behavioral avoidance and displacement from wind lease areas on the OCS. The offshore wind development would also be responsible for the majority of impacts related to new cable emplacement and pile-driving noise, but effects on birds resulting from these IPFs would be localized and temporary and would not be expected to be biologically significant.

BOEM anticipates that the cumulative impacts of the No Action Alternative, which would result primarily from collision risk and functional habitat loss, would have a **moderate adverse** impact on birds because impacts, though unavoidable, would not result in population-level effects. The No Action Alternative could also include beneficial impacts on marine birds due to the presence of offshore structures; however, these impacts would be **minor beneficial** because although they would have some measurable effects on one or a few individuals or habitat, they would be localized to small areas.

3.5.3.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than described in the sections below. The following proposed PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on birds.

- The onshore substation/converter stations, which could require limited tree clearing.
- The number, size, and location of the WTGs.
- The routing variants within the selected onshore export cable system, which could require removal of trees on the edge of the construction corridor.
- The time of year during which construction occurs.

Variability of the proposed Project design exists as outlined in Appendix C. Below is a summary of potential variances in impacts.

- WTG number, size, and location: the level of hazard related to WTGs is proportional to the number of WTGs installed; fewer WTGs would present less hazard to birds.
- Onshore export cable routes and substation/converter stations footprints: the route chosen (including variants within the general route) and substation/converter stations footprint would determine the amount of habitat affected.
- Season of construction: The activity and distribution of birds exhibit distinct seasonal changes. For instance, summer and fall months (generally May through October) constitute the most active season for birds in the Project area, and the months on either side coincide with major migration events. Therefore, construction during months in which birds are not present, not breeding, or less active would have a lesser impact on birds than construction during more active times.

SouthCoast Wind has committed to measures to minimize impacts on birds. These measures include, but are not limited to, siting the proposed Project to avoid locating Project components in or near areas of known important or high bird use, incorporating the use of HDD at landfall locations to avoid disturbance to shorelines and coastal habitats, using lighting technology to minimize impacts on avian species, ensuring that lighting on WTGs will be executed in accordance with FAA regulations, and developing and implementing a Post-Construction Monitoring Plan to evaluate and mitigate for potential collision risk for bird species (Appendix G, *Mitigation and Monitoring*). SouthCoast Wind's *Draft Post-Construction Avian and Bat Monitoring Framework* is provided as Attachment G-3 in Appendix G.

3.5.3.5 Impacts of Alternative B – Proposed Action on Birds

The following summarizes the potential impacts of the Proposed Action on birds during construction, O&M, and decommissioning phases (described in Chapter 2, *Alternatives)*.

Accidental releases: Some potential exists for mortality, decreased fitness, and health effects due to the accidental release of fuel, hazardous materials, and trash and debris from vessels associated with the Proposed Action. Vessels associated with the Proposed Action may potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris. All vessels associated with the Proposed Action would comply with USCG requirements for the prevention and control of oil and fuel spills. Proper vessel regulations and operating procedures would minimize effects on offshore bird species resulting from the release of debris, fuel, hazardous materials, or waste (BOEM 2012). In addition, SouthCoast Wind will abide by the Bureau of Safety and Environmental Enforcement's regulations (30 CFR 250.300) concerning marine pollution prevention and control in OCS waters. In the case of an accidental spill within the proposed Project area, SouthCoast Wind will use an approved OSRP mitigation measures to prevent birds from going to affected areas including hazing, chumming, and relocating to unaffected areas (COP Volume 2, Table 16-1; SouthCoast Wind 2024). These releases, if any, would occur infrequently at discrete locations and vary widely in space and time; as such, BOEM expects localized and temporary and negligible impacts on birds.

Light: Under the Proposed Action, up to 149 WTG/OSP positions in the OCS would be lit with navigational and FAA hazard lighting; these lights have some potential to attract birds and result in increased collision risk (Hüppop et al. 2006). Birds may be less attracted to longer-wavelength lighting such as red and yellow lights (Zhao et al. 2020; Rebke et al. 2019) and steady burning lights pose a higher risk than pulsing strobe lights (Rebke et al. 2019; Patterson 2012; Kerlinger et al. 2010). In accordance with BOEM (2021) lighting guidelines and as outlined in SouthCoast Wind COP Volume 1, Section 3.3.12 (SouthCoast Wind 2024), each WTG and OSP would be lit and marked in accordance with FAA and USCG lighting standards and consistent with BOEM best practices. Lighting would be placed on all structures and would be visible throughout a 360-degree arc from the surface of the water. SouthCoast Wind would implement an ADLS to only activate WTG lighting when aircraft enter a predefined airspace. The short-duration synchronized flashing of the ADLS would have less impact on birds at night than the standard continuous, medium-intensity red strobe light aircraft warning systems. ADLS for the Proposed Action is anticipated to be activated for less than 5 hours per year, or 0.1 percent of nighttime hours, compared to standard continuous FAA hazard lighting (COP, Appendix T, Section 5.1.3; SouthCoast Wind 2024). This would reduce impacts already associated with WTG lighting. Vessel lights during construction, O&M, and decommissioning would be minimal and likely limited to vessels transiting to and from construction areas. To further reduce impacts on birds, SouthCoast Wind proposes to minimize lighting, to the extent practicable. As such, BOEM expects impacts, if any, to be long term but negligible from lighting.

Cable emplacement and maintenance: The Proposed Action would disturb up to 3,888 acres (1,573 hectares) of seafloor associated with the installation of interarray cable and offshore cable, which would result in turbidity effects that have the potential to reduce marine bird foraging success or have temporary and localized impacts on marine bird prey species including the sand lance (*Ammodytes* sp.; Staudinger et al. 2020). These impacts are expected to be temporary, with sediments settling quickly to the seabed and potential plumes generally confined to just above the seabed. The maximum TSS level would drop below 10 mg/l (0.00008 lb/gal) within 2 hours for all simulated scenarios and drop below 1 mg/l (0.000008 lb/gal) within 4 hours for any scenario except for nearshore areas of the Brayton Point corridor where 100 mg/L and 10 mg/L concentrations would last for less than 5 hours and a little over 2 days, respectively (SouthCoast Wind 2024). Dredging, which may also occur along the proposed cable routes in locations where sand waves (naturally mobile slopes on the seabed) are encountered or when crossing federal and state navigation channels, would produce similar effects, but with plumes likely to last longer and extend farther out. As BOEM (2018) notes, while turbidity would likely be high in the areas affected by dredging, the sediment would not affect water quality after it settles, and the period of sediment suspension would be very short term and localized. 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 given the localized and temporary nature of the potential impacts.

Noise: The expected impacts of aircraft, G&G surveys, and pile-driving noise associated with Proposed Action alone would not increase the impacts of noise beyond those described under the No Action Alternative. Effects on offshore bird species could occur during the construction phase of the Proposed

Action due to equipment noise, primarily through sound generated from pile driving. The pile-driving noise impacts would be short term (2 hours per pin pile with a maximum of eight per day or 4 hours per monopile with a maximum of two per day) and soft starts will be used to mitigate impacts (COP Volume 2, Table 9-11; SouthCoast Wind 2024). Additionally, prey species for marine birds would likely be temporarily displaced from the active construction noise, which would likely cause avian species to forage elsewhere. Potential disturbances from pile-driving noise are expected to be temporary and limited to the areas where the activity occurs.

Vessel and construction noise from seabed preparation, substructure installation, WTG and OSP installation, cable laying, and placement of scour protection could disturb offshore bird species, but they would likely acclimate to the noise or move away, potentially resulting in a temporary loss of habitat (BOEM 2012). During construction, multiple vessels may operate concurrently throughout the Lease Area or offshore export cable corridor with dynamic positioning vessels generating noise from cavitation on the propeller blades of the thrusters. However, marine life, including diving birds, within the region is regularly subjected to vessel activity and would be habituated to the underwater noise (BOEM 2014b). BOEM anticipates the temporary impacts, if any, related to construction and installation of the offshore components would be negligible.

Normal operation of the substation and/or converter stations would generate continuous noise, but BOEM expects negligible long-term impacts when considered in the context of the other commercial and industrial noises near the proposed sites. Noise from onshore construction would be mitigated to the extent practicable and is also considered negligible in context of other short-term commercial and industrial noises near the proposed substation.

Presence of structures: The various types of impacts on birds that could result from the presence of structures, such as fish aggregation and associated increase in foraging opportunities, entanglement and fishing gear loss or damage, migration disturbances, and WTG strikes and displacement, are described in detail Section 3.5.3.3, *Impacts of Alternative*. The impacts of the Proposed Action alone as a result of presence of structures would be long term but minor and may include some minor beneficial impacts.

As previously described and depicted for the offshore wind lease areas on Figure 3.5.3-6 and Figure 3.5.3-7, the locations of the OCS offshore wind lease areas were 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 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). However, operation of the Proposed Action would result in impacts on some individuals of offshore bird species and possibly some individuals of coastal and inland bird species during spring and fall migration. These impacts could arise through direct mortality from collisions with WTGs 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 OCS during all seasons of the year (Figure 3.5.3-6), suggesting that bird fatalities due to collision are likely to be low.

When WTGs are present, many birds would avoid the WTG 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 WTGs by flying above, below, or between them (e.g., Desholm and Kahlert 2005; Plonczikier and Simms 2012; Skov et al. 2018). 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). Vattenfall (a European energy company) recently studied bird movements within an offshore wind farm situated 1.8–3 miles (3–4.9 kilometers) off the coast of Aberdeen, Scotland (Vattenfall 2023). The purpose of the study was to improve the understanding of seabird flight behavior inside an offshore wind farm with a focus on the bird breeding period and post-breeding period when densities are highest. The study was robust in that seabirds were tracked inside the array with video cameras and radar tracks, which allowed for measuring avoidance movements (meso- and micro-avoidance)[1] with high confidence and at the species level. Detailed statistical analyses of the seabird flight data were enabled both by the large sample sizes and by the high temporal resolution in the combined radar track and video camera data. Meso-avoidance behavior showed that species avoided the RSZ by flying in between the turbines with very few avoiding by changing their flight altitude in order to fly either below or above the rotors. The most frequently recorded adjustment under micro-avoidance behavior was birds flying along the plane of the rotor; other adjustments included crossing the rotor either obliquely or perpendicularly, and some birds cross the rotor-swept area without making any adjustments to the spinning rotors. The study concluded that, together with the recorded high levels of micro-avoidance in all species (over 0.96), it is now evident that seabirds will be exposed to very low risks of collision in offshore wind farms during daylight hours. This was substantiated by the fact that no collisions or even narrow escapes were recorded in over 10,000 bird videos during the 2 years of monitoring covering the April–October period. The study's calculated micro-avoidance rate (over 0.96) is similar to Skov et al. (2018).

[1] Micro-avoidance is flight behavior within and in the immediate vicinity of individual wind turbine rotor swept areas (i.e., last second action to avoid collision); meso-avoidance is flight behavior within and in the immediate vicinity of the wind farm (i.e., anticipatory/impulsive evasion of rows of turbines in a wind farm).

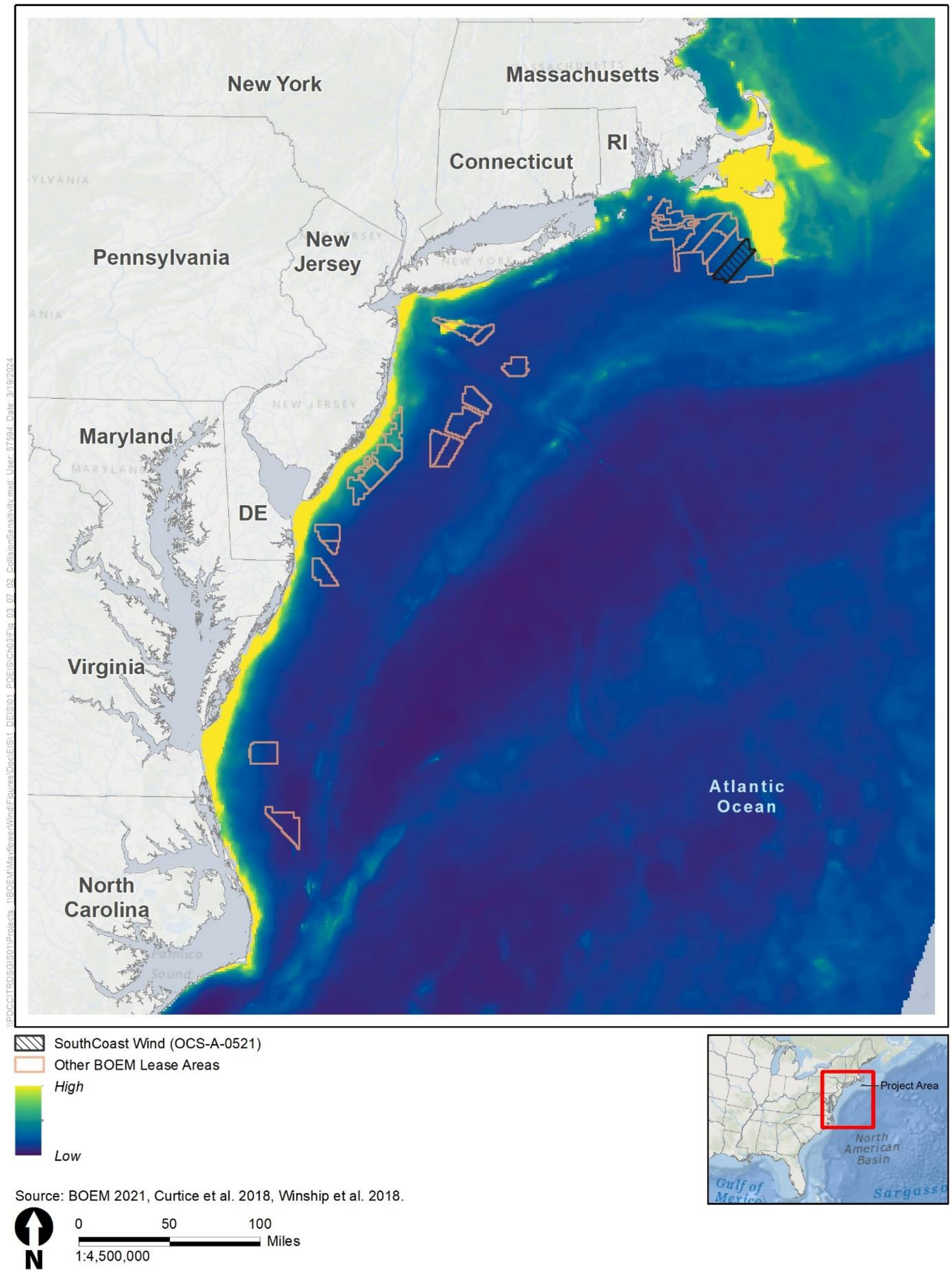


Figure 3.5.3-6. Total avian relative abundance distribution map for the higher collision sensitivity species group

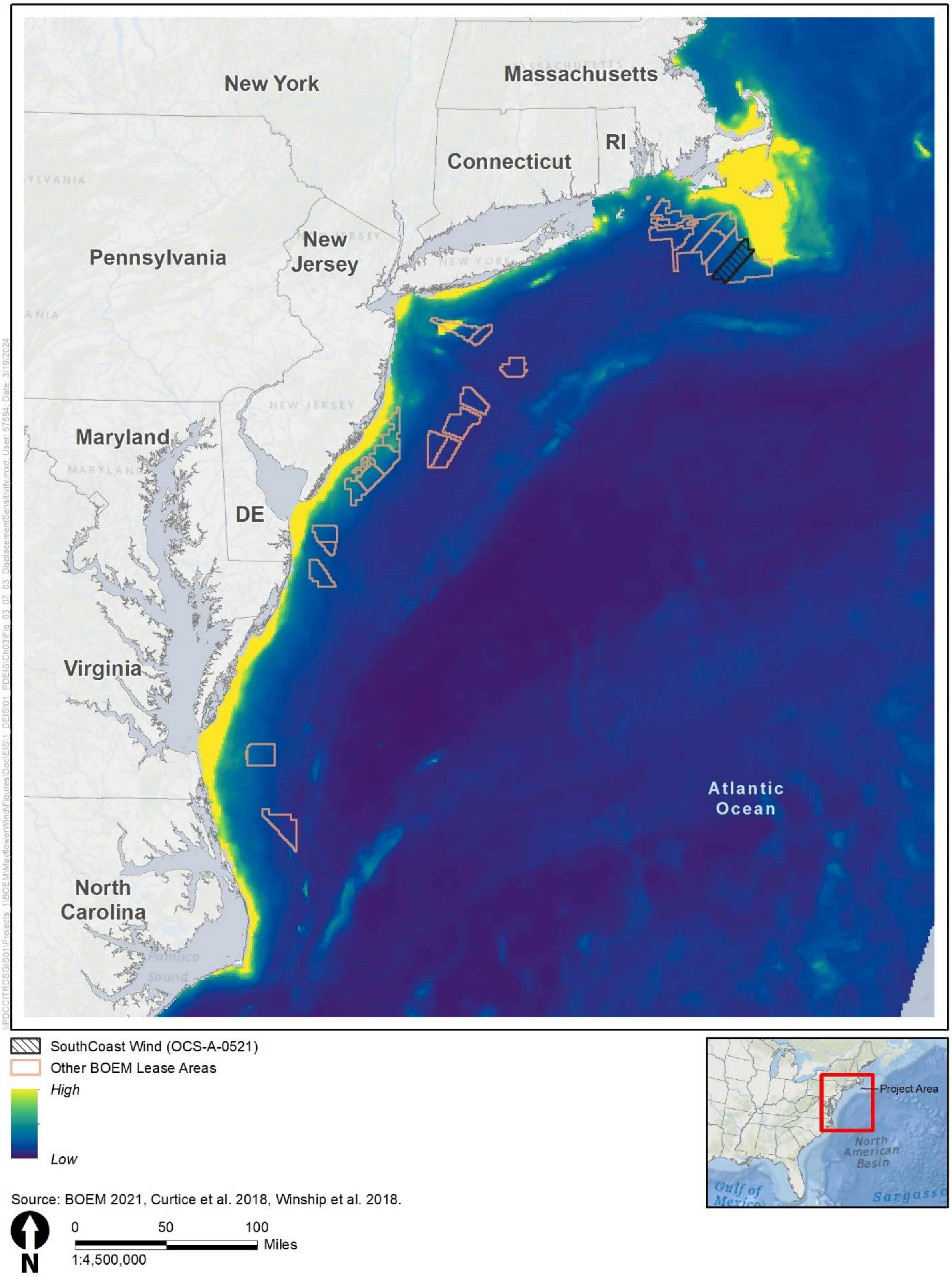


Figure 3.5.3-7. Total avian relative abundance distribution map for the higher displacement sensitivity species group

SouthCoast Wind performed an avian exposure risk assessment to estimate the risk of various offshore bird species encountering the Wind Farm Area (SouthCoast Wind 2024). The Lease Area is not likely to contain areas where high relative abundances of collision risk species may collide with the operational turbines. However, some collision-sensitive species—including the razorbill, northern gannet, gull, and seaducks—may frequent northern portions of the Lease Area during the winter and spring. Displacement-sensitive species densities including the razorbill, northern gannet and some seaduck species are likely to be low relative to regional and local waters with a small pocket of the moderately high activity recorded in the northern portion of the Lease Area during the winter and spring. While some non-marine birds have the potential to be exposed to the Wind Farm Area, it is far enough offshore as to be beyond the range of most breeding terrestrial or coastal bird species. Of the species considered to have a higher overall exposure risk, the northern gannet and long-tailed duck are listed as SGCNs in Massachusetts; the razorbill, black scoter, red-breasted merganser, and surf scoter are listed as SGCNs in Rhode Island; and the common eider is listed as an SGCN in both Massachusetts and Rhode Island.

During migration, many bird species, including songbirds, likely fly at heights well above or below the RSZ (75.5 to 1,066.4 feet [23 to 325 meters] above MLLW) (COP Appendix I1; SouthCoast Wind 2024). As shown in Robinson Willmott et al. (2013), species with low sensitivity scores include many passerines that only cross the Atlantic OCS briefly during migration and typically fly well above the RSZ. Other bird species such as seaducks have been observed increasing their altitude to avoid WTGs during the night (Desholm and Kahlert 2005). However, bird species such as gulls are ranked as vulnerable to collisions as they fly at RSZ heights (Johnston et al. 2014; Cook et al. 2012) but may exhibit avoidance behavior (Cook et al. 2012).

It is generally assumed that inclement weather and reduced visibility cause changes to 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). Furthermore, many of these passerine species, while 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. While several studies documenting bird flight and wind speeds over terrestrial environments have shown birds to fly at variable wind speeds, including above the typical cut-in speeds of wind turbines (Abdulle and Fraser 2018; Bloch and Bruderer 1982; Bruderer and Boldt 2001; Chapman et al. 2016), Robinson Willmott and Forcey (2014) found that most of the bird activity (including blackpoll warblers) in the offshore environment on the OCS occurred during windspeeds less than 6 miles per hour (10 kilometers per hour) (Robinson Willmott and Forcey 2014: Figure 109). The cut-in speed for the SouthCoast Wind WTGs is 5.6 to 8.9 miles per hour (9 to 14.4 kilometers per hour); therefore, based on the Robinson Willmott and Forcey (2014) offshore study, passerines would likely be migrating when the turbine blades are more often idle. Furthermore, most carcasses of small migratory songbirds found at land-based wind energy facilities in the Northeast were within 6.6 feet (2 meters) of the turbine towers, suggesting that they are colliding with towers rather than with moving turbine blades (Choi et al. 2020). Although it is possible that migrating passerines could collide with offshore structures, migrating passerines are also occasionally found dead on boats, presumably from exhaustion (e.g., Stabile et al. 2017).

Some marine bird species might avoid the Wind Farm Area 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), seaducks (Drewitt and Langston 2006; Petersen et al. 2006), and northern gannets (Drewitt and Langston 2006; Lindeboom et al. 2011; Petersen et al. 2006) typically avoid offshore wind developments. The proposed Project would no longer provide foraging opportunities to those species with high displacement sensitivity, but suitable foraging habitat exists in the immediate vicinity of the proposed Project and throughout the region. However, as depicted on Figure 3.5.3-7, modeled use of the Wind Farm Area by bird species with high displacement sensitivity is low. A complete list of species included in the higher displacement sensitivity group can be found in Robinson Willmott et al. (2013). Because the Wind Farm Area is not likely to contain important foraging habitat for the species susceptible to displacement, BOEM expects this loss of habitat to be insignificant. SouthCoast Wind proposes to develop and implement a Post-Construction Monitoring Plan to evaluate and mitigate for potential collision risk for bird species (COP Volume 2, Table 16-1; SouthCoast Wind 2024); SouthCoast Wind's *Draft Post-Construction Avian and Bat Monitoring Framework* is provided in Appendix G, *Mitigation and Monitoring*. Population-level, long-term impacts resulting from habitat loss would likely be negligible.

Generally, onshore operation is not expected to pose any significant IPFs (i.e., hazards) to birds because activities would disturb little if any habitat. The Onshore Project components are mostly within existing, highly disturbed, industrial areas that are unlikely to provide important bird habitat.

Traffic (aircraft): The expected impacts of aircraft traffic associated with the Proposed Action would be negligible and would not increase impacts beyond those described for the No Action Alternative.

Land disturbance: The expected impacts of onshore construction associated with the Proposed Action would not increase the impacts of this IPF beyond those described under the No Action Alternative. SouthCoast Wind proposes to use HDD technology for cable installation at landfall locations, which will primarily go under beaches and would avoid beach habitat for nesting shorebirds (COP Volume 2, Table 16-1; SouthCoast Wind 2024); as such, temporary impacts on birds, particularly nesting shorebirds, resulting from the landfall location would be negligible. Collisions between birds and vehicles or construction equipment have limited potential to cause mortality. However, these temporary impacts, if any, would be negligible, as most individuals would avoid noisy construction areas (Bayne et al. 2008; Goodwin and Shriver 2010; McLaughlin and Kunc 2013).

Overall, impacts on bird habitat from onshore construction activities would be limited because, whenever possible, facilities (including overhead transmission lines) would be co-located with existing developed areas to limit disturbance. Vegetation clearing would likely be minimal for the sites in

Falmouth and the sites of the converter stations and Onshore Project components at Brayton Point.[2] If tree clearing is required, SouthCoast Wind has proposed to conduct habitat assessments and presence/absence surveys and would coordinate with MassWildlife, RIDEM, and USFWS as appropriate. Clearing during construction within temporary workspaces would result in temporary loss of forage and cover for birds within the area. Construction of the onshore converter stations and/or substation would result in temporary and permanent impacts on habitat from construction of the permanent converter station/substation facility and use of temporary construction workspace. However, the existing habitat at the sites of the onshore converter stations and substation sites is in previously disturbed areas and the Project would result in no further additional habitat fragmentation, significant new open spaces, or open corridors (SouthCoast Wind 2024). Due to the short duration of the activities and AMMs (COP Volume 2, Table 16-1; SouthCoast Wind 2024) that SouthCoast Wind has committed to implementing to reduce impacts, population-level impacts on birds from habitat modification and impacts are unlikely. Given the nature of the existing habitat, its abundance on the landscape, and the temporary nature of construction, the impacts on birds are expected to be negligible.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind and offshore wind activities. Ongoing and planned non-offshore wind activities related to installation of new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and installation of new structures would contribute to impacts on birds through the primary IPFs of accidental releases, lighting, cable emplacement and maintenance, presence of structures, traffic (aircraft), and land disturbance. The construction, O&M, and decommissioning of both onshore and offshore infrastructure for offshore wind activities across the geographic analysis area would also contribute to the same IPFs. Given that the abundance of bird species that overlap with wind energy facilities on the Atlantic OCS is relatively small, offshore wind activities would not appreciably contribute to impacts on bird populations. Temporary disturbance and permanent loss of habitat onshore may occur as a result of offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the geographic analysis area. Ongoing and planned offshore wind activities in combination with the Proposed Action would result in an estimated 3,031 WTGs, of which the Proposed Action would contribute 147 or about 5 percent.

The cumulative impacts on birds would likely be moderate because, although bird abundance on the OCS is low, there could be unavoidable impacts offshore and onshore; however, BOEM does not anticipate the impacts to result in population-level effects or threaten overall habitat function. In the

[2] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action*, Brayton Point is the preferred POI for both Project 1 and Project 2, and Falmouth is the variant POI for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

context of reasonably foreseeable environmental trends, the Proposed Action would contribute an undetectable increment to the cumulative impacts on birds.

Impacts of Alternative B on ESA-Listed Species

Three bird species in the geographic analysis area are either threatened or endangered and protected by ESA. Impacts of the Proposed Action on ESA-listed birds are represented in the IPFs discussed previously as all impact types and mechanisms for birds also apply to ESA-listed birds. BOEM prepared a BA analyzing the effects of the Project on USFWS federally listed species. There are no critical habitats designated for these species in the action area defined in the BA. Consultation with USFWS pursuant to Section 7 of the ESA concluded on September 1, 2023, and results of the consultation are included in the *Conclusions* section below.

Conclusions

Impacts of the Proposed Action: Construction, installation, O&M, and eventual decommissioning of the Proposed Action would have **minor adverse** impacts on birds, depending on the location, timing, and species affected by an activity. The primary factors of the Proposed Action affecting birds are habitat loss and collision-induced mortality from rotating WTGs and permanent habitat loss and conversion from onshore construction. The Proposed Action would also result in potential **minor beneficial** impacts associated with foraging opportunities for marine birds.

BOEM prepared a BA assessing the potential effects on federally listed species (BOEM 2023). Consultation with USFWS pursuant to Section 7 of the ESA was concluded September 1, 2023. In USFWS's transmittal letter for the Biological Opinion, USFWS concurred with BOEM's determination of it may affect, but is not likely to adversely affect, for the roseate tern. For the piping plover and rufa red knot, USFWS issued a Biological Opinion on BOEM's determination of likely to adversely affect (USFWS 2023). The Biological Opinion stated that USFWS does not anticipate significant reduction in the reproduction, numbers, or distribution of the piping plover and rufa red knot. USFWS conservation measures, other Project measures, and nondiscretionary terms and conditions included in the Biological Opinion to minimize or compensate for Project effects related to collision risk or to address significant data gaps in avian and bat use of offshore areas, collision modeling, and compensatory mitigation are presented in Table G-2 (Appendix G). With the adoption of these measures, it is USFWS's conclusion that operation of the SouthCoast Wind Project is not likely to jeopardize the continued existence of the Atlantic Coast piping plover or the rufa red knot (USFWS 2023).

Cumulative Impacts of the Proposed Action: BOEM anticipates that the cumulative impacts from the Proposed Action on birds in the geographic analysis area, primarily due to collision risk and functional habitat loss, would be **moderate adverse** because impacts would be unavoidable, but not result in population-level effects. The Proposed Action could also include cumulative beneficial impacts on marine birds due to the presence of offshore structures; however, these impacts would only be **minor beneficial** because although they would have some measurable effects on one or a few individuals or habitat, they would be localized to a small area. The contribution of the Proposed Action to the cumulative impacts of individual IPFs resulting from ongoing and planned activities would range from negligible to moderate, as well as moderate beneficial impacts. The Proposed Action would contribute to the cumulative impacts primarily through the permanent impacts from the presence of structures.

3.5.3.6 Impacts of Alternative C on Birds

Impacts of Alternative C: Under Alternative C, the export cable route to Brayton Point would be rerouted onshore to avoid sensitive fish habitat in the Sakonnet River. The new overland portions of Alternative C-1 and Alternative C-2 would largely be sited in public road ROWs to the extent possible. Both the eastern and western variations of Alternative C-1 and Alternative C-2 overlap four separate Natural Heritage areas. Prior to traveling along Route 138, the eastern variation additionally abuts Gardiner Pond, the Heffenreffer Wildlife Refuge, and the Norman Bird Sanctuary and would be 1 mile (1.7 kilometers) northwest of the Sachuest Point National Wildlife Refuge (NWR). Both the Norman Bird Sanctuary and the Sachuest Point NWR provide stopover and wintering habitat that support federally and state-listed migratory birds.

Alternative C-1 would increase the total onshore export cable route by 9 miles (14 kilometers) over the Proposed Action. The increase of land disturbance would require a longer construction schedule due to the complexity of working in developed areas with multiple property owners along the proposed route. Additionally, Alternative C-1 passes through coastal communities that are popular tourist destinations in the summer months which may lead to seasonal limitations on construction. The combination of a slower rate of progress and seasonal restrictions would result in a significantly longer construction period for onshore cable runs.

The only IPFs that would be meaningfully different under Alternative C compared to the Proposed Action are land disturbance and new cable emplacement/maintenance. The primary impacts of Alternative C affecting birds would be habitat loss from tree and brushland disturbance, which would result in both temporary and permanent impacts. In addition to the forest and brushland area disturbed under the Proposed Action, 4.95 acres (2.00 hectares), 2.59 acres (1.04 hectares), and 15.46 acres (6.26 hectares) of forest habitat could be disturbed under Alternative C-1 (eastern variation), Alternative C-1 (western variation), and Alternative C-2, respectively. In addition, 1.51 acres (0.61 hectare), 1.07 acres (0.43 hectare), and 1.31 acres (0.53 hectare) of brushland under Alternative C-1 (eastern variation), Alternative C-1 (western variation), and Alternative C-2, respectively, would be disturbed in addition to the Proposed Action disturbance (refer to Section 3.5.4, *Coastal Habitat and Fauna*). These impacts may affect bird foraging and nesting located along the edges of the road ROWs. While the area of tree and brushland disturbance would be greater than the Proposed Action, the potential impact on birds would remain minor.

In the aquatic environment, Alternative C-1 and Alternative C-2 would reduce the total offshore export cable route by 9 miles (14 kilometers) and 12 miles (19 kilometers), respectively. However, cable emplacement activity would still occur and result in short-term and localized sediment suspension. Individual birds would be expected to successfully forage in nearby areas and impacts would remain negligible.

Cumulative Impacts of Alternative C: In the context of reasonably foreseeable environmental trends, the cumulative impacts of Alternative C would be similar to those described under the Proposed Action.

Impacts of Alternative C on ESA-Listed Species

BOEM anticipates that SouthCoast Wind would use HDD technology for cable installation at the Alternative C-1 landfall location. Cables would be installed primarily under beaches and would avoid beach habitat for nesting shorebirds, which would include the three ESA-listed species in the Project area. As such, impacts on these species' habitat would be avoided and other construction impacts (e.g., noise) would be temporary and negligible. There is no beach habitat for the three ESA-listed bird species at the Alternative C-2 landfall.

Conclusions

Impacts of Alternative C: Impacts of Alternative C would be similar to the impacts of the Proposed Action. While Alternative C would result in a greater area of onshore habitat impacts along the onshore export cable routes than the Proposed Action, the overall affected area would be small and the same construction, O&M, and decommissioning impacts would still occur. Therefore, Alternative C would result in **minor** adverse impacts on birds and could include **minor beneficial** impacts.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with Alternative C on birds, primarily due to habitat loss and collision risk, would be similar to the Proposed Action and result in **moderate** adverse impacts, because impacts would be unavoidable, but not result in population-level effects. Cumulative impacts would also be **minor beneficial** because although increased foraging habitat due to the presence of structures would have some measurable effects on one or a few individuals or habitat, they would be localized to a small area.

3.5.3.7 Impacts of Alternatives D (Preferred Alternative), E, and F on Birds

Impacts of Alternatives D, E, and F: Impacts on birds associated with construction and installation, O&M, and decommissioning of the Project under Alternatives D, E, and F would be similar to those described under the Proposed Action. Under Alternative D, potential impacts on birds from the presence of structures, noise, and light could be reduced with the removal of six WTGs in the northern portion of the Lease Area that are nearest to Nantucket Shoals. Nantucket Shoals provides foraging habitat for various avian species including seabirds and seaducks and has high year-round avian abundance (Figure 3.5.3-2). As shown in Chapter 2*, Alternatives*, Figure 2-7, Nantucket Shoals is a persistent hotspot of *gammarid* amphipod abundance, which is a persistent food source for seaducks, including the long-tailed duck (*Clangula hyemalis*) and potentially white-winged scoters (*Melanitta deglandi*) (White et al. 2009; Veit et al. 2016). In addition to these species, the northern portions of the Lease Area may be frequented by other collision-sensitive and displacement-sensitive species including the northern gannet, razorbill, and gull in winter and spring (Figure 3.5.3-6 and Figure 3.5.3-7), and a reduction in offshore wind development in this area may lessen the impacts on these species. The red-throated loon may also frequent the northern portion of the Lease Area. The removal of six WTGs in this area may lessen the impacts on birds by providing more area of open ocean nearest to Nantucket Shoals foraging habitat. However, this 4 percent reduction in WTGs represents only a small portion of the overall Project, and impacts associated with the remaining 141 WTGs would still occur. Overall impacts are not anticipated to be materially different than the Proposed Action.

None of the differences between Alternatives E and F and the Proposed Action would have the potential to significantly reduce or increase impacts on birds from the analyzed IPFs. Alternative E-1 would require all piled foundations, resulting in similar impacts from noise as the Proposed Action. Under Alternative E-2 and Alternative E-3, foundations would be used that require no impact pile driving (suction-bucket and GBS), eliminating impacts on diving birds due to underwater noise. Foundations with larger seabed footprints (Alternative E-3) may present increased foraging opportunities due to increased aggregations of fish near structures due to the presence of artificial reefs. BOEM anticipates that the impacts on birds under Alternatives E-1, E-2, and E-3 would not be measurably different from those anticipated under the Proposed Action. Under Alternative F, the Falmouth offshore export cable route would still be within the Proposed Action's PDE but would include only three HVDC cables compared to five HVAC cables under the Proposed Action, which would reduce seafloor disturbance by approximately 700 acres. The reduction in seafloor disturbance would not have a meaningful difference on bird foraging opportunities.

Cumulative Impacts of Alternatives D, E, and F: In the context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives D, E, and F would be similar to those described under the Proposed Action.

Impacts of Alternatives D, E, and F on ESA-Listed Species

Impacts on ESA-listed species resulting from individual IPFs associated with the construction and installation, O&M, and decommissioning of the Project under Alternatives D, E, and F would be similar to those described under the Proposed Action for the reasons described above for all birds. Coastal shorebirds including the *rufa* red knot and piping plover may travel through the Lease Area, but available data do not indicate that such movements are common. Tern species, including the roseate tern, may occur in the Lease Area in low to moderate levels relative to regional and local occurrences. Concentrations of terns are not expected in the Lease Area based on sand lance distribution data. None of the differences between Alternatives E and F and the Proposed Action would have the potential to significantly reduce or increase impacts on ESA-listed birds from the analyzed IPFs. BOEM does not anticipate impacts to be measurably different than those described under the Proposed Action.

Conclusions

Impacts of Alternatives D, E, and F: The expected **minor adverse** impacts and **minor beneficial** impacts associated with the Proposed Action alone would not change under Alternatives D, E, and F. Alternative D would reduce the number of WTGs compared to the Proposed Action in the northern Lease Area but would have similar overall impacts on birds. Alternative E would reduce impacts on diving birds due to underwater noise under Alternatives E-2 and E-3 but, along with Alternative F, would have the same

WTG number and overall Wind Farm Area footprint as the Proposed Action and, therefore, would have similar impacts on birds.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with Alternatives D, E, and F on birds, primarily due to habitat loss and collision risk, would be similar to the Proposed Action and result in **moderate adverse** impacts, because impacts would be unavoidable, but not result in population-level effects. Cumulative impacts would also be **minor beneficial** because although increased foraging habitat due to the presence of structures would have some measurable effects on one or a few individuals or habitat, it would be localized to a small area.

3.5.3.8 Comparison of Alternatives

Under Alternative C, the export cable route to Brayton Point would be rerouted onshore resulting in the overlap of four separate Natural Heritage areas, which provide stopover and overwintering habitat that support federally and state-listed migratory birds. While the area of tree and brushland disturbance would be greater than that associated with the Proposed Action, the anticipated minor impacts of the Proposed Action would not change substantially under Alternative C. Therefore, the overall impact level on birds would not change—minor and minor beneficial impacts.

Alternatives D, E, or F would have the same, or fewer number of WTGs as the Proposed Action, which would result in the same impacts on birds; the overall impact level would not change—minor and minor beneficial impacts.

In the context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternatives C, D, E, and F when each is combined with the impacts from ongoing and planned activities would be the same as for the Proposed Action—minor and minor beneficial impacts.

3.5.3.9 Proposed Mitigation Measures

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix G, Tables G-2 through G-4 and summarized and assessed in Table 3.5.3-4. If one or more of the measures analyzed here are adopted by BOEM or cooperating agencies, some adverse impacts on bats could be further reduced. The Draft EIS analyzed two BOEM-proposed bird and bat mitigation measures, that were subsequently incorporated into the ESA consultation and are now reflected in Appendix G, Table G-2 (i.e., adaptive mitigation for birds and bats, and annual bird and bat mortality reporting).

Table 3.5.3-4. Mitigation and Monitoring Measures Resulting from Consultations (also identified in Appendix G, Table G-2): birds

Measure	Description	Effect
Conservation Measures and Reasonable and Prudent Measures from Terms and Conditions from the USFWS Biological Opinion	USFWS Conservation Recommendations, Reasonable and Prudent Measures, and Terms and Conditions were transmitted by letter dated September 1, 2023. Conservation Recommendations under BOEM, BSEE, and USFWS jurisdiction include turbine configuration, collision risk model support and utilization, light impact reduction, Avian and Bat Post-Construction Monitoring Plan, and Incidental Mortality and Reporting. Reasonable and Prudent Measures include collision minimization and collision detection reports.	Measures required through the ESA consultation would likely result in reduced potential impacts on birds. Should post-construction monitoring show impacts on birds deviate substantially from the impact analysis in the EIS, measures would be implemented to address the specific impact reported. Potential collision impacts with offshore WTGs and OSPs could be reduced by requiring installation of bird perching-deterrent devices and shielding of light downward to minimize bird attraction to operating WTGs and on the OSP. Implementation of these measures would provide incremental reductions in impacts on birds, would improve accountability, and would reduce uncertainty associated with estimated rates of collision mortality, but would not alter the overall impact determination.

Table 3.5.3-5. BOEM or agency-proposed measures (also identified in Appendix G, Table G-3): birds

Measure	Description	Effect
Compensatory Mitigation for Piping Plover, Red Knot, and Roseate Tern	At least 180 days prior to the start of commissioning of the first WTG, the lessee must distribute a Compensatory Mitigation Plan to BOEM, BSEE, and the USFWS for review and comment. BOEM, BSEE, and USFWS will review the Compensatory Mitigation Plan and provide any comments on the plan to the lessee within 60 days of its submittal. The lessee must resolve all comments on the Compensatory Mitigation Plan to BOEM's and BSEE's satisfaction before implementing the plan and before commissioning of the first WTG. The Compensatory Mitigation Plan must provide compensatory mitigation actions to offset take of piping plover, red knot, and roseate tern for the first 5 years of WTG operation. The Compensatory Mitigation Plan must include a) detailed description of the mitigation actions; b) the specific location for each mitigation action; c) a timeline for completion of the mitigation measures; d) itemized costs for implementing the mitigation actions; e) details of the mitigation mechanisms (e.g., mitigation agreement, applicant-proposed mitigation; and f) monitoring to ensure the effectiveness of the mitigation actions in offsetting take.	While this mitigation would offset any take of ESA-listed species in the Project Area, it would not reduce the impact rating for any of the Proposed Action's IPFs.

Measures Incorporated in the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.5.3-4 and Table 3.5.3-4, and Tables G-2 and G-3 in Appendix G are incorporated in the Preferred Alternative. These measures would further define how the effectiveness and enforcement of environmental protection measures would be ensured and improve accountability for compliance with environmental protection measures by requiring monitoring, reporting, and adaptive management of potential bird impacts on the OCS. However, given bird use of the OCS is anticipated to be low, offshore wind activities are unlikely to appreciably contribute to impacts on birds regardless of measures intended to address potential offshore bird impacts. In the onshore environment, tree-clearing restrictions and conducting post-construction monitoring and reporting would ensure impacts on birds and their habitats would be avoided and minimized to the extent practicable. Because these measures ensure the effectiveness of and compliance with environmental protection measures that are already analyzed as part of the Proposed Action, these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.5.3.5, *Impacts of Alternative B – Proposed Action on Birds*.

3.5 Biological Resources

3.5.4 Coastal Habitat and Fauna

This section discusses potential impacts on coastal habitat and fauna resources from the Proposed Action, alternatives, and ongoing and planned activities in the coastal habitat and fauna geographic analysis area. Coastal habitat includes flora and fauna within state waters (which extend 3 nautical miles [5.6 kilometers] from the shoreline) inland to the mainland, including the foreshore, backshore, dunes, and interdunal areas. The coastal habitat and fauna geographic analysis area, as shown in Figure 3.5.4-1, includes the area within a 1.0-mile (1.6-kilometer) buffer of the Onshore Project area that includes the offshore export cable corridors, the landfall locations under consideration, the overhead transmission lines, underground transmission lines, substation, converter stations, and points of interconnection at Brayton Point, in Somerset, Massachusetts, and in Falmouth, Massachusetts. [1]

This section analyzes the affected environment and environmental consequences of the Proposed Action and alternatives on coastal flora and fauna, including special-status species. The affected environment and environmental consequences of Project activities that are in the geographic analysis area and extend into state waters (i.e., HDD for cable landfalls and cable laying within 1.0 mile [1.6 kilometers] of cable landfalls) are presented in Section 3.5.2, *Benthic Resources*; Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*; Section 3.5.6, *Marine Mammals*; Section 3.5.7, *Sea Turtles*; and Section 3.4.2, *Water Quality*. Additional information on birds, bats, and wetlands is presented in Section 3.5.3, *Birds*; Section 3.5.1, *Bats*; and Section 3.5.8, *Wetlands*, respectively, and will not be addressed in this section.

3.5.4.1 Description of the Affected Environment

This section describes vegetation communities and associated fauna in the upland portions of the geographic analysis area and includes information on special-status species and habitats in the onshore geographic analysis area. Vegetation communities occurring in wetlands are described in Section 3.5.8, *Wetlands*, while aquatic vegetation and estuarine habitats are described in Section 3.5.2, *Benthic Resources*.

The geographic analysis area encompasses the Falmouth and Brayton Point Onshore Project areas. The Falmouth Onshore Project area falls in the Cape Cod Coastal Lowland and Islands Ecoregion of the Atlantic Coastal Pine Barrens (Griffith et al. 2009). The Brayton Point Onshore Project area is in the Narragansett-Bristol Lowland and Island Ecoregion of the Northeastern Coastal Zone (Griffith et al. 2009; Swain 2020).

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[1] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action*, Brayton Point is the preferred ECC for both Project 1 and Project 2, and Falmouth is the variant ECC for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

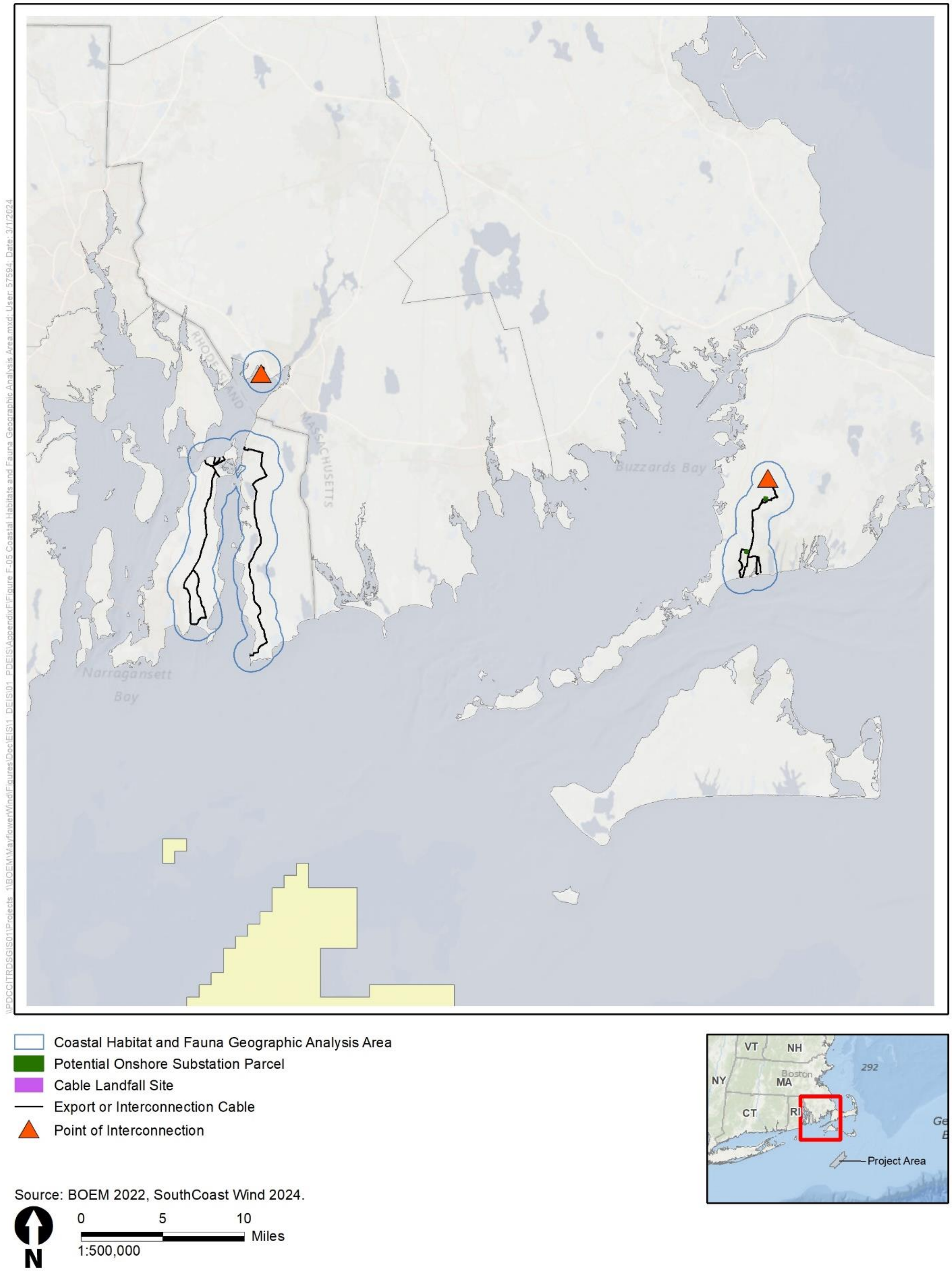

Figure 3.5.4-1. Coastal Habitat and Fauna geographic analysis area

Cape Cod Coastal Lowland and Island Ecoregion (Falmouth Onshore Project Area)

Characteristics of the Cape Cod Coastal Lowland and Island Ecoregion include terminal moraines and outwash plains left by receding glaciers that include habitats such as forests, wetlands, grasslands, scrub-shrub, and fragmented vegetated areas. Most of the land in the Falmouth Onshore Project area is disturbed or developed, with portions of relatively undisturbed land. Desktop studies, wetland delineations, and windshield surveys are summarized in COP Appendix J (SouthCoast Wind 2024). The most likely species to occur in the area include 8 mammals, 11 birds, 6 reptiles, 7 amphibians, and 6 fish species (SouthCoast Wind 2024). Forest and open woodlots serve as the primary habitat for many mammal species, such as Virginia opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), eastern coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*). Meadow vole (*Microtus pennsylvanicus*) and white-footed mouse (*Peromyscus leucopus*) use the grasslands (SouthCoast Wind 2024). Forests are also used by many bird species: dark-eyed junco (*Junco hyemalis*), blue jay (*Cyanocitta cristata*), and black-capped chickadee (*Poecile atricapillus*). Open woodlots are used by the American robin (*Turdus migratorius*), American crow (*Corvus brachyrhynchos*), mourning dove (*Zenaida macroura*), American goldfinch (*Spinus tristis*), and chipping sparrow (*Spizella passerine*). Ponds, lakes, and wetland are where the red-winged blackbird (*Agelaius phoeniceus*) and the swallow (*Tachycineta bicolor*) are found. The European starling (*Sturnus vulgaris*) is found in developed areas and is an invasive species throughout the United States (Homan et al. 2017). Birds are discussed further in Section 3.5.3, *Birds*.

Many species of reptiles, amphibians, and perennial freshwater fish reside in and around ponds and lakes: painted turtle (*Chrysemys picta)*, spotted turtle (*Clemmys guttata*), spring peeper (*Pseudacris crucifer*), American bullfrog (*Lithobates catesbeianus*), yellow perch (*Perca flavescens*), largemouth bass (*Micropterus salmoides*), chain pickerel (*Esox niger*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), and pumpkinseed (*Lepomis gibbosus*) (SouthCoast Wind 2024). Wetlands provide habitat for other reptiles, amphibians, and freshwater fish species: grey treefrog (*Hyla versicolor*), green frog (*Rana clamitans*), spotted salamander (*Ambystoma maculatum*), eastern red-backed salamander (*Plethodon cinereus*), eastern ribbon snake (*Thamnophis sauritus*), and Northern water snake (*Nerodia sipedon*). The Northern ring-necked snake (*Diadophis punctatus*), black racer (*Coluber contrictor*), and fowler's toad (*Anaxyrus fowleri*) inhabit open woodlots.

Narragansett-Bristol Lowland and Islands Ecoregion (Brayton Point Onshore Project Area)

The Narragansett-Bristol Lowland and Islands Ecoregion is relatively flat with gently rolling irregular plains. This ecoregion contains many wetlands, low-gradient streams, and oak and oak-pine forests with combinations of central hardwood species (Swain 2020). Similar species to those found in the Falmouth Onshore Project area are expected to occur in the Project area for the Brayton Point landfall site and export cable routes and substation, in Somerset, Massachusetts. Many migratory birds visit Narraganset Bay in the spring and fall. A significant population of waterfowl are found in the Lee and Cole Rivers IBA, directly adjacent to the Brayton Point landfall site. Other avian species expected to be present include those that inhabit coastal terrestrial habitats, like shore birds, wading birds, raptors, gulls, and seaducks (SouthCoast Wind 2024) and are discussed in Section 3.5.3, *Birds*.

The intermediate landfall site on Aquidneck Island is highly urbanized and, therefore, the species inhabiting that environment have likely adapted to living in urban environments.

The onshore cable routes under Alternative C-1, which traverses Aquidneck Island for approximately 12 miles (19 kilometers), and Alternative C-2, which extends for nearly 16 miles (26 kilometers) through Little Compton and Tiverton, also occur in the Narragansett-Bristol Lowland and Islands Ecoregion. Species inhabiting these areas would be similar to those described for the other Brayton Point Onshore Project facilities.

Coastal Flora Special-Status Species and Habitats

Protected terrestrial species identified by the United States Fish and Wildlife Service (USFWS), Natural Heritage & Endangered Species Program (NHESP), and RIDEM as potentially occurring in the vicinity of the Project area are provided in this section. The MESA also offers further protection for the state-listed species. The USFWS IPaC tool (USFWS 2022) and MassWildlife (NHESP data) (MassWildlife 2022) were used to determine the potential presence of special-status floral species in the geographic analysis area. Personal communications with NHESP were used to confirm the online data include the most recent list of state-protected species (Maier 2022). Additionally, personal communications with RIDEM were used to provide information on protected species in Rhode Island (Jordan 2022). Table 3.5.4-1 provides all threatened or endangered species, besides birds and bats, that may potentially occur in the geographic analysis area.

Table 3.5.4-1. Federally and state-listed endangered and threatened species that may potentially occur in the geographic analysis area

Common Name	Scientific Name	Federal Status [a]	MESA Status [b]	RIDEM Status [c]
Amphibians				
Eastern spadefoot	*Scaphiopus holbrookii*	--	T	--
Fish				
Shortnose sturgeon	*Acipenser brevirostrum*	E	E	--
Invertebrates				
Melsheimer's sack bearer	*Cicinnus melsheimeri*	--	T	--
Collared cycnia	*Cycnia collaris*	--	T	--
The pink streak	*Dargida rubripennis*	--	T	--
Imperial moth	*Eacles imperialis*	--	T	--
Scarlet bluet	*Enallagma pictum*	--	T	--
Pine barrens bluet	*Enallagma recurvatum*	--	T	--
Agassiz's clam shrimp	*Eulimnadia agassizii*	--	E	--
Water-willow borer Moth	*Papaipema sulphurata*	--	T	--
Salt marsh tiger beetle	*Ellipsoptera marginata*	--	--	T

Common Name	Scientific Name	Federal Status [a]	MESA Status [b]	RIDEM Status [c]
Plants				
American chaffseed	*Schwalbea american*	E	--	--
Sandplain gerardia	*Agalinis acuta*	E	E	--
Purple needlegrass	*Aristida purpurascens*	--	T	--
Purple milkweed	*Asclepias purpurascens*	--	E	--
Whorled milkweed	*Asclepias verticillata*	--	T	--
Mattamuskeet rosette-grass	*Dichanthelium mattamuskeetense*	--	E	--
Purple cudweed	*Gamochaeta purpurea*	--	E	--
Saltpond pennywort	*Hydrocotyle verticillata*	--	T	--
Saltpond grass	*Leptochloa fusca* ssp. *fascicularis*	--	T	--
Stiff yellow flax	*Linum medium* var. *texanum*	--	T	--
Dwarf bulrush	*Lipocarpha micrantha*	--	T	--
Adder's tongue fern	*Ophioglossum pusillum*	--	T	--
Eastern prickly pear	*Opuntia humifusa*	--	E	--
Short-beaked beaksedge	*Rhynchospora nitens*	--	T	--
Papillose nut sedge	*Scleria pauciflora*	--	E	--
Grass-leaved ladies'-tresses	*Spiranthes vernalis*	--	T	--
Resupinate bladderwort	*Utricularia resupinata*	--	T	--

[a] USFWS 2022.
[b] MassWildlife 2022.
[c] Jordan 2022.
E= Endangered, T= Threatened

There are two federally listed plant species that may occur in the geographic analysis area: American chaffseed (*Schwalbea american*) and sandplain gerardia (*Agalinis acuta*). American chaffseed is an herbaceous perennial found on the sandy glacial outwash plains in nutrient-poor coils and are often observed with the sandplain gerardia. It is a fire-dependent species and requires open habitats often shaded out by rapidly growing pitch pines and invasives (MassWildlife 2020a). It reaches heights of 12–18 inches (30.5–46 centimeters) and blooms in early July. Though it was last observed on Cape Cod in 1965, a population was found in Barnstable County in 2018 (MassWildlife 2020a). Sandplain gerardia is an annual species that averages 4–8 inches (10–20 centimeters) but can reach heights up to 16 inches (41 centimeters) (MassWildlife 2020b). It grows in dry, sandy soils along roadsides and grasslands and pine-oak forests often where lichens are present Flowering occurs from late August through later September, and the blooms only last a single day (MassWildlife 2020b). The shortnose sturgeon (*Acipenser brevirostrum*) is also listed as federally endangered and may occur in the Onshore Project area. Shortnose sturgeon is an anadromous fish that mainly lives in large freshwater rivers and coastal estuaries. Impacts on shortnose sturgeon are addressed in Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*.

Falmouth Onshore Project Area

Six state-listed endangered plant species may occur in the Falmouth Onshore Project area (Table 3.5.4-1). Examples include the purple milkweed (*Asclepias purpurascens*), papillose nutsedge (*Scleria pauciflora*), and prickly pear (*Opuntia humifusa*). Purple milkweed is found in shrub thickets, open woodlands, pine oak forests, roadsides, and dry fields. They can also be found occasionally in wetlands (Native Plant Trust 2022a). Papillose nutsedge can be found in wetland and non-wetland environments. Prickly pear is the only native cactus in New England and is found on sandy coastal beaches, dunes, grasslands, meadows, and ridges (Native Plant Trust 2022c).

Ten plant species are state listed as threatened and may occur in the Falmouth Onshore Project area (Table 3.5.4-1). Examples include the saltpond pennywort (*Hydrocotyle verticillata*) found along the margins of ponds or in wetland marshes and meadows. The short-beaked bald-sedge (*Rhynchospora nitens*) remains dormant on the banks of sandy or muddy rivers and lakes until water levels are unusually low (Native Plant Trust 2022d), while resupinate bladderwort (*Utricularia resupinate*) is found submerged in shallow water of lakes and ponds (Native Plant Trust 2022e). Adder’s tongue fern (*Ophioglossum pusillum*) inhabit marshes and meadows. Saltpond grass (*Leptochloa fusca* ssp. *fascicularis*) does not have a classified wetland status and can inhabit disturbed areas, as well as beaches and marshes (Native Plant Trust 2022b).

Plant species of special concern in the Falmouth Onshore Project area include Wright's rosette-grass (*Dichanthelium wrightianum*), redroot (*Lachnanthes caroliniana*), New England blazing star (*Liatris novae-angliae*), pinnate water-milfoil (*Myriophyllum pinnatum*), pondshore smartweed (*Persicaria puritanorum*), sea-beach knotweed (*Polygonum glaucum*), long-beaked beaksedge (*Rhynchospora scirpoides*), Plymouth gentian (*Sabatia kennedyana*), teretea arrowhead (*Sagittaria teres*), and bristly foxtail (*Setaria parviflora*).

Brayton Point Onshore Project Area

There are no state-listed plant species, or species of special concern that occur in the Brayton Point Onshore Project area, specifically in the area of the intermediate landfall in Aquidneck Island (Jordan 2022).

Coastal Fauna Special-Status Species

Falmouth Onshore Project Area

The USFWS IPaC database did not identify any federally listed threatened or endangered faunal species (non-bird or bat) under the jurisdiction of USFWS in the geographic analysis area; however, the monarch butterfly (*Danaus plexippus*) has a candidate species status (USFWS 2022).

There are no state-listed endangered or threatened reptile species that occur in the Falmouth Onshore Project area (MassWildlife 2022; Maier 2022). Eastern spadefoot (*Scaphiopus holbrookii* – state listed as threatened) is the only listed amphibian potentially occurring in the Falmouth Onshore Project area (Table 3.5.4-1); the species is found burrowing in dry sandy, loamy soils associated with pitch pine barrens, coastal oak woodlands, and sparse shrubs with vernal pools and leaf litter (MassWildlife 2015). Shortnose sturgeon (*Acipenser brevirostrum*) is the only fish species listed as endangered under MESA. Eight state-listed invertebrate species may also potentially occur in the Falmouth Onshore Project area, with Agassiz's clam shrimp (*Eulimnadia agassizii*) being the only state-endangered species listed (Table 3.5.4-1). The other seven invertebrate species—Melsheimer's sack-bearer (*Cicinnus melsheimeri*), collared cycnia (*Cycnia collaris*), pink-streak (*Dargida rubripennis*), imperial moth (*Eacles imperialis*), scarlet bluet (*Enallagma pictum*), pine barrens bluet (*Enallagma recurvatum*), and water-willow stem borer moth (*Papaipema sulphurate*)—are listed as threatened.

Species of special concern in the Falmouth Onshore Project area include eastern box turtle (*Terrapene Carolina*), eastern hog-nosed snake (*Heterodon platirhinos*), bridle shiner (*Notropis bifrenatus*), coastal heathland cutworm (*Abargrotis nefascia*), frosted elfin (*Callophrys irus*), Herodias underwing moth (*Catocala herodias*), purple tiger beetle (*Cicindela purpurea*), chain dot geometer (*Cingilia catenaria*), buck moth (*Hemileuca maia*), tidewater mucket (*Leptodea ochracea*), American clam shrimp (*Limnadia lenticularis*), pink sallow moth (*Psectraglaea carnosa*), pine barrens speranza (*Speranza exonerate*), and pine barrens zale (*Zale lunifera*).

Brayton Point Onshore Project Area

The Brayton Point Onshore Project area includes Aquidneck Island as well as Little Compton, and Tiverton (as part of Alternative C) in Rhode Island and Brayton Point in Massachusetts. The USFWS IPaC database did not identify any federally listed threatened or endangered faunal species (non-bird or bat) under the jurisdiction of USFWS in the Brayton Point Onshore Project area; however, the monarch butterfly (*Danaus plexippus*) has a candidate species status (USFWS 2022).

The only state-listed species that may occur in the Rhode Island section is the salt marsh tiger beetle (*Ellipsoptera marginata*), listed as threatened (Jordan 2022). Adult tiger beetles emerge in the fall to feed until the cold winter months. They burrow underground until the spring when they emerge to feed, mate and lay eggs, burrow underground, and hibernate the winter. Habitat loss, disturbance, sea-level rise, and tidal erosion all pose threats for these beetles (SouthCoast Wind 2024).

Terrestrial Habitats and Wildlife

Falmouth Onshore Project Area

The Falmouth Onshore Project area consists of three landfall sites, onshore export cable routes, and two potential substation sites. Most of the Onshore Project area is highly developed with areas of dense residential, commercial and industrial development, although there are areas of open space and rural residential development that provide higher quality habitat. COP Volume 2, Section 6.3.1.1.2, Figure 6-7 shows the land use in the Falmouth Onshore Project area (SouthCoast Wind 2024). Only species adapted to urban environments are anticipated to be in the Falmouth Onshore Project area.

The three landfall sites considered—Central Park, Shore Street, and Worcester Avenue—consist of coastal beach community habitat adjacent to developed areas. The Worcester Avenue and Central Park landfall locations are of low ecological value, largely consisting of mowed lawns and other areas common to human disturbance and presence. The Shore Road landfall location is largely developed and devoid of natural communities (SouthCoast Wind 2024).

From the coastline, the Falmouth onshore export cable routes would traverse mostly developed areas of Falmouth, Massachusetts. Natural communities present along the Falmouth onshore export cable routes and underground transmission route include bare land, deciduous forest, developed open space, evergreen forest, grassland, impervious, wetlands, scrub/shrub, and unconsolidated shore. Some export cable route segments would traverse natural pockets of undisturbed environments. Species that thrive in edge environments are likely to be found in these areas (COP Appendix J; SouthCoast Wind 2024).

The two sites being considered for the onshore substation, the Lawrence Lynch site and the Cape Cod Aggregates site, primarily consist of disturbed and developed land currently used for sand and gravel mining and processing. At the Lawrence Lynch site, there are several constructed stormwater ponds on the site but these features are not considered a valuable resource for wildlife, fish, or other aquatic life due to their highly altered nature and function as a stormwater management facility (COP Appendix J; SouthCoast Wind 2024).

Brayton Point Onshore Project Area

The Brayton Point Onshore Project area consists of several potential landfall sites, onshore export cable routes, and up to two converter stations. The Brayton Point Onshore Project area is situated in an ecoregion that is relatively flat with most elevations under 200 feet (61 meters) (Griffith et al. 2009). Terrestrial habitats for wildlife in the Onshore Project areas and the immediate vicinity of the proposed Project include forested land, disturbed or developed land, wetland areas, grasslands, scrub-shrub areas, fragmented vegetated habitats, and coastal habitats. These habitats are predominately composed of disturbed or developed lands (SouthCoast Wind 2024).

Intermediate Landfalls and Export Cable Routes

The natural communities at the intermediate landfalls and along the export cable routes on Aquidneck Island include developed land, developed recreation, impervious surfaces, and wetlands (SouthCoast Wind 2024).

The onshore export cable route under Alternative C-1 would make landfall at the southern end of Aquidneck Island and then traverse the island for approximately 12 miles (19 kilometers). Terrestrial habitats along the export cable route are mainly developed or agricultural lands. Other natural communities include deciduous forest, brushland, mixed forest, and wetlands. The onshore export cable route under Alternative C-2 would pass through Little Compton and Tiverton, Rhode Island for approximately 16 miles (26 kilometers). Terrestrial habitats along the route include developed or agricultural lands, with some deciduous forest, brushland, and wetlands.

Brayton Point Landfall, Export Cable Routes, and Converter Stations

Two landfall sites were investigated and are being considered at Brayton Point: western, from the Lee River on the western side of Brayton Point, and eastern from the Taunton River on the eastern side of Brayton Point. Both landfall locations are generally devoid of natural communities as they consist of roads and former industrial facilities (SouthCoast Wind 2024). The proposed onshore export cable route would be installed within and below existing developed land to up to two HVDC converter stations. The converter stations at Brayton Point would be constructed at the former Brayton Point Power Station in Somerset, Massachusetts (SouthCoast Wind 2024). The site is largely developed with limited habitat resources available.

3.5.4.2 Impact Level Definitions for Coastal Habitat and Fauna

Impact level definitions for coastal habitat and fauna are provided in Table 3.5.4-2.

Table 3.5.4-2. Definitions of impact levels for coastal habitat and fauna

Impact Level	Type of Impact	Definition
Negligible	Adverse	No effect or no measurable impact on coastal habitats or fauna.
Minor	Adverse	Impacts from which coastal habitats or fauna would recover completely without mitigating action.
Moderate	Adverse	Notable and measurable impacts from which coastal habitats or fauna would recover completely with mitigating action.
Major	Adverse	Regional or population-level impacts from which coastal habitats or fauna would not recover.

3.5.4.3 Impacts of Alternative A – No Action on Coastal Habitat and Fauna

When analyzing the impacts of the No Action Alternative on coastal habitat and fauna, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for coastal habitat and fauna. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D*, Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for coastal habitat and fauna Section 3.5.4.1, *Description of the Affected Environment and Future Baseline Conditions* 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 in the geographic analysis area that contribute to impacts on coastal habitat and fauna are generally associated with onshore impacts, including onshore coastal development (e.g., residential, commercial, industrial) and climate change. Onshore construction activities and associated impacts are expected to continue at current trends and have the potential to affect coastal flora and fauna through temporary and permanent habitat removal or conversion, temporary noise impacts during construction, and lighting, which could cause avoidance behavior and displacement of animals, as well as injury or mortality to individual animals or loss and alteration of vegetation and individual plants. However, population-level effects would not be anticipated. Ongoing climate change can increase storm frequency and severity, disturbing the established coastal community. Sea-level rise has also resulted in habitat loss due to coastal flooding and rising water tables (Sacatelli et al. 2020). The wetlands, dunes, and beaches are inherently vulnerable and erode in the storms, creating moving shorelines that fluctuate seasonally (USEPA 2016). Climate change may also affect coastal habitats through the earlier arrival of spring bringing more precipitation, heavier rainstorms, and summer temperatures that are hotter and drier (USEPA 2016). These shifting rainfall patterns increase the intensity of both floods and droughts, which may affect populations of terrestrial and coastal plants and animals. For instance, vernal pools, such as those found in the Falmouth Onshore Project area, are typically filled with water in the fall or winter due to rainfall and seasonal high groundwater levels and remain ponded through the spring and into summer. However, often vernal pools dry up completely by the middle or end of the summer, or at least every few years, preventing fish populations from becoming established in the pool. Invasive species emerge earlier in the year, expand their range into new ecosystems, become more competitive, and can take advantage of the already stressed species more effectively as a result of higher concentrations of carbon dioxide from warming temperatures (Beaury et al. 2020). The increase of deer populations from these warmer temperatures earlier in the year leads to the loss of forest underbrush, leaving other species more vulnerable (USEPA 2016). The effects of climate change on other animals will likely include loss of habitat (Sacatelli et al. 2020), population declines, increased risk of extinction, decreased reproductive productivity, and changes in species distribution.

There are no ongoing offshore wind activities in the geographic analysis area for coastal habitat and fauna.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with the other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Other planned non-offshore wind activities that may affect coastal habitat and fauna primarily include increasing onshore development activities (see Appendix D, Section D.2, for a description of planned activities). Similar to ongoing activities, other planned non-offshore wind activities may result in temporary and permanent impacts on animals and vegetation, including disturbance, displacement, injury, mortality, habitat and plant degradation and loss, and habitat conversion.

Within the Massachusetts and Rhode Island lease areas, there are several approved and proposed offshore wind projects adjacent to the SouthCoast Wind Lease Area. However, at this time BOEM is not aware of any onshore components of other offshore wind projects that would co-occur or overlap with the geographic analysis area for coastal habitat and fauna for the Proposed Action. If any offshore wind activities are identified that would occur in the geographic analysis area, impacts would be similar to those under the Proposed Action, and any adverse impacts on coastal habitats and fauna would be minimal.

BOEM expects other offshore wind activities (without the Proposed Action) to affect coastal habitat and fauna through the following primary IPFs.

Noise: Onshore noise associated with intermittent construction of required offshore wind development infrastructure may result in localized and temporary impacts on coastal fauna, including avoidance and displacement, although no individual fitness or population-level effects would be expected to occur. Displaced wildlife could use adjacent habitats and would repopulate these areas once construction ceases. Onshore construction noise associated with other offshore wind activities (without the Proposed Action) is expected to result in temporary, localized, and negligible impacts.

Land disturbance: Onshore construction of offshore wind development infrastructure has the potential to result in some impacts due to habitat loss or fragmentation. However, onshore construction would be expected to account for only a very small increase in development relative to other ongoing development activities. Furthermore, construction would be expected to generally occur in previously disturbed habitats, and no individual fitness- or population-level impacts on coastal habitat and fauna would be expected to occur. As such, onshore construction impacts associated with offshore wind development (without the Proposed Action) would be minor, short-term, and would not be expected to appreciably contribute to overall impacts on coastal habitat and fauna.

Presence of structures: Additional structures and cables that are anticipated to be constructed in association with future offshore wind activities would not be expected to affect coastal fauna at the individual or population level considering the anticipated placement of most onshore wind components in developed areas. Impacts would be long-term but negligible.

Traffic: If the use of construction equipment or vehicles from other offshore wind developments overlapped the geographic analysis area, collisions with coastal wildlife could occur. However, those collisions are expected to be rare because most of the wildlife are expected to avoid construction areas or have the mobility to avoid construction equipment. Therefore, impacts on coastal fauna from traffic resulting from other offshore wind developments (without the Proposed Action) would be expected to be short-term, temporary during the construction period, and negligible.

Impacts of Alternative A on ESA-Listed Species

Two ESA-listed plant species occur or potentially occur in the geographic analysis area. Any future federal or private activities that could affect federally listed species in the geographic analysis area would need to comply with ESA Section 7 or Section 10, respectively, to ensure that the proposed activities would not jeopardize the continued existence of the species.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, coastal habitats and fauna would continue to be affected by existing environmental trends and ongoing activities. BOEM expects ongoing activities to have continuing temporary and permanent impacts (disturbance, habitat loss, displacement, injury, and mortality) on coastal habitat and fauna, primarily through onshore coastal construction and climate change. BOEM anticipates that the potential impacts of ongoing construction activities on coastal habitat and fauna would be minor but impacts from climate change could be moderate. Therefore, the No Action Alternative would result in **moderate adverse** impacts on coastal habitats, primarily driven by climate change.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and coastal habitat and fauna would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to the impacts on coastal habitat and fauna through construction-related activities that affect habitat, vegetation, and wildlife. Currently, there are no future offshore wind activities proposed in the geographic analysis area. If any were to occur, they would have some potential to result in temporary disturbance and permanent loss of onshore habitat. However, habitat removal is anticipated to be minimal due to the developed and urbanized landscape of the geographic analysis area. Any impacts resulting from habitat loss or disturbance would not be expected to result in population-level effects on species in the geographic analysis area. BOEM anticipates the cumulative impacts of the No Action Alternative would be **moderate adverse**, primarily driven by ongoing construction activities and climate change.

3.5.4.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following proposed PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on coastal habitat and fauna.

- The onshore export cable routes, including routing variants, and extent of land disturbance for new onshore substations, which could require the removal of vegetation.

Variability of the proposed Project design exists as outlined in Appendix C. The following summarizes potential variances in impacts.

- Onshore export cable routes and substation footprints: The route chosen (including variations of the general route) and substation footprints would determine the amount of habitat affected.

SouthCoast Wind has committed to measures to minimize impacts on coastal habitat and fauna, including avoiding areas of unique or protected habitat or known habitat for threatened or endangered and candidate species to the extent practicable and conducting maintenance and repair activities in a manner to avoid or minimize impacts on sensitive species and habitat. Onshore export cables would be buried beneath existing roadways and SouthCoast Wind would implement construction best management practices such as erosion and sediment control measures where needed. SouthCoast Wind would train construction staff on biodiversity management and environmental compliance requirements and implement a Vegetation Management Plan (Appendix G, Table G-1; COP Volume 2, Section 16, Table 16-1; SouthCoast Wind 2024).

3.5.4.5 Impacts of Alternative B – Proposed Action on Coastal Habitat and Fauna

The following summarizes the potential impacts of the Proposed Action on coastal habitat and fauna and special-status species during the various phases of the Project. Routine activities would include construction, O&M, and decommissioning of the Project, as described in Chapter 2, *Alternatives*.

Noise: Construction noise is anticipated at the landfall sites (primarily associated with HDD activities), along the onshore export cable routes, and at substation and converter station locations. Impacts, if any, are expected to be limited to behavioral avoidance of construction activity and noise. Construction would predominantly occur in already developed areas where wildlife is habituated to human activity and noise. Displaced individuals would likely return to the affected areas once the noise has ended, and BOEM anticipates temporary and negligible impacts from construction noise. Normal operation of the substation and converter stations would generate continuous noise. Terrestrial fauna may habituate to noise so that it has little to no effect on their behavior or biology (Kight and Swaddle 2011). For this reason, BOEM expects minimal impacts on coastal fauna from onshore O&M, especially given that terrestrial fauna in this area is likely to be already subject and habituated to anthropogenic noise from other nearby sources in the developed landscape surrounding the substation and converter station locations. Onshore O&M noise is expected to result in long-term, localized, and minor impacts.

Land disturbance: Construction of the onshore export cables, substation, and converter stations at Falmouth and Brayton Point would result in land disturbance of various coastal vegetation communities, which are quantified in COP Appendix J, Table 4-1 and Table 4-2 (SouthCoast Wind 2024). Impacts on habitat from onshore construction activities would be limited because facilities would be located mostly in existing developed areas. The onshore Project components are sited in existing paved areas, public road ROW, and developed industrial areas to the maximum extent practicable.

In the Falmouth Onshore Project area, offshore export cables would make landfall in Falmouth and connect to one of two substation sites. None of the onshore export cable routes would affect substantial areas of natural habitat or vegetation communities. The onshore cable routes would be installed to the greatest extent feasible in the disturbed road ROW, with the result that most impacts on natural communities would be avoided. Tree and vegetation clearing would be less than 0.5 acre (0.2 hectare) for each of the onshore export cables route options (COP Volume 2, Section 6.3.1.1.2; SouthCoast Wind 2024). The maximum footprint of the substation would be up to 26 acres (10.5 hectares), mostly comprised of disturbed land that provides minimal habitat value.

Depending on the specific landfalls, cable routes, and substation sites selected, there would be between 43 and 151 acres (17 and 61 hectares) of natural communities in the Falmouth Onshore Project area with the potential to be affected by construction, operation, and decommissioning activities of the Proposed Action (COP Appendix J, Table 4-1; SouthCoast Wind 2024). Of these affected areas, 76 percent and 52 percent, respectively, consist of impervious surface, bare land, and developed open space, where there would be no to minimal vegetation affected. The remaining 10–72 acres (4–29 hectares) of affected vegetation communities include coastal beach, unconsolidated shore, deciduous forest, wetlands, scrub, evergreen forest, grasslands, water, and wetlands, depending on the specific Project component. It is anticipated that direct effects on sensitive environmental resources, such as wetlands, would be avoided to the maximum extent practicable during the detailed design and construction of the Project. As such, the area of natural community types ultimately altered by the route is anticipated to be less than the acreages identified above (COP Appendix J; SouthCoast Wind 2024).

Within the Brayton Point export cable corridor, export cables would come ashore for the intermediate landfall on Aquidneck Island. HDD would be used to enter and exit Aquidneck Island to avoid potential impacts on nearby tidal zones, eelgrass zones, coastal dunes, and public beaches. A 3-mile (4.8-kilometer) underground onshore export cable, using one of three potential routes, would cross the island using existing roadways where feasible, which would minimize the potential impacts on vegetation communities. At Brayton Point, the export cables would connect to the site of the HVDC converter stations, which is mostly comprised of developed and disturbed land with minimal habitat value.

Depending on the routes selected, there would be between 62 and 69 acres (25 and 28 hectares) of natural communities within the Brayton Point Onshore Project area with the potential to be affected by construction, O&M, and decommissioning activities of the Proposed Action (COP Appendix J, Table 4-2; SouthCoast Wind 2024). Of the total 69 acres, approximately 84 percent consists of impervious surface, bare/vacant land, and developed open space, where there would be no to minimal vegetation affected. The remaining 11 acres (4 hectares) of affected vegetation communities include beaches, deciduous forest, scrub/shrub, and grassland, depending on the specific Project component.

To limit land disturbance whenever possible, SouthCoast Wind would co-locate facilities and onshore export cables with existing developed areas (i.e., roads and existing transmission ROWs). By using the HDD to transition onshore, the impacts on beaches and nearshore vegetated natural habitats would be avoided for all options. Due to the very small area needed for HDD operations, compared to the amount of suitable habitat available in Falmouth and in the vicinity of Brayton Point, species in the area are not expected to be meaningfully affected by the short-term and temporary construction activity. Some previously disturbed areas of maintained roadside vegetation may be affected during construction, dependent upon workspace requirements for equipment. Additional ground disturbance and the introduction of new impervious surface would be required at the onshore substation and converter station sites.

SouthCoast Wind has committed to implementing various measures to avoid and minimize impacts on coastal habitat and fauna. These including contacting appropriate federal or state agencies should tree clearing be required, implementing a Vegetation Management Plan and installing sediment erosion controls near waterbodies to minimize impacts on these resources, and training construction staff on biodiversity management and environmental compliance requirements. To the greatest extent practicable, construction would take place away from significant fish and wildlife habitats and during times when highly sensitive species are not likely to be present. Overall, land disturbance under the Proposed Action is anticipated to have short-term and long-term minor impacts on coastal flora and fauna habitats.

Presence of structures: Because most of the area where onshore Project components would be constructed and operated is developed and urbanized, the wildlife communities are composed of disturbance-tolerant species inhabiting an area with existing structures, cables, and other infrastructure. Export cables would be buried and therefore, following construction and reclamation, would not contribute to impacts on coastal habitat and fauna. Additional structures and cables from the onshore Project components would not alter the characteristics of the existing environment to an extent that would alter wildlife species composition, population sizes, or individual fitness, leading to long-term, negligible impacts.

Traffic: Collisions between wildlife and vehicles or construction equipment would be rare because most wildlife are expected to avoid construction areas or have the mobility to avoid construction equipment. The species likely to be present in the Project area are also acclimated to urban environments and are less vulnerable to development and traffic. However, individuals that are not able to move away from disturbed areas (e.g., juveniles in nests) or those that occupy a single tree being removed (e.g., invertebrates) could be more vulnerable to this impact, particularly during land clearing and ground excavation. To the extent practicable, construction activities would take place outside of periods when highly sensitive species are likely to be present. SouthCoast Wind has identified a preliminary list of timing restrictions it would adhere to, including illuminating equipment at night, clearing trees in colder months, and avoiding known raptor nests during nesting periods (COP Appendix J, Section 5.4.2.4; SouthCoast Wind 2024). While these restrictions are intended to minimize impacts on birds and bats, they may also benefit other species. Routine O&M activities are likely to have less potential for direct injury or fatality for wildlife than the construction phase. SouthCoast Wind would develop a Vegetation Management Plan and implement best management practices to minimize potential impacts on vegetation communities during construction. In addition, vehicle speed limits would be enforced at all Project sites. Population-level effects are not expected to occur. Impacts would be short term, temporary during the construction period, and negligible.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind and offshore wind activities. Ongoing and planned non-offshore wind activities related to onshore development activities would contribute to impacts on coastal habitat and fauna through the primary IPFs of noise, presence of structures, land disturbance, and traffic. The construction, O&M, and decommissioning of onshore infrastructure for the Proposed Action would contribute to impacts primarily associated with temporary disturbance and permanent loss of habitat onshore. BOEM is not aware of any offshore wind activities other than the Proposed Action that would overlap the geographic analysis area for coastal habitat and fauna. But if habitat removal is anticipated, it would be minimal and any related impacts would not be expected to result in individual fitness or population-level effects in the geographic analysis area.

The cumulative impact on coastal habitat and fauna would likely be moderate, mostly driven by climate change. The Proposed Action onshore cable routes and substation/converter stations sites are located in developed areas where there is limited natural habitat and wildlife is habituated to human activity and noise. In the context of reasonably foreseeable environmental trends, the Proposed Action would contribute an undetectable increment to the cumulative impacts on coastal habitat and fauna.

Impacts of Alternative B on ESA-Listed Species

Impacts of the Proposed Action on ESA-listed birds, bats, and fish are represented in the IPF text in Section 3.5.3, *Birds*, Section 3.5.1, *Bats*, and Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*. One ESA-listed plant species occurs or potentially occurs in the geographic analysis area.

BOEM prepared a BA assessing the potential effects on federally listed species (BOEM 2023). Consultation with USFWS pursuant to Section 7 of the ESA was concluded on September 1, 2023. In USFWS's transmittal letter for the Biological Opinion, USFWS concurred with BOEM's determination of may affect, but is not likely to adversely affect, for the northern long-eared bat (*Myotis septentrionalis*; endangered), tri-colored bat (*Perimyotis subflavus*; proposed endangered), roseate tern (*Sterna dougallii dougallii*; endangered), monarch butterfly (*Danaus plexippus*; proposed), and sandplain gerardia (*Agalinis acuta*; endangered) (USFWS 2023).

Conclusions

Impacts of the Proposed Action: Construction and installation, O&M, and conceptual decommissioning of the Proposed Action would have **moderate adverse** impacts on coastal habitat and fauna because most potential effects would be localized and short-term and could be minimized with mitigation measures and other best management practices.

Cumulative Impacts of the Proposed Action: BOEM anticipates that the cumulative impacts on coastal habitat and fauna in the geographic analysis area would be **moderate adverse**, mostly driven by climate change. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by the Proposed Action to the cumulative impacts on coastal habitat and fauna would be undetectable. The Proposed Action would contribute to the cumulative impacts primarily through the permanent impacts from habitat loss from onshore construction.

3.5.4.6 Impacts of Alternative C on Coastal Habitat and Fauna

Impacts of Alternative C: The export cable route to Brayton Point under Alternative C-1 and Alternative C-2 would be rerouted onshore to avoid sensitive fish habitat in the Sakonnet River, which would increase impacts on coastal habitat and fauna compared to the Proposed Action. The Alternative C-1 onshore export cable route would be installed largely within existing road ROWs on Aquidneck Island, increasing the total length of the onshore cable route by approximately 9 miles (14 kilometers). The Alternative C-2 onshore export cable route would be installed largely within existing road ROWs in Little Compton and Tiverton, increasing the total length of the onshore cable route by approximately 13 miles (21 kilometers). The increase of land disturbance and the routes' passage through towns and tourist destinations under both alternatives would require a longer construction schedule than the Proposed Action due to the complexity of working in developed areas with multiple property owners and confined spaces for cable installation, affecting coastal habitat and fauna for a longer period of time than the Proposed Action.

The types of impacts under Alternative C-1 and Alternative C-2 would be similar to those described for the Proposed Action, but slightly greater due to the larger area of land disturbance in coastal habitats. Approximately 68 percent and 56 percent of Alternative C-1 and Alternative C-2, respectively, consist of developed land cover types, with the remaining area consisting of natural vegetation land cover. Table 3.5.4-3 summarizes the vegetation communities within the Alternative C-1 and C-2 onshore export cable routes that could be directly affected by installation of the cables. Alternative C-2 would result in the greatest impact on coastal habitat and fauna because more acres of natural vegetation would be affected than under Alternative C-1. The vegetated areas presented in Table 3.5.4-3 are in addition to the areas affected by the Proposed Action because the export cable routes under this alternative would effectively replace an offshore segment of the Proposed Action's overall export cable route. Alternative C-1 crosses near the Sachuest Point National Wildlife Refuge and may result in temporary impacts on wildlife in the refuge during construction activity. The onshore cable routes under both Alternative C-1 and Alternative C-2 would be installed within existing road ROWs to the extent feasible; however, the alternate routes may require pathways in road shoulder, median, and off-road, including private property, transmission ROWs, stream/wetland crossings, and railroad ROWs due to the narrower roads lined with historic stonewalls and structures in the southern portions of the alternate routes. Despite this, impacts on coastal habitat and fauna under either alternative would be limited to the immediate vicinity of the roadway where there is already limited habitat.

Table 3.5.4-3. Vegetation potentially affected by Alternatives C-1 and C-2 onshore export cables (acres)

Vegetation Community	Alternative C-1 East	Alternative C-1 West	Alternative C-2
Brushland	1.51	1.07	1.31
Agriculture [a]	8.99	8.84	15.08
Mixed Forest	1.34	0.80	0.31
Softwood Forest	0	0	0.09
Deciduous Forest	3.61	1.79	15.06
Sandy Areas [b]	0.20	0.20	0.51
Wetlands [c]	0.92	3.31	1.27
Total	**16.57**	**16.01**	**33.63**

Source: RIGIS 2011.

[a] Agriculture includes cropland (tillable), abandoned fields/orchards, pastures, orchards, groves, and nurseries.

[b] Sandy Areas include beach and non-beach sandy areas. Note, Alternative C-2 does not have any beach sandy areas, and each sandy area for Alternative C-1 would be avoided with HDD.

[c] The wetland areas presented in this table are based on a broad land cover GIS dataset and do not substitute for the more accurate wetlands GIS data used to generate wetland impacts in Section 3.5.8, *Wetlands*.

Cumulative Impacts of Alternative C: The cumulative impacts on coastal habitat and fauna would be moderate for the same reasons described for the Proposed Action. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative C to the cumulative impacts on coastal habitat and fauna would be slightly greater than the Proposed Action but would still represent an undetectable increment.

Impacts of Alternative C on ESA-Listed Species

Impacts on ESA-listed species would be similar to the Proposed Action, with proportionally more land disturbance due to the longer onshore cable component of Alternative C-1 and Alternative C-2 compared to the Proposed Action.

Conclusions

Impacts of Alternative C: Activities associated with the construction, installation, O&M, and eventual decommissioning of Alternative C would have **minor** short-term impacts on coastal habitat and fauna, depending on the location, timing, and species affected by an activity. The primary impacts of Alternative C affecting coastal habitat and fauna would be habitat loss.

Cumulative Impacts of Alternative C: In context of other reasonably foreseeable environmental trends, the cumulative impacts of Alternative C on coastal habitat and fauna would be similar to the Proposed Action and result in a **moderate** impact.

3.5.4.7 Impacts of Alternatives D (Preferred Alternative), E, and F on Coastal Habitat and Fauna

Impacts of Alternatives D, E, and F: Because Alternatives D, E, and F would involve modifications only to offshore components, impacts on coastal habitat and fauna from Alternatives D, E, and F would be the same as those under the Proposed Action.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives D, E, and F would be the same as those described for the Proposed Action.

Impacts of Alternatives D, E, and F on ESA-Listed Species

Impacts on ESA-listed species would be the same as the Proposed Action.

Conclusions

Impacts of Alternatives D, E, and F: As discussed above, the anticipated **moderate adverse** impacts under the Proposed Action would not change under Alternatives D, E, and F.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives D, E, and F would be the same as those described for the Proposed Action and result in **moderate adverse** impacts.

3.5.4.8 Comparison of Alternatives

Under Alternative C, the export cable route to Brayton Point would be rerouted onshore resulting in increased impacts on coastal habitat and fauna compared to the Proposed Action. The overall affected area would be small, and the anticipated minor impacts associated with the Project would not change substantially under Alternative C. Therefore, the overall impact level on coastal habitat and fauna would not change—moderate adverse.

Because Alternatives D, E, and F involve modifications only to offshore components, impacts on coastal habitat and fauna from those alternatives would be the same as those under the Proposed Action—moderate adverse.

In the context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternatives C, D, E, and F when each is combined with the impacts from ongoing and planned activities would be the same as for the Proposed Action—moderate adverse.

3.5.4.9 Proposed Mitigation Measures

No measures to mitigate impacts on coastal habitat and fauna have been proposed for analysis.

3.5 Biological Resources

3.5.5 Finfish, Invertebrates, and Essential Fish Habitat

This section discusses potential impacts on finfish, invertebrates, and EFH from the proposed Project, alternatives, and ongoing and planned activities in the finfish, invertebrates, and EFH geographic analysis area. The geographic analysis area, as shown on Figure 3.5.5-1., includes the Northeast Continental Shelf Large Marine Ecosystem (LME),[1] which extends from the southern edge of the Scotian Shelf (in the Gulf of Maine) to Cape Hatteras, North Carolina, likely encompassing the majority of movement ranges for most invertebrates and finfish species. The entirety of the geographic analysis area includes only U.S. waters. Due to the size of the geographic analysis area, the analysis in this EIS focuses on finfish and invertebrates that would be likely to occur in the Project area and be affected by Project activities.

Some Project vessels are expected to transit through the Gulf of Mexico to and from the Port of Corpus Christi and Port of Altamira, Mexico (Section 3.6.6, *Navigation and Vessel Traffic*). However, approximately 71 vessel trips during construction and 9 vessel trips during decommissioning anticipated to these ports is a relatively small amount, and no trips would occur during O&M. Typical vessel routes through the Gulf of Mexico from the Port of Corpus Christi and Port of Altamira, Mexico, have limited steam time within waters where five ESA-listed fish species may occur, including gulf sturgeon (Ross et al. 2009), Nassau grouper (NMFS 2023), smalltooth sawfish (NMFS 2018), scalloped hammerhead shark (NMFS 2020b), and giant manta ray (Farmer et al. 2022). Vessels transiting to and from Corpus Christi, Texas, and the Port of Altamira, Mexico, are expected to follow general traffic patterns through the Straits of Florida and across the Gulf of Mexico, far offshore of the shallow nearshore waters occupied by gulf sturgeon, Nassau groupers, and smalltooth sawfish. The dispersed distribution of giant manta rays in the open ocean habitat where Project vessels would transit and the low number of reported vessel strikes for scalloped hammerhead sharks indicate that vessel interactions with these species are less likely to occur. Given known habitat preferences and species distributions, and the slow speeds at which vessels would be traveling through the Gulf of Mexico, Project vessels are not expected to encounter or cause impacts on any of these ESA-listed species. Other vessel-related impacts that may occur in the Gulf of Mexico are expected to be negligible (e.g., accidental releases) (Section 3.5.5.5, *Impacts of Alternative B – Proposed Action on Finfish, Invertebrates, and Essential Fish Habitat*). For these reasons, impacts in the Gulf of Mexico are not considered further.

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[1] 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 (NOAA) uses them as the basis for ecosystem-based management.

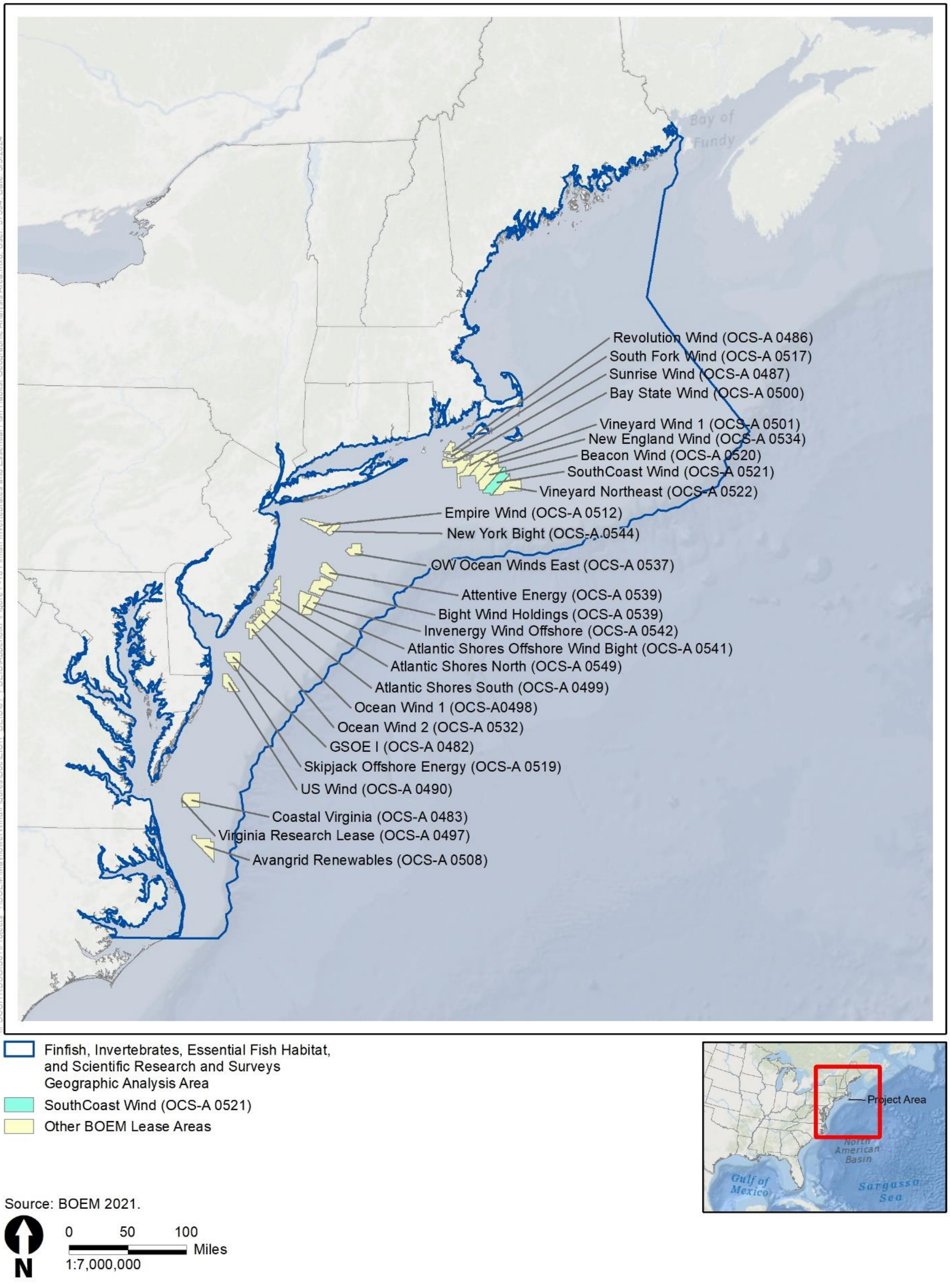

Figure 3.5.5-1. Finfish, invertebrates, and essential fish habitat geographic analysis area

This section provides a qualitative assessment of the impacts of each alternative on finfish, invertebrates, and EFH, which has been designated under the Magnuson-Stevens Fishery Conservation and Management Act as "essential" for the conservation and promotion of specific fish and invertebrate species. A discussion of benthic species is provided in Section 3.5.2, *Benthic Resources*, and a discussion of commercial fisheries and for-hire recreational fishing is provided in Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*.

3.5.5.1 Description of the Affected Environment

Finfish

The geographic analysis area is the LME, which was selected based on the likelihood of capturing the majority of movement range for most finfish species that would be expected to pass through the Project area. This area is large and has very diverse and abundant fish assemblages that can be generally categorized based on life history and preferred habitat associations (e.g., pelagic, demersal, resident, highly migratory, and anadromous species). In this region, fish distribution is largely influenced by seasonal temperature fluctuations. Various species use the geographic analysis area for feeding, development, reproduction, and nursery habitat (NEFSC 2020).

Many species of finfish belonging to pelagic, demersal, resident, or highly migratory assemblages occur in the geographic analysis area, suggesting that these species could potentially occur in or pass through the Project area. Moreover, a number of the species with potential to occur in the Project area have designated EFH either in or in the vicinity of the Project area (COP Appendix N; SouthCoast Wind 2024). For a list of species with EFH designations, see Appendix B, *Supplemental Information and Additional Figures and Tables*, of this EIS. In addition to those species with designated EFH, several species of commercial and recreational importance would be expected to occur in the geographic analysis area and Project area, which are discussed in further detail in Section 3.6.1.

Pelagic finfish species spend most of their lives swimming in the water column rather than occurring on or near the seafloor (NEFSC 2020). Pelagic species migrate north and south along the Atlantic Coast, depending on sea surface temperatures. They use the highly productive coastal waters during the summer months for feeding and then move to waters that are deeper, more distant, or both for the remainder of the year. Common species of this assemblage include Atlantic herring and Atlantic mackerel. Coastal pelagic species also rely on coastal wetlands, seagrass habitats, and estuaries to provide habitat for their early life stages. Demersal fish, or groundfish, are finfish species that inhabit benthic or benthopelagic (near-benthic) habitats. Common species of this assemblage include skates, summer flounder, and black sea bass. Many demersal finfish species have either pelagic eggs or larvae that are carried long distances by oceanic surface currents or eggs that adhere to the various benthic substrates. Highly migratory finfish species often migrate from southern portions of the Atlantic Ocean to as far north as the Gulf of Maine and are expected to be present in the Offshore Project area during the warmer summer months. Common species of this assemblage include tunas, sharks, and billfishes. Based on bottom trawl surveys conducted by NMFS NEFSC, the Massachusetts/Rhode Island offshore wind lease areas have low finfish biomass but high species richness when compared to neighboring waters around Cape Cod (COP Volume 2, Section 6.7.2, Figure 6-34 through Figure 6-37; SouthCoast Wind 2024).

Finfish species are also characterized as either estuarine, marine, or anadromous. Estuarine species generally reside in nearshore areas where waters have lower salinity levels than ocean waters (e.g., where rivers meet the ocean) and include species such as white perch (*Morone americana*). Marine finfish species are found offshore in deeper waters and utilize the open water column. Examples of marine finfish include Atlantic menhaden (*Brevoortia tyrannus*) and Atlantic herring (*Clupea harengus*). Anadromous fish species prefer both nearshore and offshore waters but annually migrate up rivers to lower-salinity environments for spawning. Juvenile anadromous species leave coastal rivers and estuaries to enter the ocean, where they grow to sexual maturity prior to returning to freshwater environments for spawning. Several species of anadromous fish are present in the geographic analysis area and thus could occur in the Project area. These include the American shad, alewife, and striped bass. In addition to estuarine, marine, and anadromous fish species, the less-common catadromous species, which are fish species that behave in the opposite fashion of anadromous fish, with adults migrating from fresh water to spawn in the sea, such as the American eel (*Anguilla rostrata*), are known to occur in coastal river systems along the east coast of North America and make their way to the Atlantic Ocean to spawn.

BOEM has funded several studies of finfish species occurrence in the northeast wind lease areas, which are summarized by Guida et al. (2017). The Mid-Atlantic Bight region contains some of the most productive fishing areas along the East Coast of the United States, largely due to the diversity and density of finfish that occur in the region (NJDEP 2010). The NMFS, Massachusetts Division of Marine Fisheries, Rhode Island Department of Environmental Management, and Northeast Area Monitoring and Assessment Program all have seasonal trawl surveys that sample finfish in the Project area. Data from these surveys are considered for use in stock assessments of state- and federally managed species. Stock assessments for federally managed species potentially affected by the Project can be found on NMFS' Stock Status, Management, Assessment, and Resource Trends website (NMFS 2022a) and NMFS' NEFSC Stock Assessment Review Index website (NEFSC 2022), and summaries are provided in the EFH Assessment (COP Appendix N; SouthCoast Wind 2024). Stock assessments for each Atlantic States Marine Fisheries Commission (ASMFC)–managed species can be found on ASMFC's website (ASMFC 2022). State-managed and federally managed fishes in the LME that have EFH in the Project area (COP Volume 2, Section 6.7.2.2.1, Table 6-49 through Table 6-51) or recorded catch in (COP Appendix V, Section 2.2, Table 2-5; SouthCoast Wind 2024) or in and around (COP Appendix V, Section 2.1, Table 2-1; SouthCoast Wind 2024) the Project area are listed in in Appendix B, *Supplemental Information and Additional Figures and Tables*. Many of these species can be found in the Project area throughout multiple life stages (i.e., eggs, larvae, juvenile, adult). The commercial importance of species is discussed in Section 3.6.1, and a record of species catch in the Project area is in COP Appendix V, Section 2.2, Table 2-5 (SouthCoast Wind 2024).

The outlook for finfish species throughout the geographic analysis area includes presumed increased anthropogenic pressure as human population size along the northeastern seaboard increases (NEFSC Ecosystem Assessment Program 2012), continued commercial and recreational fishing, and changing climate. Species-selective harvesting has led to shifts in fish community composition, with dominant populations comprising larger proportions of small pelagic fish, skates, and small sharks, which are of relatively low economic value (NOAA 2009). Currently, at the ecosystem level, the Georges Bank and the Mid-Atlantic Bight ecosystems that the Project area overlaps are not experiencing overfishing (NMFS 2021a, 2021b). Warming of coastal and shelf waters is resulting in a northward shift in the distributions of some fish species that prefer cooler waters; based on future increases in surface water temperatures, it is expected that this trend will continue (Morley et al. 2018; NEFSC Ecosystem Assessment Program 2012). Distributions are expected to contract in some species, while other species are expected to see range expansions under warmer conditions. A small number of species, such as longfin inshore squid (*Doryteuthis pealeii*), butterfish (*Peprilus triacanthus*), and black sea bass (*Centropristis striata*), have seen positive impacts on their productivity and distribution due to warming conditions, and Atlantic croaker (*Micropogonias undulates*) is one of the species expected to expand its range into the region. While these species stand to gain from warming temperatures, a greater number of species in the region are expected to see negative impacts on their productivity and distribution. Species such as the yellowtail flounder (*Limanda ferruginea*) have already experienced declines in productivity due to environmental changes, and species such as the Atlantic mackerel (*Scomber scombrus*) are expected to have their distribution shift out of the region (Hare et al. 2016). Trends of fish populations shifting toward the northeast and generally into deeper waters alter both species interactions and fishery interactions (Hare et al. 2016; NMFS 2021a, 2021b). Recent habitat climate vulnerability analyses link black sea bass, scup, and summer flounder to several highly vulnerable nearshore habitats, including estuarine systems, suggesting that populations are facing additional pressures that could lead to further population decline (Hare et al. 2016; NMFS 2021a, 2021b). Multiple drivers interact with each fish species differently; however, underlying climate change is likely linked to these changes. Most notably, fishes such as striped bass and flounder species may be affected due to increased predation levels at early life stages, where warmer than average winters may be affecting fishery resources during critical life stages. Striped bass surveys suggest recruitment success has decreased dramatically relative to the long-term average. Low recruitment could be caused by a mismatch in striped bass larval and prey abundance as a result of warm winter conditions, leading to decreased larval survival rates (NMFS 2021a). Moreover, warm winters trigger early phytoplankton and zooplankton blooms, resulting in timing mismatches between juvenile striped bass and key prey species (NMFS 2021a).

The Project area includes a portion of Nantucket and Rhode Island Sounds, which serve as a nursery habitat for some juvenile fishes, and Narragansett Bay, which is a regionally important estuary providing unique and diverse habitats, especially for early life stage development and survival. In the Sakonnet River/Mount Hope Bay portion of the Narragansett Bay, there has been a recent community shift from year-round resident species to summer migrants (e.g., summer flounder, black sea bass, scup, and butterfish) (SouthCoast Wind 2024). The phenology of finfish assemblages in Narragansett Bay has been driven by climate change with warm-water species residing longer as warm seasons have expanded (Langan et al. 2021). This pattern is expected to continue with further climate change.

Several ESA-listed species may occur in the geographic analysis area, including all five distinct population segments (DPS) (The Gulf of Maine, the New York Bight, the Chesapeake Bay, The Carolinas, and the

South Atlantic DPS) of Atlantic sturgeon (*Acipenser oxyrinchus*) (NMFS 2022b), shortnose sturgeon (*Acipenser brevirostrum*) (SSSRT 2010), giant manta ray (*Manta briostris*) (NMFS 2017a), Gulf of Maine distinct population segment of Atlantic salmon (*Salmo salar*) (NMFS 2020a), and oceanic whitetip shark (*Carcharhinus longimanus*) (NMFS 2017b).

The species with the greatest probability of occurring in the Offshore Project area, which includes the Lease Area and offshore and inshore ECCs, is the Atlantic sturgeon; however, occurrence would be rare, especially in the Lease Area (Stein et al. 2004; Eyler et al. 2009; Dunton et al. 2010; Erickson et al. 2011). The greatest probability of occurrence would be along the ECCs, particularly the Brayton Point ECC, and along the Sakonnet River (Stein et al. 2004). Otherwise, Atlantic sturgeon may be encountered by vessels transiting to and from ports, with potential port locations for the Proposed Action extending from Nova Scotia to South Carolina. Juvenile and adult Atlantic sturgeon occur in the offshore marine environment during fall, winter, and summer (Stein et al. 2004). Atlantic sturgeon have not been documented to spawn in tributaries between the Delaware and Hudson Rivers (Hilton et al. 2016). Atlantic sturgeon enter Chesapeake Bay in July and continue migrating into the James, York, and Pamunkey Rivers in Virginia to spawn in September (Hager et al. 2020, 2014; Kahn et al. 2014; Balazik et al. 2012). The only potential Project ports that are located within or close to designated Atlantic sturgeon critical habitat are the Port of Charleston (Cooper River) in South Carolina and Sparrows Point Port (Potomac River) in Maryland. However, the majority of Cooper River is upriver of the Port of Charleston and the mouth of the Potomac River is downriver of Sparrows Point Port. Impacts on any relevant physical and biological features of the designated critical habitat of the Carolina and Chesapeake Bay distinct population segments of Atlantic sturgeon are not anticipated to occur during transits of vessels or the transport of components during the construction phase of the Project.

The shortnose sturgeon (*Acipenser brevirostrum*) is found mainly in large freshwater rivers and coastal estuaries located along the east coast of North America, from New Brunswick to Florida. Based on its habitat preferences, shortnose sturgeon may occur in the nearshore ECCs and landfall locations (SouthCoast Wind 2024). However, shortnose sturgeon rarely leave their natal rivers (Bemis and Kynard 1997; Zydlewski et al. 2011). The Hudson River population is almost exclusively confined to the river (Kynard et al. 2016; Pendleton et al. 2018), differing from other populations that may use coastal waters to move into smaller coastal rivers nearby. None of the primary ports being considered for Proposed Action are along the Hudson River. In Mount Hope Bay and the Taunton River, a survey conducted by Buerkett and Kynard (1993) found that shortnose sturgeon was not present in this river system. In Chesapeake Bay, shortnose sturgeon primarily inhabit the Potomac and Susquehanna Rivers (NMFS 2024). The mouth of the Potomac River is downriver of Sparrows Point Port in Maryland while the mouth of the Susquehanna River is upriver of Sparrows Point Port.

Atlantic salmon are unlikely to occur in the Offshore Project area. Endangered Atlantic salmon from the Maine DPS, are not expected to occur south of central New England and the natural spawning population in North America occurs primarily between West Greenland and the Labrador Sea (Rikardsen et al. 2021; USASAC 2020). However, the DPS of Atlantic salmon could be affected by vessels transiting from the Port of Sheet Harbour in Nova Scotia, Canada; while it is noted that vessel strikes are not an identified threat to the species (74 FR 29344) or their recovery (USFWS and NMFS 2019), accidental releases or vessel noise could temporarily affect Atlantic salmon.

The giant manta ray (*Manta birostris*) is listed as threatened throughout its range (NMFS 2017a). This highly migratory species is found in temperate, subtropical, and tropical oceans worldwide. Sightings of giant manta rays in New England are rare, though individuals have been documented as far north as New Jersey and Block Island (BOEM 2021 citing Gudger 1922; BOEM 2021 citing Miller and Klimovich 2017; Farmer et al. 2022). In sightings compiled from 1925 to 2020 by Farmer et al. (2022), all sightings of giant manta rays, north of New Jersey, occurred along the boundary of the Atlantic OCS. Giant manta rays may overlap in areas traversed by vessels from New Jersey and farther south, however, interactions between transiting vessels and giant manta ray would be unlikely.

The oceanic whitetip shark (*Carcharhinus longimanus*) is listed as threatened throughout its range (NMFS 2017b). This species is generally found in tropical and subtropical oceans worldwide, inhabiting deep, offshore waters on the outer edge of the OCS (Young and Carlson 2020). In the western Atlantic, oceanic whitetips occur as far north as Maine (NMFS 2016). Given the species' preference for deep, offshore waters, it is possible, but unlikely that they would transit through the Offshore Project area. Similar to the other listed species, Oceanic whitetips may be affected by vessels transiting to and from ports. However, vessel strikes have not been identified as a threat to the species (NMFS 2016), and there is no information to indicate that vessels have adverse effects on this species (BOEM 2021).

Invertebrates

The geographic analysis area for invertebrates is the LME, which was selected based on the likelihood of encompassing most of the spatial range for most invertebrate species that would be expected to occur in the Project area. In this region, mobile invertebrate distribution is largely influenced by seasonal temperature fluctuations. Many species of invertebrates belonging to pelagic, demersal, and resident assemblages occur in the geographic analysis area, suggesting that these species could occur in or pass through the Project area. Moreover, a number of species with the potential to occur in the Project area have designated EFH either in or in the vicinity of the Project area (COP Appendix N; SouthCoast Wind 2024). In addition, several species of commercial and recreational importance would be expected to occur in the geographic analysis area and Project area, which is discussed in further detail in Section 3.6.1.

Invertebrate resources assessed in this section include the invertebrate zooplankton community and important megafauna species that have benthic, demersal, or planktonic life stages. Macrofaunal and meiofaunal invertebrates associated with benthic resources are assessed in Section 3.5.2. The description of invertebrate resources is supported by studies conducted by SouthCoast Wind (COP Appendix M; SouthCoast Wind 2024) as well as other studies reviewed in the literature. Benthic invertebrates in the geographic analysis area include polychaetes, crustaceans (e.g., amphipods, crabs, lobsters), mollusks (e.g., gastropods, bivalves), echinoderms (e.g., sand dollars, brittle stars, sea cucumbers), and various other groups (e.g., sea squirts, burrowing anemones) (Guida et al. 2017).

Zooplankton

Zooplankton are a type of heterotrophic plankton in the marine environment that range from microscopic organisms to large species, such as jellyfish. These invertebrates and early life vertebrates (e.g., ichthyoplankton) play an important role in marine food webs and include both organisms that spend their whole life cycles in the water column and those that spend only certain life stages (larvae) in the water column (e.g., meroplankton). In the marine environment, zooplankton dispersion patterns vary on a large spatial scale (from meters to thousands of kilometers) and over time (hours to years). Zooplankton can exhibit diel vertical migrations up to hundreds of meters; however, horizontal large-scale distributions over long distances are dependent on ocean currents and the suitability of prevailing hydrographic regimes. Historical information is available for zooplankton in the vicinity of the Offshore Project area, along with information from ongoing data collection surveys (e.g., the NEFSC Ecosystem Monitoring program surveys of the OCS and slope of the northeastern United States; that is, the Mid-Atlantic Bight, southern New England, Georges Bank, and the Gulf of Maine).

Zooplankton productivity, spatial distribution, and species composition are regulated by seasonal water changes. In the Mid-Atlantic Bight, strong seasonal patterns with increased zooplankton biomass are observed in spring in the upper few hundred meters of the water column (NJDEP 2010). Maximum abundance tends to occur between April and May on the OCS and in August and September on the inner shelf. The lowest zooplankton densities occur in February (NJDEP 2010). Thermal stratification is seasonal, and, when it breaks down, nutrients are released to the surface waters, driving seasonal patterns of abundance. High productivity is typical of the Northeast Continental Shelf LME, but productivity varies both spatially and seasonally. Large seasonal changes in water temperature occur in the Project area with influences from the Gulf Stream and ocean circulation patterns, which strongly regulate the productivity, species composition, and spatial distribution of zooplankton (NJDEP 2010). In 2021, for example, increasing zooplankton diversity in the Mid-Atlantic Bight was attributed to the declining dominance of a calanoid copepod (*C. typicus*), while the zooplankton community maintained a similar composition of other species (NMFS 2021a). The temporal and spatial patterns of *Calanus* copepods (zooplankton) have been linked to the phases of the North Atlantic Oscillation, which has a direct effect on the position and strength of important North Atlantic Ocean currents (Fromentin and Planque 1996; Taylor and Stephens 1998).

Narragansett Bay also has seasonal zooplankton abundance trends with peak abundance during spring and summer (Beaulieu et al. 2013). Predator-prey dynamics also influence zooplankton abundances in Narragansett Bay. Monitoring has observed changes in predator-prey overlap for two species of zooplankton in response to climate change (Costello et al. 2006).

Megafaunal Invertebrates

Stock assessments for each ASMFC-managed invertebrate species can be found on ASMFC's website (ASMFC 2022). State- and federally managed invertebrates in the LME that have EFH in the Project area (COP Volume 2, Section 6.7.3.1, Table 6-52; SouthCoast Wind 2024) or recorded catch in (COP Appendix V, Section 2.2, Table 2-5; SouthCoast Wind 2024) or in and around (COP Appendix V, Section 2.1, Table

2-1; SouthCoast Wind 2024) the Project area include: American lobster (*Homarus americanus*), Atlantic sea scallop (*Placopecten magellanicus*), Atlantic surfclam (*Spisula solidissima*), horseshoe crab (*Limulus polyphemus*), Jonah crab (*Cancer borealis*), longfin inshore squid (*Loligo pealeii*), northern shortfin squid (*Illex illecebrosus*), northern shrimp (*Pandalus borealis*), ocean quahog (*Arctica islandica*), and Atlantic deep-sea red crab (*Chaceon quinquedens*).

Notable seasonal temperature changes in the Northeast Continental Shelf LME influence the distribution and movement of invertebrates with latitudinal (north–south) seasonal migrations and longitudinal (inshore–offshore) seasonal migrations (NJDEP 2010). Some megafaunal invertebrates found in the geographic analysis area are migratory (e.g., American lobster, Jonah crab, longfin inshore squid, and northern shortfin squid). Highly mobile invertebrates with broad habitat requirements have more flexibility to respond to disturbance and anthropogenic impacts compared to other invertebrates that are more sensitive because they have limited mobility or require specific habitats during one or more life stages. Species that are sessile or have more limited mobility, meaning they would be expected to reside in the Project area, include species such as Atlantic sea scallop, Atlantic surfclam, and ocean quahog, which were identified as shellfish species of concern for the Massachusetts offshore wind lease area by Guida et al. (2017). NEFSC seasonal trawl survey catches in the Massachusetts offshore wind lease area between 2003 and 2016 found that longfin squid were one of the dominant species in the warm season, along with some finfish species. In the cold season, no invertebrate species were dominant (Guida et al. 2017).

The Lease Area and the southern sections of the export cable corridors are predominantly characterized by soft-sediment habitats (NBEP 2017; COP Appendix M; SouthCoast Wind 2024). Economically and ecologically important species associated with soft sediments in the vicinity of the Project area include Atlantic sea scallop, bay scallop (*Argopecten irradians*), horseshoe crab, Atlantic surfclam, squid, Atlantic deep-sea red crab, channeled whelk, razor clam (*Ensis leei*), soft-shelled clam (*Mya arenaria*), northern quahog (*Mercenaria mercenaria*), and ocean quahog (COP Volume 2, Section 6.7.3; SouthCoast Wind 2024). Other soft-sediment megafaunal invertebrates include decapod crab species, sand dollars, sea stars, gastropods, and sea urchins (SouthCoast Wind 2024).

The northern section of the Falmouth ECC and the glacial moraines in the offshore portion of the Brayton Point ECC contain hard, complex habitats with attached epifauna and mobile epifauna such as whelk.[2] Hard substrates provide important nursery habitat for juvenile lobster and areas where squid species can attach egg masses, called mops (NJDEP 2010). Both squid and American lobster are of economic importance. The commercial importance of other species, such as Jonah crab (*Cancer borealis*), has increased with the decline of the American lobster fishery. Jonah crabs are typically associated with rocky habitats and soft sediment, while lobsters prefer hard-bottom habitats. Invertebrates associated with the presence of SAV occur in the northern portion of both export cable corridors (COP Appendix K; SouthCoast Wind 2024). The hard substrates, along with SAV, are EFH for the

[2] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action*, Brayton Point is the preferred ECC for both Project 1 and Project 2, and Falmouth is the variant ECC for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

spat (i.e., free-moving larvae) life stage of Atlantic sea scallop, which attach to these surfaces for survival (NEFMC and NMFS 2017), as do bay scallops.

The outlook for invertebrate species throughout the geographic analysis area includes presumed increased anthropogenic pressure as human population size along the northeastern seaboard increases (NEFSC Ecosystem Assessment Program 2012), continued commercial and recreational fishing, and changing climate. Warming of coastal and shelf waters is resulting in a northward shift in the distributions of some invertebrate species that prefer cooler waters; based on future increases in surface water temperatures, it is expected that this trend will continue (NEFSC Ecosystem Assessment Program 2012). American lobster distributions are a dramatic example of invertebrate distributions shifting toward the northeast and generally into deeper waters with more than a 70 percent decline in landings in southern New England between 1996 and 2014 and evidence of receding nursery habitat in Narragansett Bay (NOAA 2021; Wahle et al. 2015).

The Project area includes a portion of Nantucket and Rhode Island Sounds and Narragansett Bay, which provide unique and diverse habitats, especially for early life stage development and survival. The phenology of longfin squid in Narragansett Bay has been driven by climate change with this warm-water species residing longer as warm seasons have expanded (Langan et al. 2021). This pattern is expected to continue with further climate change with likely opposite effects for cold-water species (Langan et al. 2021).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on activities that could adversely affect EFH. NOAA defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (NOAA 2004, 2013). NMFS, the Northeast Fisheries Management Council, and the Mid-Atlantic Fisheries Management Council have defined EFH for various species in the northeastern United States offshore and nearshore coastal waters. EFH designations have been described based on 10-by 10-foot (3-by 3-meter) squares of latitude and longitude along the coast. The majority of EFH for species occurring in the waters of the New England and Mid-Atlantic OCS and nearshore coastal waters is managed under federal Fishery Management Plans developed by the New England Fishery Management Council and Mid-Atlantic Fishery Management Council (NEFMC 2021; MAFMC 2020). In addition to these species, several highly migratory species managed through a Fishery Management Plan developed by NMFS (2021c) are known or likely to occur in the geographic analysis area.

EFH has been designated for 46 species or management groups that occur in the New England and Mid-Atlantic OCS and nearshore coastal waters. Species and their EFH occurrence within the Project area are described in Table 3.5.5-1. The table also shows stock status and trends and spawning stock biomass.

Table 3.5.5-1. EFH in Project area and stock status for species in the New England and Mid-Atlantic OCS and nearshore coastal water

Species	EFH Occurrence in Project Area	Stock Status	Harvest Trend	10 Year Stock Trend	Spawning Stock Biomass (metric tons)	Report Year
Albacore Tuna	• EFH for juvenile and adult life stages in the Lease Area, Falmouth export cable corridor, and offshore portion of the Brayton Point export cable corridor • EFH for juvenile life stage only in Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor	Not overfished	Not subject to overfishing	Increasing	NA	2020
American Plaice	• Larval life stage EFH in the Lease Area	Not overfished	Not subject to overfishing	Decreasing	17,748	2019
Atlantic Butterfish	• EFH for all life stages in the Lease Area, Falmouth export cable corridor, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for juvenile and adult life stages only at the Falmouth landfalls	Not overfished	Not subject to overfishing	Increasing	66,566	2022
Atlantic Cod	• EFH for all life stages in the Lease Area, Falmouth export cable corridor, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for egg, larval, and juvenile life stages only at the Falmouth landfalls	Overfished (GB; GOM)	Overfishing is occurring (GB; GOM)	Decreasing (GB; GOM)	NA (GB); 3,083–3,223 (GOM, 2019)	2021
Atlantic Herring	• EFH for all life stages in the Lease Area, Falmouth export cable corridor, and offshore portion of the Brayton Point export cable corridor • EFH for larval, juvenile, and adult life stages only in Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for juvenile life stage only at Falmouth landfalls	Overfished	Not subject to overfishing	Decreasing	39,091	2022

Species	EFH Occurrence in Project Area	Stock Status	Harvest Trend	10 Year Stock Trend	Spawning Stock Biomass (metric tons)	Report Year
Atlantic Mackerel	• EFH for all life stages in the Lease Area and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for egg, larval, and juvenile life stages only in Falmouth export cable corridor and offshore portion of the Brayton Point export cable corridor • EFH for juvenile life stage only in Falmouth landfall	Overfished	Overfishing is occurring	No Change	42,862	2021
Atlantic Sea Scallop	• Egg, larval, juvenile, and adult life stage EFH in the Lease Area, Falmouth export cable corridor, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor	Not overfished	Not subject to overfishing	Increasing	147,073	2020
Atlantic Surfclam	• Juvenile and adult life stage EFH in the offshore portion of the Brayton Point export cable corridor, Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and near the Falmouth landfalls	Not overfished	Not subject to overfishing	No Change	46,355,000	2016
Atlantic Wolffish	• EFH for all life stages in the offshore portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and at Falmouth landfalls	Overfished	Not subject to overfishing	Increasing	676	2020
Barndoor Skate	• Juvenile and adult life stage EFH in the Lease Area	Not overfished	Not subject to overfishing	Increasing	NA	2020
Basking Shark	• EFH for all life stages in the Lease Area, offshore portion of the Brayton Point export cable corridor, Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor, and Falmouth export cable corridor	Unknown	Unknown	NA	NA	NA
Black Sea Bass	• EFH for juvenile and adult life stages in the Falmouth export cable corridor, Falmouth landfall, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for juvenile life stage only in the Lease Area	Not overfished	Not subject to overfishing	Increasing	29,769	2021

Species	EFH Occurrence in Project Area	Stock Status	Harvest Trend	10 Year Stock Trend	Spawning Stock Biomass (metric tons)	Report Year
Blue Shark	• Neonate, juvenile, and adult life stage EFH in the Lease Area, Falmouth export cable corridor, and offshore portion of the Brayton Point export cable corridor	Not overfished	Not subject to overfishing	NA	NA	2015
Bluefin Tuna	• Juvenile and adult life stage EFH in the Lease Area, Falmouth export cable corridor, Falmouth landfalls, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor	Unknown	Not subject to overfishing	NA	NA	2017
Bluefish	• EFH for juvenile and adult life stages in the offshore portion of the Brayton Point export cable corridor and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for adult life stage only in the Lease Area and Falmouth export cable corridor	Not overfished	Not subject to overfishing	Decreasing	95,742	2021
Common Thresher Shark	• EFH for all life stages in the Lease Area, offshore portion of the Brayton Point export cable corridor, Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and Falmouth landfalls	Unknown	Unknown	NA	NA	NA
Dusky Shark	• EFH for all life stages in the Lease Area, Falmouth export cable corridor, and offshore portion of the Brayton Point export cable corridor	Overfished	Overfishing is occurring	NA	NA	2016
Haddock	• EFH for all life stages in Lease Area • EFH for egg, larval, and juvenile life stages only in the offshore portion of the Brayton Point export cable corridor and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for egg life stage only in the Falmouth export cable corridor	Not overfished (GB; GOM)	Not subject to overfishing (GB); overfishing is occurring (GOM)	NA (GB; GOM)	79,513 (GB, 2021); 16,528 (GOM, 2021)	2022
Little Skate	• Juvenile and adult life stage EFH in the Lease Area, offshore portion of the Brayton Point export cable corridor, Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and Falmouth landfalls	Not overfished	Not subject to overfishing	Decreasing	NA	2020

Species	EFH Occurrence in Project Area	Stock Status	Harvest Trend	10 Year Stock Trend	Spawning Stock Biomass (metric tons)	Report Year
Longfin Inshore Squid	• EFH for all life stages in the Lease Area, offshore portion of the Brayton Point export cable corridor, Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and near the Falmouth landfalls	Not overfished	Unknown	No Change	NA	2017
Monkfish	• EFH for all life stages in the Lease Area and offshore portion of the Brayton Point export cable corridor • EFH for egg and larval life stages only in the Falmouth export cable corridor	Unknown (GOM; MA)	Unknown (GOM; MA)	NA (GOM; MA)	NA (GOM; MA)	2022
Northern Shortfin Squid	• Adult life stage EFH in the offshore portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and near the Falmouth landfalls	Unknown	Unknown	NA	NA	2022
Ocean Pout	• EFH for egg, juvenile, and adult life stages in the Falmouth export cable corridor, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for egg and adult life stages only in the Lease Area	Overfished	Not subject to overfishing	No Change	NA	2017
Ocean Quahog	• Juvenile and adult life stage EFH in the Lease Area, offshore portion of the Brayton Point export cable corridor, and Falmouth export cable corridor	Not overfished	Not subject to overfishing	Increasing	NA	2017
Offshore Hake	• Larval life stage EFH in the Lease Area, Falmouth export cable corridor, and offshore portion of the Brayton Point export cable corridor	Not overfished	Unknown	NA	NA	2010
Pollock	• EFH for egg, larval, and juvenile life stages in the offshore portion of the Brayton Point export cable corridor • EFH for egg and larval life stages only in the Lease Area • EFH for larval life stage only in the Falmouth export cable corridor and Falmouth landfalls • EFH for juvenile life stage only in the Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor	Not overfished	Not subject to overfishing	NA	NA	2019

Species	EFH Occurrence in Project Area	Stock Status	Harvest Trend	10 Year Stock Trend	Spawning Stock Biomass (metric tons)	Report Year
Porbeagle Shark	• EFH for all life stages in the Lease Area	Overfished	Not subject to overfishing	NA	NA	2021
Red Hake	• EFH for all life stages in the Lease Area, Falmouth export cable corridor, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for egg, larval, and juvenile life stages only at the Falmouth landfalls	Not overfished (GOM); Overfished (MA)	Not subject to overfishing (GOM); Overfishing is occurring (MA)	Increasing (GOM); Decreasing (MA)	NA (GOM; MA)	2017
Sand Tiger Shark	• Neonate and juvenile life stage EFH in the Lease Area, offshore portion of the Brayton Point export cable corridor, Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and Falmouth landfalls	Unknown	Unknown	NA	NA	NA
Sandbar Shark	• EFH for juvenile and adult life stages in the Lease Area, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for juvenile life stage only in the Falmouth export cable corridor	Overfished	Not subject to overfishing	No Change	NA	2017
Scup	• EFH for all life stages in the Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for juvenile and adult life stages only in the Lease Area, offshore portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and Falmouth landfalls	Not overfished	Not subject to overfishing	Decreasing	176,404	2021
Shortfin Mako Shark	• Neonate, juvenile, and adult life stage EFH in the Lease Area, Falmouth export cable corridor, and offshore portion of the Brayton Point export cable corridor	Overfished	Overfishing is occurring	NA	NA	2017

Species	EFH Occurrence in Project Area	Stock Status	Harvest Trend	10 Year Stock Trend	Spawning Stock Biomass (metric tons)	Report Year
Silver Hake	• EFH for all life stages in the Lease Area • EFH for egg, larval, and adult life stages only in the offshore portion of the Brayton Point export cable corridor and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for egg and larval life stages only in the Falmouth export cable corridor and Falmouth landfalls	Not overfished (GM; MA)	Not subject to overfishing (GM; MA)	Increasing (GM; MA)	NA (GM; MA)	2020
Skipjack Tuna	• EFH for juvenile and adult life stages in the Lease Area, Falmouth export cable corridor, and offshore portion of the Brayton Point export cable corridor • EFH for adult life stage only at the Falmouth landfalls and the Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor	Not overfished	Unknown	NA	NA	2014
Smooth hound Shark Complex	• EFH for all life stages in the Lease Area, offshore portion of the Brayton Point export cable corridor, Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and Falmouth landfalls	Not overfished	Not subject to overfishing	NA	NA	2015
Spiny Dogfish	• Male and female sub-adult and adult life stage EFH in the Lease Area, offshore portion of the Brayton Point export cable corridor, and Falmouth export cable corridor • EFH for sub-adult female and adult male life stages only in the Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor	Not overfished	Not subject to overfishing	Decreasing	NA	2018
Summer Flounder	• EFH for all life stages in the Lease Area, offshore portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and Falmouth landfall • EFH for larval, juvenile, and adult life stages only in the Sakonnet River/Mount Hope Bay portion of the export cable corridor	Not overfished	Not subject to overfishing	Decreasing	47,397	2021

Species	EFH Occurrence in Project Area	Stock Status	Harvest Trend	10 Year Stock Trend	Spawning Stock Biomass (metric tons)	Report Year
Tiger Shark	• Juvenile and adult life stage EFH in the Lease Area, Falmouth export cable corridor, and offshore portion of the Brayton Point export cable corridor	Unknown	Unknown	NA	NA	NA
White Hake	• EFH for juvenile and adult life stages only in the Lease Area • EFH for larval and juvenile life stages only in the Falmouth export cable corridor and offshore portion of the Brayton Point export cable corridor • EFH for juvenile life stage only at the Falmouth landfalls	Not overfished	Not subject to overfishing	Decreasing	NA	2017
White Shark	• EFH for all life stages in the Lease Area, offshore portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and Falmouth landfalls • EFH for neonate life stage only in Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor	Unknown	Unknown	NA	NA	NA
Windowpane Flounder	• EFH for all life stages in the Lease Area, Falmouth export cable corridor, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for juvenile and adult life stages only at the Falmouth landfalls	Not overfished	Not subject to overfishing	Increasing	NA	2017
Winter Flounder	• EFH for all life stages in the Falmouth export cable corridor, Falmouth landfall, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for larval, juvenile, and adult life stages only in the Lease Area and offshore portion of the Brayton Point export cable corridor	Not overfished	Not subject to overfishing	Decreasing	3,353	2022
Winter Skate	• Juvenile and adult life stage EFH in the Lease Area, offshore portion of the Brayton Point export cable corridor, Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor, Falmouth export cable corridor, and Falmouth landfalls	Not overfished	Not subject to overfishing	No Change	NA	2020

Species	EFH Occurrence in Project Area	Stock Status	Harvest Trend	10 Year Stock Trend	Spawning Stock Biomass (metric tons)	Report Year
Witch Flounder	• EFH for all life stages in the Lease Area • EFH for egg, larval, and adult life stages only in the offshore portion of the Brayton Point export cable corridor • EFH for larval and adult life stages only in the Falmouth export cable corridor	Overfished	Unknown	Increasing	NA	2017
Yellowfin Tuna	• EFH for juvenile and adult life stages in the offshore portion of the Brayton Point export cable corridor • EFH for juvenile life stage only in the Lease Area, Falmouth export cable corridor, Falmouth landfalls, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor	Not overfished	Not subject to overfishing	NA	NA	2019
Yellowtail Flounder	• EFH for all life stages in the Lease Area, Falmouth export cable corridor, offshore portion of the Brayton Point export cable corridor, and Sakonnet River/Mount Hope Bay portion of the Brayton Point export cable corridor • EFH for juvenile life stage only at the Falmouth landfalls	Overfished (GB; SNE); not overfished (GOM)	Unknown (GB); not subject to overfishing (GOM; SNE)	Decreasing (GB; SNE); Increasing (GOM)	NA (GB); 3,058 (GOM, 2021); 70 (SNE, 2021)	2022

Stock status is determined as "overfished" if a stock's biomass level is depleted to a degree that the stock's capacity to produce maximum sustainable yield is jeopardized.
Harvest Trend is determined to be "subject to overfishing" if the harvest rate is higher than the recruitment rate that produces maximum sustainable yield.
Source: NMFS 2022a
NA = not applicable; GB = Georges Bank stock; GOM = Gulf of Maine stock; SNE = Southern New England stock; MA = Mid-Atlantic stock

NOAA, the Northeast Fisheries Management Council, and the Mid-Atlantic Fisheries Management Council also identified an HAPC as a component of EFH. HAPCs are high-priority areas for conservation and exhibit one or more of the following characteristics: rare, sensitive, stressed by development, provide important ecological functions for federally managed species, or especially vulnerable to anthropogenic degradation. HAPCs can cover specific localities or cover habitat types that could be found at many locations (NOAA 2004). HAPCs that could be directly affected by Project activities include the summer flounder HAPC, juvenile Atlantic cod HAPC, and Southern New England HAPC specific to Atlantic cod spawning. The summer flounder HAPC includes all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes (i.e., SAV) in any size bed, as well as loose aggregations, in currently designated adult and juvenile summer flounder EFH. Summer flounder HAPC overlaps the Project area at the Falmouth landfall sites (MAFMC 2016). The juvenile Atlantic cod HAPC includes inshore areas of the Gulf of Maine and southern New England between 0 to 65 feet (0 to 20 meters), relative to mean high water. The juvenile Atlantic cod HAPC overlaps the Project area in Mount Hope Bay, the Sakonnet River, and Nantucket Sound (NEFMC and NMFS 2017). Larval and young-of-the-year Atlantic cod have both been observed overlapping with the Project area in the Sakonnet River and Mount Hope Bay (Langan et al. 2019).

In October 2017, the New England Fishery Management Council established a new juvenile Atlantic cod HAPC for the New England coastline out to a depth of 66 feet (20 meters). NMFS implemented this HAPC on April 9, 2018. This HAPC for juvenile Atlantic cod is a subset of EFH for juvenile Atlantic cod, which consists of structurally complex habitats, including eelgrass, mixed sand and gravel, rocky habitats, and emergent epifauna (NEFMC and NMFS 2017). The HAPC for juvenile Atlantic cod includes all hard-bottom habitats within both ECCs and within 20 nautical miles of shore. The total area of juvenile Atlantic cod HAPC present in the ECCs is not known but is assumed to occur along the entire length of the ECCs from the 65.6-foot (20-meter) depth contour to shore. Overall, the proportion of juvenile cod HAPC within the ECCs is small considering the entire HAPC extends from the Canadian border to southern New England (map 245 in NEFMC and NMFS 2017).

Evidence of cod spawning has been observed in an area known as Cox Ledge, which lies on the northwest corner of the Massachusetts and Rhode Island wind energy areas (Van Hoeck et al. 2023). An HAPC framework adjustment for southern New England was proposed by the NEFMC for complex habitats and Atlantic cod spawning habitats, which could potentially overlap with the Project area (NEFMC 2023). Alternatives proposed under the Southern New England HAPC include designating cod spawning grounds on and surrounding Cox Ledge as a HAPC, designating the spawning grounds on and around Cox Ledge and any future cod spawning grounds identified in southern New England as HAPCs, designating all areas in southern New England with complex habitats as an HAPC, and designating the area overlapping offshore wind lease sites in Southern New England as an HAPC (NEFMC 2023). The spatial extent of the HAPC overlapping wind energy lease sites is based on the footprint of the lease areas, buffered by approximately 10 kilometers on all sides, combined with the footprint of the Cox Ledge spawning ground. The HAPC proposal emphasizes the importance of protecting high-value complex benthic habitats currently known to be used by Atlantic cod for spawning and other potentially suitable cod-spawning areas from the negative impacts associated with offshore development (NEFMC

2023). This proposed expansion is also in recognition of other EFH species that use complex habitat during their life history. The species noted in addition to Atlantic cod are Atlantic herring, Atlantic sea scallop, little skate, monkfish, ocean pout, red hake, winter flounder, and winter skate. The southern New England HAPC adjustments became effective on March 6, 2024 (NOAA 2024).

Geophysical surveys conducted by SouthCoast Wind mapped and characterized seafloor habitats in the Project area (COP Appendix M.3; SouthCoast Wind 2024). Habitat types within the Project area (**Error! Not a valid bookmark self-reference.**) that include EFH for managed species range from various sediment types and boulders to SAV and shell accumulations. The Lease Area is composed predominantly of mud to muddy sand while complex habitats can be found within sections of the ECCs. HAPC for juvenile Atlantic cod and summer flounder were also quantified within the Lease area and cable corridors (**Error! Not a valid bookmark self-reference.**). Benthic habitats found in the Falmouth ECC as it crosses the Muskeget Channel are mostly complex habitats consisting of coarse sediments and Glacial Moraine A (Table 3.5.5-3). In both the Mount Hope Bay (Table 3.5.5-4) and Sakonnet River (Table 3.5.5-5) segments of the Brayton Point ECC, sediments of sand or finer grain size are the dominant substrate types with a co-occurrence of *Crepidula* shell substrate.

Table 3.5.5-2. Area (acres) of different habitat types within Project components

Habitat Types	Lease Area	Falmouth ECC Route - Federal	Falmouth ECC Route – MA State Waters	Brayton Point ECC Route - Federal	Brayton Point ECC Route – RI State Waters
Glacial Moraine A	-	-	1,691	411	185
Bedrock	-	-	-	-	3
Gravel Pavement	-	-	1,818	-	-
Mixed-Size Gravel	-	-	-	18	510
Boulder Fields Present	-	2.6	544	945	184
Coarse Sediment	-	-	2,325	1,026	0.1
Mud to Muddy Sand	49,731	15	444	4,015	3,851
Sand	777	4,406	4,174	9,596	1,478
SAV	-	-	295	-	-
Shell Accumulations	-	-	1,531	-	1,342
Anthropogenic		-	-	-	7
HAPC	-	151	10,895	0	6,210

Source: COP Appendix M; SouthCoast Wind 2024.

Table 3.5.5-3. Area (acres) of different habitat components within the Muskeget Channel area of the Falmouth ECC

Habitat Types	Area (Acres)	Percentage of Area
Coarse Sediment	1,091	41.1%
Coarse Sediment - with Boulder Field(s)	22	0.8%
Glacial Moraine A	1,008	38.0%
Sand	516	19.4%
Sand - Mobile with Boulder Field(s)	19	0.7%
Sand - SAV	0.06	0.0%
Total	**2,657**	**100%**

Source: Mayflower Wind – Benthic Habitat Pop-up Mapper (INSPIRE 2022).

Table 3.5.5-4. Area (acres) of different habitat components within the Mount Hope Bay portion of the Brayton Point ECC

Habitat Types	Area (Acres)	Percentage of Area
Anthropogenic (dredged material deposit)	75	3.0%
Anthropogenic (rock rubble)	0	0.0%
Bedrock	2	0.1%
Coarse Sediment - with Boulder Field(s)	0	0.0%
Glacial Moraine A	19	0.7%
Mud to Muddy Sand	1,700	67.6%
Mud to Muddy Sand - (Likely) Crepidula Substrate with Boulder Field(s)	56	2.2%
Mud to Muddy Sand - Crepidula Substrate with Boulder Field(s)	4	0.2%
Mud to Muddy Sand - Shell / Crepidula Substrate	609	24.2%
Mud to Muddy Sand - with Boulder Field(s)	7	0.3%
Sand	42	1.7%
Total	**2,516**	**100%**

Source: Mayflower Wind – Benthic Habitat Pop-up Mapper (INSPIRE 2022).

Table 3.5.5-5. Area (acres) of different habitat components within the Sakonnet River portion of the Brayton Point ECC

Habitat Types	Area (Acres)	Percentage of Area
Anthropogenic (Rock Rubble)	4	0.1%
Anthropogenic (Rock Rubble/Trawl Marks)	3	0.1%
Mixed-Size Gravel in Muddy Sand to Sand	233	7.0%
Mud to Muddy Sand	1,632	48.9%
Mud to Muddy Sand - (Likely) Crepidula Substrate	37	1.1%
Mud to Muddy Sand - Crepidula Substrate	606	18.1%

Habitat Types	Area (Acres)	Percentage of Area
Mud to Muddy Sand - Mobile	29	0.9%
Mud to Muddy Sand - with SAV	4	0.1%
Sand	791	23.7%
Sand - with Boulder Field(s)	1	0%
Total	**3,340**	**100%**

Source: Mayflower Wind – Benthic Habitat Pop-up Mapper (INSPIRE 2022).

3.5.5.2 Impact Level Definitions for Finfish, Invertebrates, and Essential Fish Habitat

Impact level definitions are provided in **Error! Reference source not found.**.

Table 3.5.5-6. Definitions of impact levels for finfish, invertebrates, and essential fish habitat

Impact Level	Type of Impact	Definition
Negligible	Adverse	Impacts on species or habitat would be so small as to be unmeasurable.
	Beneficial	No effect or no measurable effect.
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 would be temporary or short term in nature.
	Beneficial	A small and measurable beneficial impact on a few individuals. Habitat benefits would be temporary or short term.
Moderate	Adverse	Impacts on species would be unavoidable but would not result in population-level effects. 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 effects on species that rely on them.
	Beneficial	A notable and measurable beneficial impact on a larger number of individuals or multiple species but would not result in population-level effects. Habitat benefits would be short term, long term, or permanent.
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.
	Beneficial	A regional or population-level beneficial impact on species or habitat.

3.5.5.3 Impacts of Alternative A – No Action on Finfish, Invertebrates, and Essential Fish Habitat

When analyzing the impacts of the No Action Alternative on finfish, invertebrates, and EFH, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for finfish, invertebrates, and EFH. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D*, Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for finfish, invertebrates, and EFH, described in Section 3.5.5.1, *Description of the Affected Environment and Future Baseline Conditions,* 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 in the geographic analysis area that contribute to impacts on finfish, invertebrates, and EFH are generally associated with commercial harvesting and fishing activities, UXO interaction, fisheries bycatch, regulated fishing effort, water quality degradation and pollution, effects on benthic habitat via dredging and bottom trawling, accidental fuel leaks or spills, and climate change.

Some mobile invertebrates can migrate long distances and encounter a wide range of stressors over broad geographical scales (e.g., longfin and shortfin squid). Their mobility and broad range of habitat requirements may also mean that limited disturbance may not have measurable effects on their stocks (populations). This would apply to finfish, where populations are composed largely of long-range migratory species; it would be expected that their mobility and broad ranges would preclude many temporary and short-term impacts associated with ongoing offshore impacts throughout the geographic analysis area. Invertebrates with more restricted geographical ranges or sessile invertebrates or life stages may be subject to these stressors for longer durations and can be more sensitive to temporary offshore disturbances (Guida et al. 2017).

Seafloor habitat is routinely disturbed through dredging (for navigation, marine minerals extraction, and military purposes) and commercial fishing use of bottom trawls and dredge-fishing methods. Ongoing dredging for the purposes of navigation and other ongoing activities results in short-term, localized impacts, such as habitat alteration and change in complexity, on finfish, invertebrates, and EFH. Sandy or silty habitats, which are abundant in the geographic analysis area, are quick to recover from dredging disturbance. According to Newcombe and MacDonald (1991), impacts from settlement of resuspended sediment plumes increase with the concentration of resuspension and the duration over which invertebrates are exposed to that plume. In general, sediment plumes are localized, which results in larger and coarser sediment falling out of the water column and settling on the seafloor in the area near or immediately adjacent to the activity, while smaller, fine sediments may remain suspended in the water column for a longer period before settling potentially at a greater distance from the disturbance.

UXO interactions would be expected to continue due to ongoing development of aquaculture, fishing, wind farms, power cables, and oil or gas pipeline development. Additionally, an increase in ship traffic, in general, would result in an overall increase in potential interactions with UXO and the associated corrosion of UXO, subsequent releases of their constituents to the marine environment, and adverse impacts on marine habitats. Therefore, the potential for disturbance, injury, or mortality to fish and loss of habitat would also persist.

Regulated fishing would continue to affect finfish, invertebrates, and EFH in the geographic analysis area by direct removal of resources (i.e., harvests) and gear impacts on habitats (e.g., bottom disturbance). Ongoing fisheries management practices are anticipated to have positive population-level impacts on managed species in the long term. Existing legislation requires federally managed species to achieve maximum sustainable yield, meaning federally managed species in the region would see restored population numbers under successful fisheries management. Abandoned or lost fishing gear remains in the aquatic environment for extended time periods, often entangling or trapping mobile invertebrate and fish species. Bycatch affects many species throughout the geographic analysis area, such as windowpane flounder, blueback herring, shark species, and hake species. Water quality impacts from ongoing onshore and offshore activities affect nearshore habitats, and accidental spills can occur from pipeline or marine shipping. Invasive species can be accidentally released in the discharge of ballast water and bilge water from marine vessels. The resulting impacts on invertebrates and finfish depend on many factors but can be widespread and permanent, especially if the invasive species becomes established and outcompetes native species.

Global climate change has the potential to affect the distribution and abundance of invertebrates and their food sources, primarily through increased water temperatures but also through changes to ocean currents and increased acidity. The northeast shelf has experienced increasingly elevated temperatures in both surface and bottom depths (NMFS 2021a, 2021b). Finfish and invertebrate migration patterns can be influenced by warmer waters, as can the frequency or magnitude of disease (Hare et al. 2016). Regional water temperatures that increasingly exceed the thermal stress threshold may affect the recovery of the American lobster fishery off the East Coast of the United States (Rheuban et al. 2017). Ocean acidification driven by climate change is contributing to reduced growth and, in some cases, decline of invertebrate species with calcareous shells. Increased freshwater input into nearshore estuarine habitats can result in water quality changes and subsequent effects on invertebrate species (Hare et al. 2016).

Based on a recent study, northeastern marine, estuarine, and riverine habitat types were found to be moderately to highly vulnerable to stressors resulting from climate change (Farr et al. 2021). In general, rocky and mud bottom, intertidal, SAV, kelp, coral, and sponge habitats were considered the most vulnerable habitats to climate change in marine ecosystems (Farr et al. 2021). Similarly, estuarine habitats considered most vulnerable to climate change include intertidal mud and rocky bottom, shellfish, kelp, SAV, and native wetland habitats (Farr et al. 2021). Riverine habitats found to be most vulnerable to climate change include native wetland, sandy bottom, water column, and SAV habitats (Farr et al. 2021). As invertebrate habitat, finfish habitat, and EFH may overlap with these habitat types, this study suggests that marine life and habitats could experience dramatic changes and decline over time as impacts from climate change continue.

The following ongoing offshore wind activities in the geographic analysis area contribute to impacts on finfish, invertebrates, and EFH.

- Continued O&M of three offshore wind projects:
  - Block Island project (five WTGs) installed in state waters.
  - South Fork Wind Farm Project (12 WTGs and 1 OSP) installed in OCS-A 0517.
  - CVOW-Pilot Project (two WTGs) installed in OCS-A 0497.

- Ongoing construction of eight offshore wind projects:
    - Vineyard Wind 1 Project (62 WTGs and 1 OSP) in OCS-A 0501.
    - Revolution Wind project (65 WTGs and two OSPs) in OCS-A 0486.
    - Sunrise Wind Project (94 WTGs and 1 OSP in OCS-A 0487.
    - New England Wind Project (128 WTGs and 2 OSPs) in OCS-A 0534 and a portion of OCS-A 0501.
    - Empire Wind (147 WTGs and 2 OSPs) in OCS-A 0512.
    - Ocean Wind 1 (98 WTGs and 3 OSPs) in OCS-A 0498.
    - Atlantic Shores South Project (195 WTGs and 2 OSPs) in OCS-A 0499.
    - CVOW-C Project (176 WTGs and 3 OSPs) in OCS-A 0483.

Ongoing O&M of the Block Island, South Fork Wind, and CVOW-Pilot projects and ongoing construction of multiple offshore wind projects would affect fish, invertebrates, and EFH through the primary IPFs of accidental releases, anchoring, discharges/intakes, EMF, lighting, cable emplacement and maintenance, noise, port utilization, and presence of structures. Ongoing offshore wind activities would have the same type of impacts that are described in *Cumulative Impacts of the No Action Alternative* for ongoing and planned offshore wind activities, but the impacts would be of lower intensity.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impact of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Planned non-offshore wind activities that may affect finfish, invertebrates, and EFH include new submarine cables and pipelines, tidal energy projects, marine minerals extraction, dredging, military use, marine transportation, and oil and gas activities (see Appendix D, *Planned Activities Scenario*, for a description of planned activities). Impacts from planned non-offshore wind activities would be similar to those from ongoing activities and may include temporary and permanent impacts on benthic resources from disturbance, injury, mortality, habitat degradation, and habitat conversion. While these impacts would have localized effects on finfish, invertebrates, and EFH, population-level effects would not be expected.

The following sections summarize the potential impacts of ongoing and planned offshore wind activities on finfish, invertebrates, and EFH during construction, O&M, and decommissioning of the projects. Planned offshore wind activities include offshore wind energy development activities on the Atlantic OCS other than the Proposed Action determined by BOEM to be reasonably foreseeable (see Attachment 2 in Appendix D for a complete description of planned offshore wind activities).

BOEM expects other offshore wind activities to affect finfish, invertebrates, and EFH through the following primary IPFs.

Accidental releases: Offshore wind energy development could result in the accidental release of contaminants or trash/debris that could affect water quality. The risk of any type of accidental release would increase, primarily during construction but also during operations and decommissioning of offshore wind facilities. Hazardous materials that could be released include coolant fluids, oils and lubricants, and diesel fuels and other petroleum products. These materials tend to float in seawater, so they are less likely to directly contact the benthic environment; however, zooplankton communities and planktonic stages of invertebrates would be more likely to be exposed. Accidental release in the water column could also affect finfish species through consumption of material and smothering, both of which could result in mortality. Accidental releases could thus potentially result in lethal or sublethal effects, particularly on finfish and invertebrates, especially sensitive life stages such as planktonic larvae and pelagic eggs. Any accidental releases are expected to be localized and subject to mitigation to minimize environmental impacts. In most cases, the corresponding impacts on benthic habitats are unlikely to be detectable unless there is a catastrophic spill (e.g., an accident involving a tanker ship) or the spill involves heavy fuel oil that would sink to the seabed and persist in the aquatic environment for a longer time period. Compliance with USCG regulations would minimize the risk of accidental release of trash or debris. Therefore, with mitigation measures in place, the total volume of contaminants and trash or debris from accidental releases would be negligible and not measurably contribute to potential adverse impacts in the geographic analysis area.

Another potential impact related to vessels and vessel traffic is the accidental release of invasive species, especially during ballast water and bilge water discharges from marine vessels. Increasing vessel traffic related to the offshore wind industry would increase the risk of accidental releases of invasive species, primarily during construction. Vessels are required to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and USEPA National Pollutant Discharge Elimination System Vessel General Permit standards, both of which aim at least in part to prevent the release and movement of invasive species. Adherence to these regulations would reduce the likelihood of discharge of ballast or bilge water contaminated with invasive species. Although the likelihood of invasive species becoming established due to offshore wind activities is low, the impacts of invasive species invertebrates could be strongly adverse, widespread, and permanent if the species were to become established and outcompete native fauna. The increase in this risk related to the offshore wind industry would be small in comparison to the risk from ongoing activities (e.g., transoceanic shipping).

The overall offshore wind impacts of accidental releases on finfish, invertebrates, and EFH are likely to be localized and short term, resulting in little change to these resources. As such, accidental releases from offshore wind development would not be expected to appreciably contribute to overall impacts on these resources, and impacts would be minor.

Anchoring: Offshore wind energy development would lead to increased vessel anchoring during survey activities and during the construction, installation, maintenance, and decommissioning of offshore components. In addition, anchoring/mooring of meteorological towers or buoys could be increased. Anchoring causes temporary disturbance to the seafloor, which would be considered temporary, short-term impacts that occur regularly throughout the geographic analysis area. These activities would increase turbidity and could result in direct mortality from physical contact for finfish and invertebrate resources and degradation of sensitive hard-bottom habitats, including EFH. Other offshore wind projects could disturb up to 6,708 acres (2,715 hectares) of seafloor habitat, increasing turbidity and potentially disturbing, displacing, or injuring benthic habitat, finfish, and invertebrates. This disturbance would be localized and temporary, representing considerably less than 1 percent of the total available benthic habitat in the geographic analysis area. Potential impacts would be minimized by the implementation of mitigation measures. For finfish specifically, it is unlikely that adult fish would be directly affected by anchoring, and impacts would be negligible. However, less-mobile life stages, such as eggs and larvae, could experience direct mortality or smothering from turbidity, with impacts occurring at a local, small scale, not at a population or species level, and they would be temporary, minor, and localized. It would be expected that recovery of any affected species would occur in the short term, although degradation of sensitive habitats could persist in the long term.

Physical seabed disturbance due to anchoring would generally result in localized and temporary impacts on invertebrate resources, with recovery in the short term. Mobile invertebrates would be temporarily displaced, whereas sessile and slow-moving invertebrates could be subject to localized lethal and sublethal impacts. Demersal eggs and larvae would be particularly vulnerable to sediment disturbance and resettlement. High rates of mortality can occur in longfin squid egg masses if exposed to abrasion (Steer and Moltschaniwskyj 2007). In contrast, if the anchoring activity leads to the restructuring of patchy cobble boulder habitat into more linear, continuous cobble habitat, the change may provide juvenile lobsters with higher-value small-scale habitat, where predation rates would be expected to be lower (Guarinello and Carey 2020).

Impacts would be expected to be localized, turbidity would be temporary, and mortality of sessile invertebrate and life stages from contact would be recovered in the short term. Degradation of sensitive habitats, such as eelgrass beds and hard-bottom habitats, if it occurs, could be long term to permanent. The overall impacts of anchoring on finfish, invertebrates, and EFH are likely to be moderate, localized, and short term.

Cable emplacement and maintenance: Cable emplacement and maintenance activities (including dredging) would disturb sediments and cause sediment suspension, which could disturb, displace, and directly injure finfish and invertebrate species and EFH. Seabed areas identified for cable emplacement are cleared of buried hazards by conducting a grapnel run. Larger boulders that cannot be avoided by rerouting are removed or relocated using a boulder plow. The intensity of impacts would depend on multiple factors, including time of year, sediment type, and habitat type being affected where activities occur. Short-term disturbance of seafloor habitats during grapnel runs, dredging, or the use of boulder plows could disturb, displace, and directly injure or result in mortality of invertebrates in the immediate vicinity of the cable-emplacement activities. Finfish that spawn in aggregations or close to the seabed may be vulnerable to direct impacts from cable emplacement activities, especially if those activities take place during spawning season.

Sand wave and smaller sand ripple clearance may be required to install cables at a sufficient depth that they would not be uncovered as a result of sand wave mobility. Larger-scale sand waves are considered to be more stable and permanent when compared with sand ripples, with associated slopes generally less than 1 degree, although vertical relief may be as much as 49 feet (15 meters). Cable emplacement and maintenance activities may flatten depressions and small sand waves, temporarily reducing benthic habitat suitability for species such as red and silver hake within the cable footprint. Prey organisms that use these habitats would also be displaced, potentially affecting habitat suitability for fish species. Trenching may leave behind temporary depressions. The extent of these natural features is difficult to quantify, as they are continually reshaped by natural sediment transport processes. Natural recovery from anthropogenic disturbance is likely to occur within several months of the disturbance, depending on timing relative to winter storm events. Due to their mobility, it is expected that the sand ripples would rapidly return after cable installation, while larger sand waves would take longer to reform.

Dredging activities result in plumes of sediments into the water column that will eventually settle on the seafloor. Additional activities such as trenching for new cables, as well as maintenance activities, also periodically disturb sediments. In general, sediment plumes are localized, which results in larger and coarser sediment falling out of the water column and settling on the seafloor in the area near or immediately adjacent to the activity, while smaller, fine sediments may remain suspended in the water column for a longer time period before settling potentially at a greater distance from the disturbance. In addition to dredging, pile-driving activities can produce sediment plumes that would result in sediment deposition and burial of invertebrates and non-motile organisms and life stages, such as benthic eggs and larvae.

Dredging and mechanical trenching used in the course of cable installation could cause localized, short-term impacts (habitat alteration, lethal and sublethal effects) on invertebrates through sediment deposition and seabed profile alterations. Sediment deposition could result in adverse impacts on invertebrates, including smothering. The tolerance of invertebrates to being covered by sediment (sedimentation) varies among species and life stage. Some sessile shellfish may only tolerate 0.4 to 0.8 inch (1 to 2 centimeters), while other benthic organisms can survive burial in upward of 7.9 inches (20 centimeters) (Essink 1999). Demersal eggs and larvae would be particularly vulnerable to sediment disturbance and resettlement. For example, high rates of mortality can occur in longfin squid egg masses if exposed to abrasion. For migratory invertebrate species, impacts would be expected to vary by time of year, based on the species' presence in the vicinity of the dredge area. Finfish are unlikely to be affected by sediment deposition or burial; however, sessile life stages of some finfish such as eggs and larvae could be smothered by sediments, causing mortality. Impacts would be expected to vary by time of year, based on when any finfish species may spawn.

When new cable emplacement and maintenance cause resuspension of sediments, increased turbidity could have an adverse impact on filter-feeding fauna such as bivalves. The impact of increased turbidity on invertebrates depends on both the concentration of suspended sediment and the duration of exposure. Plume modeling completed for other wind development projects in the region and with similar sediment characteristics (Vineyard Wind 1, Block Island Wind Farm, and Virginia Offshore Wind Technology Advancement) predict that suspended sediment would usually settle well before 12 hours have elapsed (TetraTech 2012; BOEM 2015). BOEM, therefore, expects relatively little impact from increased turbidity (separate from the impact of direct sediment deposition) due to cable-emplacement and maintenance activities. Depending on the substrate being disturbed, invertebrates could be exposed to contaminants via the water column or resuspended sediments, but effects would depend on the degree of exposure. Assuming projects use installation procedures similar to those proposed in Appendix D, the extent of impacts would be limited to approximately 13 feet (4 meters) to either side of each cable. Therefore, the duration and extent of impacts would be limited and short term, and it would be expected that finfish and invertebrates would recover following this disturbance; however, EFH and other habitats such as eelgrass or hard-bottom habitats, discussed further in Section 3.5.2, may remain permanently altered (Hemery 2020), as eelgrass would be expected to require a greater amount of time to recover. Affected hard-bottom habitat would not be expected to recover, but the extent of hard-bottom habitat that could potentially be affected is assumed to be low relative to the amount of this habitat available throughout the geographic analysis area.

Some types of cable installation equipment use water withdrawals, which can entrain planktonic invertebrate larvae (e.g., squid, crab, lobster) with assumed 100 percent mortality of entrained individuals (MMS 2009). Due to the surface-oriented intake, water withdrawal could entrain pelagic eggs and larvae but would not affect resources on the seafloor. However, the rate of egg and larval survival to adulthood for many species is very low (MMS 2009). Due to the limited volume of water withdrawn, BOEM does not expect population-level impacts on any given species.

Offshore cables associated with wind projects would be similar to those of the Project, including interarray cables, substation interconnection cables, and offshore export cables. The geographic analysis area for finfish and invertebrates is more than 16 million acres (64,750 km^2). The total seafloor disturbance would represent less than 0.1 percent of the geographic analysis area. Cable routes that intersect sensitive EFH such as eelgrass beds or rocky bottom and other more complex habitats may cause long-term or permanent impacts; otherwise, impacts of habitat disturbance and mortality from physical contact with finfish and invertebrates would be recovered in the short term, and overall impacts would be expected to be minor to moderate.

Discharges/intakes: Increases in vessel discharges would occur during construction and installation, O&M, and decommissioning of offshore wind development. Offshore permitted discharges include uncontaminated bilge water and treated liquid wastes. Increases would be greatest during construction and decommissioning of offshore wind projects. Discharge rates would be staggered according to project schedules and localized. Certain discharges are required to comply with permitting standards that are established to minimize potential impacts on the environment.

Other offshore wind projects in the geographic analysis area may use HVDC converter OSPs that would convert AC to DC before transmission to onshore project components. As described in a recent white paper produced by BOEM (Middleton and Barnhart 2022), these HVDC systems are cooled by an open loop system that intakes cool sea water and discharges warmer water back into the ocean. Entrainment and impingement of finfish and invertebrates could occur at HVDC converter intakes on the OSPs. Impacts of entrainment and impingement on finfish and invertebrates at HVDC converter intakes would be limited to the immediate area of the OSPs and to intake volumes.

Additionally, entrainment and impingement would occur at intakes for cable-laying equipment. Impacts on finfish, invertebrates, and EFH from entrainment and impingement at intakes are expected to be localized. Further, as discussed under the *Cable emplacement and maintenance* IPF, entrainment and impingement at cable-laying equipment intakes would be short term. Impacts on finfish, invertebrates, and EFH from discharge volumes and intakes from offshore wind activities are expected to be moderate.

EMF: The marine environment continuously generates a variable ambient EMF. Additional EMFs would also emanate from new offshore export cables and interarray cables constructed for offshore wind projects. Up to 13,373 miles (21,521 kilometers) of cable would be added in the geographic analysis area from other planned offshore wind activities, producing an EMF in the immediate vicinity of each cable during operations. BOEM would require future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operation. EMF effects from these future projects on finfish, invertebrates, and EFH would vary in extent and significance depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., high-voltage alternating current or high-voltage direct current, transmission voltage). EMF strength diminishes rapidly with distance, and the area around submarine power cables with elevated EMF levels extends less than approximately 33 feet (10 meters) around each cable (CSA Ocean Sciences, Inc. and Exponent 2019). When submarine cables are laid, installers typically maintain a minimum separation distance of at least 330 feet (100 meters) from other known cables to avoid inadvertent damage during installation, which also precludes any additive EMF effects from adjacent cables.

Population-level impacts on finfish have not been documented for EMFs from alternating current cables (CSA Ocean Sciences, Inc. and Exponent 2019). There is no evidence to indicate that EMFs from undersea alternating current power cables adversely affects commercially and recreationally important fish species at a population level in the southern New England area (CSA Ocean Sciences, Inc. and Exponent 2019). A more recent review by Gill and Desender (2020) supports these findings. Other research has been conducted where fish were found to be affected by EMFs at high intensity for a small number of individual finfish species. For example, behavioral impacts have been documented for benthic species such as skates near operating DC cables (Hutchison et al. 2018, 2020b). Skates exhibited changes in behavior in the form of increased exploratory searching and slower movement speeds near the EMF source, but EMFs did not appear to present a barrier to animal movement. A study on larval haddock (Cresci et al. 2022) found that a majority of larvae displayed reduced swimming speed when exposed to magnetic fields in the intensity range of those produced by HVDC cables. Exposure to these magnetic fields could alter the dispersal of Haddock larvae. The magnetic field is localized to the cable and its intensity drops off sharply with distance, meaning that effects on haddock dispersal would be limited to those larvae that come into close contact with the cables.

To date, the effects of EMFs on invertebrate species have not been extensively studied, and studies of the effects of EMFs on marine animals have mostly been limited to commercially important species such as lobster and crab (e.g., Love et al. 2017; Hutchison et al. 2020b). Burrowing infauna may be exposed to stronger EMFs, but scientific data are limited. Recent reviews by Gill and Desender (2020), Albert et al. (2020), and CSA Ocean Sciences, Inc. and Exponent (2019) of the effects of EMFs on marine invertebrates in field and laboratory studies concluded that measurable effects can occur for some species but not at the relatively low EMF intensities representative of marine renewable energy projects. For example, behavioral impacts were documented for lobsters near a direct current cable (Hutchison et al. 2018) and a domestic electrical power cable (Hutchison et al. 2020b), including subtle changes in activity (e.g., broader search areas, subtle effects on positioning, and a tendency to cluster near the EMF source), but only when the lobsters were within the EMF. There was no evidence of the cable acting as a barrier to lobster movement, and no effects were observed for lobster movement speed or distance traveled. Additionally, faunal responses to EMFs by marine invertebrates, including crustaceans and mollusks (Hutchison et al. 2018; Taormina et al. 2018; Normandeau Associates, Inc. et al. 2011), include interfering with navigation that relies on natural magnetic fields, predator/prey interactions, avoidance or attraction behaviors, and physiological and developmental effects (Taormina et al. 2018). A study on bivalves (Jakubowska-Lehrmann et al. 2022) found that exposure to static magnetic fields decreased the filtration rates of a cockle species (*Cerastoderma glaucum*) while EMFs had no effect on filtration. EMF exposure in the cockles was found to lower the ammonia excretion rate and inhibit the activity of the enzyme acetylcholinesterase.

Other studies have found that an EMF does not affect invertebrate behavior. For example, Schultz et al. (2010) and Woodruff et al. (2012) conducted experiments exposing American lobster and Dungeness crab (*Metacarcinus magister*) to EMFs ranging from 3,000 to 10,000 milligauss and found that EMFs did not affect their behavior. Assuming the other wind projects with high-voltage alternating current cables in the geographic analysis area have similar array and export cable voltages as the Proposed Action, the induced magnetic field levels expected for the offshore wind projects are between two and three orders of magnitude lower than those tested by Schultz et al. (2010) and Woodruff et al. (2012). Similarly, a field experiment in Southern California and Puget Sound, Washington, found no evidence that the catchability of two species of crabs was reduced if the animals must traverse an energized alternating current low-frequency (35 kilovolt for one species and 69 kilovolt for the other) submarine power cable to enter a baited trap. Whether the cables were unburied or lightly buried did not influence the crab responses (Love et al. 2017). While these voltages are between two and eight times lower than those proposed for the Project and likely for other projects, the array and export cables would likely be shielded and buried at depth to reduce potential EMFs from cable operation.

A recent study concluded that, similar to invertebrates, impacts on finfish from EMFs are minor or short term, specifically for species that are known to sense EMFs more acutely than pelagic fish species, such as elasmobranchs and benthic species (Bilinski 2021). Based on this study, impacts were limited to minor responses in elasmobranchs and benthic species, which included attraction to cabled areas. It is important to reiterate that EMF impacts on finfish have not been extensively studied, and it remains unknown if finfish experience physiological impacts, what life stages of finfish are most affected by EMFs, and if long-term impacts develop later in life (Bilinski 2021).

EMF levels would be highest at the seabed and in the water column above cable segments that cannot be fully buried and are laid on the bed surface under protective rock or concrete blankets. Wind energy development projects may not be able to bury all cables to sufficient depth and, thus, additional shielding of the cables may be used to dampen EMF effects. Invertebrates in proximity to these areas could experience detectable EMF levels but minimal associated effects. These unburied cable segments would be short and widely dispersed. CSA Ocean Sciences, Inc. and Exponent (2019) found that offshore wind energy development as currently proposed would have negligible effects, if any, on bottom-dwelling finfish and invertebrates residing in the southern New England area. For pelagic species in the same area, no negative effects were expected from offshore wind energy development as currently proposed because of their preference for habitats located at a distance from the seabed.

The information indicates that EMF impacts on finfish, invertebrates, and EFH would be minor, highly localized, and limited to the immediate vicinity of cables and would be undetectable beyond a short distance; however, localized impacts would persist as long as cables are in operation. Most exposure is expected to be of short duration, and the affected area would represent an insignificant portion of the available habitat for finfish and mobile invertebrate species; therefore, impacts on finfish, invertebrates, and EFH would be expected to be minor.

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

Lighting: Light can attract finfish and invertebrates, including potential prey for finfish, further acting as an attractant for finfish. As such, light could affect finfish movement in highly localized areas. Light can also affect natural reproductive cycles for finfish, such as spawning; however, light would need to be persistent and present for long periods of time to influence natural reproductive cycles (Longcore and Rich 2004). Light is important in guiding the settlement of invertebrate larvae, and artificial light can change the behavior of aquatic invertebrates such as squid, although the direction of response can be species and life stage specific. Offshore wind activities include up to 2,796 offshore WTGs and 51 OSPs in the geographic analysis area. Construction and O&M of these structures would introduce short-term and long-term sources of artificial light to the offshore environment in the form of vessel lighting and navigation and safety lighting on offshore WTGs. Zooplankton diel migration and movement may also be influenced by changes in light exposure. Offshore wind development would result in increased light from offshore structures and vessels. Vessels would be lit during construction, maintenance, and decommissioning. Impacts from vessel lighting would likely be insignificant relative to activities not related to offshore wind activities that occur throughout the geographic analysis area. Furthermore, potential impacts from lighting would be anticipated to have little impact on finfish and invertebrates during daylight hours and would be limited by the depth of the water in the offshore wind lease areas.

The overall impacts of light on finfish, invertebrates, and EFH are likely to be negligible, localized, and short term, resulting in little change to these resources. As such, light from offshore wind development would not be expected to appreciably contribute to overall impacts on these resources, and impacts would be negligible.

Noise: Noise impacts caused by offshore construction, geophysical and geotechnical, and O&M activities; cable laying/trenching; and pile driving could affect finfish and invertebrates. Of these noise-producing factors, noise from pile driving would likely have the greatest impact. Pile-driving noise occurs during installation of foundations for offshore wind structures. Pile driving for construction of more than one offshore wind project may occur concurrently in the geographic analysis area over an 8-year period.

In-water noise is transmitted through the water column and seabed and could cause injury or mortality to finfish present in the vicinity of each pile. Noise from pile driving would cause short-term stress and behavioral changes to finfish and invertebrates. Sound transmission depends on many environmental parameters, such as the sound speeds in the water and substrates. It also depends on the sound production parameters of a pile and how it is driven, including the pile material, size (length, diameter, and thickness), and make and energy of the hammer. Fish response would be highest near impact pile driving (within tens of meters), moderate at intermediate distances (within hundreds of meters), and low far from the pile (within thousands of meters) (COP Appendix U-2; SouthCoast Wind 2024). Behavioral changes induced by sound can be observed in fish up to 7.5 kilometers away from the pile-driving site (Hastings and Popper 2005). During active pile-driving activities, highly mobile finfish likely would be displaced from the area, most likely showing a behavioral response; however, fish in the immediate area of pile-driving activities could suffer injury or mortality. Affected areas would likely be recolonized by finfish in the short term following completion of pile-driving activity. Early life stages of finfish, including eggs and larvae, could experience mortality or developmental issues as a result of noise; however, thresholds of exposure for these life stages are not well studied (Weilgart 2018).

Impacts from pile-driving noise on finfish would also depend on other factors that affect local fish populations, including time of year. Impacts from noise would be greater if occurring during spawning periods or in spawning habitat, particularly for species that are known to aggregate in specific locations to spawn, use sound to communicate, or spawn once in their lifetime. Prolonged localized behavioral impacts on specific finfish populations over the course of years could reduce reproductive success for multiple spawning seasons for those populations, which could result in long-term decline in local populations. Recent studies (de Jong et al. 2020) have found continuous noise exposure to be detrimental to the reproduction of species that use sound to coordinate reproductive behavior. Chronic exposure to continuous noise can induce hearing loss in fish. Anthropogenic noise may also overlap in frequency with the calls made by fish, causing the calls to be drowned out and inaudible to other individuals of the species. Fish-chorusing behavior has been found to change in the presence of noise from pile-driving activities (Siddagangaiah et al. 2021). Calls were found to increase in intensity and change in duration. Deviations in calling behavior may have effects on fish reproductive success, migration, and predation behavior. However, based on behavioral studies of black sea bass (Jones et al. 2020), fish behavior returns to a pre-exposure state following completion of noise impacts. Additionally, as acoustic impacts decline with distance, it is unlikely that impacts of pile driving from wind farms outside of a certain threshold distance would result in any local population being subject to multiple years of acoustic impacts that would result in long-term impacts on the population. Therefore, impacts on finfish from pile driving are anticipated to be temporary and intermittent during periods when pile driving is actively occurring. It is important to note that no planned non-offshore wind pile-driving activities have been identified in the geographic analysis area for this resource other than current ongoing activities.

Marine invertebrates lack internal air spaces and gas-filled organs needed to detect sound pressure and so are considered less likely to experience injury from overexpansion or rupturing of internal organs, the typical cause of lethal noise-related injury in vertebrates (Popper et al. 2001). Noise thresholds for invertebrates have not been developed because of a lack of available data, but some invertebrates are responsive to particle motion and are therefore capable of vibration reception (e.g., crustaceans, squid) (Mooney et al. 2020). This is supported by other studies that found American lobster and shore crabs (*Carcinus maenas*) to have some capability to detect and respond to sound (Jézéquel et al. 2021; Aimon et al. 2021).

The longfin squid (*Loligo pealeii*) has been found to perceive sound similar to fish, but with the use of a statocyst to detect particle motion. This leads to squid being especially sensitive to low frequency sounds (Mooney et al. 2010). Short exposure to low frequency sounds was found to cause traumatic lesions in the statocysts of squid, creating negative impacts on their sense of balance and direction (André et al. 2011). Upon exposure to pile-driving impulses recorded from a wind farm installation, the longfin squid has been found to exhibit an initial startle response, comparable to that of a predation threat, but upon exposure to additional impulses, the squid's startle response diminished quickly, indicating potential habituation to the noise stimulus (Jones et al. 2020). After a 24-hour period, the squid seem to re-sensitize to the noise, which is an expected response to natural stimuli as well. Squid schooling and shoaling behavior could be interrupted when exposed to pile-driving impulse noises, which could affect predation risk. The startle response to pile-driving impulses could disrupt squid spawning behavior should the pile driving occur during spawning season. During feeding, a lower proportion of squid captured live killifish (*Fundulus heteroclitus*) prey in noise exposure trials compared to silent control trials, but these differences in capture rates were not statistically significant. Regardless of whether they were hunting, squids exhibited comparable alarm responses to noise. Hearing measurements confirmed the noise was detected by the squid (Jones et al. 2021).

Noise transmitted through water and through the seabed can cause a disturbance response in invertebrates within a limited area around each pile and short-term stress and behavioral changes in individuals over a greater area (e.g., discontinuation of feeding activity). The extent depends on pile size, hammer energy, and local acoustic conditions, with the affected areas recolonized in the short term. These impacts are therefore anticipated to be temporary and intermittent, occurring only during active impact and vibratory pile driving. A study by Jézéquel et al. (2022) found that bivalve behavior is influenced by the noise generated by pile driving. Scallops across all life stages reacted to pile-driving impact noise by shutting their valves. Scallops did not become acclimated to the noise and continued to react after 2 weeks of repetitive exposure. This response expends energy and leads to increased respiration, leaving the scallops with less energy and more vulnerable to predation. The scallops were found to react to the intermittent, high intensity noise of impact hammer pile driving, but did not react to the continuous, low intensity noise created by vibratory hammer pile driving (Jézéquel et al. 2022).

Noise impacts from geophysical and geotechnical activities are anticipated to occur annually for the foreseeable future but would be localized. Seismic surveys that are used for oil and gas exploration create high-intensity impulsive noise that penetrates the seabed and could cause injury or behavioral impacts on finfish and invertebrates (BOEM 2012). It is important to note that geophysical surveys for the purposes of offshore wind projects are generally used to investigate shallow hazards and hard-bottom areas to evaluate the feasibility of turbine installation; as such, seismic surveys for offshore wind projects do not require use of seismic air guns (used for oil and gas exploration), which penetrate miles into the seabed. Consequently, seismic surveys for offshore wind projects have far fewer impacts than those for oil and gas exploration. Oil and gas exploration on the Atlantic OCS is currently unlikely. High-resolution geophysical (HRG) surveys would be anticipated to occur in the geographic analysis area for the purpose of collecting data on conditions at the seafloor and the shallow subsurface. HRG surveys require use of sparkers and boomers, which generally operate within discrete frequency bands for short durations (relative to seismic air guns). Sparkers and boomers put out less energy relative to seismic air guns and operate in smaller areas and would only be expected to potentially affect finfish and invertebrates close to the activity. During HRG survey activities, finfish and invertebrates close to sparkers and boomers may experience short-term and very localized impacts that could include displacement (BOEM 2021). These impacts would be highly localized around the sound source and would be short term in duration. Finfish and invertebrates in the general area but not in the immediate vicinity of the sound source could experience short-term stress and temporary behavioral changes in a larger area affected by the sound (BOEM 2021; COP Appendix N and U-2; LGL 2024).

Noise from trenching equipment for placement of new or expanded submarine cables and pipelines is likely to occur in the geographic analysis area due to planned and ongoing wind energy projects. It is assumed that while these disturbances are likely to occur, they would be infrequent over the next 35 years. Trenching noise depends on the substrate being trenched, where sandy sediments would be expected to create lower noise levels compared to rocky substrate, larger cobbles, or both. In a study by Subacoustech, noise from trenching was found to be composed of broadband noise, tonal machinery noise, and transients, likely associated with rock breakage; a source level of 178 decibels referenced to a pressure of 1 micropascal (dB re 1 µPa) at 1 meter distance was measured during the study (Nedwell et al. 2003), which is lower than the thresholds where injury to fish would be expected but above the threshold where behavioral changes may occur. Additionally, during cable-laying operations, vessels may use dynamic positioning to stay on course. The noise associated with dynamically positioning vessels has also been shown to illicit a diving response in fish (Peña 2019). As such, noise impacts from trenching would be expected to alter fish behavior at close range. Noise impacts associated with submarine cables and pipelines would be temporary and localized and extend only a short distance beyond the emplacement corridor. Impacts from noise would be lower than impacts from the trenching and disturbance to the seafloor; regardless, the most prominent noise-producing activities would be related to trenching and seafloor excavation, if burial of pipeline or cables is determined to be necessary. Noise from trenching could result in injury or mortality for finfish in the immediate vicinity of the activity and would likely result in temporary behavioral changes in a broader area. These impacts would be short term, and finfish would be expected to return to the areas of impact following any cable or pipeline activities.

Noise from aircraft, vessels, and WTG O&M is expected to occur in the geographic analysis area, but it is anticipated that these activities would have little impact on finfish and invertebrates. Offshore wind projects may require use of aircraft for crew transport during construction and maintenance; however, little noise from aircraft propagates through the water column. Therefore, impacts on finfish from aircraft use are not likely to occur. Future activities related to offshore wind projects presumably would be related to increased vessel traffic associated with both construction and maintenance of WTGs and associated facilities. Vessels associated with construction were found to be loud enough at a distance of up to 10 feet (3 meters) to induce avoidance of finfish and invertebrates but not cause physical harm to the fish (MMS 2009). WTGs are known to produce continuous noise that barely exceeds ambient noise levels at 164 feet (50 meters) from the base of the WTG (Thomsen et al. 2015); this noise would persist for the life of any offshore wind project though would vary with wind speed and operational state.

The overall impacts of noise on finfish, invertebrates, and EFH are likely to be moderate and long term.

Port utilization: It is possible that ports along the eastern seaboard in the geographic analysis area will be upgraded at some time in the future, which would affect offshore habitat. The Northeast Regional Planning Body anticipates that major vessel traffic routes will be relatively stable in the region for the foreseeable future; however, coastal developments and market demands that are unknown at this time could affect them (Northeast Regional Planning Body 2016). The general trend along the East Coast of the United States from Virginia to Maine indicates that port activity will increase modestly in the foreseeable future. These increases in port activity may require port modifications that could cause localized, minor impacts on finfish and EFH, likely resulting in temporary displacement of finfish. Existing ports in the geographic analysis area have already affected finfish, invertebrates, and EFH. It is anticipated that modifications of ports would cause temporary and localized impacts on finfish, invertebrates, and EFH, likely resulting in behavioral responses, such as avoiding the area during port modification activities. These impacts would be limited to the short term and would not be expected to affect finfish and invertebrate species at a population level; however, mortality at less-mobile life stages such as eggs and larvae could occur if individuals were present in the immediate vicinity of port modification activity. The overall impacts of port utilization on finfish, invertebrates, and EFH vary from short term and minor for water quality and vessel noise impacts to permanent and moderate for port expansion activities that heavily modify benthic environments.

Presence of structures: Presence of structures could lead to impacts on finfish, invertebrates, and EFH through entanglement, gear loss or damage, hydrodynamic disturbance, fish aggregation, habitat conversion, and migration disturbances. These impacts could occur through addition of buoys, meteorological towers, WTG foundations, scour/cable protection, and transmission cable infrastructure. Over the next 35 years, development is expected to continue in the geographic analysis area, providing additional structures on the seafloor. Based on assumptions of development for other offshore wind projects, 2,847 foundations would be developed in the geographic analysis area (Appendix D, Table D2-2). BOEM assumes that offshore wind projects would include similar components for construction—that is, WTGs, offshore and onshore cable systems, OSP, onshore O&M facilities, and onshore interconnection facilities—all of which would increase the total number of structures in the geographic analysis area over the next 35 years. In the geographic analysis area, structures are anticipated predominantly on sandy bottom, except for cable protection, which is more likely to be needed where cables pass through hard-bottom habitats. The potential locations of cable protection for planned activities have not been fully determined at this time; however, any addition of scour protection/hard-bottom habitat would represent substantial new hard-bottom habitat, as the geographic analysis area is predominantly composed of sand, mud, and gravel substrates.

The presence of WTG vertical structures such as towers and foundations in the pelagic environment may affect the flow of water within and near offshore wind farms. The general understanding of offshore wind-related impacts on hydrodynamics is derived primarily from European-based studies. A synthesis of European studies by van Berkel et al. (2020) summarized the potential effects of wind turbines on hydrodynamics and fisheries. Local to a wind facility, the range of potential impacts include increased turbulence downstream, remobilization of sediments, reduced flow inside wind farms, downstream changes in stratification, redistribution of water temperature, and changes in nutrient upwelling and primary productivity. Turbulent wakes resulting from the water flow around turbine foundation structures influence local current speed and direction which may increase vertical mixing (Segtnan and Christakos 2015; Grashorn and Stanev 2016; Carpenter et al. 2016; Cazenave et al. 2016), as further described in Section 3.4.2, *Water Quality*, and Section 3.5.6, *Marine Mammals*. During summer, when water is more stratified, increased mixing could increase pelagic primary productivity near the structure, increasing the algal food source for zooplankton and filter feeders. Increased mixing may also result in warmer bottom temperatures, increasing stress on some shellfish and fish at the southern or inshore extent of the range of suitable temperatures. Water column impacts depend heavily on factors such as foundation type and oceanographic conditions (e.g., currents, well-mixed to stratified waters, and depth). While model simulations in European wind farms have shown changes to mixing and stratification downstream of pilings and a potential for cascading ecological effects, discerning the wind facility-induced effect signal from location-specific natural variability in environmental conditions can be challenging (Carpenter et al. 2016; Floeter et al. 2017; Schultze et al. 2020). As environmental conditions in the northeast U.S. shelf differ from European wind farm sites in the North Sea (e.g., seasonal stratification), more research is needed to identify the magnitude and type of impact offshore wind farms will have on ocean processes specific to the U.S. Atlantic OCS (Hogan et al. 2023).

The presence of WTGs is likely to create hydrodynamic effects that could have localized impacts on food web productivity and pelagic eggs and larvae. Addition of vertical structure that spans the water column could alter vertical and horizontal water velocity and circulation. The geographic analysis area is considered seasonally stratified, with warmer waters and high salinity leading to weak stratification in the late summer and early fall. The presence of WTG foundations in the water column can introduce vertical mixing and turbulence that also results in some loss of stratification (Carpenter et al. 2016; Floeter et al. 2017; Schultze et al. 2020). In strongly stratified locations, the mixing seen at foundations is often masked by processes forcing toward stratification (Schultze et al. 2020), but the introduction of nutrients from depth into the surface mixed layer can lead to a local increase in primary production (Floeter et al. 2017). Dorrell et al. (2022) states that offshore wind growth may fundamentally change shelf sea systems, particularly in seasonally stratified seas, but enhanced mixing could positively affect some marine ecosystems. Refer to Section 3.5.6, *Marine Mammals*, for additional discussion regarding hydrodynamic and atmospheric wake effects on secondary impacts to larval transport and primary production.

Wind turbine foundation structures can also influence current speed and direction. Monopile turbulent wakes have been observed and modeled at the kilometer scale (Cazenave et al. 2016; Vanhellemont and Ruddick 2014). While impacts on current speed and direction decrease rapidly around monopiles, there is evidence of hydrodynamic effects out to a kilometer from a monopile (Li et al. 2014). However, other work suggests the influence of a monopile is primarily limited to within 328 to 656 feet (100 to 200 meters) of the pile (Schultze et al. 2020). The discrepancy is likely related to local conditions, wind farm scale, and sensitivity of the analysis. Based on these studies, the turbulent wake effects from monopile foundation structures could occur within 328 to 3,280 feet (100 to 1,000 meters) downstream of each monopile. Hydrodynamic changes at this scale could have localized effects on food web productivity and the transport of pelagic eggs and larvae. Given their planktonic nature, altered circulation patterns could transport pelagic eggs and larvae out of suitable habitat, altering their survivability. Additionally, pelagic juveniles and adults utilizing water column habitats may experience localized hydrodynamic effects down current of each monopile making these pelagic habitats potentially unsuitable. Most juvenile and adult fishes are expected to elicit an avoidance behavioral response away from unsuitable habitat within the turbulent wake of turbine foundation structures.

Net primary productivity is driven by photosynthesis in marine phytoplankton and accounts for half of global-scale photosynthesis and supporting major ocean ecosystem services (Field et al. 1998). There are few empirical data showing the impact of WTGs on ocean stratification (Tagliabue et al. 2021), although recent models have demonstrated ocean mixing as a result of the wind-wake effect of WTGs in the North Sea (Carpenter et al. 2016; Floeter et al. 2017; Dorrell et al. 2022; Christiansen et al. 2022; Daewel et al. 2022). A modeling study of atmospheric wake effects by Daewel et al. (2022) showed that large clusters of offshore wind turbines (5 MW, 295-foot [90-meter] hub height) in the North Sea provoke large scale changes in annual primary productivity. Productivity was modeled to decrease in the center of large wind farm clusters but increased around these clusters in the shallow, near-coastal areas of the inner German Bight and Dogger Bank. These modeled changes in net primary production were found to reach up to 10 percent locally but remained below 1 percent both inside and outside of the offshore wind farm clusters when integrated over a larger scale. As a result of reduced average current velocities, model results also showed a reduction in bottom-shear stress leading to reduced resuspension of organic carbon, increased amounts of organic carbon in sediments, and changes to bottom water oxygen concentrations. While more pronounced locally compared to the region-wide average, changes in sedimentation, seabed processes, and spatial distribution of primary production have the potential to affect higher trophic levels and ecosystem function. The authors indicate the need for more research to assess the combined effects of atmospheric wakes and turbulent wakes induced by wind turbine foundations as the latter might counteract the stabilizing effect of the wind wakes (Daewel et al. 2022). These model results reflect a buildout of turbines that is almost eight times the approximately 3,100 WTGs currently expected to be installed for all wind farms on the East Coast from Massachusetts to North Carolina. While detectable changes to the atmospheric forces that affect sea surface mixing are likely to occur once wind farms on the Atlantic OCS become operational, the potential influence that these impacts will have on biological productivity remains uncertain given the different physical factors in the Project area than were modeled, the much lower number of wind turbines, and the larger size of wind turbines (two to three times larger) planned for the Atlantic OCS compared to those modeled by Daewel et al. (2022).

In a modeling study focused on the buildout of larger-sized WTGs (up to 15 MW and 150-meter hub height) on the U.S. northeast shelf, on average, meteorological changes at the surface induced by next-generation extreme-scale offshore wind turbines (diameter and hub height greater than 492 and 328 feet [150 and 100 meters], respectively) would be nearly imperceptible (Golbazi et al. 2022). The authors simulated the potential changes to near-surface atmospheric properties caused by large offshore wind facilities in the summer and found significant wind speed reduction at hub height within the wind farm (up to 2 meters per second or a 20 percent reduction) that decreased with downwind distance from the wind farm. However, at the surface, an average wind speed deficit of 0.5 meter per second or less (10 percent maximum reduction) was found to occur within the wind farm footprint along with a slight cooling effect (-0.06 Kelvin on average). In comparison, studies on the effects of WTG wind wakes in the North Sea have identified the reduction in wind-induced mixing as the catalyst to changes in upper ocean dynamics (Ludewig 2015; Christiansen et al. 2022) and biological productivity (Daewel et al. 2022). Given the lower wind speed reductions (10 to 20 percent) reported by Golbazi et al. (2022) for the larger wind turbines planned for the U.S. Atlantic OCS compared to a wind speed reduction of up to 43 percent for smaller turbines in the North Sea (Platis et al. 2020), it is plausible that the observed effects from the reduction in wind-induced mixing would also be lessened. However, more region-specific research is still needed to validate this assumption.

Christiansen et al. (2022) modeled the wake-related wind speed deficits that occur due to wind farms in the southern and central North Sea and the resulting larger-scale disturbances on hydrodynamics and thermodynamics. The results of this modeling study predicted surface wind speed reductions potentially extending over tens of kilometers downwind from offshore wind turbine arrays leading to reductions in sea surface currents and potential alterations to temperature and salinity distributions and stratification. Wind wakes and their impacts on hydrodynamic patterns that extend outside the borders of wind farm developments could lead to broadscale effects on nutrient availability, primary production, and ecosystem dynamics (Christiansen et al. 2022; Dorrell et al. 2022; van Berkel et al. 2020). While observations and model scenarios of wind wakes associated with wind energy fields have been generated for wind farms in the North Sea (Schultze et al. 2020; Daewel et al. 2022; Christiansen et al.

2022), there is still uncertainty regarding the applicability of those models to the oceanographic environment of the northeastern U.S. continental shelf (van Berkel et al. 2020; Miles et al. 2021). Oceanographic and hydrodynamic conditions resulting from the presence of offshore structures are not fully understood at this time but may conservatively range from hundreds of meters (Li et al. 2014; Schultze et al. 2020) to tens of kilometers (Dorrell et al. 2022; Christiansen et al. 2022) and are likely to vary seasonally and regionally.

No future activities were specifically identified in the geographic analysis area specific to entanglement, gear loss, and damage; however, it is reasonable to assume that fishing activities (both commercial and recreational) may increase over time in the vicinity of structures due to the likelihood of fish and crustacean aggregation. Damaged and lost fishing gear caught on structures may result in ghost fishing[3] or other disturbances, potentially leading to finfish mortality. Impacts from fishing gear would be localized; however, the risk of occurrence would remain as long as the structures are present. The presence of structures in an otherwise primarily sandy benthic environment would provide a more complex environment, likely to attract finfish and invertebrates such as mobile crustaceans of commercial value. As such, entanglement and gear loss may cause increased impacts on finfish, including mortality and alteration of habitats. These impacts would be localized and short term; however, they would likely persist intermittently as long as structures remain in place.

The addition of new hard surfaces and structures, including WTG foundations, scour protection, and hard protection on top of cables, to a mostly sandy seafloor would create a more complex habitat. Structure-oriented finfish species such as black sea bass, striped bass, and Atlantic cod (among others) would be attracted to these more complex structures (Wilber et al. 2022; Hutchison et al. 2020a; Methratta and Dardick 2019). In a meta-analysis of studies on windfarm reef effects, Methratta and Dardick (2019) noted an almost universal increase in the abundance of epibenthic and demersal fish species. At the Block Island Wind Farm, Hutchison et al. (2020a) and Wilber et al. (2022) documented a high abundance of black sea bass, Atlantic cod, scup, bluefish, monkfish, winter flounder, striped bass, tautog, and dogfish around the offshore wind farm structures as a result of the added habitat and foraging opportunities created by the artificial reef effect. Colonization of these new hard structures by more sessile and benthic organisms (e.g., sponges, algae, mussels, shellfish, sea anemones) would also likely occur over time (Degraer et al. 2020; Kerckhof et al. 2019; De Mesel et al. 2015). Higher densities of filter feeders, such as mussels that colonize the structure surfaces, could consume much of the increased primary productivity but also provide a food source and habitat to crustaceans such as crabs (Dannheim et al. 2020). Mussels have been found to be the preferred food source of Jonah crabs in the Gulf of Maine by Donahue et al. (2009). These impacts would likely be permanent or remain as long as the structure remains. It is important to note that increases in biomass to any specific region due to the presence of hard substrates (WTGs in this case) is not necessarily an ecosystem benefit; rather, the long-term impacts of the artificial reef effect would be characterized as unknown. Moreover, increased fish

[3] *Ghost fishing* refers to entrapment, entanglement, or mortality of marine life in discarded, lost, or abandoned fishing gear, which can also smother habitat and act as a hazard to navigation.

aggregation could result in increased regulated fishing, potentially leading to higher biomass removal if the artificial reef effect results in greater fish aggregation without a related increase in fish production.

In contrast to the potential beneficial effects of WTG foundations creating an artificial reef effect, these structures could also facilitate introduction and spread of non-native species through the stepping-stone effect. New hard substrate structures in the environment could provide opportunity for non-native species to colonize in an area that would otherwise be unable to settle due to lack of hard substrate habitat/structures. If established, new networks of hard substrate structures (WTG foundations in this case) could serve as new environments on which non-native species could propagate and expand. Studies of WTGs in the North Sea of Scotland found that non-native species were thriving on offshore structures, confirming that the stepping-stone effect can occur in offshore environments if non-native species are present, introduced, or both (De Mesel et al. 2015). Expansion of non-native species in offshore environments can cause ecological impacts on an area if allowed to propagate and expand.

Finfish aggregation around structures could be perceived as beneficial, adverse, or neutral for finfish and invertebrates. Aggregation and colonization would likely lead to increased fishing pressure at structures and may result in adverse predation pressures; however, complex structures generally provide protection and potential habitat for egg laying and larvae recruitment, which would be considered beneficial to finfish species and some invertebrate species. On the other hand, species that rely on soft-bottom habitat, such as surfclams and longfin squid, would experience a reduction in favorable conditions but not to the extent that population-level impacts would be expected (Guida et al. 2017). The addition of structures in the geographic analysis area would not be expected to impede migratory fish or invertebrate movement through these areas.

In this context, BOEM anticipates that the impacts associated with the presence of structures may be negligible to moderate and long term. The impacts on finfish, invertebrates, and EFH resulting from the presence of structures would persist for the duration for which the structures remain.

Traffic (vessel strikes): The presence of vessels introduces the risk of vessel collision with marine life, and vessel collisions with marine life are an ongoing threat in the geographic analysis area due to vessels from numerous industries such as trade, tourism, resource development, and offshore wind development. Marine species that spend a significant time near the water surface or in areas where vessel routes overlap with migration, feeding, or breeding grounds have the potential to be struck by vessels (SEER 2022). Vessel collisions may result in blunt-force and sharp-force trauma, both of which can result in death, but are likely to be underrepresented due to a lack of reporting awareness and because not all struck marine animals are recoverable for documentation. Impacts of vessel collisions can result in injury and mortality and may affect populations of some ESA-listed species. Vessel speed reductions and route restrictions have shown to be effective mitigation measures for reducing the impacts related to vessel collisions. Additionally, BOEM expects minimization measures for vessel impacts would be required for planned offshore wind activities, further reducing the risk of injury or mortality for finfish and mobile invertebrates, resulting in negligible impacts.

Impacts of Alternative A – No Action on ESA-Listed Species

Several ESA-listed species may occur in the geographic analysis area, including Atlantic sturgeon (*Acipenser oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*), giant manta ray (*Manta briostris*), Gulf of Maine distinct population segment of Atlantic salmon (*Salmo salar*), and oceanic whitetip shark (*Carcharhinus longimanus*). Ongoing and planned activities, including offshore wind activities, would continue to affect these ESA-listed species through both temporary and permanent impacts. Due to the mobile nature and preferred habitats of these species, the presence of structures, light, and offshore cable emplacement and maintenance IPFs are expected to have negligible impacts. Nearshore cable emplacement, maintenance, and resulting EMFs may affect shortnose and Atlantic sturgeon, but these impacts are expected to be minor. The primary impacts expected to affect ESA-listed finfish include noise (specifically, pile-driving activities), regulated fishing efforts, and climate change. Of these, regulated fishing and climate change would likely have long-term minor to moderate impacts from bycatch and similar climate change effects on ESA-listed finfish as on other finfish. Noise from pile driving has the potential to injure or kill sturgeon, but the scale of duration and the area of effects would likely lead to minor impacts with appropriate mitigation. Other ongoing and planned activities such as increased vessel traffic, new subsea cables and pipelines, onshore construction (including ports), channel maintenance, and installation of permanent non-offshore wind-related structures would be expected to have negligible to minor effects. Shortnose and Atlantic sturgeon are prone to vessel strikes in nearshore environments, while giant manta rays are at risk of vessel strikes occurring offshore. However, the dispersed nature of vessel traffic makes these events unlikely. Accidental releases are likely to have minor impacts on sturgeons in most locations. Combining all offshore wind and ongoing and planned non-offshore wind activities (including all of the IPFs discussed) in the geographic analysis area would result in long-term minor to moderate impacts on ESA-listed finfish and invertebrates. Any future federal or private activities that could affect federally listed fish in the geographic analysis area would need to comply with ESA Section 7 or Section 10, respectively, to ensure that the proposed activities would not jeopardize the continued existence of the species.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, finfish and invertebrates would continue to be affected by existing environmental trends and ongoing activities throughout the geographic analysis area. BOEM expects ongoing activities to have continuing short-term, long-term, and permanent impacts (e.g., disturbance, injury, mortality, habitat degradation, habitat conversion) on finfish, invertebrates, and EFH primarily through regular maritime activity, ongoing offshore wind activity, and climate change. The No Action Alternative would likely have **moderate adverse** impacts on finfish and invertebrates.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and finfish, invertebrates, and EFH would continue to be affected by natural and human-caused IPFs. Planned non-offshore wind activities would contribute to the impacts on finfish, invertebrates, and EFH through increased vessel traffic, new subsea cables and pipelines, onshore construction (including ports), channel maintenance, and installation of permanent non-offshore wind-related structures.

Offshore wind activities are anticipated to affect finfish, invertebrates, and EFH through primary IPFs that include cable emplacement and maintenance, noise (specifically pile-driving activities), and presence of structures. Considering all the IPFs together, BOEM anticipates that the No Action Alternative, when combined with planned activities in the geographic analysis area, would result in **moderate adverse** impacts on finfish, invertebrates, and EFH. However, regardless of offshore wind-related activities in the geographic analysis area, it is anticipated that the greatest impact on finfish and invertebrates would be caused by ongoing regulated fishing activity and climate change.

3.5.5.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the Project Design Envelope would result in impacts similar to or less than those described in the following sections. The following Project Design Envelope parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on finfish, invertebrates, and EFH.

- The number, size, and locations of WTGs and OSPs.
- Total length of export and interarray cables.
- The time of year during which construction occurs.

Variability of the proposed Project design exists as outlined in Appendix C. A summary of potential variances in impacts follows.

- WTG number and locations: The level of hazard related to WTGs is proportional to the number of WTGs installed, with fewer WTGs requiring fewer foundations resulting in fewer construction-related impacts on finfish, invertebrates, and EFH.
- Season of construction: Finfish vary in their migration movements, meaning that certain species may be present at different times of year, and their chosen depth in the water column may also be influenced by time of year and water temperature. Some mobile invertebrates also vary in their migration movements, and sensitive life stages are present at certain times of the year. Any construction window would affect finfish species; however, certain windows may avoid larger migratory movements and potential impacts on sensitive fish species, such as Atlantic sturgeon, that may occur in the Project area and are listed under the ESA.

SouthCoast Wind has committed to measures to minimize impacts on finfish, invertebrates, and EFH by conducting and evaluating geotechnical and geophysical surveys to identify and avoid sensitive habitats if possible, as well as vessel speed restrictions, sound-attenuation measures, soft starts during pile driving, varied species monitoring and reporting, and several BOEM best management practices (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

3.5.5.5 Impacts of Alternative B – Proposed Action on Finfish, Invertebrates, and Essential Fish Habitat

The following sections summarize potential impacts of the Proposed Action on finfish, invertebrates, and EFH during construction and installation, O&M, and conceptual decommissioning of the Project, as described in Chapter 2, *Alternatives*.

Accidental releases: As discussed in Section 3.5.5.3, *Impacts of Alternative A – No Action on Finfish, Invertebrates, and Essential Fish Habitat*, nonroutine events, such as accidental oil or chemical spills, can have adverse or lethal effects on marine life; however, applicant-proposed measures, such as a spill prevention and a response plan, would be developed and implemented during all phases of the Proposed Action. The risk of any type of accidental release would be increased, primarily during construction, but also during O&M and decommissioning of offshore wind facilities (COP Appendix AA, Section 8.3.1, Table 8-3; SouthCoast Wind 2024 discusses the maximum-case scenarios of potential releases). Modeling by Bejarano et al. (2013) predicted that the impact of smaller spills on benthic invertebrates would be low, and any accidental releases from the Project are expected to be localized. Larger spills are unlikely but could have a larger impact on benthic fauna due to adverse effects on water quality (Section 3.4.2, *Water Quality*). Compliance with USCG regulations would minimize the risk of accidental release of trash or debris. Another potential impact related to vessels and vessel traffic is the accidental release of invasive species, especially during ballast water and bilge water discharges from marine vessels. Vessels are required to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and USEPA National Pollutant Discharge Elimination System Vessel General Permit standards, both of which aim at least in part to prevent the release and movement of invasive species. Adherence to these regulations would reduce the likelihood of discharge of ballast or bilge water contaminated with invasive species. The risk of accidental releases would be increased by the additional vessel traffic associated with the Proposed Action, especially traffic from foreign ports, primarily during construction. The potential impacts on benthic resources are described in Section 3.5.2. As described for construction and installation, the Proposed Action would comply with all laws regulating at-sea discharges of vessel-generated waste, and Project measures to avoid or limit accidental release would be adopted. Impacts due to accidental releases on finfish, invertebrates, and EFH would be negligible.

Anchoring: Vessel anchoring, including use of spud cans on jack-up vessels, would cause short-term impacts on finfish and invertebrates in the immediate area where anchors, spud cans, and chains meet the seafloor in offshore sandy environments. Impacts would include turbidity affecting finfish and invertebrates and injury, mortality, and habitat degradation, primarily of invertebrates. All impacts would be localized, turbidity would be temporary, and displacement and mortality from physical contact would be recovered in the short term. Impacts may be higher in sensitive habitats (e.g., eelgrass beds, hard-bottom habitats) and other EFH. Degradation of EFH and other sensitive habitats such as SAV or hard-bottom habitats, if it occurs, could be long term to permanent. BOEM could require SouthCoast Wind, as a condition of COP approval, to develop and implement an anchoring plan, potentially in combination with additional habitat characterization. Such a plan could reduce the area of sensitive habitats affected by anchoring, but avoidance of all sensitive habitats is not likely feasible. The overall impacts of anchoring on finfish, invertebrates, and EFH are likely to be minor adverse, localized, and short term.

Cable emplacement and maintenance: The Proposed Action would entail a maximum of approximately 1,676 miles (2,697 kilometers) of new cable installation, which includes 497 miles (800 kilometers) of interarray cables and 1,179 miles (1,897 kilometers) of offshore export cables. The primary impacts on finfish, invertebrates, and EFH associated with cable emplacement include habitat alteration, sediment resuspension, and entrainment during seabed preparation activities and cable installation. An estimated cable emplacement seabed disturbance area of 1,408 acres (570 hectares) is anticipated for the interarray cables, 1,753 acres (709 hectares) for the Falmouth export cable, and 727 acres (294 hectares) for the Brayton Point export cable (COP Volume 1, Tables 3-29 and 3-30; SouthCoast Wind 2024). Seabed preparation activities may be conducted in some areas prior to cable installation and may include cable installation surveys, boulder removal, grapnel runs, sand wave dredging, UXO clearance, and seabed leveling. Export and array cables would be installed via jet trenching, precut plow, mechanical plow, and mechanical cutting, as necessary. Cable micro-routing based on geophysical surveys is expected to minimize impacts on complex habitats and maximize the likelihood of sufficient cable burial.

Boulder clearance or relocation would be minimized through micro-routing of cables within each ECC. Any boulders discovered in the pre-installation surveys that cannot be easily avoided by micro-routing could be removed with a grab lift or plow, as needed (COP Volume 1; SouthCoast Wind 2024). Specific locations to which boulders would be relocated are still to be determined. However, it is planned that any relocated boulders would be placed within the ECC in seabed areas similar to those from which they were removed. The surface disturbance area per cable due to boulder clearance or relocation is estimated to be 34 acres in the Brayton Point ECC and 43 acres in the Falmouth ECC. Boulder field clearance in the Falmouth ECC is expected to be needed primarily in areas traversing Muskeget Channel and Nantucket Sound (Figure 3.5.5-2). A boulder relocation plan is currently in development, but anticipated boulder clearance areas have been outlined (COP Appendix M.3; SouthCoast Wind 2024). These areas are defined as 49 feet (15 meters) in width for each cable installation. In areas where the use of a boulder clearance plow is necessary, the plow is pulled along the seabed and scrapes the seabed surface pushing boulders out of the cable corridor, flattening sand ripples in the process. In low-density boulder fields, an orange peel grabber may be utilized for boulder relocation minimizing impacts to sensitive and slow to recover habitats used by hard-bottom associated EFH species. The boulder grab would be used to the extent possible, and the use of the 49-foot (15-meter)-wide boulder plow would be minimized. If the use of boulder plow is necessary, the plow may be ballasted to only clear boulders and avoid the creation of a deep depression in the seabed.

Dredging is most likely in sand wave areas where typical jet plowing is insufficient to meet target cable burial depth. Sand wave clearance areas in the Falmouth ECC are expected to potentially occur within a 0.9-mile (1.4-kilometer) and 2.1-mile (3.4-kilometer) section north of Martha's Vineyard, and a 2.1-mile (3.3-kilometer) section within the Muskeget Channel (Figure 3.5.5-2). No sand wave clearance is expected in the Brayton Point ECC. The total estimated seabed disturbance resulting from vessel anchoring during cable emplacement activities in identified ECC anchoring areas (Figure 3.5.5-2) is 8.9 acres (3.6 hectares) for the Falmouth ECC and 2.8 acres (1.1 hectares) for the Brayton Point ECC (COP Volume 1; SouthCoast Wind 2024).

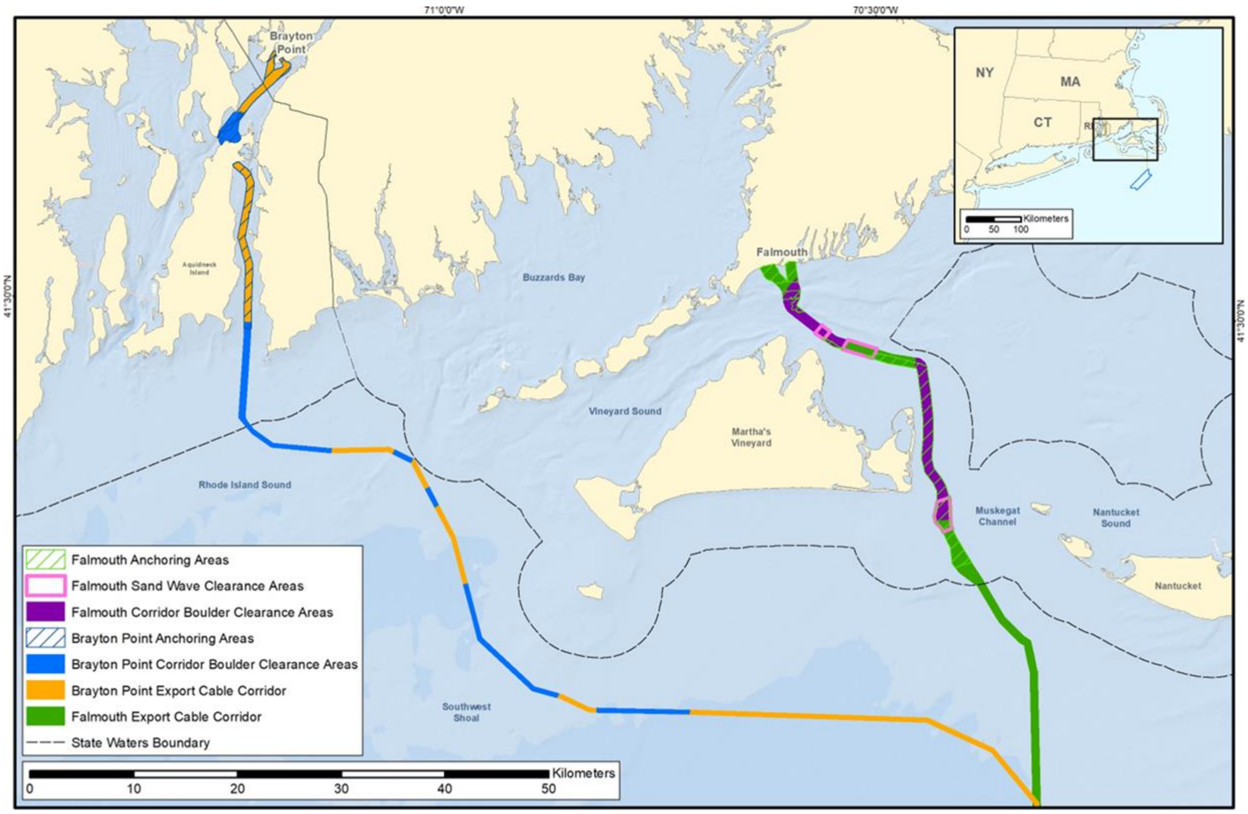

Figure 3.5.5-2. Temporary seabed disturbance locations in the Falmouth and Brayton Point ECCs from seabed preparation activities which include vessel anchoring, boulder clearance, and sand wave clearance

SouthCoast Wind has estimated that seabed preparation prior to cable installation would result in short-term disturbances to benthic habitats that occur over an estimated area of up to 99 acres for interarray cables in the Lease Area and up to 203 acres in the ECCs. Seabed preparation in this area is expected to disturb both soft-bottom and complex benthic habitat. Additionally, boulder relocation would potentially alter the composition of both the original and relocated habitats for boulder fields present along the Falmouth ECC including portions of the Muskeget Channel and in the Brayton Point ECC, which includes sections of the Sakonnet River and Mount Hope Bay. Medium- and low-density boulder fields in large-grained complex habitats are important EFH for several managed species, including Atlantic cod (adults and spawning adults), longfin squid (i.e., benthic squid mops), ocean pout (all life stages), winter flounder (adults), and monkfish (adults and juveniles). Damage caused to medium- and low-density boulder fields, as well as associated biogenic features and attached, habitat forming organisms that provide shelter, attachment surfaces, and prey resources for the aforementioned EFH species would incur direct impacts. Over time, the relocated boulders would be recolonized, contributing to the habitat function provided by existing complex benthic habitat of relocated boulders.

Sand waves and biogenic depressions are a component of juvenile and adult EFH used by red and silver hake. Seabed preparation (i.e., sand wave clearance by dredging) and cable installation would flatten depressions and ripples and mega-ripples, and damage structure provided by habitat forming organisms, such as amphipod tubes. Amphipods are important prey for several soft-bottom EFH species and life stages including red hake (juveniles), winter flounder (young-of-year, juveniles, and adults), and winter skates (juveniles and adults), and impacts on these biogenic features could result in limited prey availability for these species and refuge from predators. These combined effects would reduce habitat suitability within the cable installation footprint for EFH species that associate with soft-bottom habitat. Sand waves are naturally dynamic features in soft-bottom benthic habitats. As such, these habitat features are expected to recover rapidly from seabed preparation impacts, within 18 to 24 months following initial disturbance through natural sediment transport processes and recolonization by habitat-forming organisms from adjacent habitats. This conclusion is supported by knowledge of regional sediment transport patterns (Dalyander et al. 2013), observed recovery rates from seabed disturbance at the nearby Block Island Windfarm (HDR 2020), and recovery rates from similar bed disturbance impacts observed in other regions (de Marignac et al. 2009; Dernie et al. 2003; Desprez 2000).

Project-specific sediment dispersion modeling was completed using proposed cable installation methods, site-specific sediment grain size and bathymetric data, and a high-resolution wave and current model for each export cable corridor and interarray cables. Results showed that redeposition of suspended sediments occurs quickly before being transported long distances. Total suspended solid concentrations above 100 milligrams per liter (mg/L) (0.0008 pounds per gallon) extended a maximum of 1,214 feet (370 meters) for any scenario except for nearshore areas of the Brayton Point corridor, where they extended to just over 1 kilometer (0.62 mile). The maximum total suspended solid level dropped below 10 mg/L (0.00008 pounds per gallon) within 2 hours for all simulated scenarios and dropped below 1 mg/L (0.000008 pounds per gallon) within 4 hours for any scenario except for nearshore areas of the Brayton Point corridor, where 100 mg/L and 10 mg/L concentrations lasted for less than 5 hours and a little over 2 days, respectively. Deposition thicknesses exceeding 0.20 inches (5 millimeters) were generally limited to a corridor with a maximum width of 79 feet (24 meters) around the cable routes but reached a maximum of 590 feet (180 meters) from the centerline for the interarray cables (COP Appendices F1 and F3; SouthCoast Wind 2024).

Even though invertebrates have a range of susceptibility to suspended sediments and sediment deposition based on life stage, mobility, and feeding mechanisms, invertebrates in this area would be expected to recover in the short term. Sediment plumes in the water column would likely cause temporary displacement of finfish and mobile invertebrates, but they would be expected to return following settlement of sediments. Nearshore/inshore environments, such as bays where cable installation would occur, would likely cause temporary displacement of finfish and mobile invertebrates due to sediment resuspension in the water column. In general, nearshore environments have finer sediments that take longer to settle back to the seafloor, thus potentially causing impacts on EFH.

Some types of seabed preparation equipment such as hydraulic dredgers (e.g., trailing suction hopper dredgers) use water withdrawals, which can entrain planktonic larvae of benthic fauna (e.g., larval polychaetes, mollusks, crustaceans) and fish. Hydraulic dredging methods pose a high risk of entrainment to benthic or epibenthic eggs, larvae, and juvenile fish through the direct uptake of organisms by the suction field generated at the draghead during dredging operations (Reine and Clarke 1998). While potential for entrainment may be high, overall mortality rates of entrained fish may be lower depending on the scale of the dredging operation and type of hydraulic dredger (Wenger et al. 2017). Because of the limited volume of water withdrawn, BOEM does not expect population-level impacts on any given species. This is because the rate of egg and larval survival to adulthood for many species is naturally very low (MMS 2009). The impacts associated with increased turbidity caused by this IPF are discussed in Section 3.5.5.3.

Installation of the interarray cable and ECCs could result in direct impacts such as crushing and burial of slow-moving or sessile organisms and life stages. Direct mortality of benthic life stages and sessile organisms could also result from fluidizing the sediments along the cable corridors during cable burial. The effects of crushing and burial impacts on EFH resulting from cable installation would vary depending on how benthic and demersal habitats exposed to these impacts are used by EFH-designated species. Benthic and epibenthic life stages would be the primary groups affected, with secondary effects on EFH-designated species and life stages that prey on benthic and epibenthic organisms. Mobile organisms such as juvenile and adult finfish may be temporarily displaced by cable installation but will be able to avoid direct impacts related to these activities. It is anticipated that pelagic species and motile life stages will avoid construction activities based on typical installation speeds, and direct impacts are not anticipated. Direct impacts on foraging habitat are expected to be localized to the width of the trench and short term as benthic organisms would recolonize the area. Indirect impacts on EFH could occur as a result of sediment suspension, temporarily decreasing foraging success due to increased turbidity. It would be expected that normal foraging behavior would resume following completion of installation and settlement of suspended sediments.

In addition to crushing and burial impacts, installation methodologies could reshape benthic structures and habitats depending on the cable installation method used. Jet-plowing, which would flatten depressions and sand waves could temporarily reduce benthic habitat suitability for juvenile and adult red and silver hake within the cable plow footprint. In contrast, mechanical trenching may create short-term depressions that would serve the same habitat function and potentially leave little impact on juvenile and adult red and silver hake. However, it is difficult to quantify features like sand depressions and sand waves because these habitats are dynamic and shaped by sediment transport processes. Natural recovery from anthropogenic disturbance is likely to occur within several months of the disturbance.

During construction, seabed disturbance resulting from the Proposed Action would lead to impacts on finfish, invertebrates, and EFH, which include injury, mortality, and habitat alteration. The areas affected by seabed preparation and cable installation would be rendered temporarily unsuitable for species associated with complex, heterogenous complex, and soft-bottom benthic habitats during one or more life stages. Array cable and export cable emplacement would, therefore, result in short-term adverse effects on finfish, invertebrates, and EFH lasting through seabed preparation activities and cable installation but would be expected to recover shortly after installation. BOEM expects the impacts due to cable emplacement on finfish, invertebrates, and EFH to be moderate while cable maintenance activities would have minor impacts.

SouthCoast Wind is considering benthic imagery surveys to monitor benthic habitats and invertebrate impacts and recovery during the construction, O&M, and decommissioning phases (COP Volume 2, Table 11-20; SouthCoast Wind 2024). Such surveys would aid in evaluating the impacts from cable installation and maintenance.

Discharges/intakes: Increases in Project vessel discharges would occur during construction and installation, O&M, and decommissioning. As described under the No Action Alternative, certain discharges are required to comply with permitting standards that are established to minimize potential impacts on the environment. Impacts from entrainment and impingement of finfish and invertebrates associated with cable emplacement would be mostly confined to cable centerlines and would be short term and minor.

Entrainment and impingement of finfish and invertebrates could occur at the HVDC converter OSP intake of Project 1 and potentially for Project 2 should SouthCoast Wind also select an HVDC converter OSP design. If HVAC OSPs are used, entrainment and impingement impacts would not occur. SouthCoast Wind developed a NPDES permit application for one offshore HVDC converter OSP in the Lease Area for Project 1 (Appendix B, Figure B-2) (TetraTech and Normandeau Associates, Inc. 2023). If SouthCoast Wind selects HVDC technology for Project 2, the parameters and modeling results from the NPDES permit application for Project 1, described below, would be representative of a HVDC converter OSP for Project 2 located in the southern portion of the Lease Area.

The cooling water intake system (CWIS) located within the jacketed foundation structure associated with the HVDC converter OSP is expected to withdraw seawater from the ocean at a rate of approximately 9.9 million gallons per day at a depth of 74 feet (22.6 meters) below the surface and 81 feet (24.7 meters) above the seafloor (TetraTech and Normandeau Associates, Inc. 2023). This mid-water column depth of withdrawal minimizes entrainment impacts as it avoids the higher concentrations of buoyant ichthyoplankton that inhabit surface waters (Sundby and Kristiansen 2015) and those planktonic taxa associated with benthic habitats (Kendall and Naplin 1981). The CWIS is also designed to maintain an intake velocity of 0.5 feet (0.2 meter) per second or less to minimize impingement impacts.[4]

Impacts of entrainment on finfish and invertebrates at HVDC converter intakes are anticipated to be limited to the immediate area of the OSP(s). To minimize potential impacts on zooplankton from entrainment, SouthCoast Wind has committed to siting the northernmost HVDC converter OSP outside of a 10-kilometer buffer of the 30-meter isobath from Nantucket Shoals, an area of high productivity and foraging value for several marine species (COP Volume 2, Table 16-1; SouthCoast Wind 2024). Given the limitations of recent data immediately in the vicinity of the intake location, SouthCoast Wind's NPDES permit application used EcoMon plankton data from 1977 from 2019 to estimate entrainment

[4] USEPA considers intake velocities of 0.5 feet per second or less a suitable compliance option to minimize impingement impacts.

abundance from cooling water withdrawal at the OSP (TetraTech and Normandeau Associates, Inc. 2023). The minimum, mean, and maximum larval densities observed within 10 miles (16 kilometers) of the OSP location were used to extrapolate the range of entrainment abundance. The annual entrainment abundance of fish larvae was estimated to range from 8.3 million to 174.4 million with a mean estimate of 83.2 million. Based on monthly mean larval densities and excluding unidentified fish, the taxa with the highest estimated larval entrainment annually were hakes (3.9 million), Atlantic herring (3.9 million), sand lances (3.3 million), summer flounder (1.3 million) and silver hake (0.5 million) (TetraTech and Normandeau Associates, Inc. 2023).[5] Impacts from entrainment of finfish and invertebrates associated with HVDC converter OSPs would be continuous during the O&M phase resulting in long-term and moderate impacts.

In addition to entrainment impacts, the HVDC converter OSP would discharge warmer water into the surrounding ocean, which could have localized impacts on fish species. Discharge would occur at one 36-inch (0.91-meter) diameter vertical-shaft discharge caisson, located in the middle portion of the water column at a depth of 42.7 feet (13 meters) below the surface, set perpendicular to the seafloor, and within the jacketed foundation structure (TetraTech and Normandeau Associates, Inc. 2023). The impact of raised water temperatures on living organisms is most frequently seen in the lowered dissolved oxygen saturation level of warmer water since dissolved oxygen levels are often a limiting factor for organism survival (Mel'nichenko et al. 2008). Further, temperature affects the speed of egg development and growth of offspring (Walkuska and Wilczek 2009). SouthCoast Wind modeled thermal plumes of the discharged cooling seawater from the HVDC converter OSP. From four modeled maximum temperature delta scenarios in the fall, winter, spring, and summer (TetraTech and Normandeau Associates, Inc. 2023), the distance from the discharge point where the temperature delta reached 1°C (1.8°F) was 41.9 feet (12.8 meters) in the fall, 84.9 feet (25.9 meters) in the winter, 67.5 feet (20.6 meters) in the spring, and 46.6 feet (14.2 meters) in the summer. The effluent plume area was highest in the winter at 792.1 square feet (73.6 square meters) and lowest in the fall at 407.0 square feet (37.8 square meters). These results indicate that impacts on the ocean temperature are localized and minimal when the maximum temperature increases occur and that the water quality standard allowed for by the Ocean Discharge Criteria is expected to be met well within the 100-meter (330-foot) radius mixing zone for initial dilution of discharges (TetraTech and Normandeau Associates, Inc. 2023). The limited range of warmed water, local oceanographic conditions, and the ability of fish to move out of the affected area would likely result in long-term and minor impacts on fish species. Similar results would be anticipated if SouthCoast Wind selects a second HVDC converter OSP for the southern portion of the Lease Area.

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[5] As further described in the NPDES application (TetraTech and Normandeau Associates, Inc. 2023), due to limitations in the available data, there are uncertainties in these results. For example, entrainment estimates do not fully capture the annual entrainment abundance of all fish and life stages, as all fish eggs and the larvae of less common taxa are excluded from the publicly available EcoMon data set. Additionally, the estimates assume the 1977–2019 time series is representative of the current and future species composition, and that abundance will remain constant each year. The data also represents sampling of ichthyoplankton at various depths, whereas the OSP intake would withdraw water from a discrete depth in the water column (81 feet [24.7 meters] above the seafloor). This may result in overestimation of larval entrainment, as individuals settling in demersal habitats or floating on the surface may not be susceptible to the intake flow.

During installation of up to 85 suction-bucket jacket WTG foundations in the southern portion of the Lease Area as part of Project 2, planktonic organisms may become entrained as water is pumped out of the buckets during the embedding process. An entrainment assessment was conducted to estimate the potential impact this construction activity may have on zooplankton and ichthyoplankton species present within the installation area (RPS 2024). The presence and abundance of plankton species in the SouthCoast Wind suction-bucket jacket installation area was determined using NOAA-NEFSC Ecosystem Monitoring (EcoMon) survey program plankton data (NEFSC 2019) limited to within 3.10 miles (5 kilometers) of the foundation installation area. This analysis area was used on the assumption that foundation installation is a one-time localized action with short-term entrainment impacts. Monthly entrainment estimates for suction-bucket foundation installations were calculated using a per foundation one-time total seawater displacement volume of 27,200 cubic meters (6,800 cubic meters per bucket by four buckets per foundation), the assumption that the installation of 85 suction-bucket jacket foundations would occur evenly over a 16-month period from April 2030 to July 2031, and the taxa-specific EcoMon plankton density data averaged by month.

Excluding unidentified fish (Pisces), the ichthyoplankton taxa with the highest estimated monthly larval entrainment were the Atlantic mackerel (944,475; June), sand lance (394,397; January), hake (259,068; August), and gulf stream flounder (248,608; September). Summer flounder and Atlantic cod were estimated to have relatively low monthly larval entrainment in the suction-bucket jacket installation area with a peak of 16,614 (October) and 3,920 (February) individuals, respectively. Total estimated entrainment (number of individuals) by taxa from start to completion of suction-bucket jacket foundation installation was highest for Atlantic mackerel (954,383) followed by sand lance (869,447), gulf stream flounder (507,854), and hake (488,465) (RPS 2024). While entrainment estimates were generated from the best available data, these estimates do not reflect the current species composition in the study area, seasonality, population dynamics, and natural variability due to the limitations of the data set used and given that no project-specific studies have been conducted to characterize the local composition of plankton species in the vicinity of the suction bucket installation area and the susceptibility of these species to the impacts of entrainment. As the installation of suction-bucket jacket foundations is a one-time localized action, entrainment impacts are considered short term and limited to the immediate vicinity of the installation activity.

Many fish species in the region exhibit broadcast spawning or other high fecundity reproductive strategies that produce thousands to millions of eggs per fish (e.g., Kelly and Stevenson 1985; Kjesbu 1989; Morse 1980; Papaconstantinou and Vassilopoulou 1986; Pitt 1971). Given these high fecundity rates, entrainment mortality at the scale estimated here is not expected to result in population-level effects on EFH species. It is important to note that the entrainment analysis excluded fish eggs, such that the estimates presented are less than the potential entrainment of all life stages. However, given the high natural mortality of the egg stage for most fish species and the relatively small volume of water being withdrawn, entrainment mortality of eggs is expected to be small relative to natural egg mortality. Entrainment mortality would also remove some small organisms that are consumed by planktivorous species, potentially resulting in a loss in foraging opportunity for sessile EFH species such as filter-feeding invertebrates. However, mobile and pelagic species are not expected to experience losses in foraging opportunities because they can move to feed in areas outside the suction bucket foundation footprint. Therefore, the entrainment impact from the installation of 85 suction-bucket jacket foundations in the southern portion of the Lease Area would constitute a short-term negligible effect on finfish, invertebrates, and EFH.

Gear utilization: SouthCoast Wind has proposed a variety of survey methods to evaluate the effect of construction and operations on benthic habitat structure and composition and economically valuable fish and invertebrate species. Fisheries and benthic monitoring plans to be conducted within the Lease Area and the Brayton Point ECC during the pre-construction, construction, operations, and decommissioning phases of the Project have been developed in coordination with the University of Massachusetts Dartmouth's School for Marine Science and Technology (SMAST), the Anderson Cabot Center of Ocean Life at the New England Aquarium, and federal and state agencies, and align with BOEM guidelines (BOEM 2019) with additional recommendations provided by the Responsible Offshore Science Alliance Fisheries Monitoring Working Group.

The proposed fisheries monitoring plans incorporate multiple surveys utilizing a range of survey methods to assess different facets of the regional ecology and fisheries. For the Lease Area, these surveys include a demersal otter trawl survey, a benthic optical drop camera survey, a ventless trap survey, and a neuston tow survey (SMAST 2024). The demersal otter trawl survey, employing a tow speed of 3.0 knots and a tow duration of 20 minutes, would be used to evaluate the impacts of development on demersal fish populations. The benthic optical drop camera survey deploys three cameras (digital still and video) and estimates the substrate, as well as 50 different invertebrate and fish species that associate with the sea floor. A ventless trap survey would focus on assessing populations of American lobster, Jonah crab, and black sea bass in the SouthCoast Wind Lease Area while the neuston net survey would sample neustonic American lobster larvae and other large ichthyoplankton. Trawl surveys used to assess abundance and distribution of target fish and invertebrate species within the offshore Project area could affect a variety of fish and invertebrate species. The capture of fish species, including ESA-listed species like the Atlantic sturgeon, in trawl gear has the potential to result in injury and mortality, reduced fecundity, and delayed or aborted spawning migrations (Moser and Ross 1995; Collins et al. 2000; Moser et al. 2000). Capture of sturgeon in trawl gear could result in injury or death; however, the use of trawl gear is considered a safe and reliable method to capture sturgeon if tow and onboard handling times are limited (Beardsall et al. 2013). Drop camera surveys are non-intrusive sampling techniques, which are not expected to cause any impacts on fish, invertebrate, or EFH. Ropeless fishing gear would be deployed during the ventless trap survey meaning there would be no vertical downlines. The primary method for retrieving trap strings would be grappling, though on-demand systems would continue to be tested and potentially phased into the survey as the technology progresses and becomes logistically feasible. Bycatch of non-target species is possible during ventless trap surveys though bycaught organisms would be returned to the environment where practicable. The potential bycatch impact would be comparable to, but limited in extent relative to, the baseline level of impacts from commercial fisheries. Survey gear types placed on the seabed (e.g., traps) could also potentially disturb benthic habitats and epifauna (Schweitzer et al. 2018). However, any resulting disturbance would be minimal given the limited number or traps to be used and the small footprint of the survey gear.

A fisheries monitoring plan (INSPIRE 2023a) has also been developed for the portion of the Brayton Point ECC in Rhode Island state waters with acoustic telemetry and trap surveys as the primary monitoring methodologies. SouthCoast Wind would conduct acoustic telemetry monitoring along the Brayton Point ECC to monitor potential changes in the movements, presence, and persistence of several commercially and recreationally important species (e.g., striped bass, summer flounder, tautog, and false albacore) in response to cable installation activities. Acoustic telemetry methodologies have been used extensively in fisheries research (Hussey et al. 2015; Freiss et al. 2021) and mortality of tagged fish is expected to be low. SouthCoast Wind would also conduct a trap survey to monitor whelk relative abundance and size structure along commercially fished sections of the Brayton Point ECC in the Sakonnet River. The survey would identify potential impacts from the short-term disturbance of submarine cable installation on the localized channeled and knobbed whelk resources. The use of traps could result in unavoidable impacts on habitat-forming invertebrates that comprise an important component of habitat for some EFH species. The extent of habitat disturbance and number of organisms affected could be comparable to and limited in extent relative to the baseline level of impacts from commercial fisheries.

SouthCoast Wind has developed a benthic monitoring plan for benthic habitats in the Lease Area and the Brayton Point ECC to evaluate detectable post-construction changes (INSPIRE 2024). To assess the effect of the introduction of hard-bottom novel surfaces, an ROV stereo-camera system would be used to measure changes in benthic percent cover, identify key or dominant species, and document nonnative species. To evaluate structure-oriented enrichment and cable-associated physical disturbance, sediment grab samples and SPI/PV would be used to measure changes in benthic function over time with distance from foundations or distance from the cable centerline. During physical sampling (e.g., grab sampling), organisms captured would be removed from the environment for scientific analysis. Other non-target fish and invertebrate species could also be affected by sampling activities when survey equipment contacts the seafloor or when inadvertently captured as bycatch causing injury or death. Non-target organisms would be returned to the environment where practicable.

While project monitoring surveys would result in unavoidable impacts on individual finfish and invertebrates, the extent of habitat disturbance and number of organisms affected would be small compared to the baseline level of impacts from commercial fisheries and would not measurably affect the viability of any species at the population level. Any sampling activity would make use of a random sampling design making repeated disturbance of the same habitat unlikely. As such, habitat impacts from survey implementation would likely be short term. The intensity and duration of impacts anticipated from fisheries and benthic monitoring activities would constitute a short-term minor adverse effect on finfish, invertebrates, and EFH.**EMFs:** During operation, powered transmission cables would produce EMFs (Taormina et al. 2018). Depending on the type of cable used (AC or DC), the resulting EMFs would differ significantly in that AC transmissions vary rapidly in direction while DC transmissions are static (i.e., have a frequency of 0 Hz) (COP Appendix P2; SouthCoast Wind 2024). DC magnetic fields, such as those associated with submarine cables, can combine with the Earth's static geomagnetic field altering the direction and/or magnitude of the resulting EMFs. DC cable EMF interaction with the Earth's geomagnetic field will depend on the direction/orientation of the cable at the emplacement location (COP Appendix P2; SouthCoast Wind 2024). Additionally, DC cable EMFs average three times higher amplitude compared to those produced by AC cables (Hutchison et al. 2020b). To minimize EMFs generated by cables, cabling under the Proposed Action would include industry standard electric shielding (COP Volume 2, Table 16-1; SouthCoast Wind 2024). EMF strength rapidly decreases with distance from the cable (Taormina et al. 2018). SouthCoast Wind proposes to bury interarray and export cables to a target depth of 6 feet (1.8 meters). Due to variable conditions in the Lease Area and along the proposed ECC routes, the anticipated burial depth would range from 3.2 feet (1.0 meters) to 8.2 feet (2.5 meters) for interarray cables and from 3.2 feet (1.0 meters) to 13.1 feet (4.0 meters) for export cables, excluding asset crossings. This depth is well below the aerobic sediment layer where most benthic infauna live. EMF impacts would be greater in areas where cable burial depth meets only the lower end of the anticipated burial depth range or cannot be buried. However, EMF impacts would still be localized to the areas around the cables. EMF levels would be highest at the seabed and in the water column above cable segments that cannot be fully buried and are laid on the bed surface under protective rock or concrete blankets. Based on a preliminary understanding of the site conditions in the offshore export cable routes, SouthCoast Wind estimates that up to 10 percent of the length of the offshore export cables to Falmouth and 15 percent of the offshore export cables to Brayton Point, inclusive of cable crossing locations, may require cable protection.

The scientific literature provides some evidence of responses to EMFs by fish and mobile invertebrate species (Hutchison et al. 2018; Taormina et al. 2018; Normandeau Associates, Inc. et al. 2011), although recent reviews (CSA Ocean Sciences, Inc. and Exponent 2019; Gill and Desender 2020; Albert et al. 2020) indicate the relatively low intensity of the EMF associated with marine renewable projects would not result in impacts. Effects of an EMF may include interference with navigation that relies on natural magnetic fields, predator/prey interactions, avoidance or attraction behaviors, and physiological and developmental effects (Taormina et al. 2018). Behavioral response to DC EMFs has been found to be species-specific and varies by life stage. Demersal fish such as haddock (Cresci et al. 2022) and the larval stages of crustaceans (Harsanyi et al. 2022) are among the groups that have shown responses to EMF. Klimley et al. (2017) found that EMFs from a DC undersea power cable did not affect the migration success and survival of chinook salmon and green sturgeon, while Hutchison et al. (2018) noted that DC power cable EMF did not act as a barrier to the movement of the American lobster and little skate. In both studies, altered patterns of mobility were observed; however, these changes were temporary and did not interfere with migration success or population health.

CSA Ocean Sciences, Inc. and Exponent (2019) found that offshore wind energy development as currently proposed would have minor effects, if any, on bottom-dwelling finfish and invertebrates residing within the southern New England area. Although demersal biota are the most likely to be exposed to the EMF from power cables, potential exposure would be minimized because an EMF quickly decays with distance from the cable source (CSA Ocean Sciences, Inc. and Exponent 2019). Project-specific modeling confirmed that EMFs diminished rapidly with distance (COP Appendix P1; SouthCoast Wind 2024). In the case of mobile species, an individual exposed to an EMF would cease to be affected when it leaves the affected area. An individual may be affected more than once during long-distance movements; however, there is no information on whether previous exposure to an EMF would influence the impacts of future exposure. For pelagic species in the southern New England area, no negative effects were expected from offshore wind energy development as currently proposed because of their preference for habitats located at a distance from the seabed. Therefore, while EMFs emitted from operational cables would be present for the lifetime of the project, impacts on finfish, invertebrates, and EFH from EMFs from the Proposed Action would likely be localized and short term in the form of temporary alterations in mobility and behavior but with no appreciable effects on overall movement or population health.

BOEM expects impacts due to EMFs on finfish, invertebrates, and EFH would be minor because exposure to detectable EMFs would range from non-existent to short term throughout the life of the Project.

Lighting: Activities associated with the Proposed Action that could cause impacts from artificial lighting on finfish and invertebrates include presence of vessels throughout construction, operation, and decommissioning and navigation and safety lighting on offshore WTGs. Transiting and working vessels associated with construction would use artificial lighting during any operations outside of daylight hours. Light is generally considered an attractant to finfish (Marchesan et al. 2005); thus, it would be expected that areas where artificial light strikes and penetrates the ocean surface would experience increased fish activity, and finfish movement in highly localized areas would be affected. Artificial lighting can also affect natural reproductive cycles for finfish, such as spawning; however, light would need to be persistent and present for long periods of time to influence natural reproductive cycles (Longcore and Rich 2004). Light sources from the Project would involve obstruction lights on the nacelle and mid-mast, which are characterized by intermittent flashes of red hues, and marine navigational lights, which are characterized by intermittent flashes of yellow hues, neither of which present a continuous light source. Lighting may also result in impacts on normal behavior of fish and pelagic eggs and larvae by altering their movement and potentially causing temporary increases in predation pressure and disruption of normal swimming behavior, where light may be an attractant to finfish. Zooplankton diel migration and movement may be also influenced by changes in light exposure. Artificial light would be minimized to the extent practicable through use of BMPs. Furthermore, potential impacts from lighting would be anticipated to have little impact on finfish and invertebrates during daylight hours and would be limited by the depth of the water in the offshore Project area.

The cumulative impacts of light on finfish, invertebrates, and EFH are likely to be localized and short term, resulting in little change to these resources. As such, artificial light impacts associated with the proposed action would be considered negligible.

Noise: Activities associated with the Proposed Action that could cause underwater noise effects on finfish and invertebrates are pile driving, vessel traffic, aircraft, geophysical surveys (HRG surveys and geotechnical surveys), WTG operation, cable installation, foundation removal, and seabed preparation activities. Pile driving during construction and UXO detonation, should it occur, would produce the most intense underwater noise impacts with the greatest potential to cause injury and behavioral effects on finfish and invertebrates, noise from HRG surveys and vessels could result in behavioral effects, and operational WTG noise would occur over the longest duration; therefore, these effects are the focus of the following Proposed Action assessment.

Impacts from sound vary based on the intensity of the noise and the method of sound detection used by the animal. Impacts can range from minor behavioral alterations, such as temporary displacement or temporary disruption of normal activities (e.g., feeding, movement), to physiological reactions, such as ruptured capillaries in fins, hemorrhaging of major organs, or burst swim bladders (Popper et al. 2014), which could lead to mortality. Assessment of the potential for underwater noise to injure or disturb a fish or invertebrate requires acoustic thresholds against which received sound levels can be compared. Available injury thresholds for fish were developed by the Fisheries Hydroacoustic Working Group (2008) and Popper et al. (2014) and are provided in **Error! Reference source not found.**.

Table 3.5.5-7. Acoustic metrics and thresholds (dB) for fish currently used by NMFS and BOEM for impulsive pile driving

Faunal Group	Onset of Physical Injury		Behavioral Disturbance LP
	Injury Lpk	Injury LE	
Fish equal to or greater than 2 grams [a,b]	206	187	150
Fish less than 2 grams [a,b]	206	183	150
Fish without swim bladder [c]	213	216	150
Fish with swim bladder not involved in hearing [c]	207	203	150
Fish with swim bladder involved in hearing [c]	207	203	150

Note: NMFS does not have physical injury thresholds for non-impulsive sources, except tactical sonar
dB = decibels; L_{pk} = peak sound pressure level in decibels referenced to 1 microPascal squared; also written as SPL_{pk};
L_E = weighted cumulative sound exposure level in decibels referenced to 1 microPascal squared second; also written SEL_{cum};
L_p = root mean squared sound pressure level in decibels referenced to 1 microPascal squared; also written SPL_{rms} or L_{rms}
[a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working Group 2008.
[b] Andersson et al. 2007; Mueller-Blenkle et al. 2010; Purser and Radford 2011; Wysocki et al. 2007.
[c] Popper et al. 2014.

Noise thresholds for invertebrates have not been developed because of a lack of available data. In general, mollusks and crustaceans are less sensitive to noise-related injury than many fish because they lack internal air spaces and are less susceptible to over-expansion or rupturing of internal organs, the typical cause of lethal noise related injury in vertebrates (Popper et al. 2001). Current research suggests that some invertebrate species groups, such as cephalopods (e.g., octopus, squid), crustaceans (e.g., crabs, shrimp), and some bivalves (e.g., scallops, ocean quahog) are capable of sensing sound through particle motion (Carroll et al. 2016; Edmonds et al. 2016; Hawkins and Popper 2014). Studies of the effects of intense noise sources on invertebrates, similar in magnitude to those expected from Project construction, found little or no measurable effects even in test subjects within 3.3 feet (1 meter) of the source (Edmonds et al. 2016; Payne et al. 2007). Jones et al. (2020, 2021) evaluated squid sensitivity to high-intensity impulsive sound comparable to monopile installation. They observed that squid displayed behavioral responses to particle motion effects within 6.6 feet (2 meters) of high-intensity impulsive noise. They further theorized that squid in proximity to the seabed might be able to detect particle motion from impact pile driving imparted through sediments several hundred meters from the source, eliciting short-term behavioral responses lasting for several minutes.

Other researchers have found evidence of cephalopod sensitivity to continuous low frequency sound exposure comparable to sound sources like vibratory pile driving (Andre et al. 2011). Solé et al. (2018, 2022) exposed various species of cephalopod larvae to underwater noise comparable to impact pile driving and observed similar statocyst injuries that were likely to negatively affect survival. Solé et al. (2022) found that exposure to impact pile driving noise above 170 dB re 1 μPa^2 caused observable damage to statocysts in cuttlefish larvae, and that those effects could be attributed to the sound pressure (versus particle motion) component of noise. That damage resulted in an apparent reduction in survival and reduced response to predator stimuli in the developing larvae. Solé et al. (2018) observed similar statocyst damage in two species of squid exposed to maximum peak noise levels of 175 dB re 1 µPa. From an underwater acoustic assessment conducted in the SouthCoast Wind Lease Area (Limpert et al. 2024), modeling results showed that pile-driving noise above 170 dB re 1 μPa^2 can reach a radial distance of up to 13 kilometers from the foundation site (Table 3.5.5-8). Within this distance, injury-level effects on cephalopods from cumulative exposure could potentially occur.

The current underwater noise thresholds consider effects on fish mainly through sound pressure, without taking into consideration the effect of particle motion. Popper et al. (2014) and Popper and Hawkins (2018) suggest that extreme levels of particle motion induced by various impulsive sources may also have the potential to affect fish tissues and that proper attention needs to be paid to particle motion as a stimulus when evaluating the effects of sound on aquatic life. However, thresholds for particle motion exposure are not currently available as this component of sound is still understudied due to the difficulty in measuring and modeling particle motion, and the lack of experimental data on its effects (Popper and Hawkins 2018).

Particle motion in the substrate resulting from compressional, shear, and interference waves generated by pile driving or turbine operation is another understudied component of sound propagation in the marine environment (Hawkins et al. 2021). Fish and invertebrates living close to or within the substrate sediment (e.g., sand lances) may potentially detect particle motion associated with substrate motion. However, there is limited knowledge on how fishes and invertebrates detect and respond to substrate vibration, the species-specific detection capabilities and sensitivities, and potential behavioral effects (Hawkins et al. 2021). More research is required to measure and determine the levels of substrate vibration and particle motion that may affect infaunal and bottom-oriented organisms as these may vary substantially between species (Hawkins et al. 2021).

Notably, there are no acoustic threshold criteria for fish for non-impulsive noise sources like vibratory pile driving. Sound pressure levels (SPL) generated from vibratory-driven piles would be higher near the seabed surface than elsewhere in the water column (Tsouvalas and Metrikine 2016) and could have physiological and behavioral impacts on fish and aquatic invertebrates living near or in the seabed such as the Atlantic sturgeon.

Table 3.5.5-8. Acoustic radial distances ($R_{95\%}$ in kilometers) for fish during pile driving under various scenarios at the higher impact of two modeled locations for both seasons, with 10-dB noise attenuation from a noise-abatement system

Faunal Group	Unit	Threshold Level	Location 1			Location 2		
			16 m Monopile Scenario, NNN 6600 (b) hammer	4.5 m Pre-piled Jacket Scenario, MHU 3500S (b) hammer	4.5 m Post-piled Jacket Scenario, MHU 3500S (b) hammer	16 m Monopile Scenario, NNN 6600 (b) hammer	4.5 m Pre-piled Jacket Scenario, MHU 3500S (b) hammer	4.5 m Post-piled Jacket Scenario, MHU 3500S (b) hammer
Acoustic Radial Distances to Thresholds ($R_{95\%}$ in kilometers) during Winter								
Behavioral (all fish) [b]	L_p	150 dB	17.22	10.79	13.02	12.35	9.11	11.07
Single Strike Injury (all fish) [a]	L_{pk}	206 dB	0.15	0.05	0.06	0.11	0.05	0.06
Injury over 24hr (fish ≥ 2 grams) [a]	L_E	187 dB	9.68	6.83	8.21	7.69	5.36	6.30
Injury over 24hr (fish < 2 grams) [a]	L_E	183 dB	13.19	9.63	11.78	10.10	7.48	8.74
Acoustic Radial Distances to Thresholds ($R_{95\%}$ in kilometers) during Summer								
Behavioral (all fish) [b]	L_p	150 dB	13.86	9.28	10.99	9.69	7.34	8.34
Single Strike Injury (all fish) [a]	L_{pk}	206 dB	0.14	0.05	0.06	0.11	0.05	0.06
Injury over 24hr (fish ≥ 2 grams) [a]	L_E	187 dB	8.50	6.31	7.34	6.51	4.77	5.48
Injury over 24hr (fish < 2 grams) [a]	L_E	183 dB	10.99	8.50	9.63	8.26	6.26	7.17

Cumulative sound exposure level values were calculated for a 24-hour period. Values shown were at the middle (b) hammer energy.

L_{pk} = peak sound pressure level in decibels referenced to 1 microPascal squared; also written as SPL_{pk}; L_E = weighted cumulative sound exposure level in decibels referenced to 1 microPascal squared second; also written SEL_{cum}; L_p = root mean squared sound pressure level in decibels referenced to 1 microPascal squared; also written SPL_{rms} or L_{rms}

[a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working Group (FHWG 2008).

[b] Andersson et al. (2007), Mueller-Blenkle et al. (2010), Purser and Radford (2011), Wysocki et al. (2007).

Source: Summarized from Tables 50–55 in Limpert et al. (2024).

Studies aimed at predicting the wave field emitted by impact- and vibratory-driven monopiles using traditional and novel noise-prediction models underscores the assumption that the highest noise levels occur just above the seabed (Tsouvalas and Metrikine 2016; Molenkamp et al. 2024). This effect is more pronounced in vibratory pile driving due to the energy carried by Scholte waves that propagate at the water-sediment interface and create an evanescent sound field within the water column (Hazelwood and Macey 2021). These waves become particularly dominant under low-frequency excitation, consistent with the primary driving frequency range (10–40 Hz) during vibratory pile driving (Tsouvalas and Metrikine 2016).

Noise - impact and vibratory pile driving: The primary impacts of noise on finfish and invertebrates would occur during offshore construction activities associated with the Proposed Action. Primary noise impacts would occur from pile-driving activities. Research has shown that finfish can suffer behavioral and physiological effects based on received sound levels, distance from the noise, and variables related to the noise-producing impact (e.g., materials, size of hammer). Under the Proposed Action, noise from pile driving could affect the same populations or individuals multiple times over the time that pile driving would occur though it is currently unknown whether it would have less impact to drive many piles sequentially or concurrently. As introduced in Section 3.5.5.3, invertebrates may also exhibit behavioral and physiological responses to noise exposure though available studies on the effects of wind farm specific noise sources on invertebrates are limited and knowledge gaps in this field of research remain (Solé et al. 2023).

Noise from impact and vibratory pile driving for the installation of WTGs and OSP foundations would occur intermittently during the installation of offshore structures. A maximum total of 147 WTGs and five OSPs at a maximum of 149 WTG/OSP positions are anticipated for the Proposed Action. Each WTG requires one monopile or 4 pin piles for jacket foundations and each OSP requires one monopile or up to 27 pin piles, with each pin pile or monopile requiring 2 or 4 hours of driving to install, respectively. An estimated total of 792 hours of installation time would be needed for 86 monopile WTG foundations and 2 OSPs in one construction season, with no pile driving occurring between January 1 and April 30 (LGL 2024; Appendix G, Attachment G-3).

Acoustic propagation modeling of the impact pile-driving activities for the Proposed Action was undertaken by JASCO Applied Sciences (Limpert et al. 2024) to determine distances to the established fish injury and disturbance thresholds and provided as Appendix A to the *Petition for Incidental Take Regulations* for the Project (LGL 2024). The acoustic model considered tapered monopiles that are 52 feet (16 meters) in diameter at the expected waterline and jacket foundations with 15-foot (4.5-meter)-diameter jacket pin piles. Sound fields from 52-foot (16-meter) monopiles and 15-foot (4.5-meter) jacket pin piles were modeled at two representative locations in the Lease Area using a 6,600-kilojoule impact hammer and a 3,300-kilojoule impact hammer, respectively. The modeling also applied a 10-dB-per-hammer-strike noise attenuation, which is considered achievable with currently available technologies (Bellmann et al. 2020). The modeling results represent a radius extending around each pile where potential injurious-level or behavioral effects could occur and are presented in Table 3.5.5-8.

Single-strike peak sound pressure (SPL_{PK}) injury distances represent how close a fish would have to be to the source to be instantly injured by a single pile strike. The cumulative injury distances based on sound exposure level (SEL_{cum}) consider total estimated daily exposure, meaning a fish would have to remain within that threshold distance over the entire daily period of installation to experience injury. The exposure distances for behavioral effects (SPL_{RMS}) can be met without prolonged exposure, meaning that any animal within the effect radius is assumed to have experienced behavioral effects.

The likelihood of injury from monopile installation depends on proximity to the noise source, intensity of the source, effectiveness of noise-attenuation measures, and duration of noise exposure. Modeling results (Table 3.5.5-8) indicate that acoustic radial distances were generally smaller at Location 2 and during the summer. Results modeled at Location 1 in the winter show that noise levels exceeding the injury threshold from a single strike is limited to 0.09 mile (0.15 kilometer) from the monopile, 0.03 mile (0.05 kilometer) from pre-piled jacket pin piles, and 0.04 mile (0.06 kilometer) from the post-piled jacket pin piles. For fish greater than 2 grams, injury from prolonged cumulative exposure (24 hours), assuming 10 dB of attenuation is applied, extends as far as 6 miles (9.68 kilometers) during monopile driving, 4.2 miles (6.83 kilometers) for pre-piled jacket pin pile driving, and 5.1 miles (8.21 kilometers) for post-piled jacket pin pile driving. For fish less than 2 grams, cumulative exposure in the winter is expected at distances between 8.2 miles (13.19 kilometers) for monopile driving, 5.9 miles (9.63 kilometers) for pre-piled jacket pin pile driving, and 7.32 miles (11.78 kilometers) for post-piled jacket pin pile driving. Results modeled in Location 1 indicate that behavioral effects on fish could occur between 5.8 and 10.7 miles (9.3 and 17.2 kilometers) depending on the season and equipment (monopile vs. jacket pin pile), with monopile installation in the winter having the greatest acoustic range. Within this area, it is likely that some level of behavioral reaction is expected and could include startle responses or migration out of areas exposed to underwater noise (Hastings and Popper 2005). Behavioral disturbance to fish from pile-driving noise is therefore considered temporary for the duration of the activity.

For Atlantic sturgeons, the distance to pile driving sound levels that could exceed recommended injury thresholds (fish ≥ 2 grams = 206 decibel SPLpk) is 0.09 mile (0.15 kilometer) for single strikes and within up to 6.03 miles (9.7 kilometers) for cumulative exposure (187 decibels SELcum) during monopile driving, assuming 10 dB of noise attenuation (Table 3.5.5-8). During pin pile driving, the distance to pile driving sound levels that could exceed recommended Atlantic sturgeon injury thresholds (206 decibel SPLpk) is 0.03 mile (0.05 kilometer) for single strikes for pre-piled pin pile driving and within up to 5.1 miles (8.2 kilometers) for cumulative exposure (187 decibels SELcum) for post-piled pile driving with 10 dB of noise attenuation. Based on these results, to be exposed to potentially injurious levels of noise during pile driving, the Atlantic sturgeon would need to be within 5.1 to 6.03 miles (8.2 to 9.7 kilometers) of the pile being driven for a prolonged period. However, due to the dispersed nature of Atlantic sturgeon in the offshore environment and the likelihood of animals moving away from disturbance, it is unlikely that sturgeon will be exposed to injurious noise levels.

Currently there are no established thresholds for continuous noise sources as vibratory piling is currently classified. Additionally, the distance to injury and the distance to behavioral modification are less than impact piling when using the criteria for impulsive sound sources. As such vibratory pile driving generally poses less of an acoustic impact to fish compared to impact pile driving because of the non-impulsive nature of the underwater noise produced by vibratory pile driving. Unlike impact pile driving, which is classified as an impulsive sound source, vibratory pile driving produces a gradual increase in noise levels that is 10 to 20 dB lower than that of impact pile driving (Buehler et al., 2015). Atlantic sturgeon that may be present within the ensonified area and exposed to sound levels above the behavioral threshold. However, due to the dispersed nature of Atlantic sturgeon in the offshore environment and the likelihood of animals moving away from disturbance, it is unlikely that sturgeon will be exposed to sound levels exceed the physiological threshold during vibratory pile driving.

Biological cues used by soniferous fishes for communication may also be masked potentially disrupting foraging and breeding (Mooney et al. 2020) while pile driving is ongoing. Underwater noise sufficient to alter behavior could have disruptive effects on Atlantic cod spawning (Dean et al. 2012), especially at night, as Atlantic cod courtship and spawning behaviors occur primarily at night (Dean et al. 2014; Zemeckis et al. 2019). However, once the environmental stressor (noise) is discontinued, the masking stops. Additionally, brief disturbance may not necessarily disrupt Atlantic cod spawning. For example, Morgan et al. (1997) observed the dispersal of a spawning aggregation of Atlantic cod by the passage of a single bottom trawl for a brief period (approximately 1 hour), after which the aggregation returned to the affected area and resumed spawning. In another study, McQueen et al. (2022) observed that exposure to seismic airgun noise did not cause displacement of Atlantic cod from their spawning grounds. They speculated that strong site affinity could explain the lack of a significant behavioral response to an otherwise intensive stressor. These contrasting findings suggest that short-term periods of disturbance may not necessarily result in adverse effects on Atlantic cod spawning. Similarly, recent research suggests that longfin squid spawning may not be adversely affected by pile-driving noise. In laboratory experiments where longfin squid were exposed to recordings of pile-driving noise from the installation of the Block Island Wind Farm, longfin squid did not demonstrate significant changes in reproductive behaviors (Stanley et al. 2023). The results from this study suggest that noise exposure is potentially more disruptive to squid feeding behavior and anti-predator responses than to spawning activity.

To mitigate noise impacts to the extent practicable, the Project would use a noise attenuation system that achieves at least 10 dB reduction in sound levels and would employ soft starts during impact pile driving, allowing a gradual increase of hammer blow energy and, thus, allowing mobile marine life to leave the area. Time-of-year restrictions may also be employed to limit construction noise exposure to soniferous species, such as Atlantic cod, and to avoid disrupting spawning aggregations that may form within the Project area (Nantucket Shoals). With these measures in place, injuries to fish and invertebrates are expected to be spatially localized, but impact periods would range from short term to potentially permanent. Therefore, impacts from pile driving on finfish, invertebrates, and EFH are anticipated to be moderate.

Noise - G&G survey (HRG surveys and geotechnical drilling activities): Geotechnical surveys have taken place prior to construction from 2019 to 2022 (Table 4-2, COP Vol. 2, SouthCoast Wind 2024), with no geotechnical surveys planned to occur during the construction or post-construction phases. These surveys were conducted to identify sensitive habitats (e.g. shellfish, SAV beds) and allow areas to be avoided to the extent practicable for siting of WTGs, OSPs, and cable routes. However, if specific locations of certain Project components differ from the previously surveyed layout, SouthCoast Wind would perform additional geotechnical investigations at any new locations not already covered by previous investigations. High-resolution geophysical (HRG) surveys would be conducted intermittently during construction to identify any seabed debris and provide general construction support. These surveys would include equipment operating at less than 180 kilohertz such as multi-beam echosounders, sidescan sonars, shallow penetration sub-bottom profilers (e.g., "Chirp", parametric, and non-parametric sub-bottom profilers), medium penetration sub-bottom profilers (e.g., sparkers), ultra-short baseline positioning equipment, and marine magnetometers. HRG surveys will be carried out on a routine basis during the 3 years following the first 2 years of construction, which is termed the "operations phase" in the Project's Incidental Take Regulations (LGL 2024).

Seismic noise from G&G surveys has been shown to create varying behavioral responses in fish. These responses in fishes have been documented but careful evaluations of their impacts and examinations of physiological injury are lacking (Carroll et al. 2016). Behavioral impacts on finfish from Project-related G&G surveys would also be localized and temporary. Mobile, intermittent, non-impulsive HRG survey sound sources, such as multi-beam echosounders and side-scan sonar, are not likely detectable by Atlantic sturgeon because they operate above the hearing sensitivity of this species (above 1 kilohertz) making the potential for auditory injury and behavioral disturbance unlikely.

For the HRG systems proposed for the Project, the distance to injury for fish was 13 feet (4 meters) for the sparker and 8.2 feet (2.5 meters) for the boomer (Table 3.5.5-9). During HRG surveys using impulsive equipment, finfish and invertebrates close to sparkers and boomers may experience temporary displacement (BOEM 2021). This type of behavioral impact would be localized to within 1,847 to 2,070 feet (563 to 631 meters) of the sound source and would be short term in duration. Finfish and invertebrates in the general area but not in the immediate vicinity of the sound source could experience short-term stress and temporary behavioral changes in a larger area affected by the sound.

Table 3.5.5-9. Impulsive HRG equipment source levels and associated PTS and behavioral disturbance distances for fish

Equipment	System	Highest Source Level (dB re 1 µPa)		PTS Distance (m) for Fish		Behavioral Disturbance Distance (m) for Fish
		L_{pk}	L_E	L_{pk}	L_E	
Sparker	SIG ELC 820 @ 750 J	213	182	4.0	0	631
Sub-bottom profiler	Teledyne Benthos Chirp III [a]	204	193	NA	NA	32
Boomer	Applied Acoustics S-boom @ 700 J	211	172	2.5	0	563

[a] Measured highest source levels were not provided for this exact system, so used generalized values for chirp sub-bottom profilers from Table 1 in NMFS 2021c.
dB = decibel; HRG = high resolution geophysical; m = meters; PTS = permanent threshold shift; L_{pk} = peak sound pressure level in decibels referenced to 1 microPascal squared; also written as SPL_{pk}; L_E = weighted cumulative sound exposure level in decibels referenced to 1 microPascal squared second; also written SEL_{cum}; NA = not applicable due to the sound source being out of the hearing range for the group
Source: NMFS 2021c: Table 1 and Tables A.2–A.5.

With the implementation of measures that would help mitigate the effects of HRG survey activities, the potential for serious injury is minimized. For example, ramp-up procedures would facilitate a gradual increase of equipment energy that would allow the finfish to avoid the area prior to the start of operations. In addition, as the survey equipment was secured to the survey vessel or towed behind a survey vessel and only turned on when the vessel is traveling along a survey transect, the potential effects would be transient and intermittent.

General vessel noise is produced from vessel engines and dynamic positioning to keep the vessel stationary while equipment is deployed and sampling is conducted for these surveys. BOEM's regulations and guidance under 30 CFR 585.626 and 585.627 require the lessee to submit detailed G&G data and analysis, among other data requirements to establish engineering and other construction parameters, and the G&G activities are, therefore, mandatory.

Considering the very small injury zones, the implementation of ramp-up procedures and the transient nature of the effect, the potential for finfish, including the Atlantic sturgeon, to be exposed to noise sources above physiological thresholds is considered extremely unlikely to occur. Effects of brief exposure above behavioral thresholds could result in temporary displacement from opportunistic feeding areas; however, the effects would be too small to be meaningfully measured. Therefore, noise exposure from HRG surveys is expected to have short-term and minor impacts on finfish, invertebrates, and EFH.

Noise - turbine operation: Offshore WTGs produce continuous, non-impulsive underwater noise during operation, mostly in lower-frequency bands below 8 kilohertz. There are several recent studies that present sound properties of similar turbines in environments comparable to that of the Proposed Action. Field measurements during operations indicate that sound levels are much lower than during construction; on average broadband root-mean-square sound pressure levels (SPL or L_{rms}) measured 164 feet (50 meters) from a Block Island Wind Farm turbine on average were 119 dB re 1 µPa and tonal peaks were observed at 30, 60, 70, and 120 Hz (Elliott et al. 2019). The Block Island Wind Farm turbines are 6 MW, direct-drive, four-legged jacket-pile structures. At the Block Island Wind Farm in winter, a 71 Hz constant tone was measured 328 feet (100 meters) from a turbine. In summer, sound levels increased between 70 Hz to 120 Hz. The maximum particle velocity during operations (as measured 328 feet [100 meters] from the turbine, just above the seabed) in winter was 40 dB re 1 nanometer per second, while in summer it was closer to 90 dB re 1 nanometer per second; most of the energy was below 25 Hz (Elliott et al. 2019). Overall, results from this study indicate that there is a correlation between underwater sound levels and increasing wind speed, but this is not clearly influenced by turbine machinery; rather it may be the natural effects that wind and sea state have on underwater sound (Elliott et al. 2019; Urick 1983). Furthermore, a recent compilation 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 below normal ocean ambient noise within 0.6 mile [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). Larger turbines (>10 MW) do produce higher levels of operational noise, and the least squares fit of that dataset would predict that an SPL measured 328 feet (100 meters) from a hypothetical 15 MW turbine in operation in 10 meters per second (19 knots or 22 miles per hour) wind would be 125 dB re 1 µPa. However, all of the turbines in the dataset, apart from the Block Island Wind Farm, were operated with gear boxes of various designs that did not use newer direct-drive technology that is expected to lower noise levels significantly. Stöber and Thomsen (2021) noted that the Block Island Wind Farm, using direct drive, is expected to be approximately 10 dB quieter than other equivalent sized jacket-pile turbines. Based on the Tougaard et al. 2020 dataset, operational noise from jacket piles could be louder than from monopiles due to there being more surface area for the foundation to interact with the water; however, the paper does point out that received level differences among different pile types could be confounded by differences in water depth and turbine size. Therefore, additional data are needed to fully understand the effects of size, foundation type, and drive type on the amount of sound produced during turbine operation.

Other studies have concluded that operational noise from WTGs is detected by finfish and can affect their behavior. For example, the particle motion generated at a WTG foundation from the turbine operation was found to generate relatively strong broadband sounds, as well as tones likely to induce behavioral responses by fishes, such as cod and plaice in the Baltic Sea (Hawkins 2020). Westerberg (1994, as cited in Mooney et al. 2020) reported on increased catchability of cod and roach (*Rutilus rutilus*) within 100 meters of a stopped WTG (i.e., with no noise) as compared to an operating WTG (i.e., with noise). WTG noise frequency and level were found to overlap with the auditory sensitivity of the marbled rockfish (*Sebastiscus marmoratus*), indicating turbine noise could be detected by fish and may have a masking effect on their acoustic communication (Zhang et al. 2021).

Based on the current source levels discussed above, it is unlikely that received levels of underwater noise from WTG operations would exceed physiological injury thresholds for finfish. However, sensitive species may be exposed to operational WTG noise levels that exceed temporary threshold shift (TTS) and behavioral thresholds when coupled with high wind events that increase ambient underwater noise levels. While the exact WTG type and supplier have not been finalized, SouthCoast Wind is currently considering the use of both direct drive and gear-driven current-generation turbines. The likelihood of exposure beyond TTS and behavioral thresholds may be higher particularly if larger (>10 MW), gear-driven WTGs would be installed under the Proposed Action. However, more acoustic research is warranted to characterize sound levels originating from larger turbines, the potential for those turbines to cause TTS effects, and to what distance behavioral and masking effects are likely. Operational noise effects are likely to be of low intensity and highly localized and are anticipated to attenuate to ambient levels within a close range of each foundation. Therefore, based on best available information, it is anticipated that operational noise from WTGs under the Proposed Action would have long-term but minor impacts on finfish, invertebrates, and EFH.

Noise – vessels: It is estimated that the Project would require approximately 15 to 35 vessels per day on average during construction, with an expected maximum peak of 50 vessels in the Lease Area at one time. These vessels generate low-frequency (10 to 100 hertz) (MMS 2007) non-impulsive, continuous noise. While received sound source levels from vessel noise are unlikely to exceed physiological injury thresholds for finfish and invertebrates, it may induce acoustic masking in soniferous fish, such as haddock (*Melanogrammus aeglefinus*) and cod (Vasconcelos et al. 2007). Continuous sounds produced by marine vessels have also been reported to change fish behavior; causing fish to change speed, direction, or depth; induce avoidance of affected areas by fish; or alter fish schooling behavior (Engås et al. 1995, 1998; Sarà et al. 2007; De Robertis and Handegard 2013; Mitson and Knudsen 2003). High levels of low-frequency noise (from 10 to 1,000 hertz) may be responsible for inducing an avoidance reaction (Sand et al. 2008). Popper et al. (2014) suggest that in response to continuous sounds, Atlantic sturgeon have a moderate risk for behavioral disturbance in the near field (e.g., tens of meters) and intermediate field (hundreds of meters) and low risk in the far field (thousands of meters). Masking effects are considered high risk in the near and intermediate field and moderate in the far field and TTS effects are considered of moderate risk in the near field and low in the intermediate and far fields. Vessel noise may also induce physiological stress and impair foraging and predator responses in both fish and invertebrates. Benthic feeders, such as the Atlantic sturgeon are unlikely to be affected while foraging by a transient vessel noise source. While these behavioral effects are considered possible, vessel noise would only result in brief periods of exposure near the surface of the water column and would not be expected to cause injury, hearing impairment, or long-term masking of biologically relevant cues in finfish and invertebrates. Consistent with this, BOEM determined that adverse impacts on finfish and invertebrates from noise generated by vessel transit and operations are not expected (BOEM 2018).

Given that the effects from vessel noise are expected to be temporary and localized, impacts of vessel noise to finfish, invertebrates, and EFH are, therefore, considered to be minor with no consequences on the population level.

Noise - UXO detonation: In addition to operational noises described above, there is a potential for interactions with UXOs, as well as the corrosion of UXOs in the Lease Area. The risk for encountering UXOs is moderate throughout all of the Lease Area, and a relatively equal ratio between low and moderate within the ECCs (COP Appendix E.7, SouthCoast Wind 2024). While non-explosive methods may be employed to lift and move these objects, some may need to be removed by explosive detonation. Underwater explosions of this type generate high pressure levels that could kill, injure, or disturb fish species, including ESA-listed species like the Atlantic sturgeon.

The exact number and type of UXOs in the Project area are not yet known, but SouthCoast Wind conservatively estimates that up to five UXOs in the Lease Area and up to five along the ECCs may have to be detonated in place. To avoid times when marine mammal species are more likely to be present, UXO detonations are only planned to occur from May through November, which will also benefit finfish and invertebrate species in these areas. Injury to fish from exposures to blast pressure waves is attributed to compressive damage to tissues surrounding the swim bladder and gastrointestinal tract, which may contain small gas bubbles. Effects of detonation pressure exposures to fish have been assessed in Hannay and Zykov (2022) according to the L_{pk} limits for onset of mortality or injury leading to mortality due to explosives, as recommended by the American National Standards Institute (ANSI) expert working group (Popper et al. 2014) and provided in Table 3.5.5-10. The injurious effects thresholds for all fish species groups are the same: L_{pk} = 229–234 dB re 1 µPa. For fish species that use swim bladders for hearing, Popper et al. (2014) suggest a high likelihood of TTS and recoverable injury at near and intermediate distances, where near refers to within a few tens of meters and intermediate refers to a few hundreds of meters. For fish species with swim bladders not used for hearing, the guidelines indicate high likelihood of recoverable impairment at near and intermediate distances but low levels of TTS at intermediate distances. For fish without swim bladders, the guidelines indicate low likelihood of recoverable injury at intermediate distances, moderate likelihood of TTS at intermediate distances, and low levels of both effects at far distances of a few kilometers (Table 3.5.5-10).

Table 3.5.5-10. Effects of detonation pressure exposures on fish

Type of Animal	Onset of Mortality	Onset of Physical Injury	Recoverable Injury	Temporary threshold shift (TTS)	Masking	Behavior
Fish: no swim bladder (particle motion detection)	229 – 234 dB (LPK)	206 dB (LPK) 187 dB (LE)	(N) High (I) Low (F) Low	(N) High (I) Moderate (F) Low	N/A	(N) High (I) Moderate (F) Low
Fish where swim bladder is not involved in hearing (particle motion detection)			(N) High (I) High (F) Low	(N) High (I) Moderate (F) Low		(N) High (I) High (F) Low
Fish: where swim bladder is involved in hearing (primarily pressure detection)			(N) High (I) High (F) Low	(N) High (I) High (F) Low		(N) High (I) High (F) Low

Note: N = near (distance within a few tens of meters), I = intermediate (distance within a few hundreds of meters), F= far (distance within a few kilometers).
Lpk = peak sound pressure level in decibels referenced to 1 microPascal squared; also written as SPLpk; LE = frequency weight sound exposure level in decibels referenced to 1 microPascal squared second; also written as SEL.
Sources: Hannay and Zykov 2022; Popper et al. 2014.

The greatest exceedance distance to the onset of injury for the largest UXO size (454 kg) with no noise mitigation measures is 2,779 feet (847 meters) (Table 3.5.5-11). During UXO detonation, noise mitigation would be required, and the likely achieved noise mitigation would be approximately 10 dB. Results show that when mitigation measures are applied, the maximum distance to the onset of injury threshold exceedance for the largest UXO size is reduced to 290 meters from the source, thereby, further reducing the risk of injury to fish from UXO detonation (Table 3.5.5-11). Implementation of mitigation measures coupled with the unlikely detonation of UXO, the low number of potential detonations required for the Proposed Action (modeled for no more than 10), further reduces the potential for exposure to finfish and invertebrates. Thus, the risk of injury or behavioral disturbance from UXO detonation is low, and impacts on finfish, invertebrates, and EFH, should they occur, are anticipated to be **minor** with no effects on the population level.

Table 3.5.5-11. Unmitigated and mitigated maximum exceedance distances for onset of injury for fish without and with a swim bladder due to peak pressure exposures for various UXO sizes

Species	Onset Injury L_{pk} (dB re 1 µpa)	All sites: Maximum distance to L_{pk} onset injury threshold exceedance (m)				
		E4 (2.3 kg)	E6 (9.1 kg)	E8 (45.5 kg)	E10 (227 kg)	E12 (454 kg)
All fish hearing groups (unmitigated)	229	145	230	393	671	847
All fish hearing groups (10 dB mitigation)	229 [a]	49	80	135	230	290

[a] The threshold of 229 dB re 1 µPa is from Popper et al. (2014).
dB = decibel; kg = kilogram; m = meter; UXO = unexploded ordnance; L_{pk} = peak sound pressure level in decibels referenced to 1 microPascal squared; also written as SPL_{pk}
Source: Hannay and Zykov 2022: Table 22 and Table 45.

Presence of structures: Various impacts on finfish, invertebrates, and EFH resulting from the presence of new structures associated with the Proposed Action are described in detail in Section 3.5.5.3. The Proposed Action would include up to 149 WTG/OSP positions, which would be constructed in mostly sandy seafloor areas. The size of the impact area would vary based on construction design (i.e., monopile, jacket, or suction bucket foundation). The primary impact would be from the foundations, which would be constructed in mostly soft-bottom seafloor, creating new habitat in the water column and transforming small portions of EFH. New structures could affect finfish and invertebrate migration through the area by providing unique complex features (relative to the primarily soft-bottom seafloor) and altering water currents. This could lead to retention of those species and possibly affect spawning opportunities. Impacts on fish migration as a result of structures associated with offshore wind are unknown, as studies related to this potential impact are not available.

New complex structures could result in additional impacts such as aggregation of fish, entanglement, gear loss, and habitat conversion. These impacts would be highly localized but could be long term for those structures that are not removed. Wind turbine structures would create an artificial reef effect, whereby more sessile and benthic organisms such as mussels, barnacles, anemones, and algae would likely colonize these structures over time creating new trophic pathways (De Mesel et al. 2015). Higher densities of invertebrate colonizers would provide a food source and habitat to other invertebrates such as mobile crustaceans. Additionally, new structures could be beneficial to some finfish and invertebrate species, providing potential feeding grounds and areas of protection from predators. In a synthesis study on the reef effect occurring in European and American offshore wind farms in the North Atlantic, Degraer et al. (2020) found that species densities, biological diversity, and biomass all increased in the soft-bottom communities nearest the turbine foundation. Methratta and Dardick (2019), in their meta-analysis of the effects of wind farm structures on fish populations, observed an almost universal increase in the abundance of benthic and demersal fish species inside wind farms. Trophic dynamics are likely to be altered through changes in predator–prey interactions. This could also lead to negative impacts on some juvenile fishes and invertebrates through increased predation through the aggregation of opportunistic feeders and predatory species. Similar effects would be expected from the use of scour protection and concrete mattresses for cable protection at cable crossing locations. SouthCoast Wind anticipates a maximum of 16 cable crossing locations along the Brayton Point ECC potentially requiring up to nine concrete mattresses each. Interarray cable crossings may also require cable protection, however, cable crossing locations along the interarray cable layout have not yet been identified. Colonization of concrete mattresses used for cable protection by epifouling taxa, mobile invertebrates, and benthic fishes has been found to occur in European wind farms. A recent study on artificial hard substrate colonization at the Hywind Scotland Pilot Park floating offshore wind farm (Karlsson et al. 2022) found species of hydroids, sea stars, crab, lobster, flatfish, and ling inhabiting concrete mattresses used for cable protection three years post construction. It is expected that epifaunal colonization, species succession, and reef effects will also occur on concrete mattresses used within the SouthCoast Wind Project area, however, the magnitude of effects may vary by location and season.

Turbulent wakes resulting from the water flow around turbine foundation structures influence local current speed and direction, which may increase vertical mixing (Segtnan and Christakos 2015; Grashorn and Stanev 2016; Carpenter et al. 2016; Cazenave et al. 2016). In strongly stratified locations, enhanced vertical mixing could increase pelagic primary productivity near the structure (Floeter et al. 2017), increasing the algal food source for zooplankton and filter feeders. Species that rely on soft-bottom habitat, such as surfclams and longfin squid, would experience a reduction in favorable conditions but not to the extent that population-level impacts would be expected. The presence of structures also has potential to influence sediment transport dynamics creating seabed scour that is often reported to reach equilibrium depths of about 1.3 times the foundation diameter (COP Appendix F2; SouthCoast Wind 2024). Project-specific modeling estimated scour would be less than this level (COP Appendix F2; SouthCoast Wind 2024). Species, such as surfclams, that reside in soft-bottom habitat may experience altered dynamics, but not to the extent that population-level impacts would be expected. The added structure from offshore wind development is generally considered to have a net neutral or positive effect on the affected environment from the artificial reef effect (English et al. 2017); however, the level of benefit or impact may vary by species and location (ICF 2021).

The recruitment of larval fish and invertebrate species may also be affected by alterations in water movement around offshore wind turbines. Shifts in circulation patterns could potentially affect the availability of food to species higher up the food chain (ICF 2021). A BOEM study on the effects of changes in hydrodynamics on larval distribution and settlement due to offshore wind development (Johnson et al. 2021) found that larval settlement density could be both positively or negatively affected by altered current speed and direction depending on wind farm build-out scenarios in the Massachusetts-Rhode Island offshore wind energy area and larvae-specific characteristics. In general, shifts in larval settlement patterns were evident for all three species modeled (Atlantic sea scallop, silver hake, and summer flounder). Larval sea scallop settlement density was found to increase south of Block Island but decreased south of Martha’s Vineyard in response to increased current speeds north of the offshore wind build-out areas. Silver hake larval settlement shifted to the south of Nantucket Shoals and into the Georges Bank area, while summer flounder larval settlement density decreased in Nantucket Sound both due to reduced current speeds within the offshore wind build-out areas. However, observed shifts in larval settlement are not expected to affect fisheries stocks for these species on a regional level (Johnson et al. 2021).

The presence of WTGs is also expected to result in broadscale effects on nutrient availability, primary production, and ecosystem dynamics (Christiansen et al. 2022; Dorrell et al. 2022; van Berkel et al. 2020) through surface wind speed reductions caused by the extraction of wind energy by wind turbines (wind wake) and hydrodynamic alterations in and around the Lease Area. A recent report by the National Academies of Science Engineering and Medicine (NASEM 2024) evaluated the potential of offshore wind farms to alter the hydrodynamic processes and productivity in the Nantucket Shoals region of the North Atlantic. The report determined that potential ecological impacts from offshore wind projects adjacent to Nantucket Shoals are difficult to predict due to the lack of observational studies and the uncertainty of hydrodynamic effects at the turbine, wind farm, and regional scales. The report further concludes that the hydrodynamic impacts on zooplankton productivity and distribution would be difficult to isolate from the significant impacts of climate change or other influences on the Nantucket Shoals regional ecosystem. As described in Section 3.5.5.3, potential impacts on net primary productivity in the North Atlantic from the presence of structures may occur but more research is needed to determine the extent that these impacts are influenced by changes in ocean stratification or other physical mechanisms. Atmospheric and hydrodynamic effects caused by the presence of WTG structures can be both localized and broad scale extending from a few hundred meters (Li et al. 2014; Schultze et al. 2020) to tens of kilometers (Dorrell et al. 2022; Christiansen et al. 2022) from a WTG and is likely to vary depending on season and location. While observations and model scenarios of wind wakes associated with wind energy fields have been generated for wind farms in the North Sea (Schultze et al. 2020; Daewel et al. 2022; Christiansen et al. 2022), there is still uncertainty regarding the applicability of those models to the oceanographic environment of the northeastern U.S. continental shelf (van Berkel et al. 2020; Miles et al. 2021). Furthermore, the cascading effects on trophic ecology and spatial distribution of fish and invertebrate species in the U.S. Atlantic OCS from wind turbine-induced changes in local and regional ocean dynamics are not yet fully understood and requires further study. Given the current body of knowledge, impacts on finfish, invertebrates, and EFH from wind farm-induced hydrodynamic changes are expected to be permanent and minor but may vary seasonally and regionally.

Traffic (vessel strikes): Project-related vessels used in pre-construction, construction, O&M, and decommissioning may pose a potential collision risk to finfish. Impacts would be greatest during construction, which would require a daily average of 15 to 35 vessels operating with the Offshore Project area or transiting to and from ports, with an expected maximum peak of 50 vessels in the Lease Area at one time, depending on activities. Impacts would be reduced during O&M because fewer vessel trips would be required and increase again during decommissioning. SouthCoast Wind has proposed a range of mitigation measures to avoid or reduce vessel strike risk for marine mammals and sea turtles such as dedicated observers/PSOs, vessel separation requirements, and vessel speed reductions, which may also benefit finfish species.

As described in Section 3.5.5.3, impacts of vessel collisions can result in injury and mortality but no population-level effects would be anticipated. In comparison to existing vessel traffic in the geographic analysis area, the Proposed Action would not have a measurable increase in potential vessel strikes and impacts on finfish, invertebrates, and EFH would be negligible.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind and offshore wind activities. Ongoing and planned non-offshore wind activities that would contribute to impacts on finfish, invertebrates, and EFH include submarine cables and pipelines, tidal energy projects, marine minerals extraction, dredging, military use, marine transportation, fisheries use and management, global climate change, and oil and gas activities.

Cumulative impacts of the Proposed Action would result in negligible to moderate impacts on finfish, invertebrates, and EFH from noise, cable emplacement, accidental releases, anchoring, discharges, EMF, and lighting. Most of the risk of accidental releases of invasive species comes from ongoing activities, and the impacts (mortality, decreased fitness, disease) due to other types of accidental releases are expected to be negligible. Ongoing and planned activities, including the Proposed Action, could collectively affect up to 3,072 acres (12.4 km^2) of seabed from anchoring, of which the Proposed Action would contribute 442 acres (1.78 km^2) or 14 percent. Cumulative impacts from anchoring would likely be minor and short term, with localized impacts only occurring in the immediate vicinity of anchors. The Proposed Action's contribution to impacts from discharge are anticipated to be minimal considering that the Project would contribute only 149 of the 3,094 future offshore wind structures (5 percent). Impacts from other offshore wind projects from EMF and lighting would result in similar impacts as the Proposed Action and result in overall negligible to minor impacts.

Impacts (disturbance, displacement, injury, and mortality) of new cable emplacement and maintenance under the Proposed Action and other offshore wind projects are estimated to affect up to 185,710 acres (751.5 km^2) on the Atlantic OCS. Of this, the Proposed Action would contribute 2,480 acres (10.6 km^2) of seafloor disturbance within the export cable route corridors and 1,408 acres (5.7 km^2) of seafloor disturbance in the Lease Area. In locations experiencing construction, the affected areas are expected to show some natural recovery. Seabed scars associated with jet plow cable installation are expected to recover in a matter of weeks, allowing for recolonization (MMS 2009). Mechanical trenching, which could be used in coarser sediments, could result in more-intense disturbances and a greater width of the impact corridor. Overall, cable placement activities are expected to cause permanent habitat conversion, leading to long-term localized impacts.

Construction and O&M of 3,094 offshore wind structures, including the Proposed Action, would contribute to impacts on finfish, invertebrates, and EFH from the presence of structures and noise. The Proposed Action's contribution to these impacts from installation of 149 structures would be relatively minimal. The cumulative impacts from the presence of structures would likely be minor to moderate, potentially beneficial, and long term, given that hard-structure surfaces could provide benefits to finfish and invertebrates while they are in place. Impacts of the Proposed Action from noise and the presence of offshore wind structures are expected to be long term, over the course of up to 10 years of construction, and negligible to moderate.

Impacts of Alternative B – Proposed Action on ESA-Listed Species

Impacts of the Proposed Action on ESA-listed finfish and invertebrates are limited to impacts on shortnose sturgeon and Atlantic sturgeon due to their occurrence in the Project area. Other ESA species in the geographic analysis area, including the giant manta ray, oceanic whitetip shark, and Atlantic salmon, are not expected to be present in the Offshore Project area. While these species may occur along Proposed Action vessel routes to and from ports, interactions between vessels and species are considered unlikely or are not identified as a threat to the species, as described in Section 3.5.5.1.

The Proposed Action would have similar impacts on Atlantic sturgeon as other non-ESA species. Presence of structures, emplacement and maintenance of cables, EMFs, gear utilization, and traffic are the primary IPFs that may affect migrating Atlantic sturgeon. To a lesser extent, shortnose sturgeon may be affected by nearshore cable emplacement and maintenance, EMFs, and traffic. Shortnose sturgeon may occur in the nearshore ECCs and landfall locations but are not expected in the Lease Area and, thus, would avoid offshore-related impacts from WTG installation.

Atlantic sturgeon would rarely occur in the Lease Area (Stein et al. 2004; Eyler et al. 2009; Dunton et al. 2010; Erickson et al. 2011) and are unlikely to be affected by WTG installation activity. Atlantic sturgeon individuals would only likely be present intermittently, moving through the Lease Area throughout their spring and fall migrations, and may forage opportunistically where benthic prey are present. The Project area is not known to be a preferred foraging area and has not been identified as an aggregation area, which reduces the potential for impact on this species from pile-driving noise. Atlantic sturgeon could be exposed to noises above behavioral thresholds and may avoid the area; however, access to preferred foraging, spawning, or overwintering areas would not be affected, and only cessation of opportunistic foraging during the migration period is expected. Should an exposure occur, it would be temporary with effects dissipating once the activity has ceased or the individual has left the area. Any behavioral effects would be temporary and limited to the small ensonified area with sound levels above the behavioral threshold. Given the dispersed distribution of Atlantic sturgeon in the Lease Area, the extremely unlikely potential for co-occurrence in time and space within the small area where exposure to peak noise could occur, and the anticipated avoidance of disturbing levels of sound, effects of exposure to sound levels above injury or behavioral thresholds is not expected. The greatest concern for Atlantic sturgeon with respect to placement of structures would be the changes in oceanographic and hydrologic conditions resulting from structures in the open ocean and the subsequent impacts on prey sources. However, Atlantic sturgeon consume prey, such as the sand lance, mollusks, polychaete worms, amphipods, isopods, and shrimp, not as closely affected by physical oceanographic features as other ESA-listed species. Potential impacts on larval dispersion and survival of Atlantic sturgeon prey species from changes in hydrologic conditions are unlikely and impacts are expected to be negligible.

Adverse impacts on sturgeon resulting from trawling capture are related to tow speed and duration (Moser et al. 2000). Northeast Fisheries Observer Program data from Miller and Shepherd (2011) indicate that mortality rates of Atlantic sturgeon caught in otter trawl gear is approximately 5 percent. Short-tow durations and careful handling of individuals once on deck are likely to result in a very low risk of mortality to captured individuals. The methods for the proposed trawl survey would employ a tow speed of 3.0 knots and a tow duration of 20 minutes (SMAST 2024), greatly reducing the likelihood of Atlantic sturgeon being caught during survey activities. Individual Atlantic sturgeon have been incidentally captured and released with minor injuries during trawl-based monitoring surveys conducted for the South Fork Wind Project (in BOEM 2023). While the dispersed nature of Atlantic sturgeon, the limited number of trawl tows, and expected short tow duration of fisheries and habitat surveys are not expected to result in Atlantic sturgeon mortality, trawl surveys could still result in the capture of some Atlantic sturgeon along with potential minor injuries associated with the action.

Both Atlantic sturgeon and shortnose sturgeon could be affected by Project vessel traffic to and from ports, with Atlantic sturgeon having the greatest potential for impact. While sturgeon are known to be struck and killed by vessels in rivers and estuaries, there are no reports of vessel strikes in the marine environment, likely due to the space between bottom-oriented sturgeon and the propellers and hulls of vessels (BOEM 2021). Dunton et al. (2010) reported approximately 95 percent of all Atlantic sturgeon captured in a sampling off New Jersey occurred in depths less than 66 feet (20 meters) with the highest catch per unit of effort at depths of 33 to 49 feet (10 to 15 meters). At these depths in open coastal and marine environments, Atlantic sturgeon are not likely to be struck by Project-related vessels. The dispersed nature of vessel traffic and individual sturgeons reduces the potential for co-occurrence of individual sturgeon and individual vessels throughout most of the Project area.

Atlantic sturgeon strikes are most likely to occur in areas with abundant boat traffic such as large ports or areas with relatively narrow waterways (ASSRT 2007). The majority of vessel-related Atlantic sturgeon mortality is likely caused by large transoceanic vessels travelling upriver in river areas that are comparatively narrower and shallower than the waters near the mouth of the river and over habitat types preferred by adult Atlantic sturgeon. In these areas, the draft and propeller depth of ocean vessels may overlap with the depth preference of Atlantic sturgeon (Brown and Murphy 2010; Balazik et al. 2012). In offshore areas, the risk of a vessel strike is likely to be minimal due to overall lower densities of sturgeon and available space for sturgeon to avoid vessels in these areas. Therefore, the potential for vessel strikes to ESA-listed Atlantic sturgeon is considered extremely unlikely to occur. Vessel traffic in relation to the Project is not expected to have a measurable impact on the listed sturgeon species in comparison to existing vessel traffic.

BOEM is in the process of assessing the impacts of the Proposed Action on ESA-listed finfish in the BA and on EFH in the EFH Assessment. BOEM will continue to consult with NMFS under the ESA and results of consultation will be included in the Final EIS. In addition, impacts on EFH will be described in the Final EFH Assessment.

Conclusions

Impacts of the Proposed Action: Activities associated with construction and installation, O&M, and decommissioning of the Proposed Action would have **moderate adverse** and **minor beneficial** impacts on finfish, with the primary impacts on finfish occurring as a result of noise during construction of the Proposed Action. The majority of impacts would likely be behavioral and temporarily displace some finfish, with mortality being a relatively uncommon event as a result of the Proposed Action.

Activities associated with construction and installation, O&M, and decommissioning of the Proposed Action would have long-term but localized and negligible to moderate impacts on EFH, through temporary to permanent but localized disturbance and habitat conversion. Primary impacts on EFH would result from new cable emplacement, the presence of structures, and anchoring. The resources would likely recover naturally over time. Soft-bottom habitat and sand ripples are expected to recover quickly. Sedimentation due to development activities would only affect habitat in the short term before dissipating. The presence of structures is expected to lead to aggregations and the formation of artificial reefs, creating new habitat with beneficial impacts.

Activities associated with construction and installation, O&M, and decommissioning of the Proposed Action alone would have negligible to moderate impacts on invertebrates through temporary disturbance and displacement, habitat conversion, and behavioral changes, injury, and mortality of sedentary fauna. The presence of structures may have a minor beneficial effect on invertebrates through an artificial reef effect. Despite invertebrate mortality and varying extents of habitat alteration, BOEM expects the long-term impact on invertebrates from construction and installation of the Proposed Action to be moderate. Although some resources would likely recover naturally over time, the proposed activities are likely to create areas of permanent habitat conversion. In general, the impacts are likely to be local and thus would not be expected to extend to the far-larger geographic analysis area (i.e., LME). The larger invertebrate geographic analysis area was selected to account for migratory movement of mobile species that are predicted to experience negligible impacts with respect to the Proposed Action's contribution to the impacts of individual IPFs resulting from ongoing and planned activities. The primary impacts on invertebrates would be expected to occur as a result of new cable emplacement, the presence of structures, noise from pile driving, and anchoring.

Cumulative Impacts of the Proposed Action: Cumulative impacts from the Proposed Action when combined with the impacts from ongoing and planned activities, including offshore wind activities, would result in **moderate adverse** impacts on finfish, invertebrates, and EFH in the geographic analysis area.

3.5.5.6 Impacts of Alternative C on Finfish, Invertebrates, and Essential Fish Habitat

Impacts of Alternative C: Alternatives C-1 and C-2 would avoid EFH and HAPCs by avoiding cable installation in the Sakonnet River through alternative onshore routes. Alternative C-1 would reduce the total offshore export cable route by 9 miles (14 kilometers) and Alternative C-2 would reduce the total offshore export cable route by 12 miles (19 kilometers). These reductions in offshore export cable length would eliminate the construction and installation impacts from cable emplacement and anchoring in the Sakonnet River compared to the Proposed Action. The sensitivity of the Alternative C local environment relative to the environment where the cable would be located under the Proposed Action could influence the magnitude of the potential reduction in impacts from Alternative C-1 and Alternative C-2. The Sakonnet River contains a mix of soft-bottom and complex substrates, which can be important benthic habitats for fish and invertebrates (refer to the analysis of Alternative C in Section 3.5.2, *Benthic Resources* for a description of benthic habitat impacts along the Brayton Point ECC). In a few locations, live *Crepidula* reefs or *Crepidula* shell hash were found on the sediment surface overlying reduced silt

(COP Appendix M.2; SouthCoast Wind 2024), which is a biogenic habitat that also adds complexity to the seafloor. This complex habitat, along with some boulder fields in Mount Hope Bay, are EFH for many species, and Alternative C will avoid the disturbance of this benthic habitat. Because the Sakonnet River is HAPC for juvenile Atlantic cod, there is a greater potential for Alternative C to avoid or minimize impacts on this species than the Proposed Action because cable emplacement would not occur in the Sakonnet River. Impacts on shortnose sturgeon that make coastal migrations through the nearshore estuarine waters of the Sakonnet River may also be reduced because there would be a decrease in estuarine benthic disturbance under both Alternatives C-1 and C-2, although their presence in this area is considered unlikely.

Project-specific site-assessment surveys are not available for the portion of the Alternative C export cable corridors that diverge from the Proposed Action cable corridors. However, to support BOEM's analysis of the alternatives, SouthCoast Wind commissioned a geohazard desktop study that evaluated geological features and other constraints associated with both Alternatives C-1 and C-2 (TetraTech 2023) and a desktop benthic study using available site-specific and regional benthic data for Alternative C-1 (INSPIRE 2023b). Within the 6-mile portion of the Alternative C-1 route toward the Aquidneck Island landfall, all of the over 20 USGS benthic grab samples consisted of Muddy Sand and Sand, except for one Gravel sample near the landfall location at Sachuest Beach (INSPIRE 2023b). However, the Alternative C-1 route would pass through Elbow Ledge, a high relief bathymetric feature to the south of Sachuest Bay that attracts fish from surrounding areas (Section 3.5.2, *Benthic Resources*, Figure 3.5.2-2). This shoal likely provides hard substrate for attached fauna to grow and complex habitat that supports benthic and demersal species (INSPIRE 2023b). By passing through Elbow Ledge, Alternative C-1 could present more challenges during cable installation and may potentially create a greater impact to EFH compared to the similar offshore portion of the Proposed Action cable route.

As under the Proposed Action, SouthCoast Wind would use HDD for the installation of the Alternative C offshore export cables beneath the shallower nearshore areas at all landfall locations. This is expected to substantially reduce impacts of sediment dispersion on sensitive habitats, such as SAV and wetlands, which could serve as EFH. Based on the moderate and temporary to short term nature of impacts from cable emplacement for the Proposed Action, BOEM anticipates that potential effects from avoiding the installation of export cables in the Sakonnet River would result in a reduced impact on finfish, invertebrates, and EFH but would not change the overall impact level.

The reductions in offshore export cable length would likewise reduce the O&M impacts associated with the long-term presence of cable protection compared to the Proposed Action. The potential difference in impacts between the Proposed Action and Alternative C from the presence of structures would depend on the amount of cable protection required and the habitat type where it is placed. In comparison to the Proposed Action, the amount of cable protection is anticipated to be less for Alternative C-1 followed by Alternative C-2 based on cable length. Anticipated impacts associated with finfish, invertebrates, and EFH during operation of cables under the Proposed Action are expected to be minor, potentially beneficial, and long term, given that hard-structure surfaces could provide benefits to finfish and invertebrates while they are in place. Due to the potentially adverse and beneficial long-term impacts of the presence of structures, BOEM anticipates that potential benefits from avoidance of cable emplacement impacts within Sakonnet River habitats would not result in a change in impact level from O&M on finfish, invertebrates, and EFH.

Cumulative Impacts of Alternative C: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C would be similar to those described under the Proposed Action.

Impacts of Alternative C on ESA-Listed Species

The export cable reroute under Alternatives C-1 and Alternative C-2 would not cross other habitats important to ESA-Listed species, but it would have a reduced total length of offshore export cable installation and, therefore, reduced potential impacts from construction, installation, operations, and maintenance. Under the Proposed Action, new cable emplacement and maintenance are expected to have negligible impacts on ESA-listed species. Therefore, BOEM anticipates that impacts on ESA-listed species under Alternative C would not be measurably different from those anticipated under the Proposed Action.

Conclusions

Impacts of Alternative C: Alternative C would reduce cable-related impacts on finfish, invertebrates, and EFH within the Sakonnet River compared to the Proposed Action. The Sakonnet River is an important area for juvenile Atlantic cod and other species with EFH present, but overall impacts on this area under the Proposed Action area are anticipated to be small and make up a small portion of the overall Project impacts. Therefore, construction and installation, O&M, and decommissioning of Alternative C would likewise result in **moderate** adverse impacts on finfish, invertebrates, and EFH from cable emplacement and **minor** adverse impacts from cable maintenance and anchoring, and these activities could include **minor beneficial** impacts from the reef effect associated with the presence of structures. For all other IPFs specific to Alternative C, impacts are expected to be negligible.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with Alternative C would be similar to the Proposed Action and result in **moderate adverse** impacts on finfish, invertebrates, and EFH.

3.5.5.7 Impacts of Alternative D (Preferred Alternative) on Finfish, Invertebrates, and Essential Fish Habitat

Impacts of Alternative D: Alternative D would eliminate six WTGs in the northeastern portion of the Lease Area to reduce potential impacts on foraging habitat and potential displacement of wildlife from this habitat adjacent to Nantucket Shoals (Chapter 2, Figure 2-7). The northeastern edge of the Lease Area is about 3.1 miles (5 kilometers) from the 30-meter isobath boundary of Nantucket Shoals. Nantucket Shoals provides important habitat for fish species and removing WTGs near this area may reduce impacts on finfish, invertebrates, and EFH. Notably, the northeastern portion of the Lease Area is approximately 20 miles (32 kilometers) from the Great South Channel Habitat Management Area (GSC HMA) in Nantucket Shoals, which the New England Fishery Management Council (NEFMC) established to protect complex benthic habitats important to juvenile cod and other groundfish species from mobile bottom-tending fishing gear (NOAA 2020). The species with EFH designations in the GSC HMA, and by extension Nantucket Shoals, are the same species that have EFH designations within the Lease Area for all life stages, including Atlantic cod, Atlantic sea scallop, windowpane flounder, winter flounder, yellowtail flounder, and longfin inshore squid (NEFMC 2018; Guida et al. 2017). Excluding Atlantic Sea scallop, these species are designated as overfished as a result of overfishing, habitat degradation, pollution, climate change, and disease (NOAA 2021). Eliminating WTGs would reduce impacts on these species associated with the construction and O&M of the Project.

The greatest source of impacts generated by WTG installation on fish is noise pollution from pile driving. As discussed in Section 3.5.5.5, *Impacts of Alternative B,* injury from prolonged cumulative exposure (over the entire installation of a pile) would extend as far as 10 miles (16.65 kilometers) (

Table). Because the northeastern edge of the Lease Area is located within 3.1 miles (5 kilometers) of the 30-meter isobath of Nantucket Shoals, removal of six WTGs at the edge of the Lease Area would lessen, but not avoid, noise exposure on EFH in Nantucket Shoals, as noise impacts from pile driving activity from other WTGs would still extend beyond the 30-meter isobath.

Other impacts from WTG installation, such as sediment dispersion from installation activities, would be reduced locally near the site of the WTGs, but these impacts would likely not extend into Nantucket Shoals regardless of Alternative D. The removal of six WTGs would also likely not result in a meaningful change in impacts associated with the presence of structures on hydrodynamic and atmospheric effects, because these effects may extend for several tens of kilometers beyond a wind farm (Christiansen et al. 2022). Other effects, whether adverse, beneficial, or neutral would likely not be greatly affected by the elimination of six WTGs as impacts from construction and O&M of 143 WTG/OSP foundations would still occur. Overall, BOEM anticipates that Alternative D would reduce impacts on finfish, invertebrates, and EFH by increasing the distance from the boundary of construction activities to the boundary of Nantucket Shoals but the overall impact magnitudes would be the same as the Proposed Action.

Cumulative Impacts of Alternative D: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative D would be similar to those described under the Proposed Action.

Impacts of Alternative D on ESA-Listed Species

Impacts on ESA-listed species associated with Alternative D would be largely similar to the impacts associated with the Proposed Action.

Conclusions

Impacts of Alternative D: Alternative D would reduce impacts on finfish, invertebrates, and EFH compared to the Proposed Action by eliminating six WTGs nearest to Nantucket Shoals, which provides important fish habitat and EFH for several fish species. While impacts would be reduced locally near the sites of the six removed WTG positions, impacts from the remaining 143 WTG/OSP foundations would still occur. Therefore, Alternative D is not expected to change the overall impact magnitude of the Project compared to the Proposed Action. Construction and installation, O&M, and decommissioning of Alternative D would likewise result in **moderate adverse** impacts on finfish, invertebrates, and EFH from interarray cable emplacement and **minor adverse** impacts from cable maintenance, anchoring, pile driving noise, and foundation installation, and could include **minor beneficial** impacts from the reef effect associated with the presence of structures. For all other IPFs specific to Alternative D, impacts are expected to be negligible.

Cumulative Impacts of Alternative D: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with Alternative D would be similar to the Proposed Action and result in **moderate adverse** impacts on finfish, invertebrates, and EFH.

3.5.5.8 Impacts of Alternative E on Finfish, Invertebrates, and Essential Fish Habitat

Impacts of Alternative E: Alternative E includes the use of all piled (Alternative E-1), all suction-bucket jacket (Alternative E-2), or all GBS (Alternative E-3) foundations for WTGs and OSPs. Because the Proposed Action already considers maximum pile-driving impacts of all 149 structures, there would be no difference in impacts from Alternative E-1. Alternative E-1 would install the WTGs and OSPs on either monopile or piled jacket foundations. These foundations would require installation via pile-driving. All noise-related impacts, including acoustic stress and alterations of movement, calling, and spawning behavior in finfish and invertebrates described under the Proposed Action are applicable under Alternative E-1. Impact pile driving for piled jacket foundations would occur for 2 hours per foundation with a maximum of eight piles installed per day. Impact pile driving for monopiles would occur for 4 hours per foundation with a maximum of two piles installed per day. Under Alternative E-2 and Alternative E-3, no impact pile driving would be conducted, eliminating impacts due to underwater noise. Absent the potential impacts on finfish and invertebrates from pile-driving noise, the overall construction and installation impacts on finfish and invertebrates would be reduced under Alternative E-2 and Alternative E-3 compared to the Proposed Action.

GBS foundations, under Alternative E-3, would result in the greatest area of benthic habitat disturbance from the foundation footprint and scour protection at an additional 1,317 acres compared to the Proposed Action (Table 3.5.5-12). Alternative E-2, all suction-bucket jacket foundations, would increase the benthic disturbance area by 336 acres while Alternative E-1, all piled foundations, would be expected to have the same benthic disturbance area as the Proposed Action (Table 3.5.5-12). A smaller foundation footprint would reduce O&M impacts due to the presence of structures and less scour protection would result in a decrease in soft-bottom habitat disturbance. This would benefit the existing soft-bottom benthic, surficial, and infaunal fish and invertebrate communities within the Lease Area.

Table 3.5.5-12. Acreage of benthic disturbance from Alternative E compared to the Proposed Action

Alternative	Difference in Area of Benthic Disturbance from Proposed Action
Alternative E-1: All Piled Foundation Structures	Same as Proposed Action
Alternative E-2: Suction-bucket Jacket Foundations only	336 acres more
Alternative E-3: Gravity-based Foundations only	1,317 acres more

All foundations would require some seabed preparation before construction. Seabed preparation may be required especially if the seabed is not sufficiently level. For Alternative E-1 piled foundations, in addition to permanent foundation and scour protection, there would be an additional 0.5 acre of temporary seabed disturbance per foundation. Alternative E-2 suction bucket jacket foundations require an additional 0.6 acre of temporary seabed disturbance per foundation. Alternative E-3 GBS foundations may include rock layer/scour protection and dredging. In addition to permanent foundation and scour protection, an additional 1.0 acre of temporary seabed disturbance per WTG foundation and 1.5 acre per OSP foundation would be required for Alternative E-3.

Alternative E-3 would result in the greatest artificial reef creation, due to the GBS foundations having the largest footprint. As discussed under the Proposed Action, the artificial reef effect from scour protection may increase overall abundance and diversity of finfish and invertebrates. Alternative E-2 and the piled jacket foundations of Alternative E-1 would provide more surface area for aggregation, while monopiles would provide the least. The increased surface area would also increase the potential of invasive species impacts. With more area to colonize, Alternative E-3 would have the largest risk of harboring invasive species.

Given that Alternative E would result in reductions in both adverse and beneficial impacts, O&M impacts on finfish, invertebrates, and EFH are not expected to be measurably different from those anticipated under the Proposed Action.

Cumulative Impacts of Alternative E: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative E would be similar to those described under the Proposed Action.

Impacts of Alternative E on ESA-Listed Species

Activities would not differ between the Proposed Action and Alternative E-1. Under Alternative E-2 and Alternative E-3, no impact pile driving would be conducted, eliminating impacts due to underwater noise on ESA-listed species compared to the Proposed Action. However, with the larger areas of habitat conversion associated with foundation types used in Alternative E-2 and Alternative E-3, more soft-bottom habitats would be rendered unavailable to EFH species including ESA-listed species that forage in these habitats (e.g., Atlantic sturgeon). Other impacts of Alternative E on ESA-listed species would be similar to the impacts of the Proposed Action.

Conclusions

Impacts of Alternative E: Impacts of Alternative E-1 would not be measurably different than the impacts of the Proposed Action. Therefore, construction, O&M, and decommissioning of Alternative E-1 would result in **moderate** adverse impacts on finfish, invertebrates, and EFH from interarray cable emplacement and **minor** adverse impacts from cable maintenance, anchoring, pile driving noise, and foundation installation, and could include **minor beneficial** impacts from the reef effect associated with the presence of structures. For all other IPFs specific to Alternative E-1, impacts are expected to be negligible.

Impacts of Alternative E-2 and Alternative E-3 would be similar to impacts of the Proposed Action with the most notable difference the reduction in short-term impacts from avoidance of pile-driving noise and the increase in long-term impacts from larger foundation footprints. Construction, O&M, and decommissioning of Alternative E-2 and Alternative E-3 would still result in **moderate adverse** impacts on finfish, invertebrates, and EFH from interarray cable emplacement and **minor adverse** impacts from cable maintenance, anchoring, and foundation installation, and could include **minor beneficial** impacts from the reef effect associated with the presence of structures. For all other IPFs specific to Alternatives E-2 and E-3, impacts are expected to be negligible.

Cumulative Impacts of Alternative E: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative E would be similar to the Proposed Action and result in **moderate adverse** impacts on finfish and invertebrates.

3.5.5.9 Impacts of Alternative F on Finfish, Invertebrates, and Essential Fish Habitat

Impacts of Alternative F: Under Alternative F, the Falmouth offshore export cable route would include the use of up to three ±525kV HVDC cables connected to one HVDC converter OSP (if Falmouth is selected as the POI for Project 2), instead of up to five HVAC cables connected to one or more HVAC OSPs as proposed under the Proposed Action. The addition of an HVDC converter OSP would result in the same types of impacts as described under the Proposed Action, including entrainment of fish larvae at cooling water intakes and thermal plume discharge, but impacts could be greater because there would be one additional HVDC converter OSP under Alternative F (the Proposed Action includes at least one HVDC converter OSP but also includes the potential for multiple). The HVDC converter OSP associated with Falmouth for Project 2 would be in the southern portion of the Lease Area. The design of the OSP is expected to be the same as the OSP for Project 1 for Brayton Point, which is described in greater detail under the analysis of the Proposed Action based on the NPDES permit application (TetraTech and Normandeau Associates, Inc. 2023) and would, therefore, result in the same entrainment/impingement impacts, except that the OSP would be located in deeper water and at a further distance from Nantucket Shoals.

In modeling the effects of entrainment on larval dispersal patterns and population dynamics associated with once-through CWISs in power plants in the coastal region of California, White et al. (2010) found that the effects of CWIS entrainment were highly localized in space and had minimal effects on population densities except when the population had been heavily depleted by other factors. Entrainment effects were also found to be more severe when the CWIS intake was located nearshore as opposed to farther offshore due to the low rates of diffusive movement nearshore. Eggs and larvae of overfished species with poor stock status (e.g., Atlantic cod, Atlantic herring, red hake) that spawn within the vicinity of the SouthCoast Wind converter station OSPs would be vulnerable to entrainment effects. However, applicant-committed mitigation measures in the operation of the converter OSP CWIS, such as restricting intake velocities to less than 0.5 foot per second (0.15 meter per second), single pump operation, and dual pump operation at reduced capacity via three-way valve or variable frequency drives have been put in place to minimize potential entrainment and impingement impacts (TetraTech and Normandeau Associates, Inc. 2023). With these measures in place, impacts would be minimized, and it is not expected that Alternative F would result in a substantive increase in adverse impacts from an additional HVDC converter OSP compared to the Proposed Action (the Proposed Action includes the potential for multiple HVDC converter OSPs).

The reduction in the number of cables from five HVAC cables to three HVDC cables would reduce the total seabed disturbance and benthic habitat disturbance in the Falmouth ECC by approximately 700 acres (2.8 square kilometers). While the exact location of the up to two cables that would not be installed under Alternative F is not yet known, within the Muskeget channel the reduction in cable disturbance is expected to minimize impacts on complex benthic habitats in this area. Approximately

2,140 acres of complex habitat (coarse sediment, glacial moraine A, and boulder fields) can be found within an 8.2-mile (13.2-kilometer) segment of the Falmouth ECC as it crosses the Muskeget Channel (Table 3.5.5-3; INSPIRE 2022). The total width of disturbance of the cables would be reduced from 98.5 feet (assuming a 19.7-foot-wide disturbance per cable; COP Volume 1, Table 3-29; SouthCoast Wind 2024) under the Proposed Action to 59.1 feet (18 meters) under Alternative F, reducing the extent of impacts on habitats along this segment of the Falmouth cable corridor from 98 acres to 59 acres. Depending on the final cable placement within the ECC, up to a 40 percent reduction in seabed disturbance from installation of the Falmouth offshore export cables can be anticipated, which would reduce impacts on benthic habitats, in particular complex habitats found in the Muskeget Channel, that may be important EFH. Other impacts from cable emplacement activities including temporary entrainment/impingement effects during cable-laying operations and anchoring may also be reduced under Alternative F due to fewer cables installed compared to the Proposed Action.

Though fewer DC cables would be installed under Alternative F, the amplitude of EMFs generated by DC cables can be up to three times greater than that of AC cables (Hutchison et al. 2020b). However, AC and DC EMFs differ in the way they interact with organisms and direct comparisons cannot be made (CSA Ocean Sciences, Inc. and Exponent 2019). Previous studies on DC undersea cables have shown only temporary alterations in mobility and behavior of some fish and invertebrate species with no appreciable effects on overall movement or population health (Hutchison et al. 2018; Wyman et al. 2018; Klimley et al. 2017). Furthermore, the effects of EMF from undersea cables are substantially reduced when the target cable burial depth of 3.2 to 13.1 feet (1.0 to 4.0 meters) is achieved (CSA Ocean Sciences, Inc. and Exponent 2019). Even with the reduction in cables, the same temporary construction impacts and long-term operational impacts from cable installation would still occur and there would be no change in impacts from other offshore components (e.g., WTGs). Therefore, the overall impact magnitude would be the same as the Proposed Action.

Cumulative Impacts of Alternative F: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative F would be similar to those described under the Proposed Action.

Impacts of Alternative F on ESA-Listed Species

Alternative F would reduce the area of benthic habitat disturbance in the Falmouth ECC by an estimated 700 acres (2.8 square kilometers) due to fewer cables being installed compared to the Proposed Action. ESA-listed species that use these habitats would also experience reduced impacts from cable emplacement activities. The addition of a second HVDC converter OSP would increase the potential entrainment impact on the prey of ESA-listed species that occur within the vicinity of the converter OSP though mitigation measures in the operation of the CWIS may minimize these impacts.

Conclusions

Impacts of Alternative F: Impacts of Alternative F would not be measurably different from the impacts of the Proposed Action. Therefore, construction and installation, O&M, and decommissioning of Alternative F would likewise result in **moderate adverse** impacts on finfish, invertebrates, and EFH from cable emplacement and HVDC OSP entrainment, **minor adverse** impacts from cable maintenance, anchoring, EMFs, and HVDC OSP thermal effluent, and could include **minor beneficial** impacts from the reef effect associated with the presence of structures. For all other IPFs specific to Alternative F, impacts are expected to be negligible.

Cumulative Impacts of Alternative F: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative F would be similar to the Proposed Action and result in **moderate adverse** impacts on finfish, invertebrates, and EFH.

3.5.5.10 Comparison of Alternatives

The impacts resulting from many of the individual IPFs associated with construction, O&M, and conceptual decommissioning of the Project under all action alternatives would be similar to those described under the Proposed Action. The IPFs can be grouped under general evaluation of those with the potential to cause sedimentation and habitat alteration (e.g., cable emplacement, structures, anchoring); those that would generate noise (e.g., pile driving, construction noise, trenching, vessels); accidental releases (e.g., spills, debris, invasive species); EMFs; the presence of structures (hydrodynamic disturbance, fish/invertebrate aggregation, migration disturbance); and climate change. The impacts expected to differ most among alternatives are from the presence of structures, cable installation and maintenance, while impacts of most IPFs (i.e., EMFs, lighting, accidental releases, vessel noise and anchoring) are expected to remain similar among the alternatives. These IPFs were considered in the following assessment of Alternatives B, C, D, F, and E on finfish, invertebrates, and EFH.

The number of WTGs would be reduced under Alternative D, while the number of WTGs under Alternatives C, E, and F would be the same as under the Proposed Action. Foundation structures would differ in Alternatives E-1, E-2, and E-3. Alternative E-1 would not differ significantly from the Proposed Action, merely in the decision to use monopile foundations or piled jacket foundations. Impacts from noise under Alternative D would be similar to those described under the Proposed Action; however, the duration of impacts would be shorter due to the reduced number of foundations. Alternatives E-2 and E-3 would also result in decreased noise during construction by avoiding impact pile driving. Under Alternatives E-2 and E-3, the footprint of each foundation would increase in size, thus, increasing the amount of seabed preparation for each foundation resulting in greater impacts during the construction phase from seafloor preparation. This increase in footprint of each foundation would ultimately contribute more hard surface area on-bottom and in the water column for invertebrate colonization and EFH and provide more overall structure for finfish aggregation.

The removal of WTGs in Alternative D would avoid impacts on the northeastern portion of the Lease Area, which abuts the Nantucket Shoals, and would avoid impacts on foraging finfish in the Nantucket Shoals. Alternative D would reduce impacts on any invertebrates and EFH at those foundation locations, given that there would be fewer foundations developed and, therefore, lower noise impact duration associated with pile driving and permanent loss of habitat. Additionally, the removal of six turbines would result in a reduction in the extent of IAC, thus, reducing or avoiding the short-term impacts of turbidity and sedimentation from cable emplacement and maintenance, the long-term impacts of boulder relocation, and the potential cable armoring for those IACs. As mentioned in Section 3.5.5.7, *Impacts of Alternative D on Finfish, Invertebrates, and Essential Fish Habitat*, the reduction of six turbines would likely not have an appreciable impact on hydrodynamic and atmospheric wake effects of the WTGs. Consequently, impacts associated with WTG construction, O&M, and decommissioning would be reduced under Alternative D but not under Alternatives C, F, and E compared to the Proposed Action; although the types of impacts and habitats affected may differ slightly in extent (i.e., differences among Alternatives E-1, E-2, and E-3) compared to the Proposed Action.

Alternatives C and F seek to reduce impacts on the Sakonnet River and the Muskeget Channel respectively by considering land routes (Alternatives C-1 and C-2) and cable reductions (Alternative F). Additionally, Alternative F would increase the number of HVDC converter OSPs from one to two. Under Alternative C, there would be no impacts associated with cable emplacement and maintenance in the Sakonnet River reducing impacts on finfish, invertebrates, and EFH in that location. HVDC conversion would reduce the number of cables going through EFH habitat in the Muskeget Channel, therefore, reducing impacts associated with cable emplacement and maintenance. The addition of two HVDC OSPs under Alternative F would likely not appreciably change the impacts on the benthic environment because the foundation types would be the same as those used for the WTGs, thus, not having appreciable differences for demersal finfish, invertebrates, and EFH at the OSP foundation location. Entrainment and impingement of larvae and release of thermal plumes would be the same as described in Section 3.5.5.5, *Impacts of Alternative B on Finfish, Invertebrates, and Essential Fish Habitat*, but would be essentially doubled with the addition of an HVDC OSP for both the Brayton Point and Falmouth ECCs. The overall noticeable impacts would be similar across Alternatives C and E, although direct impacts on finfish, invertebrates, and EFH would be slightly reduced under Alternatives C and E in the ECCs by reducing the impact on the benthic environment.

3.5.5.11 Proposed Mitigation Measures

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix G, Tables G-2 and G-4 and summarized and assessed in Table 3.5.5-14. If one or more of the measures analyzed below are adopted by BOEM or cooperating agencies, some adverse impacts on finfish, invertebrates, and EFH could be further reduced. After publication of the Draft EIS, BOEM conducted consultation with NMFS pursuant to Section 305(b) of the MSA (i.e., EFH consultation), which resulted in NMFS issuing EFH Conservation Recommendations. EFH Conservation Recommendations are analyzed collectively in Table 3.5.5-13. The Draft EIS analyzed a BOEM-proposed measure for fisheries and benthic habitat monitoring surveys. Fisheries and benthic habitat monitoring survey plans were subsequently developed by the Lessee and are analyzed as part of the Proposed Action in the Final EIS.

Table 3.5.5-13. Mitigation and Monitoring Measures Resulting from Consultation (also identified in Appendix G, Table G-2): finfish, invertebrates, and essential fish habitat

Measure	Description	Effect
EFH Conservation Recommendations	EFH Conservation Recommendations from NMFS were transmitted by letter dated September 23, 2024. EFH Conservation	Implementation of Conservation Recommendations, including micrositing WTGs and cables, scour protection

Measure	Description	Effect
	Recommendations for activities under BOEM's jurisdiction were provided for WTG and cable installation and relocation (micrositing), anchoring, temperate reef avoidance, spill prevention, anti-corrosion measures, habitat alteration minimization, boulder relocation, marine debris removal, scour protection, noise mitigation, contents Implementation of Conservation Recommendations, including micrositing WTGs and cables, scour protection material and avoidance, anchoring avoidance and practices, reduced distance in boulder/cobble relocation, sand bedform removal avoidance, conservation of submarine topography and benthic features, overtrenching and sufficient cable burial depth, cable cross-mapping, and seafloor, EFH Conservation Recommendations for activities under USACE's jurisdiction were provided for inshore/estuarine habitat impact minimization, mitigation of impacts on scientific surveys, temperate reef avoidance and in situ impact monitoring, and provision of locations of relocated boulders, created berms, and scour protection.	material and avoidance, anchoring avoidance and practices, reduced distance in boulder/cobble relocation, sand bedform removal avoidance, conservation of submarine topography and benthic features, overtrenching and sufficient cable burial depth, cable cross-mapping, and seafloor surveying and monitoring would minimize known or reasonably foreseeable adverse impacts on benthic habitats and features, sensitive habitats, sand bedforms, Nantucket shoals, NOAA Complex Category habitats, the Sakonnet River, Mount Hope Bay, Southern New England HAPC, and the Narragansett Bay Estuary minimizing the potential for elimination/conversion of existing benthic habitats. Conservation Recommendations for inshore/estuarine and nearshore areas, including the use of HDD, micrositing, and re-rerouting during cable installation, the avoidance of sidecasting and open-water disposal during trenching activities, the use of a closed clamshell/environmental bucket dredge and upland disposal during dredging activities in areas with elevated levels of contaminants, and the restoration of disturbed areas to preconstruction conditions would minimize impacts on inshore/estuarine and nearshore benthic habitats and species. Conservation Recommendations for noise during construction, such as the use of additional noise dampening/mitigation measures during all impact pile driving, mandatory quiet periods during pile driving of at least 4 hours per 24 hours, and noise mitigation protocols in consultation with resource agencies prior to construction activities, would avoid and minimize potential noise impacts on benthic species and habitat. Conservation Recommendations for spill preventative measures, anti-corrosion measures, and marine debris removal would minimize potential impacts from any marine debris collected during pre-lay grapnel runs and chemicals, contaminant emissions, anti-corrosive coatings and sacrificial anodes to benthic habitats and species. Conservation Recommendations

Measure	Description	Effect
		to revise the Benthic Habitat Monitoring Plan would benefit benthic habitat and species by ensuring robust experimental design, methods, and data collection/analysis to assess changes in benthic communities in the Project area. The Conservation Recommendation to mitigate impacts on NMFS scientific surveys would ensure that NMFS can continue to monitor the status and health of trust resources. The Conservation Recommendations to develop a Project-specific in situ Monitoring Program and to perform pre-, during, and post-construction in situ monitoring of temperate reefs would benefit benthic habitat and species by assessing the stressors created by Project operation on benthic communities in the Project area, and stressors created by Project construction and operation on temperate reefs, from the presence of turbines, construction and operational noise, heat and EMF exposure, and oceanic-wind wake effects, as well as monitor impacts on fish behavior, species occurrence, community composition, and density and abundance on temperate reefs. Conservation Recommendations to provide the locations of relocated boulders, created berms, scour protection, and cables requiring wet storage to relevant marine users would minimize impacts on benthic habitat by reducing the potential of gear obstructions, which would disturb benthic habitat. Although the Conservation Recommendations would provide incremental reductions in impacts on sensitive and complex habitats and temperate reefs, reductions in the overall impact rating are not anticipated for any of the Proposed Action's IPFs.
Draft NMFS Biological Opinion Reasonable and Prudent Measures	The Lessee must comply with measures in the Biological Opinion and conduct sound field verification to ensure distances to thresholds for ESA-listed fish are not exceeded during impact pile driving. SouthCoast must also report any effects to ESA-listed fish or incidental take of these species.	Reasonable and Prudent Measures and Terms and Conditions from the NMFS Biological Opinion would minimize impacts on finfish, invertebrates, and EFH during construction and installation and O&M of the Project. While adoption of this measure would decrease risk to

Measure	Description	Effect
		finfish, invertebrates, and EFH under the Proposed Action, it would not alter impact determinations.

Table 3.5.5-14. BOEM or agency-proposed measures (also identified in Appendix G, Table G-3): finfish, invertebrates, and essential fish habitat

Measure	Description	Effect
HVDC open-loop cooling system avoidance area	To minimize potential impacts on zooplankton from impingement and entrainment in offshore wind HVDC converter station open-loop cooling systems, no open-loop cooling systems would be permitted in the enhanced mitigation area of the Lease Area. No geographic restrictions on the offshore export cable corridor, nor the installation of an HVAC OSP are included in this mitigation measure.	Minimizes entrainment impacts on egg and larval stages of EFH species, NOAA Trust Resources, and prey species. Nantucket Shoals supports dense aggregations of zooplankton such as gammarid shrimp and copepods, which in turn, support higher tropic levels of wildlife. While the SouthCoast Wind Project would not overlap with the highest modeled densities of zooplankton in the Nantucket Shoals region, BOEM is requiring a precautionary measure to reduce the magnitude of potential mortality from entrainment of zooplankton in an HVDC open-loop cooling system. This measure is anticipated to result in less mortality to prey species for higher trophic level fish than compared with project design envelope which could include HVDC OSP locations closer to Nantucket Shoals and thus closer to higher densities of zooplankton.
Pile-driving time of Year restriction in enhanced mitigation area	Pile driving within the enhanced mitigation area would occur only between June 1 to October 31 when NARW presence is at its lowest. This time frame also falls outside of the spawning season of fish species in Nantucket Shoals such as Atlantic cod (fall to winter) (Weiss et al. 2005).	While this mitigation measure was proposed to ensure that no NARW are exposed to injurious levels of noise from pile driving, it also protects EFH species and NOAA Trust Resources that occur in the area during winter and spring, including spawning Atlantic cod.
Sand Wave Leveling and Boulder Clearance	Sand wave leveling and boulder clearance should be limited to the extent practicable. Best efforts should be made to microsite to avoid these areas.	Minimizes direct habitat impacts on EFH, EFH species, and NOAA Trust Resources associated with sand wave and boulder habitats.

Measures Incorporated in the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.5.5-13 and Tables G-2 through G-4 in Appendix G are incorporated into the Preferred Alternative. If adopted, these measures would have the effect of reducing the potential for injurious sound levels during the pile-driving construction period. While the impact determination for finfish, invertebrates, and EFH described in Section 3.5.2.5 would not change, these measures would ensure the effectiveness of, and compliance with, environmental protection measures already analyzed as part of the Proposed Action.

3.5 Biological Resources

3.5.7 Sea Turtles

This section discusses potential impacts on sea turtles from the proposed Project, alternatives, and ongoing and planned activities in the sea turtle geographic analysis area. The sea turtle geographic analysis area, as shown on Figure 3.5.7-1, encompasses three LMEs, namely the northeastern United States OCS LME, the southeastern United States OCS LME, and the Gulf of Mexico LME. These LMEs capture the movement range for sea turtle species that could be affected by the Project in U.S. Atlantic Ocean waters. Due to the size of the geographic analysis area, the analysis of IPFs of the proposed Project focuses on sea turtles that would likely occur near the Offshore Project area and have the potential to be affected by the Proposed Action.

3.5.7.1 Description of the Affected Environment

Four species of sea turtles are known to occur in or near the Project area, all of which are protected under the ESA (16 USC 1531 et seq.) and Massachusetts ESA and listed as a SGCN in Rhode Island. These include the leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempii*), and green sea turtle (*Chelonia mydas*). All four sea turtle species are highly migratory and are generally found in waters offshore southern Massachusetts and Rhode Island during the summer and fall (Kraus et al. 2016; Schwartz 2021). A fifth species of sea turtle, the hawksbill sea turtle (*Eretmochelys imbricata*), occurs in the larger geographic analysis area but is very unlikely to occur in the Project area because it typically inhabits tropical waters. While the hawksbill sea turtle has been recorded as far north as Massachusetts, hawksbills are exceedingly rare in the Offshore Project area and are more likely to be encountered in the Gulf of Mexico (NMFS and USFWS 1993; Kenney and Vigness-Raposa 2010). Vessel traffic is the only Project activity that could affect sea turtles in this region. Gulf of Mexico ports associated with the Project have a low likelihood of use. If they are used, a total of 80 trips are expected to be made across all Project phases. Given the relatively low number of vessel trips and the vessel strike avoidance measures that would be in place during a transit of the Gulf of Mexico (Section 3.5.7.5, *Impacts of Alternative B – Proposed Action on Sea Turtles*), impacts in the Gulf of Mexico are considered unlikely. The individual hawksbill sea turtles that have occasionally been documented in and near the southern New England area have been stunned by exposure to unusual cold water events and subsequently transported northward into the region by the Gulf Stream (Lutz and Musick 1997; NMFS and USFWS 1993).These occurrences are not representative of normal behaviors or distribution. The Proposed Action is unlikely to contribute to any measurable cumulative effects and, therefore, this species is not considered further. Table 3.5.7-1 lists the four sea turtle species and DPS that could occur in the North Atlantic coastal waters offshore Massachusetts and Rhode Island and provides the listing status and likelihood of occurrence in the Project area.

Sea Turtles Geographic Analysis Area
SouthCoast Wind (OCS-A 0521)
Other BOEM Lease Areas

Source: BOEM 2024.

N

0 200 400 Miles

1:19,000,000

Figure 3.5.7-1. Sea Turtle geographic analysis area

Table 3.5.7-1. Sea turtle species that may potentially occur in the Project area

Common Name	Scientific Name	DPS	ESA Status [a]	Frequency of Occurrence in Project Area	Seasonal Occurrence in Project Area
Leatherback sea turtle	*Dermochelys coriacea*	Not Applicable [b]	E	Common	June to November
Loggerhead sea turtle	*Caretta*	Northwest Atlantic	T	Common	May to November
Kemp's ridley sea turtle	*Lepidochelys kempii*	Not applicable	E	Possible	May to September
Green sea turtle	*Chelonia mydas*	North Atlantic	T	Possible	August to November

Sources: NMFS 2022; BOEM 2014.
[a] ESA status: E = Endangered, T = Threatened.
[b] National Marine Fisheries Service and U.S. Fish and Wildlife Service have not designated DPSs for leatherback sea turtles because the species is listed as endangered throughout its global range (85 FR 48332).
DPS = Distinct Population Segment, ESA = Endangered Species Act

Sea turtles inhabit tropical and subtropical seas throughout the world. In coastal U.S. waters, sea turtles are highly migratory and seasonally distributed, migrating to and from habitats extending from the Gulf of Mexico to New England, with overwintering concentrations in southern waters and nesting sites located on southern beaches from Virginia south through Florida. The four sea turtle species seasonally inhabit offshore waters in the Project area from May through November, including the area of direct effects. Green, leatherback, loggerhead, and Kemp's ridley sea turtles migrate north from warmer South Atlantic waters in the spring (May and June) to take advantage of abundant prey in warming northeastern embayments and estuaries, including Cape Cod Bay, when sea surface temperatures range from 61 to 79 degrees Fahrenheit (°F) (16 to 26 degrees Celsius[°C]) (CETAP 1981). Sea turtles return to southern waters as water temperatures decline in the fall and are unlikely to be present in the Project area after November 30. However, not all sea turtles leave the area during winter and there are occasional strandings of sea turtles that become incapacitated or "cold-stunned" at temperatures below 50°F (Still et al. 2005; Schwartz 1978).

Sea turtle nesting does not occur in Massachusetts or Rhode Island and there are no nesting beaches or other critical habitats in the vicinity of the Project (GARFO 2021). Individuals occurring in the Project area are either migrating or foraging and are likely to spend the majority of time below the surface. Sea turtles can remain underwater for extended periods, ranging from several minutes to several hours, depending on factors, such as daily and seasonal environmental conditions and specific behavioral activities associated with dive types (Hochscheid 2014). Such physiological traits and behavioral patterns allow them to spend as little as 3 to 6 percent of their time at the water's surface (Lutcavage and Lutz 1997). These adaptations are important because sea turtles often travel long distances between their feeding grounds and nesting beaches (Meylan 1995).

The combination of sightings, strandings, and bycatch data provides the best available information on sea turtle distribution in the Project area. This section summarizes data for each of the four sea turtle species from the most current sightings surveys of waters around the Massachusetts/Rhode Island offshore Wind Energy Area (Kraus et al. 2016; Palka et al. 2017; Palka et al. 2021), NMFS Sea Turtle

Stranding and Salvage Network (STSSN) (NMFS 2022), and recent and historic population or density estimates from NMFS and the U.S. Department of the Navy (U.S. Navy), where available. Population dynamics and habitat use of different sea turtle species along the Massachusetts and Rhode Island shore is still poorly understood. Sea turtles are wide-ranging and long-lived, making population estimates difficult, and survey methods vary depending on species (TEWG 2007; NMFS and USFWS 2013, 2015a, 2015b). Because sea turtles have large ranges and highly migratory behaviors, the current condition and trend of sea turtles are affected by factors outside of the proposed Project area.

The Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts (BOEM 2014) and COP Volume 2, Section 6.9.1 (SouthCoast Wind 2024) provide further details about each species' range and distribution, population status, ecology and life history, and conservation and management, summarized in the following subsections.

Leatherback Sea Turtle

The leatherback sea turtle is the largest living and the most widely distributed sea turtle species, ranging broadly from tropical and subtropical to temperate regions of the world's oceans (NMFS and USFWS 2013). Individuals in the Project area belong to the Northwest Atlantic population, which is one of seven leatherback populations globally. The breeding population (total number of adults) estimated in the North Atlantic is 34,000 to 94,000 (NMFS and USFWS 2013; TEWG 2007). NMFS and USFWS (2020) concluded that the Northwest Atlantic population has a total index of nesting female abundance of 20,659 females with a decreasing nest trend at nesting beaches with the greatest known nesting female abundance. The species is listed as endangered under the ESA (35 Federal Register 8491). It is also listed as endangered under the MESA and is considered SGCN in the Rhode Island Wildlife Action Plan (RIDEM 2015; Commonwealth of Massachusetts 2020). They feed almost exclusively on jellyfish, siphonophores, and salps (Eckert et al. 2012; NMFS and USFWS 2020). In a study tracking 135 leatherbacks fitted with satellite tracking tags, turtles were identified to inhabit waters with sea surface temperatures ranging from 52°F to 89°F (Bailey et al. 2012). Satellite telemetry has found the median sea surface temperature of leatherback habitat to be 65°F (18.3°C) (Dodge et al. 2014). The leatherback sea turtle dives the deepest of all sea turtles to forage and is thought to be more tolerant of cooler oceanic temperatures than other sea turtles. The study also found that oceanographic features, such as mesoscale eddies, convergence zones, and areas of upwelling, attracted foraging leatherbacks because these features are often associated with aggregations of jellyfish. Unlike the other three species, the leatherback does not use shallow waters to prey on benthic invertebrates or sea grasses.

Leatherback sea turtles undergo extensive migrations in the western North Atlantic and usually start arriving along the southern New England coast in late spring/early summer (Shoop and Kenney 1992; James et al. 2006). Recent and historic data indicate leatherback sea turtles are the most frequently observed sea turtle species in the Massachusetts/Rhode Island Wind Energy Area and occur primarily in the summer and fall, with particularly heavy presence south of Nantucket and in Muskeget Channel (COP Volume 2, Section 6.9.1.1.3, Figure 6-52; SouthCoast Wind 2024; Kraus et al. 2016; Kenney and Vingess-Raposa 2010; Whelchel and Clark 2010). From 2011 through 2021, STSSN reported 59 offshore and 242 inshore leatherback sea turtle strandings in Zone 41, which encompasses the Project area in Sothern New England (NMFS 2022). Based on survey information collected in the region to date, BOEM expects leatherback sea turtles to be common in the Project area from June to November (Table 3.5.7-1). Modeled density estimates in the Project area by season can be found in COP Volume 2, Section 6.9.1.1.3, Figure 6-53 (SouthCoast Wind 2024).

Leatherback sea turtles were the most frequently sighted species of turtle sighted in the Lease Area during aerial surveys from 2011 to 2015, and were mostly sighted during the summer and autumn, rarely in the spring, and not at all in winter (Kraus et al. 2016). Only one leatherback turtle was observed in the Lease Area from aerial surveys from 2017 through 2018. Eight sea turtles from two species were identified during the Campaign 5 aerial surveys (O'Brien et al. 2021a). Six leatherback turtle sightings occurred in June and August of 2017 through 2019. Leatherback turtles were sighted on three separate days, all directly south of Nantucket and fairly close to shore (within 10 nm). During 2020 Campaign 6A aerial surveys, three leatherback sea turtles were observed during general surveys (O'Brien et al. 2021b). All leatherback turtle sightings except one were over the Nantucket Shoals.

Loggerhead Sea Turtle

Loggerhead sea turtles range widely and have been observed along the entire Atlantic Coast as far north as Canada (Brazner and McMillan 2008; Ceriani et al. 2014; Shoop and Kenney 1992). Analysis of tagged loggerhead sea turtles suggests the highest population densities are in the shelf waters of the US coast from Florida to North Carolina. Waters of the Mid-Atlantic Bight have been found to be an important summer foraging habitat (Winton et al. 2018). Sightings most often occur in surface waters with temperatures between 44°F and 86°F, or 7°C and 30°C (Shoop and Kenney 1992). They have a general omnivorous diet and are benthic feeders, consuming vegetation, zooplankton, crabs, mollusks, jellyfish, fish, and various other invertebrates (Dodd 1988; Seney and Musick 2007). The regional abundance estimate in the Northwest Atlantic OCS in 2010 was approximately 588,000 adults and juveniles of sufficient size to be identified during aerial surveys (interquartile range of 382,000 to 817,000 [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, thereby indicating a downward trend for this population (TEWG 2009). Loggerhead sea turtles in the Project area belong to the Northwest Atlantic DPS, which is listed as threatened under the ESA (76 *Federal Register* 58868). The species is also listed as threatened under the MESA and is considered SGCN in the Rhode Island Wildlife Action Plan (RIDEM 2015; Commonwealth of Massachusetts 2020). While some progress has been made since publication of the 2008 Loggerhead Sea Turtle Recovery Plan, the recovery units have not met most of the critical benchmark recovery criteria (NMFS and USFWS 2019). The Atlantic Marine Assessment Program for Protected Species turtle tagging data recorded limited loggerhead sea turtle observations in the Massachusetts/Rhode Island Wind Energy Area between 2009–2015; however, visual surveys conducted between 2010–2017 indicated regular presence in waters near the Project area in the summer and fall (COP Volume 2, Section 6.9.1.1.4, Figure 6-54, SouthCoast Wind 2024; Palka et al. 2017, 2021). From 2011 through 2021, STSSN reported 68 offshore and 201 inshore loggerhead sea turtle strandings in Zone 41, which encompasses the Project area in Southern New England (NMFS 2022). Additionally, the

U.S. Navy indicates that loggerhead sea turtles are expected to occur commonly as non-breeding adults, subadults, and juveniles from the late spring through fall, with the highest probability of occurrence from July through September (U.S. Navy 2017b). Based on this information, BOEM expects loggerhead sea turtles to be common in the Massachusetts/Rhode Island Wind Energy Area and likely in the Project area from May to November (Table 3.5.7-1). Modeled density estimates in the Project area by season can be found in COP Volume 2, Section 6.9.1.1.4, Figure 6-54 (SouthCoast Wind 2024).

Kemp's Ridley Sea Turtle

Kemp's ridley sea turtles are most commonly found in the Gulf of Mexico and along the U.S Atlantic Coast. Juvenile and subadult Kemp's ridley sea turtles are known to travel as far north as Cape Cod Bay during summer foraging (NMFS et al. 2011). All Kemp's ridley sea turtles belong to a single population that is endangered under the ESA (35 *Federal Register* 183290). The species is also listed as endangered under the MESA and is considered SGCN in the Rhode Island Wildlife Action Plan (RIDEM 2015; Commonwealth of Massachusetts 2020). The species is primarily associated with habitats on the OCS, with preferred habitats consisting of sheltered areas along the coastline, including estuaries, lagoons, and bays (Burke et al. 1994; NMFS 2019) and nearshore waters less than 120 feet deep (Shaver et al. 2005; Shaver and Rubio 2008), although they can also be found in deeper offshore waters. The population was severely reduced prior to 1985 due to intensive egg collection and fishery bycatch, with a low in 1985 of 702 nests counted from an estimated 250 nesting females on three primary nesting beaches in Mexico (NMFS and USFWS 2015a). Recent estimates of the total population of age 2 and older is 248,307 with a total of 12,179 nests documented in Mexico and Texas in 2014. The most recent estimates of abundance (age 2 and older) and number of nests indicate a stall in growth after over a decade of consistent increase, suggesting that the population is not currently recovering to historical levels (NMFS and USFWS 2015a). Kemp's ridley sea turtles regularly occur in inshore and nearshore waters of Rhode Island, including Narraganset Bay, in the summer and fall to forage for crabs in submerged aquatic vegetation (Schwartz 2021). In waters further offshore, visual sighting data are limited because this small species is difficult to observe using typical aerial survey methods; however, rare observations have been made in the Massachusetts/Rhode Island Wind Energy Area in the summer and fall (Kraus et al. 2016). From 2011 through 2021, STSSN reported 16 offshore and 172 inshore Kemp's ridley sea turtle strandings in Zone 41, which encompasses the Project area in southern New England (NMFS 2022). Based on this information, Kemp's ridley sea turtles could occur infrequently as juveniles and subadults from July through September, potentially occurring as late as November. The highest likelihood of occurrence is in coastal nearshore areas as they seek protected shallow-water habitats near Cape Cod Bay. BOEM expects Kemp's ridley sea turtles to be in the Project area from May to November, but its co-occurrence with Project activities is expected to be uncommon due to relatively low numbers in northeastern U.S. waters. Modeled density estimates in the Project area showing no differences by season can be found in the SouthCoast Wind COP Volume 2, Section 6.9.1.1.2, Figure 6-51 (SouthCoast Wind 2024).

Green Sea Turtle

Green sea turtles are found in tropical and subtropical waters around the globe; however, juveniles and subadults are occasionally observed in Atlantic coastal waters as far north as Massachusetts (Greene et al. 2010). They are most commonly observed feeding in the shallow waters of reefs, bays, inlets, lagoons, and shoals that are abundant in algae or marine grass (NMFS and USFWS 2007a). Green turtles do not nest on beaches in the Project area; their primary nesting beaches are in Costa Rica, Mexico, the United States (Florida), and Cuba. Green sea turtles in the Project area belong to the North Atlantic DPS, which is listed as threatened under the ESA (81 *Federal Register* 20057), while breeding populations in Florida are listed as endangered (81 *Federal Register* 20058, 2016). The species is also listed as threatened under the MESA and is considered SGCN in the Rhode Island Wildlife Action Plan (RIDEM 2015; Commonwealth of Massachusetts 2020). The most recent status review for the North Atlantic DPS estimates the number of female nesting turtles to be approximately 167,424 individuals (NMFS and USFWS 2015b). According to NMFS and USFWS (2015b), nesting trends are generally increasing for this population. Because of their association with warm waters, green turtles are relatively uncommon in Rhode Island and Massachusetts waters but have been observed on rare occasions in the summer (BOEM 2014). Green turtles are commonly associated with drift lines or surface current convergences, which commonly contain floating Sargassum capable of providing small turtles with shelter and sufficient buoyancy to raft upon (Thiel and Gutow 2005; Witherington et al. 2012). They rest underwater in coral recesses, the underside of ledges, and sand-bottom areas that are relatively free of strong currents and disturbance from natural predators and humans. From 2011 to 2021, STSSN reported four offshore and 75 inshore green sea turtle strandings in Zone 41, which encompasses the Project area in southern New England (NMFS 2022). Based on this information and a lack of sightings near the Massachusetts/Rhode Island Wind Energy Area (COP Volume 2, Section 6.9.1.1.1, Figure 6-50; SouthCoast Wind 2024; Whelchel and Clark 2010), the occurrence of green sea turtles in the Project area is expected to be uncommon and limited to small numbers.

Sea turtles in the geographic analysis area are subject to a variety of ongoing human-caused impacts, including collisions with vessels, entanglement with fishing gear, fisheries bycatch, dredging, anthropogenic noise, pollution, disturbance of marine and coastal environments, effects on benthic habitat, accidental fuel leaks or spills, waste discharge, and climate change. Sea turtle migrations can cover long distances, and these factors can have impacts on individuals over broad geographical scales. Climate change has the potential to affect the distribution and abundance of prey due to changing water temperatures, ocean currents, and increased acidity.

3.5.7.2 Impact Level Definitions for Sea Turtles

Impact level definitions for sea turtles are provided in Table 3.5.7-2.

Table 3.5.7-2. Definitions of impact levels for sea turtles

Impact Level	Type of Impact	Definition
Negligible	Adverse	Impacts on sea turtles would be undetectable or barely measurable, with no consequences to individuals or populations.
	Beneficial	Impacts on sea turtles would be undetectable or barely measurable, with no consequences to individuals or populations.
Minor	Adverse	Impacts on sea turtles would be detectable and measurable, but of low intensity, highly localized, and temporary or short term in duration. Impacts may include injury or loss of individuals, but these impacts would not result in population-level effects.
	Beneficial	Impacts on sea turtles would be detectable and measurable, but of low intensity, highly localized, and temporary or short term in duration. Impacts could increase survival and fitness but would not result in population-level effects.
Moderate	Adverse	Impacts on sea turtles would be detectable and measurable and could result in population-level effects. Adverse effects would likely be recoverable and would not affect population or DPS viability.
	Beneficial	Impacts on sea turtles would be detectable and measurable and could result in population-level effects. Impacts would be measurable at the population level.
Major	Adverse	Impacts on sea turtles would be significant and extensive and long term in duration and could have population-level effects that are not recoverable, even with mitigation.
	Beneficial	Impacts would be significant and extensive and contribute to population or DPS recovery.

3.5.7.3 Impacts of Alternative A – No Action on Sea Turtles

When analyzing the impacts of the No Action Alternative on sea turtles, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for sea turtles. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D, *Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for sea turtles described in Section 3.5.7.1, *Description of the Affected Environment and Future Baseline Conditions,* 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 in the geographic analysis area that contribute to impacts on sea turtles are generally associated with coastal and offshore development, marine transport, fisheries use, and climate change. Coastal and offshore development, marine transport, and fisheries use and associated impacts are expected to continue at current trends and have the potential to affect sea turtles through accidental releases, which can have physiological effects on sea turtles; EMF and light, which can result in behavioral changes in sea turtles; new cable emplacement and maintenance and port utilization, which can disturb benthic habitats and affect water quality; noise, which can have physiological and behavioral effects on sea turtles; the presence of structures, which can result in behavioral changes in sea turtles, effects on prey species, and increased risk of interactions with fishing gear; and vessel traffic, which increases risk of vessel collision.

Interactions with fisheries is considered a significant threat to sea turtle species. Incidental bycatch in commercial and artisanal fisheries have the potential to kill or injure sea turtles, especially the use of gill net, trawl, and dredge fishing gear (NMFS and USFWS 2015a, 2015b). Reduction of sea turtle interactions with fisheries is a priority where these species occur. Finkbeiner et al. (2011) compiled sea turtle bycatch in U.S. fisheries and found that in the Atlantic, a mean estimate of 137,700 interactions, of which 4,500 were lethal, occurred annually since the implementation of bycatch mitigation measures. However, a vast majority (98 percent) of the interactions and mortalities (80 percent) occurred in the Southeast/Gulf of Mexico shrimp trawl fishery, although sampling inconsistencies and limitations should be considered when interpreting this data.

Global climate change is an ongoing risk for sea turtle species in the geographic analysis area and could result in population-level impacts on sea turtle species by displacement, impacts on prey species, altered population dynamics, and increased mortality. It is well established that climate change has the potential to affect the distribution and abundance of sea turtles and their prey due to changing water temperatures, ocean currents, and increased acidity. Furthermore, rising sea levels and increased storm intensity may negatively affect turtle nesting beaches. Increasing air temperatures can affect sea turtle population structure because temperature-dependent sex determination of embryos would result in a shift toward more female-biased sex ratios (Poloczanska et al. 2009). Patel et al. (2021) used global climate models to predict that the future distribution of suitable thermal habitat for loggerheads along the OCS will likely increase in northern regions. Sea turtle nesting could also shift northward on the U.S. Atlantic Coast. Because these changes may impact sea turtle reproduction, survival, and demography, the impacts of climate change on sea turtles are expected to be minor.

The following ongoing offshore wind activities in the geographic analysis area would contribute to impacts on sea turtles (based on the scenario shown in Appendix D).

- Continued O&M of three offshore wind projects:
    - BIWF Project (5 WTGs) installed in state waters.
    - SFWF Project (12 WTGs and 1 OSP) installed in OCS-A 0517.
    - CVOW Pilot Project (2 WTGs) installed in OCS-A 0497.
- Ongoing construction of eight offshore wind projects:
    - Vineyard Wind 1 Project (62 WTGs and 1 OSP) in OCS-A 0501.
    - Revolution Wind Project (65 WTGs and 2 OSSs) in OCS-A 0486.

- Sunrise Wind Project (94 WTGs and 1 OSP) in OCS-A 0487.
- New England Wind Project (128 WTGs and 2 OSSs) in OCS-A 0534 and a portion of OCS-A 0501.
- Empire Wind Project (138 WTGs and 2 OSSs) in OCS-A 0512.
- Ocean Wind 1 Project (98 WTGs and 3 OSSs) in OCS-A 0498.
- Atlantic Shores South Project (195 WTGs and 2 OSSs) in OCS-A 0499.
- CVOW-C Project (176 WTGs and 3 OSSs) in OCS-A 0483.

Ongoing offshore wind activities would affect sea turtles through the primary IPFs of noise, presence of structures, and vessel traffic. Ongoing offshore wind activities would have the same type of impacts from IPFs that are described in *Cumulative Impacts of the No Action Alternative* for planned offshore wind activities, but the impacts would be of lower intensity.

Impacts of Alternative A on ESA-Listed Species

All sea turtle species in the geographic analysis area are either threatened or endangered and protected by ESA. Impacts of Alternative A on ESA-listed sea turtles are discussed in the previously listed IPFs. Any future federal or private activities that could affect federally listed sea turtles in the geographic analysis area would need to comply with ESA Section 7 or Section 10, respectively, to ensure that the proposed activities would not jeopardize the continued existence of the species.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action). Planned non-offshore wind activities that may contribute to impacts on sea turtles include commercial fisheries bycatch; marine transportation; military use; oil and gas activities; undersea transmission lines, gas pipelines, and other submarine cables; tidal energy projects; dredging and port improvement; and marine minerals use and ocean dredged material disposal (see Appendix D, *Planned Activities Scenario*, Section D.2, for a description of planned activities). BOEM expects planned activities other than offshore wind to affect sea turtles through several primary IPFs, including accidental releases, EMF, light, new cable emplacement and maintenance, port utilization, noise, the presence of structures, and traffic. Refer to Table D1-20 in Appendix D for a summary of potential impacts associated with planned non-offshore wind activities by IPF for sea turtles.

The following sections summarize the potential impacts of ongoing and planned offshore wind activities on sea turtles during construction, O&M, and decommissioning of the projects. Other offshore wind activities in the geographic analysis area for sea turtles include the construction, O&M, and decommissioning of approximately 34 offshore wind projects (Appendix D, Table D-2).

BOEM expects planned offshore wind activities to affect sea turtles through the following primary IPFs.

Accidental releases: Accidental releases of fuel, fluids, hazardous materials, trash, and debris may increase as a result of offshore wind activities. Marine pollution is an ongoing threat, as sea turtle ingestion of human trash and debris has been observed in all species of sea turtles (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Ingestion often occurs when sea turtles mistake debris for potential prey items (Gregory 2009; Hoarau et al. 2014; Thomás et al. 2002). Although the threat varies among species and life stages due to differing feeding, plastic ingestion is an issue for marine turtles from the earliest stages of life (Eastman et al. 2020) and the volume of debris ingested is related to the size of the turtles (Thomás et al. 2002). In addition to plastic debris, ingestion of tar, paper, Styrofoam, wood, reed, feathers, hooks, lines, and net fragments has also been documented in loggerhead sea turtles. Trash and debris may be released by vessels during construction, operations, and decommissioning of ongoing and planned offshore wind facilities. These sublethal effects would affect individual fitness, but mortality and sublethal effects associated with ingestion of trash and debris are not expected to have population-level effects. Such releases are expected to be small and infrequent.

Unexpected or unanticipated events, including vessel collisions or allisions, events that would result in equipment failure, or oil spills and chemical releases could occur during the construction, operations, or decommissioning phases of offshore wind projects. Such an incident occurred on July 2024 where structural damage to a turbine blade at Vineyard Wind 1 offshore wind farm caused the blade to detach while undergoing testing, resulting in debris to accumulate in the water and some washing ashore around Nantucket, Vineyard, and Rhode Island sounds (Vineyard Wind 2024a). Based on preliminary investigations conducted by Arcadis US Inc. (2024), the blade materials and debris comprise fiberglass, semi-rigid foam, and polyester resins similar to materials that can be found in textiles, boat construction, and the aviation industry. These stable physical and chemical properties are also the basis for the acceptance of the blades for landfill disposal once retired, as non-toxic, non-hazardous, solid waste materials. Further evaluations will consider the potential for degradation of the residual blade materials that remain in the environment and potential exposure routes and other fate and transport mechanisms. While structural failures as considered low-probability events, offshore wind developers are required to develop a comprehensive federally approved emergency response plan to address these scenarios as part of the permitting process. Vineyard Wind and GE Vernova have since conducted root cause analyses, debris recovery efforts and debris containment, and shoreline cleanup operations and are engaged with federal (including BSEE and USCG), state, tribal, and local stakeholders to ensure the health and safety of its workforce, mariners, and the environment (Vineyard Wind 2024b).

Planned offshore wind development would require large quantities of coolant fluids, oils and lubricants, and diesel fuel (see Appendix D, Table D2-3 for specific quantities). Accidental releases of fuel, fluids, and hazardous materials may increase as a result of both ongoing and planned offshore wind activities. The risk of any type of accidental release would be increased primarily during construction when Project vessels are present, and also during operations and decommissioning of offshore wind facilities. In the planned activities scenario, there would be a low risk of a leak of fuel/fluids/hazardous materials from any single one of approximately 2,945 WTGs and OSPs, each with on average 8,400 gallons (31,797 liters) stored. Total fuel/fluids/hazardous materials in the geographic analysis area would be approximately 24.7 million gallons (93.5 million liters; Appendix D, Table D2-3). According to BOEM's modeling (Bejarano et al. 2013), a release of 128,000 gallons is likely to occur no more often than once per 1,000 years, and a release of 2,000 gallons or less is likely to occur every 5 to 20 years. The likelihood of a spill occurring from multiple WTGs and OSP at the same time is very low; therefore, the potential impacts from a spill larger than 2,000 gallons are largely discountable.

Accidental releases of fuels, fluids, and hazardous materials can have both physical and chemical effects on sea turtles that negatively influence the health and survival of affected individuals (Shigenaka et al. 2021). Physical effects are typically observed at the surface and commonly involve hatchlings and juvenile turtles, who spend most of their time at the surface. These effects limit basic functionality for most turtles exposed because oil interferes with surface breathing, movement, and vision, which limits their ability to forage or evade predators (Shigenaka et al. 2021). Chemical effects are less apparent and, therefore, less understood; however, studies have observed skin lesions, dehydration, oxidative stress, failed weight gain in hatchlings, and inflammation of skin and organs (Shigenaka et al. 2021; Mitchelmore et al. 2015; Harms et al. 2014). Impacts resulting from accidental releases may pose a long-term risk to sea turtles and could potentially lead to mortality and sublethal impacts on individuals present in the vicinity of the spill, but the potential for exposure would be minor given the isolated and low-volume nature of potential accidental releases and the variable distribution of sea turtles in the geographic analysis area. Given the volumes of fuels, fluids, and hazardous materials potentially involved and the likelihood of release occurrence, the increase in accidental releases associated with planned offshore wind activities is expected to fall within the range of releases that occur on an ongoing basis from non-offshore wind activities. Impacts from accidental releases and discharges associated with ongoing and planned construction and operation of offshore wind projects have been previously analyzed and were found to be negligible because of the low probability, short-term duration, and highly localized nature of accidental releases (BOEM 2021a, 2021b). Offshore wind projects will comply with their Oil Spill Response Plan and USCG requirements for the prevention and control of oil and fuel spills.

Cable emplacement and maintenance: Ongoing and planned offshore wind activities will involve the placement and maintenance of export and interarray cables. Cable emplacement associated with ongoing and planned offshore wind activities (not including the Proposed Action) is expected to disturb more than 181,882 acres (73,605 hectares) of seabed while associated undersea cables are installed, causing an increase in suspended sediment (Appendix D, Table D2-2). Cable emplacement may occur from a variety of methods that include trenching devices, plows, and jetting and are dependent upon seabed sediments. During cable installation, sediment plumes would be present for up to 6 hours at a time until the activity is completed and suspended sediments settle back to the seabed. Areas subject to cumulative increases in suspended sediment from simultaneous activities would be limited because the occurrence of concurrent cable installation operations is expected to be limited. The increases in suspended sediment associated with new cable emplacement and maintenance would be short term and localized to the cable corridor.

There are no data on the physiological effects of suspended sediment on sea turtles. However, elevated suspended sediment may cause sea turtles to alter their normal movements and behaviors, as sea turtles would be expected to avoid the area of elevated suspended sediment. Such alterations are expected to be too small to be detected (NMFS 2020a). Negligible impacts are anticipated if sea turtles swim through the area of elevated suspended sediment. Suspended sediment only has the potential to affect sea turtles if the area of elevated concentrations acts as a barrier to normal behaviors. However, negligible impacts are anticipated due to sea turtles avoiding or swimming through areas of elevated suspended sediment (NMFS 2020a). In addition to direct effects on sea turtle behavior, suspended sediment can indirectly affect sea turtles through impacts on prey species, including benthic mollusks, crustaceans, sponges, and sea pens. Elevated suspended sediment concentrations are shown to have minor to moderate impacts on benthic communities when they exceed 390 mg/L (NMFS 2020a). See Section 3.5.5*, Finfish, Invertebrates, and Essential Fish Habitat*, for a discussion of cable emplacement impacts on prey species.

Dredging for sand wave clearance may be necessary in places to ensure cable burial below mobile seabed sediments, which could contribute to additional impacts on sea turtles related to impingement, entrainment, and capture associated with mechanical and hydraulic dredging techniques. Dredging may occur offshore, for cable laying or seabed preparation for foundations, or inshore at landfall locations. Mechanical dredging is not expected to capture, injure, or kill sea turtles (NMFS 2020b). Sea turtles are generally not vulnerable to entrainment in hydraulic dredges due to the small intake and relatively low intake velocity (NRC 1990). Hopper dredges may strike, impinge, or entrain sea turtles, which may result in injury or mortality (Ramirez et al. 2017 citing Dickerson et al. 1990; Ramirez et al. 2017 citing Dickerson et al. 1991; Ramirez et al. 2017 citing Reine et al. 1998; Ramirez et al. 2017 citing Richardson 1990). The sea turtle species most often affected by dredge interactions is loggerhead sea turtles, followed by green sea turtles, then Kemp's ridley sea turtles (Ramirez et al. 2017). However, the risk of interactions between hopper dredges and individual sea turtles is expected to be lower in the open ocean areas where dredging may occur compared to nearshore navigational channels where sea turtles are more concentrated in a constrained operating environment (Michel et al. 2013; USACE 2020). This may be due to the lower density of sea turtles in these areas, as well as differences in behavior and other risk factors. Disturbance of soft-bottom habitat in offshore wind cable corridors due to dredging could potentially affect Kemp's ridley sea turtles, which forage in this type of habitat. However, such disturbance would be temporary and would affect a relatively small area of available habitat. Therefore, effects of benthic habitat disturbance due to dredging would be too small to be meaningfully measured or detected.

Dredging within nearshore areas could affect green sea turtle habitat by directly removing SAV or creating suspended sediments that may be deposited on top of seagrass. To mitigate this risk, it is anticipated that ongoing and planned offshore wind projects would perform SAV surveys and avoid these areas during construction, to the extent practicable. Changes in turbidity and suspended sediments could temporarily disrupt normal sea turtle behaviors, especially if turtles rely on vision to forage. Sea turtles may experience behavioral effects upon exposure to turbidity or suspended sediments and become more susceptible to other threats like vessel strikes, but this has not been studied or measured. There are also no studies that evaluate the behavioral effects of suspended sediments on mobile prey species, and Johnson (2018) suggested that any effects on sea turtle prey species from suspended sediments, sediment deposition, or turbidity may cause turtles to move to other areas and then return to the affected areas at some time in the future. It is not believed that dredging would permanently change the sea turtle prey base (Michel et al. 2013) and planned offshore wind projects would implement turbidity reduction measures to contain the silt and sediment stirred up by dredging.

Given the available information, the risk of injury or mortality of individual sea turtles resulting from dredging necessary to support offshore wind project construction would be minor and population-level effects are unlikely to occur.

Discharges/intakes: Increases in vessel discharges would occur during construction and installation, O&M, and decommissioning of offshore wind development. Offshore permitted discharges include uncontaminated bilge water and treated liquid wastes. Increases would be greatest during construction and decommissioning of offshore wind projects. Discharge rates would be staggered according to project schedules and localized. Certain discharges are required to comply with permitting standards that are established to minimize potential impacts on the environment.

Other offshore wind projects in the geographic analysis area may use HVDC converter OSPs that would convert AC to DC before transmission to onshore project components. As described in a recent white paper produced by BOEM (Middleton and Barnhart 2022), these HVDC systems are cooled by an open loop system that intakes cool sea water and discharges warmer water back into the ocean. Entrainment and impingement of sea turtle prey could occur at HVDC converter intakes on the OSPs. Impacts of entrainment and impingement on sea turtle prey at HVDC converter intakes would be limited to the immediate area of the OSPs and to intake volumes.

Additionally, entrainment and impingement would occur at intakes for cable-laying equipment. Impacts on sea turtles and their prey from entrainment and impingement at intakes are expected to be localized and minor. Further, as discussed under the *Cable emplacement and maintenance* IPF, entrainment and impingement at cable-laying equipment intakes would be short term.

EMFs: Ongoing and planned offshore wind activities would install export and interarray cables, increasing the production of EMFs and heat in the geographic analysis area. EMFs and heat effects would be reduced by cable burial to an appropriate depth and shielding, if necessary. Cables are also expected to be separated by a minimum distance of 330 feet (100 meters), avoiding additive effects from adjacent cables. Sea turtles are capable of detecting magnetic fields (e.g., Lohmann and Lohmann 1996; Normandeau et al. 2011; Putman et al. 2015), and behavioral responses to such fields have been documented (e.g., Luschi et al. 2007). The threshold for behavioral responses varies somewhat among species. Sea turtles appear to have a detection threshold of magnetosensitivity and behavioral responses to field intensities ranging from 0.0047 to 4,000 microteslas (μT) for loggerhead turtles, and 29.3 to 200 μT for green turtles, with other species likely similar due to anatomical, behavioral, and life history similarities. A review of ten offshore wind farm cable systems found an average EMF output of 7.8 μT and a maximum of 14 μT. However, this average may increase as offshore wind technology continues to develop (Normandeau et al. 2011). In the planned activities scenario, up to 32,537 miles (52,363 kilometers) of offshore export cable and interarray cable would be added in the geographic analysis area for sea turtles, producing EMFs in the vicinity of each cable during operations (Appendix D,

Table D2-1). Submarine power cables in the geographic analysis area for sea turtles are assumed to be installed with appropriate shielding and burial depth to reduce a potential EMF from cable operation to low levels.

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 EMF impacts on sea turtles associated with underwater cables. Migratory disruptions have been documented in sea turtles with magnets attached to their heads (Luschi et al. 2007), but evidence that EMFs associated with future offshore wind activities would likely result in some deviations from direct migration routes is lacking (Snoek et al. 2016). Any deviations are expected to be minor (Normandeau et al. 2011), and any increased energy expenditure due to these deviations would not be biologically significant.

Buried submarine cables can warm the surrounding sediment in contact with the cables up to tens of centimeters (Taormina et al. 2018). There are no data on cable heat effects on sea turtles (Taormina et al. 2018). However, increased heat in the sediment could affect benthic organisms that serve as prey for sea turtles that forage in the benthos. Based on the narrowness of cable corridors and expected weakness of thermal radiation, impacts on benthic organisms are not expected to be significant (Taormina et al. 2018) and would be limited to a small area around the cable. Given the expected cable burial depths, thermal effects would not occur at the surface of the seabed where sea turtles would forage. Therefore, any effects on sea turtle prey availability would be negligible and too small to be detected or meaningfully measured.

Gear utilization: Offshore wind activities are expected to include monitoring surveys in the project areas. Sea turtles could be affected by these surveys through survey vessel traffic and interactions with survey gear. Survey vessels would produce underwater noise and increase the risk of vessel strikes. The effects of vessel noise and increased strike risk would be similar to those discussed under the *Noise* and *Traffic* IPFs. Additional impacts on sea turtles could result from interactions with mobile (e.g., trawl, dredge) or fixed (e.g., trap, hydrophone) survey gear. Offshore wind projects are expected to use trawl surveys, among other methods, for project monitoring. The capture and mortality of sea turtles in fisheries utilizing bottom trawls are well documented (Henwood and Stuntz 1987; NMFS and USFWS 1991, 1992; NRC 1990). Although sea turtles are capable of extended dive durations, entanglement and forcible submersion in fishing gear leads to rapid oxygen consumption (Lutcavage and Lutz 1997). Based on available research, restricting tow times to 30 minutes or less is expected to prevent sea turtle morality in trawl nets (Epperly et al. 2002; Sasso and Epperly 2006). BOEM anticipates trawl surveys for offshore wind project monitoring would be limited to tow times of 20 minutes, indicating that this activity poses a minor risk of mortality. Additional mitigation measures would be expected to reduce the risk of serious injury and mortality from forced submergence for sea turtles caught in bottom-trawl survey gear. Tows for clam dredge surveys would have a very short duration of 120 seconds, and the survey vessels would be subject to mitigation measures similar to those for the trawl survey. While mitigation measures would reduce interactions with sea turtles, the potential for incidental capture and entanglement cannot be discounted should an individual be encountered during trawl or dredge use.

Therefore, following best practices, effects of trawl and dredge surveys on sea turtles would be minor, as it would not be expected to have population-level impacts on sea turtles.

The vertical buoy and anchor lines associated with monitoring surveys using fixed gear, such as fish traps or baited remote underwater video, could pose a risk of entanglement for sea turtles. While there is a theoretical risk of sea turtle entanglement in trap and pot gear, particularly for leatherback sea turtles (NMFS 2016), the likelihood of entanglement would be unlikely given the patchy distribution of sea turtles, the small number of vertical lines used in the surveys, and the relatively limited duration of each sampling event. BOEM also anticipates mitigation measures would be in place to reduce sea turtle interactions during fisheries surveys. Sea turtle prey species (e.g., crabs, whelks, fish) may be collected as bycatch in trap gear. However, all bycatch is expected to be returned to the water and would still be available as prey for sea turtles regardless of their condition, particularly for loggerhead sea turtles, which are known to forage for live prey and scavenge dead organisms. Given the non-extractive nature of fixed gear surveys, any effects on sea turtles from the collection of potential sea turtle prey would be so small that it cannot be meaningfully measured. Therefore, indirect effects on sea turtles due to collection of potential prey items would be negligible.

Hydrophone mooring lines for passive acoustic monitoring studies pose a theoretical entanglement risk to sea turtles, similar to trap and pot surveys. However, BOEM anticipates that monitoring studies utilizing moored systems would be required to use the best available technology to reduce any potential risks of entanglement. Therefore, passive acoustic studies are not expected to pose a meaningful risk of entanglement to sea turtles. Monitoring surveys are expected to occur at short-term, regular intervals over the duration of the monitoring program. Although the potential extent and number of animals potentially exposed cannot be determined without project-specific information, impacts of gear utilization on sea turtles are expected to be minor given the low risks of mortality and entanglement and the negligible effect on sea turtle prey availability.

Lighting: The impacts of coastal development affect sea turtles primarily through habitat loss from development and artificial lighting near sea turtle nesting areas. Artificial light on nesting beaches or in nearshore habitats has the potential to result in disorientation to nesting females and hatchling turtles up to about 3 miles (4.8 kilometers) from the light source (Orr et al. 2013) as correlated by a study that shows an inverse relationship between sea turtle nest numbers and the presence of artificial light (Mazor et al. 2013). It is, however, anticipated that in places where sea turtles nest, there will be an increase in the adoption of state and local lighting ordinances. Within the geographic analysis area, lighting impacts related to wind activities on nesting beaches would be limited to onshore areas south of Virginia as long-established sea turtle nesting beaches do not occur north of Virginia (CETAP 1981). Therefore, the majority of sea turtle nesting beaches are not within range to receive any impacts from lighting effects related to offshore wind activities.

Vessels and offshore structures associated with ongoing and planned offshore wind activities produce light at night that could elicit attraction, avoidance, or other behavioral responses in sea turtles. Ocean vessels have an array of lights including navigational, deck, and interior lights. Such lights have some potential to attract sea turtles, although impacts, if any, are expected to be localized and temporary due to the transitory nature of the effect. In laboratory experiments, juvenile loggerhead sea turtles consistently oriented toward lightsticks of various colors and types used by pelagic longline fisheries (Wang et al. 2019), indicating that hard-shelled sea turtle species expected to occur in the vicinity of offshore wind projects (i.e., green, Kemp's ridley, and loggerhead) could be attracted to offshore light sources. In contrast, juvenile leatherback sea turtles do not appear to be attracted to light in laboratory experiments (Gless et al. 2008), indicating that this species may not be attracted to offshore lighting. Gless et al. (2008) also reviewed previous studies based on fisheries logbook data and concluded that because of confounding factors, there is no convincing evidence that marine turtles are attracted to lights used in longline fisheries. Orr et al. (2013) reported that lights on offshore WTGs that flash intermittently do not present a continuous light source and are, thus, unlikely to disorient juvenile or adult sea turtles. Although the potential impacts of offshore lighting on juvenile and adult sea turtles are 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. This reflects the research described above, as well as the lack of evidence of impacts on sea turtles from decades of operations on oil and gas platforms in the Gulf of Mexico, which may have considerably more lighting than offshore WTGs (BOEM 2019).

Therefore, lighting on offshore structures associated with planned offshore wind activities is not expected to have detectable effects on sea turtles and impacts would be negligible and any behavioral responses to offshore lighting are expected to be minor, localized, and temporary.

Noise: Ongoing and planned offshore wind activities that would generate anthropogenic noise are impact and vibratory pile driving, HRG surveys, detonations of UXO, vessel traffic, aircraft, cable laying or trenching, and turbine operation. These noise sources have the potential to affect sea turtles through behavioral or physiological effects.

The installation of WTG foundations into the seabed for ongoing and planned offshore wind projects involves pile driving and other construction activities that could cause underwater noise in the geographic analysis area and result in short-term behavioral disturbance and impacts on sea turtle hearing that may recover over time (i.e., TTS) as well as long-term impacts on sea turtle hearing (i.e., PTS). The potential for underwater noise to result in adverse impacts on a sea turtle depends on the received sound level and the frequency content of the sound relative to the hearing ability of the animal. The limited data available on sea turtle hearing abilities are summarized in Table 3.5.7-3. Sea turtles appear to hear frequencies from 30 Hz to 2 kilohertz, with a range of best hearing sensitivity between 100 and 700 Hz; however, there is some sensitivity to frequencies as low as 60 Hz and possibly as low as 30 Hz (Lavender et al. 2014; Bartol et al. 1999). Therefore, there is substantial overlap in the frequencies that sea turtles can detect and the dominant frequencies produced by offshore wind activities, including pile driving, impulsive sources used for HRG surveys, and UXO.

Table 3.5.7-3. Hearing capabilities of sea turtles

Species	Hearing Capabilities		Source
	Range (Hertz)	Highest Sensitivity (Hertz)	
	60–1,000	300–500	Ridgway et al. 1969

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

Given the high energy levels of offshore wind energy survey and installation noise sources, it can be concluded that sea turtles would be affected by associated noise. There are limited data pertaining to behavioral responses of sea turtles and none specifically to sounds generated by offshore wind activities. Thresholds that have been established are presented in Table 3.5.7-4. McCauley et al. (2000) observed that one green sea turtle and one loggerhead sea turtle in an open water pen increased swimming behaviors in response to a single seismic airgun at received levels of 166 dB re 1 µPa and exhibited erratic behavior at received levels greater than 175 dB re 1 µPa. Moein et al. (1994) documented similar avoidance reactions to similar levels of seismic signals, although both studies were done in a caged environment, so the extent of avoidance could not be monitored. DeRuiter and Kamel (2012) observed that 57 percent of loggerhead sea turtles exhibited a diving response after seismic airgun array firing at received levels between 175 and 191 dB re 1 µPa. Moein et al. (1994) did observe a habituation effect to the airguns; the animals stopped responding to the signal after three presentations. Sea turtles can become habituated to repeated noise exposure over time and not suffer long-term consequences (O'Hara and Wilcox 1990). This type of noise habituation has been demonstrated even when the repeated exposures were separated by several days (Bartol and Bartol 2011; U.S. Navy 2018).

NMFS has adopted the U.S. Navy PTS and TTS thresholds for sea turtles as presented in Finneran et al. (2017). Table 3.5.7-4 outlines the acoustic thresholds for the onset of PTS, TTS, and behavioral disturbance for sea turtles for impulsive and non-impulsive noise sources. NMFS has considered behavioral response beginning at 175 dB re 1 µPa SPL_{RMS} (U.S. Navy 2017a). These thresholds apply to juvenile, subadult, and adult life stages.

Table 3.5.7-4. Sea turtle acoustic thresholds (dB) for impulsive and non-impulsive noise sources

Faunal Group	Injury - PTS			Impairment - TTS			Behavioral Disturbance L_p
	Impulsive L_{pk}	Impulsive L_E	Non-impulsive L_E	Impulsive L_{pk}	Impulsive L_E	Non-impulsive L_E	
Sea turtles	232	204	220	226	189	200	175

Sources: LGL 2024: Appendix A, Table 17; Limpert et al. 2024; Finneran et al. 2017; McCauley et al. 2000.

dB = decibels; PTS = permanent threshold shift; TTS= temporary threshold shift; L_{pk} = peak sound pressure level in decibels referenced to 1 microPascal squared; also written as SPL_{pk}; L_E = weighted cumulative sound exposure level in decibels referenced to 1 microPascal squared second; also written SEL_{cum}; L_p = root mean squared sound pressure level in decibels referenced to 1 microPascal squared; also written SPL_{rms} or L_{rms}.

In the planned activities scenario (Appendix D), the construction of 2,945 WTGs and OSPs would create underwater noise and may temporarily affect sea turtles if they are present in the ensonified area. While these potential effects are acknowledged, their potential significance is unclear.

Noise – pile driving: Impulsive noise from impact pile driving, due to the anticipated frequency and spatial extent of effects, represents the IPF with the highest likelihood for effects on individual sea turtles. Sea turtles exposed to impulsive noise with sound pressure levels that exceed 204 dB re 1 μPa^2 SEL_{cum} could experience PTS that could permanently limit an individual's ability to locate prey, detect predators, or find mates and could, therefore, have long-term effects on individual fitness. Sea turtles exposed to underwater sound pressure levels greater than 175 dB re 1 μPa SPL_{RMS} could experience behavioral disturbance (Finneran et al. 2017; McCauley et al. 2000). Such behavioral alterations could cause turtles to cease foraging or expend additional effort and energy avoiding the pile driving area. Presumably, sea turtles could continue foraging activities outside the area of elevated noise levels as adjacent habitat provides similar foraging opportunities. Although information is lacking, some sea turtles could, however, be temporarily displaced into areas that have a lower foraging quality or result in higher risk of interactions with ships or fishing gear. Sea turtles may experience physiological stress during this avoidance behavior, but it is anticipated that this stressed state would dissipate over time once the sea turtle is outside the ensonified area. This temporary displacement would result in a relatively small energetic consequence and would not be expected to have individual, population level, or long-term impacts on sea turtles.

Planned offshore wind activities may also use vibratory pile driving as an alternative to impact pile driving. Vibratory pile driving is considered a non-impulsive continuous sound source and would transmit sound in the water column for a longer period of time than with impact pile driving. Source levels for vibratory pile driving, expressed as SEL, have been measured between 175 to 190 dB re 1 $\mu Pa^2 m^2 s$ (Hart Crowser et al. 2009), which are below the threshold associated with potential hearing injury in sea turtles (Finneran et al. 2017). Vibratory pile-driving noise can exceed levels associated with behavioral disturbances in sea turtles but only within short distances from the source (Denes et al. 2018). Given this low exposure probability, vibratory pile-driving noise impacts on sea turtles would be negligible at the individual and population levels.

Potential impacts on sea turtles from multiple construction activities in the same calendar year could affect migration, feeding, breeding, and individual fitness. Intermittent, long-term impacts may be high-intensity and result in a high-exposure level. The magnitude of these impacts would be dependent upon the locations of concurrent construction operations, as well as the number of hours per day, the number of days that pile driving would occur, and the time of year in which pile driving occurs. Individuals repeatedly exposed to pile driving over a season, year, or life stage may incur energetic costs that have the potential to lead to long-term consequences (U.S. Navy 2018). However, individuals may become habituated to repeated exposures over time and ignore a stimulus that was not accompanied by an overt threat (Hazel et al. 2007); individuals have been shown to retain this habituation even when the repeated exposures were separated by several days (Bartol and Bartol 2011; U.S. Navy 2018). Therefore, impacts on sea turtles from impact pile driving would be minor, as only short-term, low-intensity behavioral responses are expected that would not result in population-level impacts.

Noise from pile driving may also occur periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water or through the seabed can result in high-intensity, low-exposure-level, and long-term but localized intermittent risk to sea turtles.

Noise – G&G (HRG surveys and geotechnical drilling activities): In the geographic analysis area, ongoing activities that may produce noise would include site characterization surveys and scientific surveys (i.e., HRG surveys). These would be infrequent and produce high-intensity impulsive noise that has the potential to affect sea turtles, including potential auditory injuries and behavioral responses, which could include short-term displacement of feeding or migrating (NSF and USGS 2011). The potential for PTS and TTS in sea turtles is considered possible if these animals were to occur near the HRG survey noise source.

Offshore wind energy projects perform geological and geophysical surveys, including HRG surveys that use a combination of sonar-based methods to map shallow geophysical features and can be classified as impulsive or non-impulsive noise sources. The equipment is towed behind a moving survey vessel and generates a short-duration pulse in the 1.1 to 200 kilohertz (kHz) range, with the interval between pulses ranging from 0.2 to 1 second, depending on the specific type of equipment used. The equipment only operates when the vessel is moving along a survey transect, meaning that the ensonified area is intermittent and constantly moving. HRG surveys that use non-impulsive sources are not expected to affect sea turtles because they operate at frequencies above the sea turtle hearing range (e.g., multibeam echosounders, side scan sonar). BOEM (2018) and NMFS (2021a) evaluated potential underwater noise effects on sea turtles from HRG surveys using impulsive sources (boomers/airguns/sparkers/sub-bottom profilers) and concluded that for an individual sea turtle to experience PTS (204 dB re 1 $\mu Pa^2 s$ SEL_{cum}; 232 dB re 1 $\mu Pa^2 \cdot s$ SPL [0–pk] impulsive sources), it would have to be within 3.3 feet (1 meter) of the loudest possible noise source. In fact, NMFS (2021a) states that none of the equipment being operated for HRG surveys—with frequencies that overlap with sea turtles' hearing—has source levels loud enough to result in PTS or TTS. However, noise from impulsive sources used during HRG surveys could exceed the behavioral effects threshold (175 dB) up to 90 meters from the source, depending on the type of equipment used. Given the limited extent of potential noise effects, injury-level exposures (PTS/TTS) are unlikely to occur. As stated above and based on the loudest impulsive noise source, it is highly unlikely that noise from HRG survey sound sources would cause PTS or TTS in sea turtles (NMFS 2021). While low-level behavioral exposures could occur, these disruptions would be limited in extent and short term in duration given the movement of the survey vessel and the mobility of the animals. Therefore, underwater noise impacts from HRG surveys are expected to be minor.

Noise – site preparation: Noise from infrequent trenching activities for pipeline and cable laying, as well as other cable burial, dredging, and marine minerals extraction, could cause behavioral disturbance to sea turtles, which is expected to be localized and temporary. During planned offshore wind projects, noise-producing activities associated with cable laying include route identification surveys, trenching, jet plowing, backfilling, and cable protection installation. Modeling based on noise data collected during cable laying operation in Europe estimates that underwater noise levels would exceed 120 dB in a 98,842-acre area surrounding the source (Bald et al. 2015; Nedwell and Howell 2004; Taormina et al. 2018). As the cable-laying vessel and equipment would be continually moving, the ensonified area would also move. Given the dynamic nature of the ensonified area, a given location would not be ensonified for more than a few hours. Therefore, impacts from cable-laying noise would result in negligible adverse effects on sea turtles.

Noise – turbine operation: Operating WTGs generate non-impulsive underwater noise that is audible to sea turtles. Operational sound is generated by WTGs due to pressure differentials across the airfoils of moving turbine blades and from mechanical noise of bearings and the generator converting kinetic energy to electricity. Sound generated by the airfoils, like aircraft, is produced in the air and enters the water through the air-water interface. Mechanical noise associated with the operating WTG is transmitted into the water as vibration through the foundation and subsea cable. Both airfoil sound and mechanical vibration may result in long-term, continuous noise in the offshore environment. Measured underwater sound levels in the literature are limited to geared smaller wind turbines (less than 6.15 MW), as summarized by Tougaard et al. (2020). Tougaard et al. 2009 measured SPLs ranging between 109 and 127 dB re 1 µPa underwater 45 and 65 feet (14 and 20 meters) from the foundations at frequencies below 315 Hz up to 500 Hz. Wind turbine acoustic signals above ambient background noise were detected up to 2,066 feet (630 meters) from the source (Tougaard et al. 2009). Noise levels were shown to increase with higher wind speeds (Tougaard et al. 2009). Operational noise from larger, current-generation WTGs on the order of 10 MW would generate higher source levels than the range noted above and were modeled up to 170 dB re 1 µPa SPL_{RMS} (Stöber and Thomsen 2021). However, the shift from using gear boxes to direct-drive technology is expected to reduce the sound level by around 10 dB and, based on available data, the sound levels produced during the operation of planned offshore wind projects would be less than the injurious thresholds defined by NMFS for sea turtles. At Block Island Wind Farm, turbine noise of 6 MW turbines reached ambient noise levels within 164 feet (50 meters) of the turbine foundations (Miller and Potty 2017); so while sound may cause behavioral effects, these effects are expected to be at relatively short distances from the foundations (Miller and Potty 2017; Tougaard et al. 2009). Additionally, studies suggest that sea turtles acclimate to repetitive underwater noise in the absence of an accompanying threat (Bartol and Bartol 2011; Hazel et al. 2007; U.S. Navy 2018). Underwater noise from offshore wind project operation is unlikely to result in significant effects on the forage base for sea turtles. These species are primarily invertivores or, in the case of green sea turtles, omnivorous vegetarians. The sound sensitivity of invertebrates like crabs, jellyfish, and mollusks is restricted to particle motion and the effect dissipates rapidly such that any effects are highly localized to the immediate proximity (i.e., on the order of meters) of the noise source (Edmonds et al. 2016). Although loggerhead and Kemp's ridley sea turtles may periodically prey on fish, fish represent a minor component of a flexible and adaptable diet. Underwater noise could temporarily reduce the availability of fish prey species, but these effects would be limited in extent and duration. Therefore, noise impacts on sea turtles are expected to be negligible from operating WTGs.

Noise – UXO detonation: Offshore wind activities may encounter UXO on the seabed in the 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 removed by explosive detonation. Underwater explosions of this type generate high pressure levels that could cause disturbance and injury to sea turtles, but the number of affected individuals would be small relative to the population sizes. The number and location of detonations that may be required for offshore wind projects are relatively unknown. Impacts associated with UXO detonations for other projects would result in minor impacts and would be similar to those described for the Proposed Action in Section 3.5.7.5, *Impacts of Alternative B – Proposed Action on Sea Turtles*.

Noise – vessel and aircraft: Due to the large number of vessels required for planned offshore wind development, vessel noise could potentially result in impacts to individual sea turtles. Vessels generate low-frequency (10 to 100 Hz) (MMS 2007), non-impulsive noise that overlaps with the hearing range of sea turtles and may elicit behavioral responses such as temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes, especially in their submergence patterns (NSF and USGS 2011; Samuel et al. 2005). However, Hazel et al. (2007) suggest that sea turtles' ability to detect approaching vessels is primarily vision-dependent, not acoustic. The increase in vessel activity associated with planned offshore wind activities could cause repeated, intermittent impacts on sea turtles resulting from short-term, localized behavioral responses, which would dissipate once the vessel leaves the area. BOEM considers these temporary behavioral effects to be unlikely given the patchy distribution of sea turtles in the geographic analysis area, and, therefore, minor impacts with no stock or population-level effects would be expected.

Helicopters may be used to transport crew during construction or operation of offshore wind facilities. When aircraft travel at relatively low altitude, non-impulsive aircraft noise has the potential to elicit stress or behavioral responses (e.g., diving or swimming away or altered dive patterns) (BOEM 2017; NSF and USGS 2011; Samuel et al. 2005). Helicopters transiting to offshore wind facilities are expected to fly at sufficient altitudes to avoid behavioral effects on sea turtles, with the exception of WTG inspections, take-off, and landing. Any behavioral responses elicited during low-altitude flight would be minor and temporary, dissipating once the aircraft leaves the area; these responses are not expected to be biologically significant.

Noise summary: Impacts of noise on sea turtles from construction and operation of offshore wind projects have been previously analyzed and could range from negligible to moderate during construction and would be negligible during operation. Moderate impacts could result from impact pile driving during construction; however, low numbers of sea turtles are expected to be present and population-level effects are unlikely, which reduces the potential adverse impact level to minor. WTG operation noise could result in localized behavioral effects (BOEM 2021a, 2021b) but are likely to be negligible. Based on the above discussion, BOEM anticipates that the impacts of noise on sea turtles from planned offshore wind activities would be minor and is anticipated to be localized, infrequent, and temporary.

Port utilization: Offshore wind on the Atlantic OCS may require the expansion or improvement of regional ports to support planned projects. The increased size of vessels and increased volume of vessel traffic may necessitate expansion. Increased port utilization and expansion results in increased noise associated with vessels or pile driving for port expansion and increased suspended sediment concentrations during port expansion activities, including dredging and pile driving. The impacts of vessel noise on sea turtles are expected to be short term and localized. Impacts on water quality associated with increased suspended sediment would also be temporary and localized. Additionally, the area affected by benthic disturbance would be small compared to available foraging habitat. Any future port expansion and associated increase in vessel traffic would be subject to an independent NEPA analysis and regulatory approvals requiring full consideration of potential effects on sea turtles regionwide.

Increased port utilization may require dredging at ports or within navigation channels to accommodate the large ships required to carry WTG components. In addition to benthic disturbance and increased suspended sediment concentrations, dredging can affect sea turtles through impingement, entrainment, or capture in the dredges, as described previously. These impacts would be localized to nearshore habitats, and typical mitigation measures (e.g., timing restrictions) are expected to minimize risk to sea turtles. Therefore, risks of injury or mortality are considered low and population-level effects are unlikely to occur.

Based on the discussion above, the impacts of port utilization on sea turtles from planned offshore wind activities would likely be minor because the potentially affected habitats would be small relative to the habitat used by sea turtles in the geographic analysis area.

Presence of structures: The development of offshore wind projects in the planned activities scenario would install more buoys, meteorological towers, foundations, and hard protection. Up to 3,025 WTG and 55 OSP foundations with associated scour protection could be built in the geographic analysis area. These structures would occupy open-water, pelagic habitat and would provide presently unavailable hard structure within the water column. The presence of structures could result in hydrodynamic changes; obstructions that cause loss of fish gear resulting in entanglement or ingestion by sea turtles; habitat conversion from open-water pelagic and benthic soft substrates to structurally complex, mid-water and benthic hard bottom; new areas of prey aggregation; avoidance or displacement; and behavioral disruption.

The addition of new hard surfaces and structures, including WTG foundations, scour protection, and hard protection on top of cables, to a mostly sandy seafloor would create a more complex habitat. The structures would create an artificial reef effect, whereby more sessile and benthic organisms would likely colonize the structures over time (e.g., sponges, algae, mussels, shellfish, sea anemones). Higher densities of filter feeders, such as mussels that colonize the structure surfaces, could consume much of the increased primary productivity but also provide a food source and habitat to crustaceans such as crabs (Dannheim et al. 2020). Growth around the artificial reefs may provide food for sea turtles. Loggerhead sea turtles are benthic foragers, feeding on vegetation, crabs, mollusks, jellyfish, fish, and other invertebrates that would grow on the artificial reef (Dodd 1988; Seney and Musick 2007). Mollusks and crabs are primary food items for juvenile loggerheads, raising the possibility of the artificial reefs being a foraging area for young sea turtles (Burke et al. 1994). Structure-oriented finfish species such as black sea bass, striped bass, and Atlantic cod would be attracted to these more complex structures. Among the fish attracted to the structure would be sea turtle predators, such as sharks, increasing the likelihood of sea turtle predation. These impacts would likely be permanent or remain as long as the structure remains.

The presence of in-water structures could alter local hydrodynamic patterns at a fine scale downstream of the structures (refer to Section 3.4.2, *Water Quality*, and Section 3.5.6, *Marine Mammals* for additional discussion). Water flows are reduced immediately downstream of foundations but return to ambient levels within a relatively short distance (Miles et al. 2017). The downstream area affected by reduced flows is dependent on pile diameter. For monopiles (i.e., the structures with the largest diameter), the downstream effects are expected at a distance of 100 meters to 1 kilometer of the structures (Dorrell et al. 2022). Although effects from individual structures are highly localized, the presence of all structures associated with ongoing and planned offshore wind activities in the geographic analysis area could result in regional impacts on wind wave energy, mixing regimes, and upwelling (van Berkel et al. 2020). Nantucket Shoals functions as a foraging area for marine vertebrates because of the presence of tidally driven currents and a persistent frontal zone mixing the water and increasing productivity; therefore, localized and regional alterations to hydrodynamics could have impacts on productivity and sea turtle prey species. Fine-scale effects on water flow could have localized impacts on prey distribution and abundance. Regional hydrodynamic effects could impact prey species at a broader scale. Effects on surface currents could influence patterns of larval distribution (Johnson et al. 2021) and seasonal mixing regimes could influence primary productivity, both of which could, in turn, affect the distribution of fish and invertebrates on the OCS (Chen et al. 2018; Lentz 2017). Hydrodynamic alterations due to the presence of WTGs could increase primary productivity in the vicinity of the structures (Carpenter et al. 2016; Schultze et al. 2020). However, such an increase would be highly localized, and the increased productivity may be consumed by filter feeders colonizing the structures (Slavik et al. 2019) rather than leading to increased prey abundance for sea turtles.

The presence of WTG vertical structures such as towers and foundations in the pelagic environment may affect the flow of water within and near the Lease Area. The general understanding of offshore wind–related impacts on hydrodynamics is derived primarily from European based studies. A synthesis of European studies by van Berkel et al. (2020) summarized the potential effects of wind turbines on hydrodynamics and fisheries. Local to a wind facility, the range of potential impacts include increased turbulence downstream, remobilization of sediments, reduced flow inside wind farms, downstream changes in stratification, redistribution of water temperature, and changes in nutrient upwelling and primary productivity. Modeling studies on the wind facility-induced effects on mixing and stratification depend on a number of factors including turbine size and orientation, number of wind turbines, local atmospheric and oceanographic conditions, and model input parameters (Miles et al. 2021). While model simulations in European wind farms have shown changes to mixing and stratification downstream of pilings and a potential for cascading ecological effects, discerning the wind facility-induced effect signal from location-specific natural variability in environmental conditions can be challenging

(Carpenter et al. 2016; Floeter et al. 2017; Schultze et al. 2020). As environmental conditions in the northeastern U.S. shelf differ from European wind farm sites in the North Sea (e.g., seasonal stratification), more research is needed to identify the magnitude and type impact offshore wind farms will have on ocean processes specific to the U.S. Atlantic OCS (Hogan et al. 2023).

Net primary productivity is driven by photosynthesis in marine phytoplankton and accounts for half of global-scale photosynthesis and supporting major ocean ecosystem services (Field et al. 1998). There are few empirical data showing the impact of WTGs on ocean stratification (Tagliabue et al. 2021), although recent models have demonstrated ocean mixing as a result of the wind-wake effect of WTGs in the North Sea (Carpenter et al. 2016; Floeter et al. 2017, Dorrell et al. 2022; Christiansen et al. 2022; Daewel et al. 2022). However, interannual changes in net primary productivity in the North Atlantic are poorly correlated with parallel changes to stratification. Tagliabue et al. (2021) emphasizes the importance of other physical mechanisms, especially the Gulf Stream. Potential impacts on net primary productivity in the North Atlantic from offshore wind projects may occur, however, in the absence of additional data, these impacts are considered negligible when compared with the effects of the Gulf Stream.

A modeling study of atmospheric wake effects by Daewel et al. (2022) showed that extremely large clusters of offshore wind turbines (24,000 5-MW WTGs with a 295-foot [90-meter] hub height) in the North Sea provoke large scale changes in annual primary productivity. Productivity was modeled to decrease in the center of large wind farm clusters but increased around these clusters in the shallow, near-coastal areas of the inner German Bight and Dogger Bank. These modeled changes in net primary production were found to reach up to 10 percent locally but remained below 1 percent both inside and outside of the offshore wind farm clusters when integrated over a larger scale. As a result of reduced average current velocities, model results also showed a reduction in bottom-shear stress leading to reduced resuspension of organic carbon, increased amounts of organic carbon in sediments, and changes to bottom water oxygen concentrations. While more pronounced locally compared to the region-wide average, changes in sedimentation, seabed processes, and spatial distribution of primary production have the potential to impact higher trophic levels and ecosystem function. The authors indicate the need for more research to assess the combined effects of atmospheric wakes and turbulent wakes induced by wind turbine foundations as the latter might counteract the stabilizing effect of the wind wakes (Daewel et al. 2022). These model results reflect a buildout of turbines that is almost 8 times the approximately 3,100 WTGs currently expected to be installed for all wind farms on the East Coast from Massachusetts to North Carolina. While detectable changes to the atmospheric forces that affect sea surface mixing are likely to occur once wind farms on the Atlantic OCS become operational, the potential influence that these impacts will have on biological productivity remains uncertain given the different physical factors in the geographic analysis area than were modeled, the much lower number of wind turbines, and the larger size of wind turbines (2 to 3 times larger) planned for the Atlantic OCS compared to those modeled by Daewel et al. (2022).

In a modeling study focused on the buildout of larger-sized WTGs (up to 15 MW and 150-meter hub height) on the U.S. northeast shelf, on average, meteorological changes at the surface induced by next-generation extreme-scale offshore wind turbines (diameter and hub height greater than 492 and 328 feet [150 and 100 meters], respectively) will be nearly imperceptible (Golbazi et al. 2022). The authors simulated the potential changes to near-surface atmospheric properties caused by large offshore wind facilities in the summer and found significant wind speed reduction at hub height within the wind farm (up to 2 meters per second or a 20 percent reduction) that decreased with downwind distance from the wind farm. However, at the surface, an average wind speed deficit of 0.5 meter per second or less (10 percent maximum reduction) was found to occur within the wind farm footprint along with a slight cooling effect (-0.06 Kelvin on average). In comparison, studies on the effects of WTG wind wakes in the North Sea have identified the reduction in wind-induced mixing as the catalyst to changes in upper ocean dynamics (Ludewig 2015; Christiansen et al. 2022) and biological productivity (Daewel et al. 2022). Given the lower wind speed reductions (10-20 percent) reported by Golbazi et al. (2022) for the larger wind turbines planned for the U.S. Atlantic OCS compared to a wind speed reduction of up to 43-percent for smaller turbines in the North Sea (Platis et al. 2020), it is plausible that the observed effects from the reduction in wind-induced mixing would also be lessened. However, more region-specific research is still needed to validate this assumption.

Wind wake may also disturb planktonic transport, and thus, prey availability for sea turtles (van Berkel et al. 2020). The National Academies of Science Engineering and Medicine recently evaluated the potential of offshore wind farms to alter the hydrodynamic processes that impact plankton abundance and availability in the Nantucket Shoals region (NASEM 2024). The study concluded that impacts of offshore wind projects on prey availability will likely be difficult to distinguish from the significant impacts of climate change and other influences on the ecosystem. Further monitoring studies will be needed to have the spatial and temporal coverage to adequately understand the impact of future wind farms.

Oceanographic and hydrodynamic conditions resulting from the presence of offshore structures are not fully understood at this time but may conservatively range from hundreds of meters (Li et al. 2014; Schultze et al. 2020) to tens of kilometers (Dorrell et al. 2022; Christiansen et al. 2022) and likely to vary seasonally and regionally. These impacts would likely be permanent but variable, and because of the relatively low offshore wind blocking effect, impacts would be expected to be minor when compared to natural variability (Floeter et al. 2017). Since the leatherback sea turtle is the most pelagic of the turtles, it is expected to be the most affected by hydrodynamic effects from offshore wind structures. The leatherback sea turtle primarily feeds on planktonic jellyfish. Alterations in the hydrodynamic environment would have the potential to alter spatial distributions of jellyfish aggregations which Leatherback sea turtles are known to follow (Bailey et al. 2012). Thus, the presence of WTGs in the Offshore Project area may influence the distribution of jellyfish prey and, in turn, affect the distribution of leatherback sea turtles.

In the Gulf of Mexico, loggerhead, leatherback, green, Kemp’s ridley, and hawksbill sea turtles have been documented in the vicinity of offshore oil and gas platforms, with the probability of occupation increasing with the age of the structures (Gitschlag and Herczeg 1994; Hastings et al. 1976). Sea turtles would be expected to use habitat in between the WTGs and around structures for feeding, breeding, resting, and migrating for short periods, but residency times around structures may increase with the age of structures if communities develop on and around foundations. Project-specific effects would vary, recognizing that larger and contiguous projects could have more significant effects on prey and forage resources, but the extent and significance of these effects cannot be predicted based on currently available information.

While the anticipated reef effect may result in long-term beneficial impacts on sea turtles, some potential exists for increased exposure to fishing gear that could lead to entanglement, ingestion, injury, and death. The presence of structures may concentrate recreational fishing around foundations and would also increase the risk of gear loss or damage. This could cause entanglement, especially with monofilament line, and increase the potential for entanglement in both lines and nets leading to injury and mortality due to abrasions, loss of limbs, and increased drag, resulting in reduced foraging efficiency and ability to avoid predators (Barnette 2017; Berreiros and Raykov 2014; Foley et al. 2008). The reef effect may attract recreational fishing effort from inshore areas and attract sea turtles for foraging opportunities, resulting in a small increase in risk of entanglement and hooking or ingestion of marine debris where fishers and turtles are concentrated around the same foundations.

After construction is complete, structures in WEAs would enter the O&M during which routine maintenance of structures would be required and conducted by maintenance crews. The deployment of maintenance crews would involve an increase of traffic in the WEA in the form of crew transport vessels and any required equipment vessels (such as jack-up vessels). Lighting would also be activated during crew transfers and maintenance. During standard operation, WTGs would not use continuous lighting, and instead they would use an ADLS, which would activate the lighting system based on approaching air traffic. Operation of structures in WEAs would entail operational noise, which is discussed under the *Noise* IPF. Non-noise-related operational activities would be temporary and localized to the individual structures undergoing maintenance.

Given the available information, the risk of injury to or mortality of individual sea turtles due to the presence of structures planned offshore wind activities, and the interactions with fishing gear that they may cause, would be minor and population-level effects are unlikely to occur. Likewise, any beneficial impacts from the reef effect would be minor, as individuals may benefit but there would be no population-level effects.

Traffic: Planned offshore wind activities would result in increased vessel traffic due to vessels transiting to and from individual lease areas during construction, operation, and decommissioning. Vessel strikes are an increasing concern 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 2007b). Sea turtles, with the exception of hatchlings and pre-recruitment juveniles, spend a majority of their time submerged, during which time they may not be susceptible to vessel strikes. Sea turtles spend less than 6 percent of their time at the water’s surface (Lutcavage and Lutz 1997), during which they would be most vulnerable to being struck by vessels or propellers. Information on swim depth is provided in the U.S. Navy Undersea Warfare Center’s dive distribution and group size parameter reports (Watwood and Buonantony 2012; Borcuk et al. 2017); these data suggest that loggerhead and green sea turtles spend 60 to 75 percent of the time within 32 feet (10 meters) of the surface, leatherback sea turtles spend about 20 percent of the time within 32 feet (10 meters) of the water surface, and there are insufficient data to quantify Kemp's ridley sea turtle activity. Any sea turtle found in the geographic analysis area could thus occur at or near the surface, whether resting, feeding, or periodically surfacing to breathe.

Construction of each individual offshore wind project would generate approximately 15 to 35 simultaneous construction vessels at any given time (BOEM made a conservative assumption that construction vessel traffic for other offshore wind projects would be similar to the Proposed Action; refer to Section 3.6.6, *Navigation and Vessel Traffic,* for additional information regarding vessel traffic). Combined, the other offshore wind projects in the geographic analysis area would generate approximately 36 vessels per day during normal O&M beginning in 2030. This vessel traffic increase would be expected to result in a small incremental increase in overall vessel traffic in the geographic analysis area for sea turtles. The relative risk of vessel strikes from wind industry vessels would depend on the stage of development, time of year, number of vessels, and speed of vessels during each stage. Offshore wind projects may also cause shifts in vessel traffic, including temporary restrictions of fishing vessels during project construction due to the implementation of safety zones, potential increases in vessel traffic in the offshore wind lease areas after project construction due to an influx of recreational fishing vessels targeting species associated with an artificial reef effect, and likely shifts in commercial fishing vessels from the wind energy lease areas to areas not routinely fished due to recreational vessel congestion and gear conflict concerns.

Collision risk is expected to be greatest when offshore wind vessels transit between the offshore wind lease areas and ports utilized by each project, as vessel speeds would be highest and turtles are expected to be most susceptible to strike in coastal foraging areas. Vessel speed may exceed 10 knots (18.5 kilometers per hour) in such waters, and those vessels traveling at speeds greater than 2 knots (4 kilometers per hour) would pose the greatest threat to sea turtles, as the turtles cannot reliably avoid vessels moving faster than 2 knots (4 kilometers per hour) (Hazel et al. 2007). The risk would be greatest for species with the highest densities in a given project area. The increased risk of vessel strikes has the potential to result in injury or mortality to individual sea turtles but would not be expected to have stock or population-level impacts on sea turtles given their low densities in the geographic analysis area and patchy distribution. Additionally, BOEM expects minimization measures for vessel impacts would be required for planned offshore wind activities, further reducing the risk of injury or mortality for sea turtles, resulting in overall minor impacts.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, sea turtles would continue to follow current regional trends and respond to current and future environmental and societal activities. BOEM expects ongoing activities would have temporary to permanent impacts on sea turtles (disturbance, displacement, injury, mortality, and reduced foraging success), primarily due to lighting associated with coastal development, noise, marine pollution, vessel strikes, entanglement or ingestion of fishing gear, and ongoing climate change. The No Action Alternative, including ongoing non-offshore wind and offshore wind activities, would result in **minor adverse** impacts on sea turtles because impacts on sea turtles would be detectable and measurable but of low intensity, localized, and temporary or short term in duration.

Cumulative Impacts of the No Action Alternative: BOEM expects that ongoing and planned activities would result in continuing localized and temporary to permanent impacts on sea turtles. Intermittent, temporary impacts from underwater noise may be of high intensity and result in a high exposure level but impacts on sea turtles are not expected to result in population-level effects. Although there would be a loss of existing benthic habitat, WTG and OSP foundations may provide foraging and sheltering opportunities for sea turtles. The significance of this reef effect is unknown, however, and is not expected to result in biologically significant impacts on sea turtles, resulting in negligible beneficial impacts. BOEM anticipates that the No Action Alternative combined with all ongoing and planned activities (including other offshore wind activities) would result in **minor adverse** impacts, because potential impacts may include injury or loss of individuals, but these impacts would not result in population-level effects.

3.5.7.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on sea turtles:

- Noise associated with the construction, operation, and decommissioning of Project structures (e.g., pile driving and construction vessels), which could have behavioral and physiological effects, or cause auditory injury to sea turtles.
- Vessel traffic, which could increase collision risk to sea turtles due to vessels transiting to and from the Wind Farm Area during construction, operations, and decommissioning, and increased recreational fishing vessels.
- The presence of structures, which could cause both beneficial and adverse impacts on sea turtles through localized changes to hydrodynamic disturbance, prey aggregation and associated increase in foraging opportunities, incidental hooking from recreational fishing around foundations, entanglement in lost and discarded fishing gear, migration disturbances, and displacement.

Variability of the proposed Project design exists as outlined in Appendix C. The following is a summary of potential variances in impacts.

- Foundation type: The potential acoustic impacts on sea turtles differ among the foundation types that the Proposed Action would use, which is up to 5 OSPs and up to 147 WTGs with monopile, piled-jacket, or suction-bucket-jacket foundations. Construction of the jacket-type foundation would have a higher acoustic impact than construction of the monopile foundation due to the increased risk of exposure because of the longer time required to install more piles (up to four 14.7-foot [4.5-meter] pin piles per jacket). Benthic impacts that also impact prey availability to sea turtles may also vary depending on the foundation types used.

- Monopile diameter: The potential acoustic impacts on sea turtles differ among the WTG monopile diameters that may be used. SouthCoast Wind would use monopiles with a maximum diameter of 52.5 feet (16.0 meters).
- WTG number: All potential impacts would be lessened with a decrease in number of WTGs built.
- OSP/HVDC converter stations: The number and type of OSP foundations will change the number of legs per OSP foundation entanglement impacts from cross beams, and impingement/entrainment risk and thermal plume effects from a CWIS.
- Season of construction: The active season for sea turtles in New England waters is from May through November. Construction outside of this window would have fewer impacts on sea turtles than construction during the active season.

Although some variation is expected in the design parameters, the impact assessment on sea turtles in this section analyzes the maximum-case scenario.

SouthCoast Wind has committed to measures to minimize impacts on sea turtles, which are considered part of the Proposed Action and applicable action alternatives and are assessed within each IPF. These applicant-proposed AMMs include, but are not limited to, incorporating soft start methods during initial pile-driving activities to allow sea turtles to migrate away from the area of effect, employing sound-attenuation methods, ensuring that all vessels underway do not intentionally approach any sighted sea turtle, and ensuring that all vessels maintain a separation distance of 164 feet (50 meters) or greater from any sighted sea turtles (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

As part of its COP, SouthCoast Wind has also developed a Marine Mammal and Sea Turtle Monitoring and Mitigation Plan for ESA-listed sea turtle species (COP Volume 2, Appendix O; SouthCoast Wind 2024). Measures proposed include but are not limited to protected species observers, vessel avoidance measures such as separation distances and speed restrictions, pile driving time-of-year restrictions, visual monitoring for HRG surveys, UXO detonation monitoring, marine debris awareness training, and monitoring and reporting of sea turtle observations during activities with potential impacts. Some of these mitigation measures will have limited effectiveness since visual observations during vessel transits will be difficult due to the significant time sea turtles spend at or just below the surface. Appendix G, Table G-1 provides a full list of the committed measures in greater detail.

3.5.7.5 Impacts of Alternative B – Proposed Action on Sea Turtles

This section summarizes the potential impacts of the Proposed Action on sea turtles during the various phases of the proposed Project. Routine activities would include construction, O&M, and decommissioning of the proposed Project, as described in Chapter 2, *Alternatives*.

The analysis of impacts under the No Action Alternative, and references therein, applies to the following discussion of the Proposed Action. The most impactful IPFs associated with the Proposed Action are discussed below and include underwater noise during pile driving, which could cause temporary impacts; increased vessel traffic, which could lead to injury or mortality from vessel strikes; the presence of structures, which would lead to permanent impacts that may be either adverse or beneficial; and cable emplacement and maintenance, which could affect sea turtles from mechanical and hydraulic dredging techniques and via water quality effects.

Accidental releases: As discussed in Section 3.5.7.3, *Impacts of Alternative A – No Action on Sea Turtles*, accidental release of trash and debris may occur from Project vessels during construction, operations, and decommissioning. BOEM assumes operator compliance with federal and international requirements for managing shipboard trash; such events also have a relatively limited spatial impact. While precautions to prevent accidental releases would be employed by vessels and port operations associated with the Project, it is likely that some debris could be lost overboard during construction, maintenance, and routine vessel activities. However, the amount would likely be miniscule compared to other inputs. In the event of a release, it would be an accidental, localized event in the vicinity of the Project area, likely resulting in non-measurable impacts, if any. However, because sea turtle ingestion of trash can be fatal, the overall impact would be minor.

Accidental releases can have both physical and chemical effects on sea turtles that negatively influence the health and survival of affected individuals (Shigenaka et al. 2021). The risk of any type of accidental release would be increased, primarily during construction, but also during O&M and decommissioning of offshore wind facilities. Table 3.5.7-5 outlines the amounts of oils and chemical fluids that represent potential accidental releases. In the event of a release, it would be an accidental, localized event in the vicinity of the Project area, likely resulting in non-measurable impacts. To reduce any impacts to sea turtles from accidental releases, SouthCoast Wind has developed an OSRP (COP Appendix AA; SouthCoast Wind 2024) with measures to avoid accidental releases and a protocol to respond to such a release if one occurs. SouthCoast Wind will adhere to all regulations under the USEPA Clean Water Act and has proposed mitigations measures (Appendix G, Table G-1). SouthCoast Wind will ensure that the shortest line length, rubber sleeves, and weak links will be used on mooring systems to prevent lines from looping or wrapping around ESA-listed species, while ensuring the safety and integrity of the structure or device (Appendix G, Table G-1). Therefore, accidental releases are considered unlikely.

Table 3.5.7-5. Total gallons of coolant, oils, lubricants, and diesel fuel in the Project area

Fluid Type	Gallons
Total Coolant Fluids in WTGs	73,500
Total Coolant Fluids in OSP or ESP	1,500
Total Oils and Lubricants in WTGs	433,650
Total Oils and Lubricants in OSP or ESP	755,000
Total Diesel Fuel in WTGs	132,300
Total Diesel Fuel in OSP or ESP	200,000

Source: Appendix D, Table D2-3.

The incremental impacts of the Proposed Action would not increase the risk of accidental releases beyond that described under the No Action Alternative. Potential impacts on sea turtles from exposure to accidental releases are expected to be sublethal due to quick dispersion, evaporation, and emulsification, which would limit the amount and duration of exposure and would have a negligible impact.

Cable emplacement and maintenance: The Proposed Action would entail a maximum of approximately 1,676 miles (2,697 kilometers) of cables, which includes 497 miles (800 kilometers) of interarray cables and 1,179 miles (1,897 kilometers) of offshore export cables. SouthCoast Wind would bury export cables to a depth of 3.2 to 13.1 feet (1 to 4 meters) below the surface and interarray cables to a depth of 3.2 to 8.2 feet (1 to 2.5 meters) below the surface. Impacts (disturbance, displacement, injury, and mortality) of new cable emplacement and maintenance under the Proposed Action are estimated to affect up to 2,480 acres (10.6 km^2) of seafloor in the export cable route corridors and 1,408 acres (5.7 km^2) in the Lease Area. The majority of benthic sediments in the Offshore Project area are fine sediments as described in Section 3.5.2.1, and any benthic invertebrate prey species of sea turtles would recover quickly and are not expected to have population-level impacts due to the small construction footprint compared to the geographic analysis area. Over 90 percent of the Brayton Point ECC benthic samples and 90 percent of the southern Falmouth ECC benthic samples are sand or finer, with only one sample of complex habitat occurring in the Lease Area. [1] Seafloor disturbances during installation and maintenance of interarray and offshore export cables may cause temporary behavioral changes in foraging activities of sea turtles in the Project area. Avoidance of the disturbed area due to a decline in foraging quality may occur for Kemp's ridley and loggerhead sea turtles because their preferred prey species include bottom-dwelling crustaceans and mollusks, which would be directly affected during cable installation. Leatherback sea turtles mainly feed on jellyfish and salps that occur in the water column and are unlikely to be impacted by cable emplacement, thus, impacts to leatherback sea turtle prey availability is expected to be negligible. Some areas where cables cannot be buried would be hard bottom habitats; thus, the addition of cable protection would not remarkably change the sediment type or alter sea turtle prey resources.

Dredging may be used for cable installation in areas for sand wave clearance to ensure cable burial below mobile seabed sediments and for HDD in-water exit pits. Dredging can be done using trailing suction hopper dredgers, cutter suction dredgers, or mechanical dredging vessels. The area of potential dredging is currently unknown due to the dynamic nature of sand waves. However, sand wave clearance is anticipated to occur within three relatively small sections of the Falmouth ECC and not expected to occur in the Brayton Point ECC (refer to the EFH Assessment for more detail on potential sand wave clearance areas). During geophysical surveys along the Brayton Point ECC, the risk to the cable due to sediment mobility along the corridor was found to be low. However, seabed preparation or alternate burial methods may be required in the northern portion of the Falmouth ECC in Muskeget Channel and Nantucket Sound, where surficial boulders, subsurface boulders, geological units representing hardgrounds or glacial tills, or shallowly buried channels with variable soil properties have been identified. The seabed preparation may include dredging or leveling steep or mobile seabed features to facilitate achieving the targeted depth of lowering to ensure adequate burial over the life of the Project.

[1] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action,* Brayton Point is the preferred POI for both Project 1 and Project 2, and Falmouth is the variant POI for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

Within the Falmouth ECC, SouthCoast Wind anticipates a suction hopper dredger (or similar) would be used for seabed preparation activities over approximately five percent of the cable route. Dredging may additionally be used during decommissioning for vessels to unearth the cables prior to being reeled onto barges or other transport vessels.

Seafloor affected by dredging prior to cable installation would result in turbidity effects that have the potential to have temporary impacts on some sea turtle foraging habitat and prey species in the immediate area (e.g., benthic mollusks, crustaceans, sponges, sea pens, crabs); however, abundant similar habitat and prey would be found in adjacent areas, resulting in fewer impacts on sea turtles. As described in Section 3.5.7.3, *Impacts of Alternative A – No Action on Sea Turtles,* dredging could also contribute additional impacts on sea turtles related to impingement, entrainment, and capture associated with mechanical and hydraulic dredging techniques. Given the available information, the risk of injury or mortality of individual sea turtles resulting from dredging necessary to support offshore Project construction would be low, with impacts anticipated to be minor with no population-level effects.

Water quality impacts from cable emplacement would cause elevated suspended sediments. Inshore trenching and dredging could result in more extensive suspended sediment with concentrations above 100 mg/l (0.0008 pounds per gallon [lb/gal]) occurring at a maximum distance of 36 meters (118 feet). Maximum TSS levels are expected to drop below 10 mg/l (0.00008 lb/gal) in 2 hours, while drops below 1 mg/l (0.000008 lb/gal) are expected after less than 4 hours (COP Appendix F1; SouthCoast Wind 2024). Elevated turbidity levels would be temporary, lasting 1 to 6 hours in the immediate vicinity of the cable emplacement corridor. Physical or lethal effects are unlikely to occur because sea turtles are air-breathing and land-brooding and, therefore, do not share the physiological sensitivities of susceptible organisms like fish and invertebrates. Sea turtles may alter their behavior in response to elevated suspended sediment concentrations (e.g., moving away from an affected area) and may also experience behavioral stressors, like reduced ability to forage and avoid predators. However, sea turtles are migratory species that forage over wide areas and would likely be able to avoid temporarily suspended sediment impacts that are limited in severity and extent without consequence. Sea turtles would be expected to swim away from the sediment plume and return to the area once turbidity has returned to background levels.

To reduce impacts from cable emplacement, SouthCoast Wind will use HDD for sea-to-shore transition that will minimize sediment mobilization and seabed sediment alteration for cable burial operations. Individual sea turtles, when present, would be expected to successfully forage in nearby areas not affected by increased sedimentation, and only non-measurable, negligible impacts, if any, on individuals would be expected given the localized and temporary nature of the potential impacts.

Discharges/intakes: Increases in Project vessel discharges would occur during construction and installation, O&M, and decommissioning. As described under the No Action Alternative, certain discharges are required to comply with permitting standards that are established to minimize potential impacts on the environment. Impacts from entrainment and impingement of sea turtles and their prey associated with intakes for cable-laying equipment would be mostly confined to cable centerlines and would be short-term and minor.

The Proposed Action would also install HVDC converter OSP(s), which would result in the intake and discharge of water by the CWIS. SouthCoast Wind developed a NPDES permit application for one offshore HVDC converter OSP in the Lease Area for Project 1 (Appendix B, Figure B-2) (TetraTech and Normandeau Associates, Inc. 2023). If SouthCoast Wind selects HVDC technology for Project 2, the parameters and modeling results from the NPDES permit application for Project 1, described below, would be representative of a HVDC converter OSP for Project 2 located in the southern portion of the Lease Area. From four modeled maximum temperature delta scenarios, the distance from the discharge point where the temperature delta reached 1°C (1.8°F) was 41.9 feet (12.8 meters) in the fall, 84.9 feet (25.9 meters) in the winter, 67.5 feet (20.6 meters) in the spring, and 46.6 feet (14.2 meters) in the summer (TetraTech and Normandeau Associates, Inc. 2023). The effluent plume area was highest in the winter at 792.1 square feet (73.6 square meters) and lowest in the fall at 407.0 square feet (37.8 square meters). The risk of direct harm caused by heated effluent water or of entrainment or impingement of sea turtles during water cycling is negligible. The likelihood of sea turtle entrapment is low due to the seasonal nature and overall low sea turtle abundance in Project area waters. Mitigation measures proposed to reduce overall entrapment (e.g., intake velocity of 0.5 feet per second and a bar rack that will consist of three stainless steel bars approximately 0.8 inch (20 millimeters) wide fixed to the opening of the intake caisson) are expected to minimize these risks further. Impacts of water intake by HVDC converter OSPs would be limited to the entrainment of sea turtle prey. However, at this scale it is not expected to make any measurable difference in sea turtle prey availability. Heated effluent is not expected to impact sea turtle prey availability due to the relatively small discharge plume and localized temperature increase within the mixing zone.

Given the low abundance of sea turtles in the Project area, the low proportion of potentially entrained prey items, the small and localized effects from thermal discharge, and the mitigation measures in place to reduce potential risks, indirect impacts from the HVDC converter offshore substation platform on sea turtles are expected to be minor**.**

During installation of up to 85 suction-bucket jacket WTG foundations in the southern portion of the Lease Area as part of Project 2, planktonic organisms may also become entrained as water is pumped out of the buckets during the embedding process. An entrainment assessment was conducted to estimate the potential impact this construction activity may have on zooplankton and ichthyoplankton species present within the installation area (RPS 2024). The presence and abundance of plankton species in the SouthCoast Wind suction-bucket jacket installation area was determined using NOAA-NEFSC Ecosystem Monitoring (EcoMon) survey program plankton data (NEFSC 2019) limited to within 3.10 miles (5 kilometers) of the foundation installation area. This analysis area was used on the assumption that foundation installation is a one-time localized action with short-term entrainment impacts. Monthly entrainment estimates for suction-bucket foundation installations were calculated using a per foundation one-time total seawater displacement volume of 27,200 cubic meters (6,800 cubic meters per bucket x 4 buckets per foundation), the assumption that the installation of 85 suction-bucket jacket foundations would occur evenly over a 16-month period from April 2030 to July 2031, and the taxa-specific EcoMon plankton density data averaged by month.

A total of 91 plankton taxa were found to occur in the suction-bucket jacket entrainment analysis area of which 55 were zooplankton and 36 were ichthyoplankton (RPS 2024). The plankton species most susceptible to entrainment impacts are described in detail in Section 3.5.6.5, *Impacts of Alternative B – Proposed Action on Marine Mammals*. While less prevalent in the suction-bucket jacket entrainment analysis area, salps, which are prey for sea turtles, had a peak density of 27,562.04 individuals per 100 cubic meters in the month of October and a total estimated entrainment of 78,698,098 individuals throughout the duration of the foundation installation activity (RPS 2024). As the installation of suction-bucket jacket foundations is a one-time localized action, entrainment impacts are considered short-term and limited to the immediate vicinity of the installation activity. In a similar entrainment assessment conducted for the cooling water intake system of the Sunrise Wind Farm offshore converter station with an intake volume of 8.1 million gallons per day and an estimated annual entrainment for *C. finmarchicus* of 1.1 billion individuals, TRC (2022) reported that this magnitude of entrainment loss represented less than 0.1 percent of the estimated local population of this species in the Sunrise Wind Farm Lease Area. In comparison, plankton entrainment estimates from suction-bucket jacket installations are considerably less, would be a one-time event, and would impact an even smaller percentage of the plankton population in the vicinity of the SouthCoast Wind suction bucket foundation installation area. Therefore, the impacts associated with the entrainment of the planktonic prey of sea turtles is considered short-term and negligible.

EMFs and cable heat: The Proposed Action would entail a maximum of approximately 1,676 miles (2,697 kilometers) of cables, which includes 497 miles (800 kilometers) of interarray cables and 1,179 miles (1,897 kilometers) of offshore export cables. Sea turtles possess geomagnetic sensitivity (but not electro sensitivity) and are able to use Earth's magnetic fields for directional (compass-type) and positional (map-type) information used to aide in orientation, navigation, and migration (Normandeau et al. 2011). Sea turtle species have wide ranges of geomagnetic sensitivity, with loggerhead sea turtles able to detect fields from 0.00469 to 4,000 μT and green sea turtles able to detect fields from 29.3 to 200 μT (Normandeau et al. 2011). Interarray and ECCs would produce AC and DC EMF emissions. EMFs produced by AC and DC cables differ significantly in that AC transmissions vary rapidly in direction while DC transmissions are static (i.e., have a frequency of 0 Hz) (SouthCoast Wind 2024, Appendix P1). DC magnetic fields, such as those associated with submarine cables, can also combine with the Earth's static geomagnetic field altering the direction and/or magnitude of the resulting cable EMF. DC cable EMF interaction with the Earth's geomagnetic field will depend on the direction/orientation of the cable at the emplacement location (SouthCoast Wind 2024, Appendix P1). Additionally, DC electromagnetic fields average three times higher amplitude compared to those produced by AC cables (Hutchison et al. 2020). The maximum induced magnetic field and electrical field generated by the ECCs would be 1,859 milligauss (185.9 μT) directly above the cable centerline in the most conservative case, where cables are laid on the surface with cable protection. However, 85.5 milligauss (8.55 μT) measured at the seabed is the more likely scenario, where the cables are buried at a depth of 6.6 feet (2 meters) below the surface (SouthCoast Wind 2024, Appendix P1).

Sea turtles would likely encounter EMFs from Project-related submarine cables during foraging activities, but it is unlikely that this detection would interfere with foraging ability because other sensory cues are used as well (Constantino and Salmon 2003; Endres and Lohmann 2012; Narazaki et al. 2013). Given the extremely small area where exposure to this IPF would occur and the proposed burial depth of the submarine cable, impacts such as changes in swimming direction and altered migration routes would not be anticipated. SouthCoast Wind estimates that as much as 10 percent of interarray cable track, 10 percent of the Falmouth ECC, and 15 percent of the Brayton Point ECC will be unable to achieve the target burial depth of 6 feet. In areas where it is not feasible to achieve the target burial depth, additional cable protection will be installed. Cable protection may include concrete mattresses or rock placement over the cable. These coverings will provide additional shielding from EMF and will encourage sedimentation and encrusting growth to further bury the cables. Based on the EMF analysis conducted by SouthCoast Wind in the Project area, which found that EMF emitted by submarine cables would be well under typical detection ranges of magnetosensitive marine species, EMF impacts on sea turtles are expected to be negligible.

Buried submarine cables can warm the surrounding sediment in contact with the cables up to tens of centimeters (Taormina et al. 2018). No data is available on cable heat effects on sea turtles (Taormina et al. 2018). However, increased heat in the sediment could affect benthic organisms which serve as prey for sea turtles that forage in the benthos. Based on the narrowness of cable corridors and estimated area of thermal radiation, impacts on benthic organisms are not expected to be significant (Taormina et al. 2018) and would be limited to a small area around the cables. Considering the anticipated cable burial depths, thermal effects are not expected to occur at the surface of the seabed where benthic-feeding sea turtles would forage; therefore, any effects on a sea turtle's opportunity to forage and direct impacts to their prey from cable heat are considered to be minor.

Gear utilization: SouthCoast Wind's fisheries and benthic monitoring plans (INSPIRE 2023, 2024) propose a variety of survey methods to evaluate the effects of construction and operations on benthic habitat structure and composition and economically valuable fish and invertebrate species. The survey methods are explained in detail in Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*, which includes a discussion on the effects of gear utilization on prey species. The proposed survey methods include acoustic telemetry, drop camera, demersal trawl, ventless trap/pot, Neuston net sampling, video/photography surveys, sediment grab sampling, and SPI/PV. In addition to specific requirements for monitoring during the construction period, periodic PAM deployments may occur over the life of the Project for other scientific monitoring needs. All requirements of the Proposed Action will follow BOEM's 2021 Project Design Criteria and Best Management Practices (BOEM 2021c) to limit interactions with protected species.

A demersal otter trawl survey will be used to assess the abundance and distribution of target fish and invertebrate species within the offshore Project area. Trawl bottom time would be limited to 20 minutes and the vessel operating the trawl would tow at 3 knots. All tows would be completed during daylight hours, and trawling would be delayed if any turtles are sighted in the vicinity of the trawl tow. Available research indicates that limiting tow times to less than 30 minutes likely eliminates the risk of death for incidentally captured sea turtles (Epperly et al. 2002; Sasso and Epperly 2006). The proposed bottom-time and the use of trained observers for trawl surveys would reduce the likelihood of capture of sea turtles and minimize the risk of serious injury and mortality from forced submergence for sea turtles that are incidentally caught. Where possible, captured sea turtles would be disentangled and, if injured, may be brought back to rehabilitation facilities for treatment and recovery. This helps to reduce the rate of death from entanglement. Safe release, disentanglement protocols, and rehabilitation (Appendix G) would help reduce the severity of impacts of these interactions. However, potential measurable effects on sea turtles due to trawl surveys may still occur and cannot be discounted.

A ventless trap survey will be used to sample crab, lobster, and fish species present in the Project area (INSPIRE 2023, 2024). The leatherback sea turtle may be particularly vulnerable to entanglement in trap/pot fishing gear, possibly due to its physical characteristics, diving and foraging behaviors, distributional overlap with the gear, and the potential attraction to prey items that collect on buoys and buoy lines at or near the surface (NMFS 2016). To reduce the risk of vertical line entanglement, ropeless gear, in lieu of downlines will be deployed. The primary method for retrieving trap strings will be grappling, though on-demand systems will continue to be tested and potentially phased into the survey as the technology progresses and becomes logistically feasible. In the event of incidental sea turtle capture, survey vessels would be required to carry adequate disentanglement equipment and crew trained in proper handling and disentanglement procedures. Thus, while there exists a possibility of sea turtle capture or entanglement in ventless trap surveys, especially among leatherback sea turtles, the likelihood is considered very low with the proposed implementation of mitigation measures and limited duration of each survey event.

Acoustic telemetry to monitor the presence and movement of fish species would be conducted using fixed station acoustic receivers, and continuous observational periods will be implemented to detect the presence of sea turtles in the area. Monitoring surveys are also expected to occur at short-term, regular intervals over the duration of the monitoring program. Therefore, the potential for entanglement of sea turtles in acoustic telemetry survey equipment is considered extremely unlikely to occur.

Neuston net sampling involves towing a plankton net at slow speeds (4 knots) for brief periods (10 minutes) in the upper 1.6 feet (0.5 meter) of the water column. As the Neuston net frame measures 7.9 x 2 x 19.7 feet (2.4 x 0.6 x 6 meter) and features a mesh size of 0.5 inch (1,320 micrometers) and deployed off the stern of the vessel, this would not pose as an entanglement risk to sea turtles. Similarly, drop camera sampling occurs directly from the vessel's stern, with continuous seabed monitoring. As part of benthic monitoring surveys, a ROV stereo-camera system will be used to assess the effect of the introduction of hard-bottom novel surfaces while sediment grab samples and SPI/PV will be used to evaluate structure-oriented enrichment and measure changes in benthic function over time (INSPIRE 2024). As these surveys avoid gear that could entangle sea turtles, the risk of entanglement from Neuston net, drop camera, and benthic habitat monitoring surveys to sea turtles is considered extremely unlikely to occur.

A PAM plan will be submitted to NMFS and BOEM for review prior to the start of activities. Monitoring studies utilizing moored systems would be required to use the best available technology to reduce any potential risks of entanglement (Appendix G, *Mitigation and Monitoring*). Surveys are also expected to occur at short-term, regular intervals over the duration of the monitoring program. Therefore, passive acoustic equipment is not expected to pose a meaningful risk of entanglement to sea turtles.

While the patchy distribution and low densities of sea turtles within 3 miles (5 kilometers) of the SouthCoast Lease Area (<1 turtle per 100 square kilometers in and near the Lease Area for all species in any season) would reduce interactions with sea turtles, the potential for incidental capture and entanglement cannot be discounted should an individual be encountered during trawl surveys. However, given the short-term, low-intensity, and localized impacts of gear utilization under the Proposed Action, impacts on sea turtles are expected to be minor with no effects on the population level.

Lighting: Vessels and offshore structures associated with offshore wind activity would have deck and safety lighting, producing artificial light during the construction, O&M, and decommissioning phases of the Proposed Action. Additional lighting for night operations and during low-visibility conditions may be necessary within the Lease Area and ECCs during construction and decommissioning. Impacts of lighting on nesting females and hatchling turtles would not occur under the Proposed Action, as sea turtle nesting beaches do not occur north of Virginia and are not included in the Project area. As discussed in Section 3.5.7.3, *Impacts of Alternative A – No Action on Sea Turtles,* lighting on vessels and offshore structures could elicit attraction, avoidance, or other short-term, localized behavioral responses in sea turtles as well as some potential impacts to prey for some sea turtle species (Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*). Orr et al. (2013) indicated that lights on WTGs that flash intermittently for navigational or safety purposes do not present a continuous light source and, therefore, do not appear to have a disorienting influence for any sea turtle life history stages. Under the Proposed Action, up to 149 WTG/OSP positions would introduce continuous artificial light in the OCS. Vessels will be illuminated to provide safe working conditions for personnel, as dictated by the operations ongoing at that time. These operations include installation and removal of WTGs, OSPs, interarray cables, and export cables. During construction, continuous nighttime vessel lighting and construction area lighting would be required at the offshore location where the vessel and personnel are working. During O&M, SouthCoast Wind will utilize lighting during operations as required by the USCG, FAA, and/or relevant regulatory body and abide by all applicable standards. This includes lighting to be placed on all offshore structures that would be visible throughout a 360-degree arc from the surface of the water to aid in mariner navigation. SouthCoast Wind does not anticipate utilizing continuous lighting on the WTGs at the water's surface; however, SouthCoast Wind does plan to illuminate, at a minimum, the landing during crew transfers (specifically, the Walk to Work gate). SouthCoast Wind would implement an ADLS to only activate WTG lighting when aircrafts enter a predefined airspace. The short-duration synchronized flashing of the ADLS would have less impact on sea turtles at night than the standard continuous, medium-intensity red-strobe light aircraft warning systems, reducing activation of the system by 99 percent (COP Appendix Y3; SouthCoast Wind 2024).

Artificial light during construction, O&M, and decommissioning would be minimal and short-term (occurring primarily during construction and decommissioning), and those on WTGs and OSPs, while considered long-term, are intermittent and would represent a small fraction of light sources anticipated under the *No Action Alternative*. As such, BOEM expects impacts to sea turtles, if any, to be negligible.

Noise: Noise transmitted through water, through the seabed, or both can result in high-intensity, low-exposure-level, and long-term but localized intermittent risk to sea turtles. Underwater noise generated by the Proposed Action include impact pile driving (installation of WTGs and OSP), vibratory pile driving, geophysical surveys (HRG surveys), geotechnical drilling surveys, detonations of UXO, vessel traffic, aircraft, cable laying or trenching and dredging during construction, and WTG operation. While all of these noise sources occur during construction, only WTG operation, HRG surveys, vessel traffic, and cable laying or trenching for cable repairs, if necessary, would occur during operation. Decommissioning activities related to noise would likely be similar to or less than those outlined for construction activities (with the exception of impact pile driving for foundations). These noise sources would increase sound levels in the marine-receiving environment and may result in potential adverse effects on sea turtles in the Project area including harm (PTS) and harassment (TTS or behavioral disturbance), as described in Section 3.5.7.3, *Impacts of Alternative A – No Action on Sea Turtles*.

Noise – pile driving: Noise from pile driving would result in a potential risk of PTS and behavioral disturbance to sea turtles, which would occur intermittently during the installation of offshore structures. Depending on the construction scenario, pile driving would consist of either impact or vibratory pile driving. Each monopile requires 4 hours of driving to install (two piles driven per day), while each piled jacket foundation requires 2 hours of driving to install (eight piles driven per day). Up to 147 WTGs and up to 5 OSPs with a maximum of 149 WTG/OSP positions are anticipated for the Proposed Action. Maximum active piling duration for WTG foundations would be up to 588 hours (147 monopile WTGs times 4 hours per pile). The maximum active piling duration for OSP foundations would be up to 40 hours (2 hours per foundation, up to four foundations per OSP, and up to five OSPs). Sea turtle hearing sensitivity is within the frequency range (100 to 1,000 Hz) of sound produced by low-frequency sources such as marine drilling (for a summary, see Popper et al. 2014). Any sea turtle present in the area could be exposed to the noise from more than one pile-driving event per day, repeated over a period of days.

Pile-driving noise associated with the Proposed Action may result in temporary impacts, including behavioral and physiological effects on individual turtles, during pile-driving activities. Potential behavioral effects of pile-driving noise include altered dive patterns, short-term disturbance, startle responses, and short-term displacement (NSF and USGS 2011; Samuel et al. 2005). Potential physiological effects include temporary stress response and, when close to the pile-driving activity, TTS or PTS. Behavioral effects and most physiological effects are expected to be of short duration and localized to the ensonified area. Any disruptions to foraging or other normal behaviors would be temporary and increased energy expenditures associated with displacement are expected to be small. However, PTS could permanently limit an individual's ability to locate prey, detect predators, or find mates and could, therefore, have long-term effects on individual fitness. As described for the No Action Alternative, there have been no documented sea turtle mortalities associated with pile driving and no direct evidence of PTS occurring for sea turtles.

To estimate radial distances to injury and behavioral thresholds for pile driving, peak SPLs and frequency-weighted accumulated SELs for the onset of PTS in sea turtles from Finneran et al. (2017) and behavioral response thresholds from McCauley et al. (2000) were used (Table 3.5.7-4) based on the behavioral threshold recommended in the GARFO acoustic tool (GARFO 2020). Acoustic propagation was modeled at two representative locations in the Project area (Location 1 – 174 feet; Location 2 – 125 feet) and under different construction scenarios as listed below. Year 1 (corresponding to Project 1) assumes WTG foundation installations would use impact pile driving only (no vibratory pile driving). Year 2 (corresponding to Project 2) assumes WTG foundation installations would use either a combination of vibratory and impact pile driving or impact pile driving only. The modeling also includes concurrent installation of WTG foundations and OSP foundations during which only impact pile driving was assumed. Project-level exposure estimates used average sound speed profiles for "summer" months (April–November) and "winter" months (December–March). Installation of WTGs was modeled between May and December for Year 1 and Year 2, with concurrent installation of four pin-piles per day for OSP jackets modeled in October for both years.

1. **Year 1 – WTG monopiles, or WTG piled jackets, impact piling only with concurrent OSP installations.**
    a. *Scenario 1* – Sequential installation of 68 WTG monopile foundations (9/16 meters; assuming 1 pile per day for 44 of the monopiles and 2 piles per day for 24 of the monopiles) plus concurrent installation of OSP jacket (12, 4.5-meter pin piles) and 3 WTG monopile (9/16 meters; 1/day) foundations for a total of 71 WTG monopiles and 1 OSP jacket foundation.

    b. *Scenario 2* – Sequential installation of 81 WTG jacket foundations (1 jacket per day with 4, 4.5-meter pin piles per jacket) plus concurrent installation of OSP jacket (16, 4.5-meter pin piles) and 4 WTG jacket (1 jacket per day with 4, 4.5-meter pin piles per jacket) foundations for a total of 85 WTG jacket foundations and 1 OSP jacket foundation.

2. **Year 2 – WTG monopiles or WTG piled jackets, vibratory and impact piling with concurrent OSP installations.**
    a. *Scenario 1* – Sequential installation of 65 WTG monopile foundations (9/16 meters; assuming 1 pile per day for 35 of the monopiles and 2 piles per day for 30 of the monopiles) plus concurrent installation of OSP jacket (12, 4.5-meter pin piles) and 3 WTG monopile (9/16 meters; 1/day) foundations, all using only impact pile driving for a total of 68 WTG monopiles and 1 OSP jacket foundation.

    b. *Scenario 2* – Sequential installation of 67 WTG monopile foundations (9/16 meters; assuming 1 pile per day for 19 monopiles and 2 piles per day for 48 of the monopiles) using vibratory and impact piling plus concurrent installation of OSP jacket (12, 4.5-meter pin piles) and 3 WTG monopile (9/16 meters; 1/day) foundations using only impact pile driving, as well as 3 WTG monopile (9/16 meters; assuming 1 pile per day) foundations using only impact pile driving, for a total of 73 WTG monopiles and 1 OSP jacket foundation.

    c. *Scenario 3* – Sequential installation of 48 WTG jacket foundations (1 jacket per day with 4, 4.5-meter pin piles per jacket) using vibratory and impact piling and 10 WTG jacket foundations using only impact pile driving (1 jacket per day with 4, 4.5-meter pin piles per jacket) plus concurrent installation of OSP jacket (16, 4.5-meter pin piles per jacket) and 4 WTG jacket (4, 4.5-meter pin piles per jacket) foundations using only impact pile driving, for a total of 62 WTG jacket foundations and 1 OSP jacket foundation.

The acoustic modeling also included assumptions on the potential effectiveness of one or more noise abatement systems in reducing sounds propagated into the surrounding marine environment. The use of one or more noise abatement system is reasonably expected to achieve greater than 10 dB broadband attenuation of impact pile-driving sounds; therefore, noise abatement system performance of 10 dB broadband attenuation was assumed when calculating ranges to threshold levels and potential exposures.

Under any foundation installation scenario, the modeling results did not exceed SPL_{pk} thresholds for any sea turtles indicating that noise from a single pile-driving event would not cause injury or impairment when mitigated with a 10 dB broadband noise attenuation. The cumulative exposure ranges to injury (SEL_{cum}) for all sea turtle species under all foundation installation scenarios and combinations of vibratory and impact pile driving had a maximum range of 0.62 mile (1 kilometer) (Table 3.5.7-6). Exposure ranges were nearly identical between combined (impact plus vibratory) and sequential (impact only) installation scenarios, apart from an increase in exposure range for green sea turtles exposed under sequential jacket pin pile installation from <0.006 mile (<0.01 kilometer) to 0.09 mile (0.15 kilometer). Exposure ranges were largest under the concurrent, impact-only installation of WTG monopiles and OSP jacket pin piles in the summer followed by the sequential, impact-only installation of WTG monopiles (at 1 pile per day) in the winter. Exposure ranges were smallest for any installation scenario of WTG jacket pin piles. As the modeling assumed higher density estimates for leatherback sea turtle, this species exhibited the largest exposure range compared to the other sea turtle species, from 0.23–0.62 mile (0.37–1.00 kilometer). The next largest exposure range was calculated for the green turtle, with an exposure to injury range of <0.006–0.37 mile (0.01–0.60 kilometer). The Kemp's ridley turtle had a small exposure range, from 0–0.24 mile (0–0.39 kilometer), and the loggerhead turtle had the smallest exposure range from 0–0.14 mile (0–0.22 kilometer). Depending on species, sea turtles that remain within <0.006–0.62 mile (0.01–0.99 kilometer) of pile driving over 24 hours could experience PTS, assuming 10 dB of noise attenuation (Table 3.5.7-6).

Table 3.5.7-6. Exposure ranges to injury (SEL_{cum}[a]) thresholds for sea turtles under different WTG and OSP pile driving installation scenarios, assuming 10 dB of noise attenuation

Species	YEAR 2 Combined [b] (impact + vibratory)			YEARS 1 and 2 Concurrent (impact only)		YEARS 1 and 2 Sequential (impact only)			
	16 m WTG Monopile 1 pile/day	16 m WTG Monopile 2 piles/day	4.5 m WTG JPP 4 piles/day	16 m WTG Monopile and 4.5 m OSP JPP	4.5 m WTG JPP and 4.5 m OSP JPP	16 m WTG Monopile 1 pile/day	16 m WTG Monopile 2 piles/day	4.5 m WTG JPP 4 piles/day	4.5 m OSP JPP 4 piles/day
Exposure Ranges (km) during Winter									
Kemp's ridley turtle	—	—	—	—	—	0.31	—	0	0.13
Leatherback turtle	—	—	—	—	—	1	—	0.37	0.57
Loggerhead turtle	—	—	—	—	—	0.01	—	0	0
Green turtle	—	—	—	—	—	0.68	—	0.15	0.15
Exposure Ranges (km) during Summer									
Kemp's ridley turtle	0.2	0.39	0	0.35	0.03	0.18	0.39	0	0.13
Leatherback turtle	1	0.89	0.39	0.99	0.45	1	0.89	0.37	0.57
Loggerhead turtle	0.01	0.02	0	0.22	0	0.01	0.13	0	0
Green turtle	0.49	0.55	< 0.01	0.6	0.2	0.48	0.55	0.15	0.15

Sources: Limpert et al. 2024: Summarized from Tables 41–49; LGL 2024: Appendix A, Tables H-50–64.
Density estimates are derived from the Strategic Environmental Research and Development Program – Spatial Decision Support System (Kot et al. 2023).
Density estimates for leatherback sea turtles during the summer are averaged seasonal densities from 2011 to 2015 (Kraus et al. 2016).
Density estimates for loggerhead sea turtles during the summer were calculated as the averaged seasonal leatherback sea turtle densities scaled by the relative, seasonal sighting rates of loggerhead and leatherback sea turtles (Kraus et al. 2016).
Densities of Kemp's ridley sea turtles are used for green sea turtles, as Kraus et al. 2016 did not observe any green sea turtles in the Lease Area.
[a] SEL_{cum} = weighted cumulative sound exposure level in decibels referenced to 1 microPascal squared second; also written L_E.
[b] Combined vibratory and impact pile driving would only occur in the summer months of Year 2.
dB = decibel; km = kilometer; m = meter; JPP = jacket pin piles; WTG = wind turbine generators; OSP = offshore service platform
dash (—) = no results because potential concurrent installation would only occur in the summer months

In addition to exposure ranges calculated with animal movement, the potential effects of sound were also summarized as acoustic radial distances, which are the distances over which at least 95 percent of the horizontal area that would be exposed to sound at or above the specified level occurred, assuming no animal movement (i.e., static receiver). Based on the modeled results at Location 1, pile-driving sound levels could exceed cumulative injury thresholds for a "static receiver" sea turtle that remained within 1.37–1.43 miles (2.2–2.3 kilometers) of the sound over 24 hours with 10 dB noise attenuation during monopile driving, and 0.81 mile (1.3 kilometers) during post-piled jacket pin-pile driving, or 0.56 mile (0.9 kilometer) during pre-piled jacket pin-pile driving (Table 3.5.7-7). At Location 2, the radial distances to cumulative injury thresholds were about 1.12 miles (1.8 kilometers) for monopile driving and 0.75 mile (1.2 kilometers) for post-piled jacket pin-pile driving, or 0.56 mile (0.9 kilometer) for pre-piled jacket pin-pile driving. Sound levels could exceed behavioral thresholds for a "static receiver" sea turtle during monopile driving with 10 dB of noise attenuation within 1.18–1.24 miles (1.9–2.0 kilometers) at Location 1 and 0.99–1.06 miles (1.6–1.7 kilometers) at Location 2. Sound levels could exceed behavioral thresholds within about 0.43 mile (0.7 kilometer) during post-piled jacket pin-pile driving with 10 dB noise attenuation at both locations. Behavioral thresholds could be exceeded at 0.31 mile (0.5 kilometer) during pre-piled jacket pin pile driving. Additionally, acoustic distances were slightly higher in the winter than in the summer at both locations.

Table 3.5.7-7. Summary of acoustic radial distances (R95% in kilometers) for sea turtles during monopile impact pile installation at the higher impact of two modeled locations for both seasons, with 10 dB noise attenuation

Scenario	Location 1			Location 2		
	Injury [a] L_{pk}	Injury [a] L_E	Behavior [b] L_p	Injury [a] L_{pk}	Injury [a] L_E	Behavior [b] L_p
Range (km) during Winter						
16 m Monopile Scenario, NNN 6600 (b) hammer	–	2.27	2.00	–	1.82	1.68
4.5 m Post-piled Jacket Scenario, MHU 3500S (b) hammer	–	1.30	0.73	–	1.22	0.73
4.5 m Pre-piled Jacket Scenario, MHU 3500S (b) hammer	–	0.93	0.48	–	0.93	0.52
Range (km) during Summer						
16 m Monopile Scenario, NNN 6600 (b) hammer	–	2.19	1.92	–	1.75	1.61
4.5 m Post-piled Jacket Scenario, MHU 3500S (b) hammer	–	1.30	0.72	–	1.18	0.72
4.5 m Pre-piled Jacket Scenario, MHU 3500S (b) hammer	–	0.92	0.48	–	0.91	0.53

Source: Limpert et al. 2024: Tables 50–55.

[a] Finneran et al. 2017.

[b] McCauley et al. 2000.

dB = decibels; km = kilometer; m = meter; L_{pk} = peak sound pressure level in decibels (dB) referenced to 1 microPascal squared; also written SPL_{pk}; L_E = weighted cumulative sound exposure level in dB referenced to 1 microPascal squared second; also written SEL_{cum}; L_p = root mean squared sound pressure level in dB referenced to 1 microPascal squared; also written SPL_{RMS} or L_{rms}; (–) dash indicates that distances could not be calculated because thresholds were not reached.

The same exposure modeling was also used to estimate the number of sea turtle species that could be exposed to injury and behavioral effects from pile driving (Table 3.5.7-8). Assuming 10 dB of noise attenuation, the results estimate the greatest Level A exposure in Year 1 would occur during the installation of 71 WTG monopiles and 12 OSP jacket pin piles (under Scenario 1) with a maximum of 2.15 leatherback sea turtles and <0.5 each of loggerhead, Kemp's ridley, and green sea turtles that may be exposed to cumulative sound levels exceeding recommended injury thresholds (SEL_{cum} or L_E) (Table 3.5.7-8). Similarly, in Year 2, the greatest Level A exposure would occur during the installation of 73 WTG monopiles and 12 OSP jacket pin piles (Scenario 2) with a maximum of 2.31 leatherback sea turtles and <0.5 each of loggerhead, Kemp's ridley, and green sea turtles that may be exposed to cumulative sound levels exceeding injury thresholds. No sea turtles were reported to be exposed during a single pile driving (SPL_{pk} or L_{pk}) event under any installation scenarios in both years.

For behavioral effects, the greatest Level B exposure would occur during the installation of 73 WTG monopiles and 12 OSP jacket pin piles (under Scenario 2 of Year 2) with a maximum of 6.25 leatherback sea turtles, 4.29 loggerhead sea turtles, and <0.5 each of Kemp's ridley and green sea turtles that may be exposed to sound exceeding behavioral thresholds (SPL_{rms} or L_p). Exposures were similar during the installation of 71 WTG monopiles and 12 OSP jacket pin piles (under Scenario 1 of Year1).

Generally, exposures were much lower under any scenario involving the installation WTG and OSP jacket pin piles, suggesting that foundation installations using jacket pin piling may lessen the extent of behavioral and injurious levels of disturbance than monopile driving. In addition, these exposure estimates do not consider potential behavioral avoidance or the use of PSOs, shutdown procedures, and other mitigation measures beyond the 10 dB noise attenuation applied during modeling, and are thus, considered conservative estimates of exposure.

The potential for injury and behavioral disturbance is minimized by implementing a range of applicant-proposed mitigation measures (Appendix G-1, *Mitigation Measures*). These measures include the implementation of noise-reduction technologies such as bubble curtains or a combination of systems (e.g., double big-bubble curtain, hydrosound damper plus big-bubble curtain) that can greatly reduce impact pile-driving sounds. Mitigation measures would also include pre-clearance, shutdown zones, and ramp-ups that would facilitate a delay of pile driving if sea turtles were observed approaching. Active visual monitoring of the zone of influence (820.2 feet [250 meters]) for sea turtles is considered highly effective in mitigating cumulative PTS effects. The proposed requirement that impact pile driving can only commence when the pre-clearance zones are fully visible to PSOs allows high sea turtle detection capability and enables a high rate of success in implementation of these zones to avoid disturbance. It is likely that the pre-clearance zone (1,640.2 feet [500 meters]) would cover the Level B harassment zone; however, as the modeled maximum acoustic radial distances leading to behavioral disturbance (e.g., 2 kilometers) exceeds the pre-clearance zone, the adaptive refinement of pile-driving monitoring and mitigation protocols through sound source verification would help reduce the probability of severe hearing impairment or serious injury as a result of pile-driving noise exposure.

Table 3.5.7-8. Estimated individuals exposed to injury and behavior threshold levels of sound under different installation scenarios for Years 1 and 2, assuming 10 dB of noise attenuation.

Species	Exposure Estimates (# individuals)														
	Year 1						Year 2								
	Scenario 1: 71 WTG monopiles and 12 OSP JPP			Scenario 2 [a]: 85 WTG jackets and 16 OSP JPP			Scenario 1 [a]: 68 WTG monopiles and 12 OSP JPP			Scenario 2 [b]: 73 monopiles and 12 OSP JPP			Scenario 3 [b]: 62 WTG jackets and 16 OSP JPP		
	Injury		Behavior	Injury		Behavior	Injury		Behavior	Injury		Behavior	Injury		Behavior
	L_{pk}	L_E	L_p	L_{pk}	L_E	L_p	L_{pk}	L_E	L_p	L_{pk}	L_E	L_p	L_{pk}	L_E	L_p
Kemp's ridley turtle	0	< 0.01	0.11	0	< 0.01	< 0.01	0	< 0.01	0.11	0	< 0.01	0.12	0	< 0.01	< 0.01
Leatherback turtle	0	2.15	5.61	0	0.59	1.77	0	1.97	5.71	0	2.31	6.25	0	0.4	1.25
Loggerhead turtle	0	0.16	3.94	0	0	3.45	0	0.12	4.03	0	0.19	4.29	0	0	2.6
Green turtle	0	< 0.01	0.1	0	< 0.01	< 0.01	0	< 0.01	0.1	0	< 0.01	0.11	0	< 0.01	< 0.01

Source: Limpert et al. 2024: Appendix H, Tables H-2–H-28.
Density estimates are derived from the Strategic Environmental Research and Development Program – Spatial Decision Support System (Kot et al. 2018).
Density estimates for leatherback sea turtles during the summer are averaged seasonal densities from 2011 to 2015 (Kraus et al. 2016).
Density estimates for loggerhead sea turtles during the summer were calculated as the averaged seasonal leatherback sea turtle densities scaled by the relative, seasonal sighting rates of loggerhead and leatherback sea turtles (Kraus et al. 2016).
Densities of Kemp's ridley sea turtles are used for green sea turtles, as Kraus et al. 2016 did not observe any green sea turtles in the Lease Area.
[a] Impact-only pile driving.
[b] Combined vibratory and impact pile driving.
dB = decibels; JPP = jacket pin piles; OSP = offshore substation platform; WTG = wind turbine generator; L_{pk} = peak sound pressure level in decibels (dB) referenced to 1 microPascal squared; also written SPL_{pk}; L_E = weighted cumulative sound exposure level in dB referenced to 1 microPascal squared second; also written SEL_{cum}
L_p = root mean squared sound pressure level in dB referenced to 1 microPascal squared; also written SPL_{rms} or L_{rms}

As pile driving may occur during nighttime hours and during periods of low visibility, visual monitoring will include the use of the best currently available technology (e.g., thermal camera systems, infrared spotlights, and night-vision devices) that can monitor clearance and shutdown zones to mitigate potential impacts. However, infrared/thermal devices have a limited ability to spot sea turtles in the field, making nighttime visual monitoring of sea turtles less reliable than daytime monitoring. Visual monitoring will be supplemented by passive acoustic monitoring (PAM) during impaired visibility at night or during daylight hours due to fog, rain, or high sea states. An Acoustic Protected Species Observer will be on watch during all pre-start clearance, piling, and post-piling monitoring periods (daylight, reduced visibility, and nighttime monitoring). A Nighttime Pile Driving Plan (NPDP) and an Acoustic Monitoring Plan (AMP) will be submitted to BOEM and NMFS for review (Appendix G-1). The AMP and NPDP will describe the methods, technologies, and mitigation requirements for any low-visibility or nighttime pile driving activities. The NPDP should sufficiently demonstrate the efficacy of the alternative technologies and methods in monitoring the full extent of clearance and shutdown zones in order for nighttime pile driving activities to be approved. In the absence of an approved NPDP, nighttime pile driving would only occur if unforeseen circumstances prevented the completion of pile driving during daylight hours, and it was deemed necessary to continue piling during the night to protect asset integrity or safety.

The potential for PTS and behavioral disturbance is considered extremely unlikely to occur for Kemp's ridley and green sea turtles given their rarity in the area; therefore, impacts leading to PTS and behavioral disturbance are expected to be negligible (<0.5 individual) for these two species. Impacts at the population level are also not anticipated given the low density of these species in the Project area and the localized nature of noise impacts.

Given the relatively small size of sea turtles and the significant time spent at or just below the surface, sea turtles may be difficult to monitor, especially during low light conditions or at night. While the measures described here may reduce the potential for PTS or behavioral disturbance in sea turtles, they would not completely eliminate such risks. However, as reported in the modeling results (Table 3.5.7-8), there is a low number of potential exposures expected from pile driving, thus, impacts from pile driving are likely to result in short-term, localized consequences to individuals that would not lead to population-level effects.

While the proposed mitigation and monitoring measures and the animal's ability to avoid areas of loud construction noise are expected to decrease the likelihood of pile-driving noise exposure, anticipated exposures above PTS and behavioral thresholds cannot be discounted for loggerhead and leatherback sea turtles because they are more common in the area. Therefore, the effects of noise exposure from Project pile driving leading to PTS or behavioral disturbance are anticipated in leatherback and loggerhead sea turtles but are considered to be short term and minor and would not have stock- or population-level effects.

Noise – G&G surveys (HRG surveys and geotechnical drilling activities): HRG surveys would be conducted to support final engineering design and construction. As described in Section 3.5.7.3, *Impacts* *of Alternative A – No Action on Sea Turtles,* survey noise could affect sea turtles through auditory injuries, stress, disturbance, and behavioral responses.

G&G surveys that use non-impulsive sources are not expected to affect sea turtles because they operate at frequencies above the sea turtle hearing range (e.g., multibeam echosounders, side scan sonar). BOEM (2021b) evaluated potential underwater noise effects on sea turtles from G&G surveys using impulsive sources (e.g., boomers, bubble guns, air guns, sparkers) and concluded that for an individual sea turtle to experience a behavioral response threshold of SPL greater than 175 dB re 1 μPa, it would have to be within 295 feet (90 meters) of a sparker or the loudest G&G sound source. NMFS (2021a) further states that none of the equipment being operated for HRG surveys—with frequencies that overlap with sea turtles' hearing—has source levels loud enough to result in permanent PTS. However, noise from impulsive sources used during HRG surveys could exceed the behavioral effects threshold (SPL: 175 dB re 1 μPa) within 105–118 feet (32–36 meters) from the source, based on the boomer and sparker systems proposed for the Project (NMFS 2021).

Given the limited spatial extent of potential noise effects, injury-level exposure (PTS) is unlikely to occur. Based on expected sea turtle avoidance, the speed of the survey vessels, and the lower noise levels and smaller operational scales of G&G survey equipment, G&G surveys associated with the Proposed Action are unlikely to result in injury of sea turtles in the Project area. While low-level behavioral exposures could occur, these disruptions would be limited in extent and duration given the movement of the survey vessel and the mobility of the animals and would have limited effects on both the individual and population.

SouthCoast Wind will implement several mitigation measures for HRG surveys, which include pre-clearance zones, shutdown zones, and ramp-up procedures (Appendix G, Table G-1). Pre-clearance and shutdown zones for sea turtles are set at 328 feet (100 meters), which is three times larger than the distance identified as exceeding sea turtle behavioral threshold for the proposed boomer and sparker equipment. Monitoring this zone for sea turtles is considered highly effective in mitigating effects from HRG surveys. With the application of these mitigation measures, the potential for sea turtles to be exposed to noise above behavioral thresholds is plausible but extremely unlikely to occur. As sea turtle peak pressure distances for all HRG sources are below the threshold level of 232 dB, noise from HRG surveys leading to PTS or injury is considered highly unlikely. Therefore, the effects from noise exposure from Project HRG surveys leading to injury or behavioral disturbance for sea turtles is considered to be minor as the impact is highly localized and would not result in population-level effects.

Noise – turbine operation: Maximum noise levels anticipated from operating WTGs are below recommended thresholds for sea turtle injury and behavioral effects. Additionally, noise levels are expected to reach ambient levels within a short distance (164 feet [50 meters]) of turbine foundations (Tougaard et al. 2009; Thomsen et al. 2015; Kraus et al. 2016; Miller and Potty 2017) and that sea turtles may acclimate to repetitive underwater noise and are expected to habituate to noise in the absence of an accompanying threat (Bartol and Bartol 2011; Hazel et al. 2007; U.S. Navy 2018). Underwater operational noise generated by offshore WTGs less than 6.15 MW has been measured to have SPLs ranging from around 80 to 135 dB re 1 μPa at various distances with frequencies between 10 hertz and 8 kilohertz, and the combined noise levels from multiple turbines would be lower or comparable to those of a small cargo ship (Tougaard et al. 2020). On the other hand, operational noise from larger WTGs on the order of 15 MW would generate higher SPL levels of 125 dB re 1 µPa measured 328 feet (100 meters) from the turbine during 22 miles per hour (10 meters per second) wind speeds (Tougaard et al. 2020). During these extremely high wind events, noise emissions could range up to 177 dB re 1 µPa-m (Stober and Thomsen 2021). However, the industry shift from using gear boxes to direct-drive technology could reduce emissions by 10 dB. Noise emissions at this level are unlikely to cause PTS or TTS in sea turtles but might result in behavioral effects such as avoidance of the area (Hazel et al. 2007). Further, while foraging sea turtles are not expected to be significantly affected if exposed to underwater noise from WTG operations, they may forage less efficiently due to increased energy spent due to avoidance behavior. Decreased foraging efficiency, especially if individuals move away from Nantucket Shoals, could have short-term metabolic effects resulting in physiological stress, but these effects would dissipate once the prey distribution no longer overlaps the underwater noise.

Current available data on sound levels produced by currently operating WTGs would have negligible impacts on sea turtles as these sound levels are below sea turtle behavior and injury thresholds. SouthCoast Wind is currently considering the use of both direct-drive and gear-driven current-generation turbines although the exact WTG type and supplier have not been finalized. If larger, gear-driven WTGs are selected to be installed under the Proposed Action, the turbines may produce sound levels exceeding recommended thresholds. However, more acoustic research is warranted to characterize sound levels originating from larger turbines, the potential for those turbines to cause TTS effects, and to what distance behavioral and masking effects are likely. Potential operational noise would likely be of low intensity and close to WTGs and would reach ambient underwater noise levels within a short distance of the foundations. Thus, if larger WTGs are installed and would produce sound levels exceeding recommended thresholds, operational noise associated with the Proposed Action may result in minor but localized impacts on sea turtles.

Noise – UXO detonation: UXO detonations could generate high pressure levels that could cause disturbance and injury to sea turtles. The Falmouth ECC does not overlap any UXO areas or Formerly Used Defense Sites (USACE 2019; AECOM 2020). The Brayton Point ECC intersects one land-based Formerly Used Defense Sites that is listed as closed out and complete but extends out into the Sakonnet River (USACE 2019). During BOEM's pre-screening process for the selection of the Massachusetts/Rhode Island Wind Energy Areas, the nearest UXO site was found 10 miles (16 kilometers) west of the Massachusetts/Rhode Island Wind Energy Area (BOEM 2013). A desktop study by SouthCoast Wind of UXO in the Offshore Project area concluded that there is a varying Low to Moderate risk from encountering UXO on site. The risk is Moderate throughout all of the Lease Area, and a relatively equal ratio between Low and Moderate within the ECCs (COP Appendix E.7; SouthCoast Wind 2024). UXO detonations would only occur from May through November. While this coincides with the highest densities of leatherback and loggerhead sea turtles, the potential for serious injury is minimized by the implementation of a range of mitigation and monitoring measures (Appendix G, *Mitigation and Monitoring*), and UXO detonation is a last resort. Other methods—such as avoidance, lift and shift, deactivation, using shaped charges that reduce the net explosive yield or that allow the UXO to burn at a slower rate, and avoiding instantaneous detonation—would be considered before a detonation. Proposed mitigation measures include establishing pre-clearance and shutdown zones that would facilitate a delay in detonations if sea turtles were observed approaching or within areas that could be ensonified above sound levels that could result in auditory and non-auditory injury. Pre-start clearance zones, commensurate with marine mammal hearing group and UXO charge weight, range from 1,312 to 28,543 feet (400 to 8,700 meters), which includes a 7,382-foot (2,250-meter) sea turtle clearance zone. Sixty minutes prior to detonation, this zone will be monitored visually by at least two PSO vessels (with two PSOs on watch). These ranges cover observed PTS/TTS ranges for sea turtles: <656 feet (<200 meters) lethal, 1,214 feet (370 meters) minor injury, and 1,969 feet (600 meters) no injury (U.S. Navy 2017a citing O'Keeffe and Young 1984). Any sightings of a sea turtle would cause the clock to restart, after the animal has moved out of the monitoring zone. Only one detonation would occur in a 24-hour period, with no nighttime detonation planned, and a 10 dB noise attenuation system would be used, similar to the system used for pile-driving activities.

Acoustic modeling has been conducted for SouthCoast Wind Project scenarios (Hannay and Zykov 2022). Maximum exceedance distance to TTS (Level B) and PTS (Level A) for the largest class of UXO with no mitigation in place were modeled to be 3,838.5 feet (1,170 meters) and 2,011.1 feet (613 meters), respectively (Table 3.5.7-9). Accounting for 10 dB mitigation, maximum exceedance distances for TTS and PTS for the largest class of UXO were modeled to be 1,309 feet (399 meters) and 692.2 feet (211 meters), respectively. The range to exceedance of Level-A and Level-B exposures were modeled at depths of 32.8–98.4 feet (10–30 meters) to approximate the ECC and 147.6–196.8 feet (45–60 meters) to approximate the Lease Area (Table 3.5.7-10). Range to Level A threshold exceedance was found to be 1,820.8 feet (555 meters) in the ECC and 984.2 feet (300 meters) in the Lease Area for the largest UXO charge size. Range to Level B threshold exceedance was found to be 6,988.2 feet (2,130 meters) in the ECC and 7,381.9 feet (2,250 meters) in the Lease Area under the largest UXO charge size. Ranges for the onset of mortality, non-auditory lung injury, and gastrointestinal injury in sea turtles were also modeled (Table 3.5.7-11). Under the largest UXO classification, mortality was found to occur at a range of 689 feet (210 meters) in the ECC and 734.9 feet (224 meters) in the Lease Area. Onset of non-auditory lung injury was found to occur at a range of 1,309.1 feet (399 meters) in the ECC and 1,483 feet (452 meters) in the Lease Area. The onset of gastrointestinal injury was found to occur at a range of 410.1 feet (125 meters).

Table 3.5.7-9. Sea turtles PTS and TTS maximum exceedance distances (meters) to TTS and PTS thresholds for peak pressure (L_{pk}) for various UXO charge sizes

Mitigation	TTS / PTS Lpk threshold (dB re 1 µPa)	E4 (2.3 kg)		E6 (9.1 kg)		E8 (45.5 kg)		E10 (227 kg)		E12 (454 kg)	
		TTS	PTS	TTS	PTS	TTS	PTS	TTS	PTS	TTS	PTS
Unmitigated	226/232	201	105	318	166	543	285	929	487	1,170	613
Mitigated 10 dB	226/232	69	36	108	57	185	98	317	168	399	211

Source: Hannay and Zykov 2022: Tables 10 and 33.

dB = decibel; kg = kilogram; PTS = permanent threshold shift; TTS = temporary threshold shift; UXO = unexploded ordnance; L_{pk} = peak sound pressure level in decibels referenced to 1 microPascal squared; also written as $SPL_{pk.}$

Table 3.5.7-10. Range (meters) to SEL PTS-onset and SEL TTS-onset thresholds in the ECC and Lease Area for sea turtles for five UXO charge sizes assuming 10 dB of noise attenuation, and the maximum area exposed above this threshold

Range per UXO Charge Size	ECC		Lease Area	
	PTS	TTS	PTS	TTS
E4 R95% Distance (km)	<50	134	<50	203
E6 R95% Distance (km)	72	358	<50	448
E8 R95% Distance (km)	190	796	63	870
E10 R95% Distance (km)	424	1,610	201	1,780
E12 R95% Distance (km)	555	2,130	300	2,250

Source: Hannay and Zykov 2022: Tables 46–55.
dB = decibel; ECC = export cable corridor; m = meter; PTS = permanent threshold shift; TTS = temporary threshold shift; UXO = unexploded ordnance; SEL = frequency weight sound exposure level in decibels referenced to 1 microPascal squared second; also written $L_{E.}$

Table 3.5.7-11. Ranges (meters) to the onset of mortality, non-auditory lung injury, and gastrointestinal injury thresholds in the Lease Area and ECCs for five UXO size classes assuming 10 dB of noise attenuation for sea turtles [a]

Range per UXO Charge Size	Mortality				Non-Auditory Lung Injury				GI Injury
	ECC		Lease Area		ECC		Lease Area		Lpk Threshold 237 dB re 1 uPA
	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	
E4 R95% Distance (m)	14	6	11	5	35	16	26	13	21
E6 R95% Distance (m)	39	18	26	14	88	43	83	34	34
E8 R95% Distance (m)	108	56	106	44	223	126	236	126	58
E10 R95% Distance (m)	233	151	253	155	441	298	497	326	99
E12 R95% Distance (m)	308	210	345	228	557	399	639	452	125

Source: Hannay and Zykov 2022: Summarized from Tables 34–44.
[a] GI injury combines ECC and Lease Area. Thresholds are based on animal mass and submersion depth.
dB= decibel; ECC = export cable corridor; GI = gastrointestinal; m = meters; UXO = unexploded ordnance; L_{pk} = peak sound pressure level in decibels referenced to 1 microPascal squared; also written as $SPL_{pk.}$

Given the low densities of sea turtles within 3 miles (5 kilometers) of the SouthCoast Lease Area (<1 turtle per 62.1 square miles (100 square kilometers) in and near the Lease Area for all species in any season), the low number of potential detonations required for the Proposed Action, and the strict implementation of mitigation measures, the potential for PTS/TTS, non-auditory injury, mortality, and behavioral disturbance from UXO detonations for the proposed Project are expected to be minor.

Noise – vessels: The frequency range for vessel noise (primarily 10–1,000 Hz) (MMS 2007) overlaps with sea turtles' known hearing range (less than 1,000 Hz with maximum sensitivity between 200 and 700 Hz; Bartol and Ketten 2006) and, therefore, the vessel noise would be audible to sea turtles in the vicinity. The increase in vessel traffic associated with the Project would occur during construction and O&M activities with an estimated 15–35 vessels operating at any given time. The construction vessels used for Project construction are described in COP Volume 1, Section 3.3.14 and Table 3-21 (SouthCoast Wind

2024). Typical large construction vessels used in this type of project range from 225–300 feet (68.6–91.4 meters) in length and can operate at speeds up to 13.8 miles per hour (12 knots). Underwater noise from vessel traffic, aircraft, geophysical surveys (HRG surveys and geotechnical drilling surveys), turbine operation, and dredging are unlikely to cause injury or death to sea turtles, but the additional noise may result in behavioral effects. Vessel noise associated with the Proposed Action could cause repeated, intermittent impacts on sea turtles resulting from short-term, localized behavioral responses. Behavioral effects are considered possible but would be temporary with effects dissipating once the vessel or individual has left the area. Although vessel noise may result in behavioral effects in how sea turtles use the Project area and nearby waters, impacts related to vessel noise would be short term and highly localized and, therefore, considered negligible to minor with no expected impacts on the population level.

Presence of structures: Impacts on sea turtles could result from the reef effect created by the presence of up to 149 foundations and between 390 acres (157 hectares) to greater than 1,700 acres (>686 hectares) of scour/cable protection. Of the foundations, a maximum of 85 may utilize suction-bucket jackets. The foundational footprints of suction-bucket jackets (4.90 acres) are larger than both pin-pile jackets (2.61 acres) and monopiles (2.52 acres). Suction-bucket jackets would create a larger temporary disturbance of the seafloor around the structure but would provide a larger area of hard-bottom habitat. The bottom habitat of the Project Area where construction would occur consists of soft-bottom habitat and is not known to be sea turtle foraging habitat. Studies have found increased biomass for benthic fish and invertebrates around artificial structures (Pezy et al. 2018; Raoux et al. 2017; Wang et al. 2019), indicating that offshore wind facilities could generate beneficial permanent impacts on local ecosystems, which may lead to behavioral changes related to foraging activities. The WTG and OSP foundations would provide some level of reef effect, likely increasing local prey availability, and may result in minor, long-term beneficial impacts on sea turtle foraging and sheltering. However, minor, long-term adverse impacts could occur as a result of increased interaction with fishing gear and vessels as the reef effect and associated increase in fish biomass could increase recreational fishing effort in and around turbine foundations, which may increase marine debris from fouled fishing gear in the area. Sea turtle entanglement in fishing gear is not considered a new IPF but rather a change in the distribution of fishing effort from other locations. The artificial reef may attract sea turtle predators to the area, increasing sea turtle predation risk. The risk of increased interactions with active or abandoned fishing gear would result in minor impacts on sea turtles, as impacts on or loss of individuals may occur, but no population-level impacts are expected.

The presence of in-water structures could reduce water flow immediately downstream of foundations but would return close to background levels within approximately eight pile diameters downstream of the pile center (Miles et al. 2017). WTGs can potentially alter atmospheric forcings that could affect surface mixing and changes in local water flow, as shown by models of the wind farms in the North Sea by Daewel et al. (2022). However, these model results reflect a much larger number of WTGs than the number currently expected to be installed in the Project area. Fine-scale effects on water flow could have localized impacts on prey distribution and abundance. As a result of the atmospheric wake effect, reductions in sea surface currents leading to alterations in upper ocean dynamics can potentially extend over 10s of kilometers downwind from offshore wind turbine arrays (Christiansen et al. 2022). Regional hydrodynamic effects could affect prey species at a broader scale. Effects on surface currents could also influence patterns of larval distribution (Chen et al. 2020; Johnson et al. 2021) and seasonal mixing regimes could influence primary productivity, both of which could, in turn, affect the distribution of fish and invertebrates on the OCS (Chen et al. 2018; Lentz 2017). Nantucket Shoals, adjacent to the Project area, is an important foraging area due to tidal currents and weather driven surface currents aggregating prey in a high-productivity area. The influence of structures in the Project area on regional hydrodynamics is not fully understood. Hydrodynamic alterations due to the presence of WTGs could increase primary productivity in the vicinity of the structures (Carpenter et al. 2016; Schultze et al. 2020). However, such an increase would be highly localized, and the increased productivity may be consumed by filter feeders colonizing the structures (Slavik et al. 2019) rather than leading to increased prey abundance for sea turtles.

Green sea turtles, loggerhead sea turtles, and Kemp’s ridley sea turtles consume prey that are not strongly tied to physical oceanographic features such as currents and upwelling. However, leatherback sea turtles consume planktonic prey that are not able to move independently of normal ocean currents. Leatherback sea turtles are known to follow jellyfish aggregations and, thus, forage around areas of upwelling (Bailey et al. 2012). Nantucket Shoals, along with areas on Georges Bank and the edge of the continental shelf, have been found to create hotspots of prey for leatherback sea turtle foraging. The tidal mixing and upwelling in areas such as Nantucket Shoals increases productivity and gelatinous zooplankton numbers (Dodge et al. 2014). Since the leatherback sea turtle is pelagic, it is expected to be the most affected by local and regional hydrodynamic changes.

The presence of WTGs in the Project area may influence the distribution of jellyfish and, thus, affect the distribution of leatherback sea turtles. In addition to currents, the abundance and distribution of jellyfish are influenced by sea surface temperature and zooplankton prey availability (Gibbons and Richardson 2008). Changes in nutrient cycling resulting from altered oceanographic conditions due to the presence of WTG substructures may also affect jellyfish distributions. However, current research suggests that these changes could be highly localized (Floeter et al. 2017; Miles et al. 2017; Schultze et al. 2020) causing minimal impacts on the foraging resources of leatherback sea turtles. In addition, given the widespread range of leatherback sea turtle prey (NMFS and USFWS 2020), foraging resources would be available outside of the Project area if any alterations to jellyfish abundances were to occur.

Given the uncertainty around regional atmospheric and oceanographic offshore wind farm effects post-construction and the possibility of both increasing and decreasing prey availability depending on multiple environmental and Project-specific factors, impacts on sea turtle prey species and sea turtles from changes in hydrodynamics are not known at this time but are likely to vary both seasonally and regionally and are expected be localized, likely resulting in minor impacts. The presence of structures may also result in potential minor beneficial impacts due to increased foraging and sheltering opportunities, though these beneficial impacts may be offset given the increased risk of vessel interaction and gear entanglement.

After the conclusion of construction in the Project area, structures would enter the O&M phase. During this phase, structures would emit operational noise, which is discussed under the *Noise* IPF section. Operational structures would also require planned and unplanned maintenance. Conducting maintenance would involve sending maintenance vessels and lighting the structures so that maintenance and crew transfers can be complete. This would increase the impacts of vessel traffic and lighting in the Project area. The impacts related to maintenance would be temporary and localized only to the structures undergoing maintenance.

Port utilization: Port expansion is not proposed for the Project, therefore, direct impacts on sea turtles are not expected. Potential impacts from increased vessel traffic are discussed under the *Traffic* IPF.

Traffic: Based on the vessel traffic generated by the proposed Project, the Proposed Action would generate 15–35 construction vessels depending on construction activities with a maximum peak of 50 vessels that could be present in the Lease Area at one time when multiple phases of construction would be happening simultaneously (during construction and installation of offshore export cables, WTGs, OSP, and interarray cables). Increased vessel traffic associated with the Project may increase the potential for high-intensity impacts from vessel strikes during travel between multiple ports and the Lease Area. While Project vessel traffic would result in a measurable increase in vessel traffic in the Lease Area, this increase would be relatively low compared to the surrounding areas. Sea turtles are also expected to be highly dispersed in the Lease Area and the likelihood of co-occurrence between Project vessels and sea turtles is expected to be low.

Several factors contribute to the probability of vessel strikes, including the sea turtle density, time of year, sea turtle submergence rates, vessel type and speed, vessel trip numbers, and vessel trip distances. Sea turtles spend a majority (55–96 percent, depending on species) of time submerged (Eckert 1989; Hays et al. 2000; Lanyon et al. 1989) but can spend long periods of time at the surface during breathing and foraging activities (Hazel et al. 2007; Shimada et al. 2017), during which time they would be vulnerable to being struck by vessels or vessel propellers. Sea turtles are primarily vision-dependent and are only able to detect approaching vessels at approximately 33 feet (Hazel et al. 2007), thus, sea turtles may not be able to avoid collision from fast-moving vessels. Sea turtles may also be challenging to reliably detect from a moving vessel at sufficient distance to avoid vessel strike due to their high submergence rate or when they are just below the surface but within the vessel's draft. There are limited measures that have been proven to be effective at reducing collisions between sea turtles and vessels (Schoeman et al. 2020). A range of mitigation and monitoring measures have been proposed and will be implemented that would serve to reduce the probability of a vessel strike, especially during peak vessel activity. These measures include reducing vessel speed to 4.6 mph (4 knots) when sea turtles are sighted within 328 feet (100 meters) of an operating vessel's forward path. As previously mentioned, due to a sea turtle's low-lying appearance, sea turtles may be difficult to detect during transits, especially during periods of low visibility (e.g., darkness, rain, or fog). During these conditions, visual observers will be equipped with night vision equipment and infrared/thermal imaging technology in efforts to reduce such risks. Collision risk will still be present due to the limited effectiveness of infrared/thermal devices to detect sea turtles. It is anticipated that potential exposure to vessel strike risk would be limited to sea turtles within surface habitats in the transit path between ports and the

Lease Area. Lookouts can advise vessel operators to slow the vessel or maneuver safely away from sea turtles, as well as observing for indicators of sea turtle presence such as drifting algal mats.

While the probability of vessel interactions with sea turtles generally would be low due to their seasonal presence with dispersed regional distribution, some unavoidable effects on sea turtles may still occur as reliably detecting sea turtles during transits would remain a challenge, thus, the risk of vessel strike cannot be discounted. The implementation of mitigation measures would lower the risk of vessel strikes, though not entirely eliminate the risk. Therefore, impacts on individual sea turtles due to vessel strikes under the Proposed Action would likely be minor and would not result in population-level effects.

Impacts of Alternative B on ESA-Listed Species

All sea turtle species in the geographic analysis area are either threatened or endangered and protected by the ESA. BOEM is preparing a BA for the potential effects on ESA-listed species under NMFS' jurisdiction, in which preliminary analyses indicate that the Proposed Action may affect and is likely to adversely affect ESA-listed sea turtles. The preliminary analysis in the draft BA indicates that auditory effects due to the Proposed Action are likely to adversely affect ESA-listed sea turtles. Green and Kemp's ridley turtles have low enough population numbers in the Project area such that effects from noise associated with the Proposed Action were deemed extremely unlikely to occur and, thus, discountable. However, noise from pile driving has the potential to result in PTS or behavioral disturbance of the more abundant leatherback and loggerhead sea turtles, and the IPF was determined likely to adversely affect these species. All other sources of noise leading to PTS or behavioral disturbance (G&G surveys, cable laying, dredging, UXO detonation) were found to be discountable and insignificant or to have no effect on ESA-listed sea turtles. While the probability of vessel interactions with sea turtles generally would be low due to their seasonal presence, their dispersed distribution in the Project area, and the proposed measures in place to avoid or minimize vessel strikes, Project vessel traffic was determined likely to adversely affect ESA-listed sea turtles due to the difficulty in reliably detecting sea turtles during vessel transits. Habitat disturbance or modification could result in decreased foraging habitat for the Kemp's ridley sea turtle and a decrease in foraging opportunities, increased entanglement risk in recreational fishing gear, turbidity effects, species avoidance or displacement, behavioral disruption, EMF and heat effects, or lighting effects for all ESA-listed sea turtles. However, these impacts are expected to be insignificant or discountable as they would be short term, localized, unlikely to occur/co-occur with species presence, or would not be measurable or measurably change risk. Gear utilization was determined likely to adversely affect ESA-listed sea turtles as the proposed trawl surveys have the potential for incidental capture or entanglement of individual sea turtles. Other effects (i.e., shifts or displacement of other ocean users) could result in displacement of fishing activity outside the Lease Area and may result in increased entanglement risk for ESA-listed sea turtles if shifts to fixed gear from mobile gear were to occur. While such a gear shift is not expected, the effects of fishing activity displacement are more likely to adversely affect leatherback and loggerhead sea turtles than Kemp's ridley and green sea turtles due to foraging strategies and presence in the pelagic Lease Area. However, such a gear shift is not expected, and effects of displacement are extremely likely to occur due to the low population size and patchy distribution of sea turtles in the Project area. BOEM concluded consultation with NMFS under the ESA on October 24, 2024.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind and offshore wind activities. Planned non-offshore wind activities in the geographic analysis area that contribute to impacts on sea turtles include commercial fishing; marine transportation; military use; oil and gas activities; undersea transmission lines, gas pipelines, and other submarine cables; tidal energy projects; dredging and port improvement; marine minerals use, and ocean dredged material disposal.

The contribution of the Proposed Action to the impacts of accidental releases from ongoing and planned activities on sea turtles would likely be minimal. BOEM assumes all vessels would comply with USCG laws and regulations to properly dispose of marine debris and minimize releases of fuels/fluids/hazardous materials. Additionally, accidental large-scale releases are unlikely and impacts from small-scale releases would be localized and short term.

Export and interarray cables from the Proposed Action and planned offshore wind development would add an estimated 11,646 miles (18,742 kilometers) of buried cable to the geographic analysis area, of which the Proposed Action represents 14 percent. In context of reasonably foreseeable environmental trends, the Proposed Action would contribute a noticeable increment to impacts of EMFs and heat from ongoing and planned activities; however, overall cumulative impacts would be negligible given the small area that would be affected by the projects compared to the remaining area of open ocean within the geographic analysis area.

The 149 structures for the Proposed Action represent only 5 percent of the 3,094 offshore wind structures that would add new sources of lighting on the OCS from existing and planned offshore wind farms. In context of reasonably foreseeable environmental trends, the Proposed Action would incrementally contribute to cumulative lighting impacts from ongoing and planned activities, which would be negligible as offshore lighting is anticipated to have minimal effect on adult sea turtles.

The 3,888 acres (1,573 hectares) of seabed disturbance from cable emplacement associated with the Proposed Action represents only 2 percent of the 185,710 acres (75,154 hectares) of seabed expected to be disturbed on the OCS due to existing and planned offshore wind farms, including the Proposed Action. While increases in foraging effort or displacement due to turbidity may occur to individual sea turtles, these temporary effects are not anticipated to lead to population-level effects on sea turtle populations. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in minor impacts on sea turtles.

Planned offshore wind activities would generate comparable types of noise impacts to those of the Proposed Action. The most significant sources of noise are expected to be pile driving followed by vessels. The 149 structures for the Proposed Action represent only 5 percent of the 3,094 offshore wind structures anticipated on the OCS for existing and planned offshore wind farms, including the Proposed Action, although some foundations from the Proposed Action and other wind farms may be installed without pile driving. Project vessels would represent only a small fraction of the large volume of existing traffic in the geographic analysis area. In context of reasonably foreseeable environmental trends, the

Proposed Action would incrementally contribute to cumulative noise impacts on sea turtles from ongoing and planned activities, which would be minor overall.

The contribution of the Proposed Action to impacts of vessel traffic from ongoing and planned activities would be small given the large volume of existing vessel traffic in the geographic analysis area. The cumulative impact from vessel traffic is anticipated to be the same as the Proposed Action, minor, assuming other offshore wind projects adopt similar AMM measures to reduce the potential of vessel strikes.

The deployment of gear used for fisheries and benthic monitoring surveys under the Proposed Action would contribute to the cumulative impact of gear utilization in the region. However, the contribution of the Proposed Action to overall gear usage in the area is minimal, and the cumulative impacts on sea turtles would likely be minor overall.

The Proposed Action would contribute incremental impacts to sea turtles through the installation of up to 149 foundations. In combination with other offshore wind projects (estimated 3,094 offshore wind structures) would cumulatively contribute to impacts on sea turtles, primarily associated with the beneficial artificial reef effects, adverse impacts from fishing gear entanglement, and hydrodynamic effects on the distribution of jellyfish prey. Cumulative impacts on sea turtles would be minor overall.

Conclusions

Impacts of Alternative B – Proposed Action. Noise produced by activities associated with Alternative B, primarily from pile driving, may cause PTS or behavioral disturbance in leatherback and loggerhead sea turtles that commonly occur in the Project area; however, behavioral disturbance is not anticipated to result in fitness level consequences. The mitigation and monitoring measures (Appendix G, *Mitigation and Monitoring*) would minimize noise exposure and the potential for PTS and behavioral disturbance, thus, impacts on sea turtles are expected to be **minor adverse**. Impacts that have the potential to result in mortality and serious injury from vessel strikes and gear entanglement would be minimized by the implementation of mitigation measures required as part of the environmental permitting processes included in Appendix G, thus, impacts are expected to be **minor**. Overall, project construction and installation, O&M, and conceptual decommissioning would result in habitat disturbance, entrainment and impingement, underwater and airborne noise, water quality degradation, vessel traffic (strikes and noise), artificial lighting, and potential discharges/spills and trash. As described previously, with the implementation of mitigation and monitoring measures included in Appendix G, only leatherback and loggerhead sea turtles that are more common in the area are anticipated to incur PTS incidental to pile driving or would be susceptible to vessel strikes or entanglement. BOEM anticipates the impacts resulting from the Proposed Action would result in **minor adverse** impacts. Adverse impacts are expected to result mainly from pile-driving noise, the risks of gear entanglement/capture, and the risk of vessel strike from increased vessel traffic. Some **minor beneficial** impacts could be realized through artificial reef effects. Beneficial effects, however, may be offset given the increased risk of entanglement due to derelict fishing gear on the structures.

Cumulative Impacts of the Proposed Action: Cumulative impacts associated with the Proposed Action when combined with impacts from ongoing and planned activities including offshore wind would result in **minor adverse** impacts on sea turtles. The main drivers for these impact ratings are pile-driving noise and associated potential for auditory injury, the presence of structures, ongoing climate change, and ongoing vessel traffic posing a risk of collision. The Proposed Action would contribute to the cumulative impact rating primarily through pile-driving noise, vessel traffic, and the presence of structures. BOEM made this decision because the overall effect would be detectable and measurable, but these impacts would not result in population-level effects.

3.5.7.6 Impacts of Alternatives C and F on Sea Turtles

Impacts of Alternatives C and F: Under Alternative C, the Brayton Point ECC would be routed onshore to avoid fisheries impacts in the Sakonnet River. Alternative C-1 and Alternative C-2 would reduce the offshore portion of the Brayton Point ECC by 9 miles and 12 miles (14 and 19 kilometers), respectively. The alternatives would avoid the potential impacts on sea turtles in the Sakonnet River; however, sightings of sea turtles in the Sakonnet River are uncommon, and cable emplacement impacts from the other portions of the offshore cable corridors would still occur. Kemp's ridley sea turtle is the only species that would be expected to benefit from the prevention of construction in the Sakonnet River, but this benefit is not expected to be significant. Kemp's ridley sea turtle is associated with coastal habitats and is known to forage in bays and estuaries across Rhode Island in the summer months (Schwartz 2021). Aside from avoiding impacts on potential Kemp's Ridley foraging habitat, impacts on sea turtles discussed under Alternative B remain relevant to Alternative C. The reduction of underwater impacts would only occur in an area that is not frequently used by most sea turtle species. Therefore, no measurable difference in the impacts on sea turtles are expected between the Proposed Action and Alternative C.

Under Alternative F, to minimize seabed disturbance in the Muskeget Channel, the Falmouth offshore export cable route would use up to three ±525kV HVDC cables connected to one HVDC converter OSP, instead of up to five HVAC cables connected to one or more HVAC OSPs as proposed under the Proposed Action. The additional HVDC converter OSP associated with Falmouth would be located in deeper waters in the southern portion of the Lease Area at a further distance from Nantucket Shoals. During operation, there would be increased intake and discharge from the additional HVDC converter OSP, which could result in increased entrainment of sea turtle prey compared to the Proposed Action. While the likelihood of sea turtle entrapment would be low due to the seasonal nature and overall low sea turtle abundance in Project area waters, mitigation measures proposed to reduce overall entrapment (e.g., intake velocity of 0.5 feet per second or less and a bar rack that will consist of three stainless steel bars approximately 0.8 inch [20 millimeters] wide fixed to the opening of the intake caisson) further minimizes the risk of entrapment in the unlikely event of a sea turtle encounter. Given the CWIS depth of withdrawal, the small and localized effects from thermal discharge, and the application of mitigation measures to reduce entrainment, OSP operations are not expected to make any measurable difference in sea turtle foraging and prey availability. The addition of a second OSP is not expected to significantly elevate the risk of entrapment for sea turtles or negatively affect prey availability compared to the Proposed Action (the Proposed Action also includes the potential for multiple HVDC converter OSPs). Any impacts on sea turtles or their prey would remain localized near the OSP locations, and the overall impact magnitude would be the same.

Additionally, the Falmouth offshore export cable route would include up to three HVDC cables compared to up to five HVAC cables under the Proposed Action, which would reduce the total seafloor disturbance by approximately 700 acres (2.8 square kilometers). Although the number of cables would be reduced, the DC current carried by the HVDC export cables can create an EMF with three times the amplitude of an EMF created by AC cables (Hutchison et al. 2020). However, AC and DC EMFs differ in the way they interact with organisms and direct comparisons cannot be made (CSA Ocean Sciences, Inc. and Exponent 2019). Measures to reduce EMFs in the surrounding area, including cable burial and shielding where sufficient burial is not possible, are expected to reduce the EMF of DC cables to levels where impacts from EMFs are localized to the immediate area of the cable (CSA Ocean Sciences, Inc. and Exponent 2019). Offshore impacts on sea turtle prey from cable emplacement and anchoring may also be reduced under Alternative F due to the fewer number of cables installed. Because impacts associated with cable installation and maintenance would still occur in the same corridor and there would be no change in impacts from other offshore components (e.g., WTGs), the impacts on sea turtles under Alternative F would be reduced but not materially different than those described for the Proposed Action.

Cumulative Impacts of Alternatives C and F: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C and Alternative F would be similar to those described under the Proposed Action.

Impacts of Alternatives C and F on ESA-Listed Species

Impacts of Alternatives C and F on ESA-listed species would not be significantly different from the IPFs discussed in the Proposed Action.

Conclusions

Impacts of Alternatives C and F: Through Alternatives C and F, BOEM expects small reductions in underwater noise from cable emplacement, vessel traffic, and bottom habitat disturbance. However, impacts relating to construction and maintenance would still occur in the Lease Area and cable corridor. Because sea turtle impacts are most likely to occur in this area, the impacts of Alternative C and Alternative F would not differ significantly from the impacts of the Proposed Action. Therefore, construction and installation, O&M, and decommissioning of Alternative C and Alternative F would likewise result in **minor adverse** impacts and could include potentially **minor beneficial** impacts.

Cumulative Impacts of Alternatives C and F: In the context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative C and Alternative F would be similar to the Proposed Action and result in **minor adverse** impacts on sea turtles in the geographic analysis area.

3.5.7.7 Impacts of Alternative D (Preferred Alternative) on Sea Turtles

Impacts of Alternative D: Alternative D addresses potential impacts on hydrodynamic features and foraging habitat for several species of birds and whales, which may also contribute to changes of impacts on sea turtles. The area of concern in Alternative D is the Nantucket Shoals, an area of elevated sea floor that creates an upwelling, and thus, ideal conditions for plankton growth. Leatherback sea turtles use this area for foraging due to its unique geography. Oceanographic features, such as mesoscale eddies, convergence zones, and areas of upwelling like those in the Nantucket Shoals, attract foraging leatherbacks because these features are often associated with aggregations of jelly fish (Bailey et al. 2012). The removal of WTGs under Alternative D would reduce construction and installation impacts from noise, vessel traffic, and anchoring when compared to the Proposed Action. The reduction of six turbines would likely not have an appreciable impact on hydrodynamic and atmospheric wake effects of the WTGs, as further described under the analysis of Alternative D in Section 3.5.6, *Marine Mammals*. Impacts associated with sea turtle prey dispersal and availability are not expected to differ from the Proposed Action. Since the number of WTGs to be removed would be small relative to the total number of WTGs, BOEM does not expect a measurable reduction in impacts on sea turtles compared to the Proposed Action.

Cumulative Impacts of Alternative D: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative D would be similar to those described under the Proposed Action.

Impacts of Alternative D on ESA-Listed Species

Impacts of Alternative D on ESA-listed species would be the same as the IPFs discussed for the Proposed Action.

Conclusions

Impacts of Alternative D: Impacts of Alternative D would not differ from the impacts of the Proposed Action, except a slight reduction in noise impacts and vessel traffic from construction and installation. Therefore, construction and installation, O&M, and decommissioning of Alternative D would likewise result in **minor adverse** impacts and could include potentially **minor beneficial** impacts as described in Section 3.5.7.5, *Impacts of Alternative B – Proposed Action on Sea Turtles*.

Cumulative Impacts of Alternative D: In the context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative D would be similar to the Proposed Action and result in **minor adverse** impacts on sea turtles in the geographic analysis area.

3.5.7.8 Impacts of Alternative E on Sea Turtles

Impacts of Alternative E: Alternative E includes the use of all piled (Alternative E-1), all suction bucket (Alternative E-2), or all GBS (Alternative E-3) foundations for WTGs and OSPs. Installation activities would not differ between the Proposed Action and Alternative E-1, which assumes pile driving would be used for all foundations with corresponding noise impacts. Under Alternative E-2 and Alternative E-3, no pile driving would occur; therefore, there would be no underwater noise impacts on sea turtles due to pile driving. The avoidance of pile-driving noise impacts would reduce overall construction and installation impacts on sea turtles under Alternative E-2 and Alternative E-3 compared to the Proposed Action. Cable emplacement and the number of structures constructed under Alternative E remains the same as the Proposed Action.

Gravity-based foundations, under Alternative E-3, would result in the greatest area of habitat conversion due to foundation footprint and scour protection at 11.55 acres per foundation. Alternative E-1 would result in at least a 77 percent reduction in footprint and scour protection from up to 2.61 acres per foundation, and Alternative E-2 would result in at least a 58 percent reduction in footprint and scour protection from 4.9 acres per foundation, compared to Alternative E-3. Larger foundation footprints under Alternatives E-3 and E-2 would result in loss of more soft-bottom habitat than Alternative E-1, which would primarily affect Kemp's ridley sea turtles as they forage in this type of habitat. Alternatives E-2 and E-3 may have a greater artificial reef effect with increased surface area, which would be a potential beneficial impact on sea turtles. However, adverse impacts from these larger underwater structures may include entanglement in lost or discarded fishing gear, potential of vessel strike from increased recreational fishing vessel traffic, and incidental hooking. For example, the GBS of Alternative E-3 may have less entanglement potential as it has a smooth, sloping exterior in the water column compared to the suction bucket foundation of Alternative E-2 that has metal cross beams, which may create more entanglement potential of marine debris and recreational fishing gear. Given that Alternative E includes increases in both beneficial and adverse impacts, there is not expected to be a measurable difference in impacts on sea turtles from those anticipated under the Proposed Action.

Cumulative Impacts of Alternative E: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative E would be similar to those described under the Proposed Action.

Impacts of Alternative E on ESA-Listed Species

Impacts of Alternative E on ESA-listed species would be the same as the IPFs discussed for the Proposed Action.

Conclusions

Impacts of Alternative E: Impacts of Alternative E-1 would not be measurably different from the impacts of the Proposed Action. Construction and installation, O&M, and decommissioning of Alternative E-1 would likewise result in **minor adverse** impacts and could include potentially **minor beneficial** impacts.

Impacts of Alternative E-2 and Alternative E-3 would be similar to impacts of the Proposed Action with the most notable difference the avoidance of impact pile-driving noise impacts and increase in artificial reef effects. Construction and installation, O&M, and decommissioning of Alternative E-2 and Alternative E-3 would result in **minor adverse** impacts and could include potentially **minor beneficial** impacts.

Cumulative Impacts of Alternative E: In the context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative E would be similar to the Proposed Action and result in **minor** adverse impacts on sea turtles in the geographic analysis area.

3.5.7.9 Comparison of Alternatives

Construction, O&M, and decommissioning of Alternatives C, D, E, and F would have the same overall **minor adverse** impacts and **minor beneficial** impacts on sea turtles as described under the Proposed Action. The Proposed Action would result in habitat disturbance, entrainment and impingement, underwater and airborne noise, water quality degradation, vessel traffic (strikes and noise), artificial lighting, and potential discharges/spills and trash. Adverse impacts are expected to result from pile-driving noise and increased vessel traffic, and beneficial impacts are expected from the presence of structures. The Sakonnet River is not frequently used by sea turtles, and aside from some reduction in impacts by avoiding potential Kemp's ridley sea turtle foraging habitat, impacts on sea turtles under Alternative C would be the same as the Proposed Action. Under Alternative F, the reduction in the number of cables in the Falmouth ECC could have a small reduction in impacts on sea turtle prey from cable installation and seabed disturbance. The addition of a second OSP is not expected to significantly elevate the risk of entrapment for sea turtles or negatively affect prey availability compared to the Proposed Action. Since the number of WTGs to be removed under Alternative D would be small relative to the total number of WTGs, BOEM does not expect a measurable reduction in impacts on sea turtles compared to the Proposed Action. In contrast to Alternative E-1, which assumes all piled foundations, Alternatives E-2 and E-3 would not result in pile-driving noise and would reduce overall construction and installation impacts on sea turtles. Conversely, Alternatives E-2 and E-3 have bigger foundation footprints and would result in the greatest area of habitat conversion, while also resulting in the greatest beneficial artificial reef effect. Because Alternative E includes increases in both beneficial and adverse impacts, it is not expected to result in a measurable difference in impacts on sea turtles from those anticipated under the Proposed Action.

3.5.7.10 Proposed Mitigation Measures

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix G, Tables G-2, G-3, and G-4 and summarized and assessed in Table 3.5.7-13. If one or more of the measures analyzed here are adopted by BOEM or cooperating agencies, some adverse impacts on sea turtles could be further reduced. After publication of the Draft EIS, BOEM conducted ESA consultation with NMFS, which resulted in NMFS issuing Reasonable and Prudent Measures and Terms and Conditions that are analyzed collectively in Table 3.5.5-12.

Table 3.5.7-12. Mitigation and Monitoring Measures Resulting from Consultations (also identified in Appendix G, Table G-2): sea turtles

Measure	Description	Effect
Draft NMFS Biological Opinion Reasonable and Prudent Measures	The Lessee must comply with measures in the Biological Opinion and conduct Sound Field Verification to ensure distances to thresholds for ESA-listed sea turtles are not exceeded during impact pile driving. SouthCoast must also report any effects to ESA-listed sea turtles or incidental take of these species.	Reasonable and Prudent Measures and Terms and Conditions from the NMFS Biological Opinion would minimize impacts on sea turtles during construction and installation and O&M of the Project. While adoption of this measure would decrease risk to sea turtles under the Proposed Action, it would not alter impact determinations for sea turtles.

Table 3.5.7-13. BOEM or agency-proposed measures (also identified in Appendix G, Table G-3): sea turtles

Measure	Description	Effect
Pile-driving time of year restriction in enhanced mitigation area	Pile driving within the enhanced mitigation area will occur only between June 1 and October 31 when NARW presence is at its lowest.	The time-of-year restriction in the enhanced mitigation area would ensure that NARWs would not be exposed to injurious levels of noise from pile-driving activities. This measure would also be protective to sea turtles that are known to forage in these areas. While the implementation of this measure would minimize the risk to sea turtles from this construction activity under the Proposed Action, it would not change the impact determination for impact pile-driving noise.

Measures Incorporated in the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits or proposed by BOEM listed in Table 3.5.7-12 and Tables G-2, G-3, and G-4 in Appendix G are incorporated in the Preferred Alternative. These measures, if adopted, would further define how the effectiveness and enforcement of mitigation measures would be ensured and improve accountability for compliance with mitigation measures by requiring the submittal of plans for approval by the enforcing agencies and by defining reporting requirements. Because these measures ensure the effectiveness of and compliance with mitigation measures that are already analyzed as part of the Proposed Action, these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.5.7.5, *Impacts of Alternative B – Proposed Action on Sea Turtles*.

3.5 Biological Resources

3.5.8 Wetlands

This section discusses potential impacts on wetlands from the proposed Project, alternatives, and ongoing and planned activities in the geographic analysis area. The wetlands geographic analysis area, as shown on Figure 3.5.8-1, includes all subwatersheds that intersect the Onshore Project area, which encompasses all wetlands and surface waters that are most likely to experience impacts from the proposed Project. See Section 3.4.2, *Water Quality*, for a discussion of impacts on water quality.

3.5.8.1 Description of the Affected Environment

Wetlands and vernal pools[1] in the Massachusetts part of the geographic analysis area were mapped using the Mass GIS 2005 Wetlands detailed dataset (MassGIS 2017), and the National Wetlands Inventory (NWI) (USFWS 2021) was used to map wetlands in the Rhode Island part of the geographic analysis area.[2] SouthCoast Wind also delineated wetlands during field surveys conducted within the onshore substation sites in Falmouth; however, the field delineation report for the onshore substation sites under consideration in Falmouth is private data and, therefore, has not been provided. Additional field delineations will be completed as part of the federal (CWA Section 404) and state permitting processes as necessary (COP Volume 2, Section 6.4.1.1; SouthCoast Wind 2024). Impacts on regulated wetland resources would require authorization under federal permits issued by USACE pursuant to the CWA, state permits or authorizations pursuant to the Massachusetts Wetland Projection Act and RIDEM Coastal Resources Management Council, and local municipal wetland bylaws. CWA Section 404 requires that all appropriate and practicable steps be taken first to avoid and minimize impacts on jurisdictional wetlands; for unavoidable impacts, compensatory mitigation may be required to replace the loss of wetlands and associated functions.

The Falmouth Onshore Project area lies entirely within one watershed: Wequaquet Lake (Hydrologic Unit Code [HUC] 10900020206). Characteristic wetland types occurring in the Falmouth Onshore Project area include palustrine wetland types, such as red maple swamps, Atlantic white cedar bogs, kettlehole bogs, highbush blueberry thickets, shrub swamps, and emergent marsh (COP Appendix J, Section 4.1.4; SouthCoast Wind 2024). Examples of natural wetland communities common to Upper Cape Cod are further described in Appendix B, *Supplemental Information and Additional Figures and Tables*.

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[1] Originally defined and protected under the Massachusetts Wetlands Protection Act Regulations, Certified Vernal Pools also receive protection under: Title 5 of the Massachusetts Environmental Code, Section 401 of the Clean Water Act, the Massachusetts Surface Water Quality Standards, and the Massachusetts Forest Cutting Practices Act (MassDEP 2022a).

[2] BOEM also reviewed University of Rhode Island (URI) Environmental Data Center and Rhode Island Geographic Information System (RIGIS) Wetlands datasets (RIDEM 2022) but found that the NWI wetland mapping appeared more accurate in the Project area based on desktop review of aerial imagery overlaid with the wetland datasets.

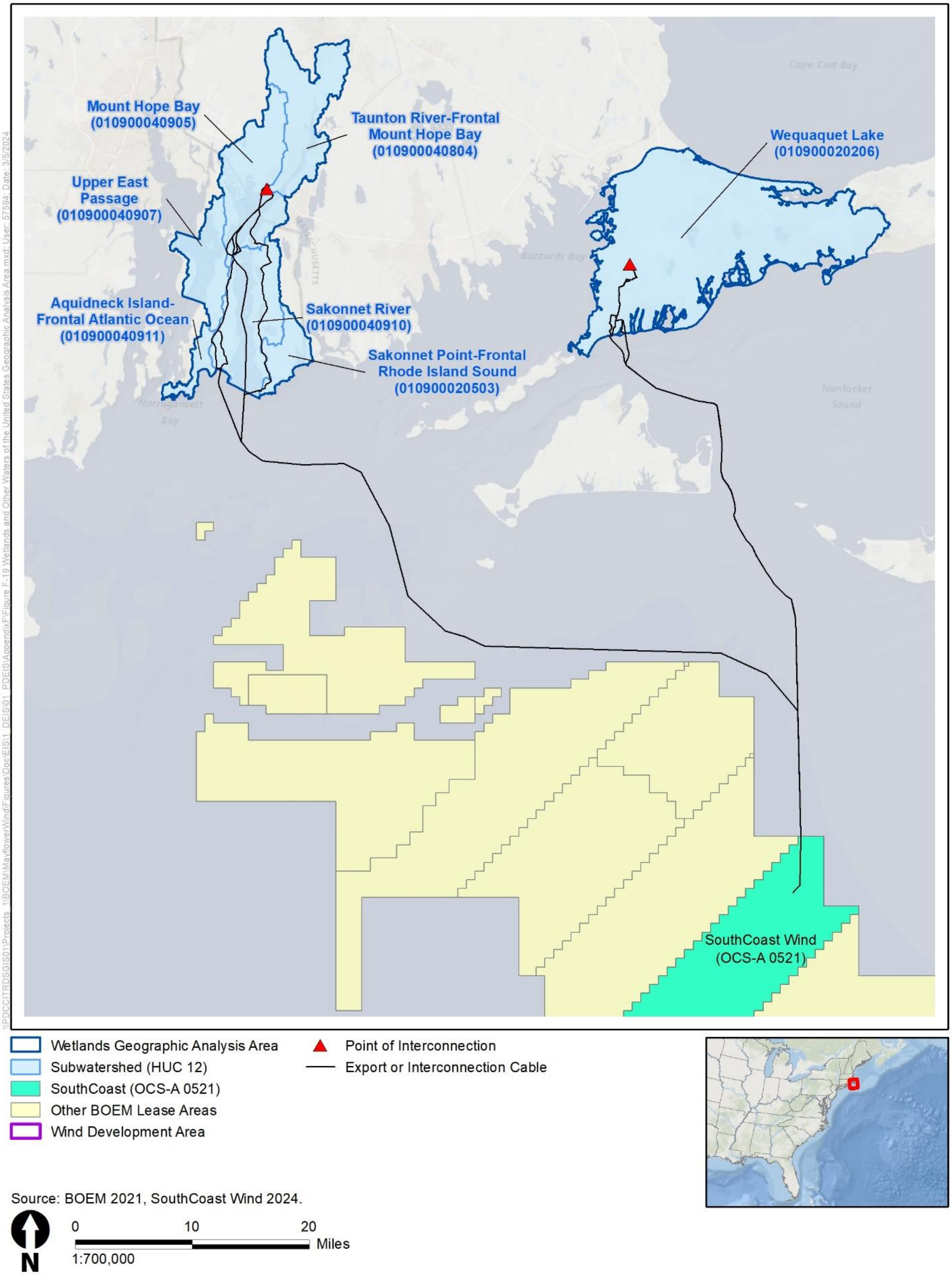

Figure 3.5.8-1. Wetlands geographic analysis area

The Brayton Point Onshore Project area lies within seven watersheds: Taunton River-Frontal Mount Hope Bay (HUC 10900040804), Mount Hope Bay (HUC 10900040905), Sakonnet River (HUC 10900040910), Sakonnet Point-Frontal Rhode Island Sound (HUC 010900020503), Upper East Passage (HUC 010900040907), Aquidneck Island-Frontal Atlantic Ocean (HUC 010900040911), and Wequaquet Lake (HUC 010900020206). According to MassGIS data (MassGIS 2017, 2020), freshwater wetlands are limited in the vicinity of the Brayton Onshore Project area and consist of a few ponds, coastal wetlands, and emergent wetlands. NWI data suggest that the Brayton Point intermediate landfall routes on Aquidneck Island in Portsmouth, Rhode Island, are adjacent to and potentially within estuarine wetlands, particularly Route Option 2 (USFWS 2021).

Wetlands are important features in the landscape that provide numerous beneficial services or functions. Wetlands protect drinking water, prevent storm damage, and provide fish, shellfish, and wildlife habitats. COP Volume 2, Table 6-28 (SouthCoast Wind 2024) provides a list of species associated with habitats in the Onshore Project area, including species that use wetland habitats. Wetlands also support commercial fishing, tourism, recreation, and educational opportunities. Coastal wetlands, like those found in the vicinity of the Onshore Project area, buffer uplands from storm damage by absorbing wave energy and reducing the height of storm waves. Wetland plants also bind the soil and help slow shoreline erosion (MassDEP 2022b).

As shown in Table 3.5.8-1, the geographic analysis area contains approximately 34,876 acres of wetlands according to state agency wetland data for Massachusetts and NWI wetland data for Rhode Island (MassGIS 2017, 2020; USFWS 2021). NWI wetland data for Falmouth are provided in Appendix B.

Table 3.5.8-1. Wetland communities in the geographic analysis area

Wetland Community	Acres (Massachusetts)	Acres (Rhode Island) [a]	Total	Percent of Total
Falmouth Onshore				
Barrier Beach System [b]	2,558	0	2,558	18.1%
Bog	54	0	54	0.4%
Cranberry Bog	862	0	862	6.1%
Deep Marsh	162	0	162	1.1%
Salt Marsh	6,431	0	6,431	45.6%
Shallow Marsh Meadow or Fen	624	0	624	4.4%
Shrub Swamp	1,316	0	1,316	9.3%
Tidal Flat	241	0	241	1.7%
Wooded Swamp Coniferous	258	0	258	1.8%
Wooded Swamp Deciduous	1,246	0	1,246	8.8%
Wooded Swamp Mixed Trees	347	0	347	2.5%
Falmouth Total	**14,099**	**0**	**14,099**	**100%**
Brayton Point Onshore [c]				
Barrier Beach System [b]	24	0	24	0.1%
Bog	46	0	46	0.2%
Cranberry Bog	36	0	36	0.2%
Deep Marsh	228	0	228	1.1%
Salt Marsh	246	3,179	3,425	16.5%
Shallow Marsh Meadow or Fen	527	963	1,490	7.2%
Shrub Swamp	761	0	761	3.7%
Tidal Flat	13	0	13	0.1%
Wetland	50	0	50	0.2%
Wooded Swamp	23	9,917	9,940	47.8%
Wooded Swamp Deciduous	4,359	0	4,359	21.0%
Wooded Swamp Mixed Trees	405	0	405	1.9%
Brayton Point Total	**6,718**	**14,059**	**20,777**	**100%**
Geographic Analysis Area Total	**20,817**	**14,059**	**34,876**	**-**

[a] Rhode Island data are based on NWI. NWI wetland categories include estuarine and marine wetlands, freshwater emergent wetlands, and freshwater forested/scrub wetlands, which were synced to MassGIS' salt marsh, shallow marsh or fen, and wooded swamp wetland categories, respectively.
[b] Barrier Beach System wetland types include coastal beach, coastal dune, marsh, open water, salt marsh, shrub swamp, wooded swamp coniferous, wooded swamp deciduous, and wooded swamp mixed trees.
[c] Wetland types and acreages reported for Brayton Point include the intermediate landfall on Aquidneck Island in Portsmouth, Rhode Island.
Sources: MassGIS 2017, 2020; USFWS 2021.

3.5.8.2 Impact Level Definitions for Wetlands

The definitions of impact levels for wetlands are provided in Table 3.5.8-2. USACE, MassDEP, and RIDEM define wetland impacts differently than BOEM's due to requirements under CWA Section 404, the Massachusetts Wetlands Protection Act, and the Rhode Island Freshwater Wetlands Act (as summarized below).

Table 3.5.8-2. Definition of potential adverse and beneficial impact levels for wetlands and other waters of the United States

Impact Level	Definition of Potential Adverse Impact Levels	Definition of Potential Beneficial Impact Levels
Negligible	Either no effect or no measurable impacts.	Either no effect or no measurable impacts.
Minor	Small, measurable, adverse impacts to local wetland or other waters of the United States extent, quality, or function; localized; could be avoided with mitigation; impacts that do occur are short-term or temporary in nature; complete recovery anticipated.	Small and measurable effects that would increase the extent, quality, and functions of wetlands or other waters of the United States in the proposed Project Area.
Moderate	Notable and measurable adverse impacts to the extent, functions, or quality of wetlands or other waters of the United States could occur, and the affected resource would recover completely with remedial or mitigation activities within a specified time frame.	Notable and measurable effects comprising an increase in the extent, function, or quality of wetlands or other waters of the United States in the proposed Project Area.
Major	Measurable, long-term, and widespread (regional or population-level) adverse impacts to the extent, functions, or quality of wetlands or other waters of the United States could occur, and full recovery not anticipated even with remediation or mitigation.	Measurable and widespread (regional or population-level) increase in extent, function, or quality of wetlands or other waters of the United States.

Under CWA Section 404, USACE considers fill impacts that permanently convert a wetland to an upland as a permanent impact. Conversion of a wetland type may also be considered a permanent impact. Temporary impacts occur when fill is placed in wetlands but the wetlands are restored to preconstruction contours when construction activities are complete (e.g., stockpile, temporary access).

Under Massachusetts General Laws Chapter 131, Section 40 (Wetlands Protection Act) no one may "remove, fill, dredge, or alter" any wetland, floodplain, bank, land under a water body, land within 100 feet (31 meters) of a wetland, or land within 200 feet (61 meters) of a perennial stream or river (25 feet [8 meters]of a few urban rivers), without a permit (known as an Order of Conditions) from the local conservation commission that protects the wetland "interests" identified in the Wetlands Protection Act. The "interests" or values protected by the Wetlands Protection Act are flood control; prevention of storm damage; prevention of pollution; and protection of fisheries, shellfish, groundwater, public or private water supply, and wildlife habitat. The term “alter” is defined to include any destruction of vegetation, or change in drainage characteristics or water flow patterns, or any change in the water table or water quality. The wetland regulations prohibit most destruction of wetlands and naturally vegetated riverfront areas and require replacement of flood storage loss when floodplains are filled (MACC 2022).

Rhode Island Code of Regulations 250-RICR-150-15-1 define “alter” and “alteration” as the “act of changing the character of a freshwater wetland as a result of activities within or outside of the wetland. Such activities include but are not limited to the following: excavating; draining; filling; placing trash, garbage, sewage, road runoff, drainage ditch effluent, earth, rock, borrow, gravel, sand, clay, peat, or other materials or effluents upon; diverting water flows into or out of; diking; damming; diverting; clearing; grading; constructing in; adding to or taking from; or other activities that individually or cumulatively change the character of any freshwater wetland“ (Rhode Island Department of State 2022).

3.5.8.3 Impacts of Alternative A – No Action on Wetlands

When analyzing the impacts of the No Action Alternative on wetlands, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for wetlands. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D*, Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for wetlands described in Section 3.5.8.1, *Description of the Affected Environment and Future Baseline Conditions* 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 in the geographic analysis area that may contribute to impacts on wetlands are generally associated with onshore development activities and climate change. Onshore construction activities and associated impacts are expected to continue at current trends and have the potential to affect wetlands through activities that can have permanent (e.g., fill placement) and short-term (vegetation removal) impacts on wetland habitat, water quality, and hydrology functions. All activities would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding and minimizing impacts. If impacts could not be entirely avoided, mitigation would be anticipated to compensate for wetland loss. Climate change induced sea level rise in the geographic analysis area is also anticipated to continue to affect wetlands. Inundation and rising water levels would result in the conversion of vegetated areas into areas of open water, with a consequent loss of wetland functions associated with the loss of vegetated wetlands. Slowly rising waters on a gentle, continuously rising surface can result in wetlands migrating landward. In areas where slopes are not gradual or where there are other features blocking flow (e.g., bulkhead or surrounding developed landscape), wetland migration would be slowed or impeded. Rising coastal waters would also continue to cause saltwater intrusion, which occurs when saltwater starts to move further inland and creeps into freshwater/non-tidal areas. Saltwater intrusion would continue to change wetland plant communities and habitat (i.e., freshwater species to saltwater species), and overall wetland functions.

Ongoing construction of the Vineyard Wind 1 project (OCS-A 0501) and New England Wind (OCS- 0354 and OCS-A 0561) would install cable landfalls and associated onshore equipment in Barnstable, Massachusetts, in the geographic analysis area, contributing to impacts on wetlands associated with the primary IPFs of accidental releases and land disturbance. Impacts of ongoing construction of Vineyard Wind 1 and New England Wind would have the same type of impacts on wetlands that are described in *Cumulative Impacts of the No Action Alternative* for ongoing and planned offshore wind activities.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Planned non-offshore wind activities that may affect wetlands would primarily include increasing onshore construction (Appendix D). These activities may permanently (e.g., fill placement) and temporarily (e.g., vegetation removal) affect wetland habitat, water quality, and hydrology functions. All activities would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding or minimizing impacts. If impacts could not be entirely avoided, mitigation would be anticipated to compensate for wetland loss.

Impacts on wetlands from other offshore wind projects may occur if onshore and nearshore activity from these projects overlaps with the geographic analysis area. The ongoing construction of the Vineyard Wind 1 and New England Wind projects have cable landings and onshore components within the geographic analysis area with cable landfalls in Barnstable, Massachusetts, which is within the Wequaquet Lake watershed (HUC 010900020206) of the geographic analysis area.

The following sections summarize the potential impacts of ongoing and planned offshore wind activities on wetlands during construction, O&M, and decommissioning of the projects. BOEM expects offshore wind activities to affect wetlands through the following IPFs.

Accidental releases: During onshore construction of offshore wind projects in the geographic analysis area, oil leaks and accidental spills from construction equipment are potential sources of wetland water contamination. 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 wetlands could occur during construction, decommissioning, and to a lesser extent O&M, 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, including the Resource Conservation and Recovery Act, Department of Transportation Hazardous Material regulations, and implementation of a Spill Prevention, Control, and Countermeasure Plan. Impacts from accidental releases on wetlands would be minor because accidental releases would be small and localized and compliance with state and federal regulations would avoid or minimize potential impacts to wetland quality or functions.

Land disturbance: Construction of onshore components in the geographic analysis area is anticipated to require clearing, excavating, trenching, fill, and grading, which could result in the loss or alteration of wetlands, causing adverse effects 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 O&M would only occur if new ground disturbance was required, such as to repair a buried component.

BOEM anticipates that 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, BOEM expects the offshore wind projects would be designed to avoid wetlands to the extent feasible. Offshore wind projects would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding or minimizing impacts. This would include compliance with the Massachusetts and Rhode Island National Pollutant Discharge Elimination System permits for stormwater discharges associated with construction activities and implementation of sediment controls and a Stormwater Pollution Prevention Plan to avoid and minimize water quality impacts during onshore construction. In-wetland work could require some or all of the following authorizations: CWA Section 404 permit from USACE, Section 401 Water Quality Certification from RIDEM or MassDEP, and additional RIDEM or MassDEP wetland permits if applicable. Work within 100 feet of wetlands in Massachusetts may also require MassDEP wetland permits pursuant to Massachusetts General Laws Chapter 131, Section 40 (Wetlands Protection Act). If impacts could not be avoided or minimized, mitigation could be anticipated for projects to compensate for lost wetlands. Overall, impacts from land disturbance on wetlands are anticipated to be moderate.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, wetlands would continue to follow current regional trends and respond to IPFs introduced by ongoing activities. Land disturbance from onshore construction periodically would cause short-term and permanent loss of wetlands. All activities would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding or minimizing impacts. If impacts could not be entirely avoided or minimized, mitigation would be anticipated for projects to compensate for lost wetlands. BOEM anticipates that the No Action Alternative would result in **moderate adverse** impacts on wetlands.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and wetlands would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to wetland impacts from the same IPFs. All activities would be required to comply with federal, state, and local regulations related to the protection of wetlands, thereby avoiding or minimizing impacts. If impacts could not be entirely avoided, compensatory mitigation would be anticipated for projects that result in permanent impacts. Therefore, BOEM anticipates the cumulative impacts of the No Action Alternative would be **moderate adverse**. Offshore wind activities are expected to contribute to the impacts through land disturbance and accidental releases, although the majority of these IPFs would be attributable to non-offshore wind ongoing activities.

3.5.8.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in similar or lesser impacts than those described in the sections below. The following proposed PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on wetlands:

- The sea-to-shore transition and landfall site variants in the Onshore Project area.
- Onshore export cable route and onshore substation site variants in the Onshore Project area.

An onshore export cable route with less wetlands in or adjacent to the right-of-way would have less potential for direct and indirect impacts on wetlands.

SouthCoast Wind has committed to measures to minimize impacts on wetland resources. SouthCoast Wind would implement BMPs to avoid, control, and address accidental releases and place construction mats to minimize soil disturbance in any wetland areas that cannot be avoided or are required to be temporarily crossed (COP Volume 2, Section 16; SouthCoast Wind 2024).

3.5.8.5 Impacts of Alternative B – Proposed Action on Wetlands

The Proposed Action could affect wetlands through the following IPFs.

Accidental releases: Onshore construction activities would require heavy equipment use and HDD activities, and potential spills could occur as a result of an inadvertent release from the machinery or during refueling activities. SouthCoast Wind would develop and implement a Project-specific SPCC plan to minimize impacts on water quality (prepared in accordance with applicable regulations such as the Massachusetts Oil and Hazardous Material Release Prevention Act and the Rhode Island Oil Pollution Prevention and Control Act). In addition, all wastes generated onshore would comply with applicable federal regulations, including the Resource Conservation and Recovery Act and the Department of Transportation Hazardous Material regulations. Therefore, BOEM anticipates the Proposed Action alone would result in minor and temporary impacts on wetlands as a result of releases from heavy equipment during construction and other cable installation activities.

Land disturbance: Construction impacts on wetlands and related functions would be similar to those described in Section 3.5.8.3, *Impacts of Alternative A – No Action on Wetlands*. Much of the proposed onshore Project components have been sited in areas that are previously disturbed or undergoing active management. The underground portion of the onshore export cable routes would be largely located in existing paved public roadway. The primary wetland impacts under the Proposed Action would be excavation, rutting, compaction, mixing of topsoil and subsoil, and potential alteration due ground disturbance associated with construction activities for the proposed onshore export cable routes. Based on MassGIS wetland data and the extent of the potential ground disturbance, there would be no wetland impact for the Brayton Point onshore Project components in Massachusetts and very little impact for the Falmouth onshore Project components (Table 3.5.8-3). Small areas of deep marsh (<0.01 acre) and wooded swamp deciduous wetland (0.06 acre) have the potential to be affected from cable installation at Falmouth; impacts on the wooded swamp deciduous wetland would likely be long term, because the cable corridor would need to be maintained as low vegetation during operations.[3]

Onshore export cable installation at the intermediate landfall on Aquidneck Island in Rhode Island would result in some wetland impacts. The impacts would be short term because these wetlands are not forested and restoration would be conducted in accordance with applicable federal and state wetland permit requirements. As shown in Table 3.5.8-3 and Figure 3.5.8-2, all four route options result in 0.012 acre of temporary wetland impacts. By using HDD, 2.1 acres of wetland impact would be avoided along Route Option 2a, and 0.1 acre of wetland would be avoided along Route Option 1 and Route Option 3. Approximately 0.9 acre of wetland would be avoided along Route Option 2b by using HDD. No permanent (e.g., permanent fill) or long-term wetland impacts are anticipated on affected wetlands on Aquidneck Island. SouthCoast Wind anticipates that wetland impacts would be avoided to the maximum extent practicable during the detailed design, engineering, and construction of the Project (COP Volume 2, Section 4.1.5.3; SouthCoast Wind 2024).

MassDEP-regulated adjacent transition areas may also be affected by clearing and soil disturbance. Water quality in wetlands could be affected by sedimentation from nearby exposed soils. SouthCoast

[3] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action,* Brayton Point is the preferred ECC for both Project 1 and Project 2, and Falmouth is the variant ECC for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

Wind would use erosion and sedimentation controls to avoid and minimize impacts during onshore construction (COP Volume 2, Table 16-1; SouthCoast Wind 2024). Dewatering also may be required during onshore construction. BMPs would be used during dewatering activities, such as temporary settling basins, filter bags, or temporary holding tanks. Dewatering activities would be short term, and water drawdown would be minimal. All earth disturbances from construction activities would be conducted in compliance with the Massachusetts and Rhode Island Pollutant Discharge Elimination System requirements for stormwater discharges associated with construction activities.

Table 3.5.8-3. Wetland impacts in the Onshore Project area – Proposed Action

Onshore Project Component	Wetland Community	Impact (Acres)	% Relative to Wetlands in GAA	Duration
Falmouth Onshore				
Onshore Export Cable Routes				
Worcester Avenue Route	N/A	0	0	N/A
Shore Street Route Eastern Option	N/A	0	0	N/A
Shore Street Route Western Option	N/A	0	0	N/A
Central Park Route	N/A	0	0	N/A
Lawrence Lynch to Cape Cod Aggregates Route	N/A	0	0	N/A
Paper Road – Thomas B Landers Road Deviation	N/A	0	0	N/A
Onshore Substation Locations				
Lawrence Lynch	N/A	0	0	N/A
Cape Cod Aggregates	N/A	0	0	N/A
Underground Transmission Route and Point of Interconnection				
Underground Transmission Route from Cape Cod Aggregates to POI	Deep Marsh	<0.01	<0.1	Short term (1–3 years)
	Wooded Swamp Deciduous	0.06	<0.1	Long term (> 5 years)
Point of Interconnection (Falmouth Switching Station)	N/A	0	0	N/A
Brayton Point Onshore				
Brayton Point Landing and Onshore Components [a]	N/A	0	0	N/A
Aquidneck Island Onshore Export Cables [b]				
Landing to Options Split (common to all route options below)	N/A	0	0	N/A
Route Option 1	Estuarine and Marine Wetland	0.012	<0.1	Short term (1–3 years)
Route Option 2a	Estuarine and Marine Wetland	0.012	<0.1	Short term (1–3 years)
Route Option 2b	Estuarine and Marine Wetland	0.012	<0.1	Short term (1–3 years)

Onshore Project Component	Wetland Community	Impact (Acres)	% Relative to Wetlands in GAA	Duration
Route Option 3	Estuarine and Marine Wetland	0.012	<0.1	Short term (1–3 years)

Source: MassGIS 2018a, 2018b, 2020; USFWS 2021.
GAA = geographic analysis area; N/A = not applicable.
Note: The disturbance area used to calculate the potential wetland impact areas from export cables is based on a 40-foot-wide corridor along the cable route, except for the cable route from Cape Cod Aggregates to POI, which is a 100-foot-wide corridor.
[a] Includes the Brayton Point Onshore landfall locations, underground transmission lines, and converter stations construction areas.
[b] SouthCoast Wind could use one of the three route options, with the Landing to Options Split segment common to all three. In addition, any wetland area along the cable corridor after the cable enters the HDD site is not considered an impact because the cable would be installed underneath any wetlands that may be along the cable corridor.

Figure 3.5.8-2. Wetlands along the Aquidneck Island onshore export cable routes

Any discharge of fill material, including the side cast of excavated material and the backfilling of excavated material, within regulated wetlands would require a CWA Section 404 permit from USACE. Additional authorizations for work in wetlands may include permits from MassDEP and/or RIDEM, and a Section 401 Water Quality Certification from MassDEP or RIDEM. Per CWA Section 404, SouthCoast Wind is required to take all appropriate and practicable steps to first avoid and minimize impacts on jurisdictional wetlands, and for those impacts that are unavoidable, propose compensatory mitigation to replace the loss of wetlands and associated functions. If necessary, SouthCoast Wind would identify compensatory mitigation based on the requirements of USACE and MassDEP or RIDEM. SouthCoast Wind would comply with all requirements of any issued permits. Because most wetlands would be avoided, and the wetland impacts that could occur are likely to be further avoided based on the width of the corridor used for the preliminary analysis in this EIS, BOEM anticipates wetland impacts would be mostly short term, localized, and small, and would not require any permanent fill or likely would not require compensatory mitigation. Therefore, potential adverse impacts on wetlands from construction activities are anticipated to be minor.

BOEM would not expect normal O&M activities to involve further wetland alteration. The onshore cable route and associated facilities generally have no maintenance needs unless a fault or failure occurs; therefore, O&M is not expected to affect wetlands. In the event of a fault or failure, impacts would be expected to be short term and negligible. Decommissioning of the onshore Project components would have similar impacts as construction.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities, and other offshore wind activities. Ongoing and planned non-offshore wind activities related to onshore development activities would contribute to impacts on wetlands through the primary IPF of land disturbance and accidental releases. Temporary disturbance and permanent loss of wetland may occur as a result of offshore wind development. Impacts would likely be short term and minor due to the low risk and localized nature of the most likely spills, the use of an Oil Spill Response Plan for projects, and regulatory requirements for the protection of wetlands. If wetland alteration or loss is anticipated, it would likely be minimal, the overall scale of impacts is expected to be small, and any activities that would result from these impacts would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding and minimizing impacts.

In the context of reasonably foreseeable environmental trends, the impacts on wetlands under the Proposed Action may add to the impacts of ongoing and planned land disturbance. Impacts due to onshore land use changes are expected to include a gradually increasing amount of wetland alteration and loss. The future extent of land disturbance from ongoing and planned non-offshore wind activities over the next 35 years is not known with as much certainty as the extent of land disturbance that would be caused by the Proposed Action, but based on regional trends is anticipated to be similar to or greater than that of the Proposed Action. If other future projects were to overlap the geographic analysis area or even be co-located (partly or completely) within the same ROW corridor that the Proposed Action would use, then the impacts of those future projects on wetlands would be of the same type as those of the Proposed Action alone; the degree of impacts may increase, although the location and timing of future activities would influence this. For example, repeated construction in a single ROW corridor would be expected to have less impact on wetlands than construction in an equivalent area of undisturbed wetland. All earth disturbances from construction activities would be conducted in compliance with the state Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activities and implementation of sediment controls and an SWPPP to avoid and minimize water quality impacts during onshore construction. Any work in wetlands would require a CWA Section 404 permit from USACE and a Section 401 Water Quality Certification; any wetlands permanently lost would require compensatory mitigation.

Conclusions

Impacts of the Proposed Action: The Proposed Action may affect wetlands through short-term disturbance from cable installation activities in or adjacent to these resources. Considering the avoidance, minimization, and mitigation measures required under federal and state statutes (e.g., CWA Section 404), and that no permanent or long-term impacts on wetlands are anticipated, construction of the Proposed Action would likely have **moderate adverse** impacts on wetlands.

Cumulative Impacts of the Proposed Action: In the context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with the Proposed Action when combined with the impacts on wetlands from ongoing and planned activities including offshore wind would likely be **moderate adverse**. The Proposed Action would contribute to the cumulative impact rating primarily through short-term impacts on wetlands from onshore construction activities. Measurable impacts would be relatively small, and the resource would likely recover completely when the affecting agent (e.g., temporary construction activity) is gone and remedial or mitigating action is taken.

3.5.8.6 Impacts of Alternative C on Wetlands

Impacts of Alternative C: Under Alternative C, the export cable route to Brayton Point would be rerouted onshore to avoid sensitive fish habitat in the Sakonnet River. The onshore export cable route would be installed largely within existing road ROWs, increasing the total length of the onshore cable route by 9 miles (14 kilometers) under Alternative C-1, and by 13 miles (21 kilometers) under Alternative C-2. The types of impacts under Alternative C-1 and Alternative C-2 would be similar to those described for the Proposed Action, but slightly greater due to the larger area of land disturbance. Alternative C-1 east variant and C-1 west variant could each result in an additional 1 acre of wetland impact compared to the Proposed Action. Alternative C-2, which does not go through Aquidneck Island, would potentially result in 0.24 acre of wetland impact, which would be slightly less than the Proposed Action for Route Option 2a, Route Option 2b, and Route Option 3, but a slightly greater wetland impact than the Proposed Action for Route Option 1 (Table 3.5.8-3). These impact estimates are based on wetland mapping within the onshore export cable corridor (using a 40-foot-wide corridor) and includes some small area (<0.1 acre total) of forested/shrub wetland impacts along Alternative C-1 west variant and

Alternative C-2, which would be considered a long-term impact if the wetlands needed to be cleared. This is a small difference compared to the Proposed Action, because the Proposed Action would not affect any wooded wetlands on Aquidneck Island. Wetland impacts from land disturbance and maintenance would still remain limited, impacts would primarily occur in existing ROWs, mitigation measures would be implemented, and compliance with federal and state regulations (e.g., CWA Section 404) for protection of wetlands would be required. Trenchless crossing methods (e.g., HDD) may also be used that would further avoid impacts at stream or wetland crossings.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C would be similar to those described under the Proposed Action.

Conclusions

Impacts of Alternative C: Alternative C-1 and Alternative C-2 would have the same **moderate adverse** short-term impacts on wetlands as the Proposed Action, although there could be a very small area of wooded wetland that could be permanently cleared if not avoided. The overall impacts on wetlands would not be materially different because land disturbance would remain limited, and implementation of mitigation measures and regulatory compliance would minimize impacts related to onshore ground disturbance.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with Alternative C would be the same as the Proposed Action, resulting in **moderate adverse** impacts on wetlands.

3.5.8.7 Impacts of Alternatives D (Preferred Alternative), E, and F on Wetlands

Impacts of Alternatives D, E, and F: The impacts of Alternatives D, E, and F on wetlands would be the same as the Proposed Action, because these alternatives differ only with respect to offshore components, and offshore components of the proposed Project have no potential impacts on wetlands.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, cumulative impacts of Alternatives D, E, and F would be the same as described under the Proposed Action.

Conclusions

Impacts of Alternatives D, E, and F: The expected short-term **moderate adverse** impacts associated with the Proposed Action alone would not change under Alternatives D, E, and F because the alternatives only differ in offshore components, and offshore components would not contribute to impacts on wetlands.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts associated with Alternatives D, E, and F would be the same as the Proposed Action and result in **moderate adverse** impacts on wetlands.

3.5.8.8 Comparison of Alternatives

The minor impacts on wetlands under the Proposed Action would be the same for Alternatives D, E, and F because these alternatives would differ only with respect to offshore components, and offshore components of the proposed Project would have no potential impacts on wetlands and are outside of the wetlands geographic analysis area. Alternative C-1 could result in slightly greater wetland impacts than the Proposed Action, while Alternative C-2 could result in slightly greater or lesser impacts on wetlands compared to the Proposed Action, depending on the ultimate route selected for the Proposed Action on Aquidneck Island. The differences in impacts from Alternative C-1 and Alternative C-2 compared to the Proposed Action and other action alternatives would be small (1 acre or less of wetland impacts) and would not change the impact magnitude.

3.5.8.9 Proposed Mitigation Measures

No measures to mitigate impacts on wetlands have been proposed for analysis.

3.6 Socioeconomic Conditions and Cultural Resources

3.6.3 Demographics, Employment, and Economics

This section discusses potential impacts on demographics, employment, and economics from the proposed Project, alternatives, and ongoing and planned activities in the geographic analysis area for demographics, employment, and economics. The geographic analysis area, as shown on Figure 3.6.3-1, includes the counties where proposed onshore infrastructure and potential port cities are located, as well as the counties closest to the Wind Farm Area: Barnstable, Bristol, Dukes, Nantucket, Plymouth, and Essex County, Massachusetts; Bristol, Newport, Washington, and Providence County, Rhode Island; New London County, Connecticut; Baltimore County, Maryland; Nueces and San Patricio Counties, Texas; and Charleston County, South Carolina. These counties are the most likely to experience beneficial or adverse economic impacts from the proposed Project.

3.6.3.1 Description of the Affected Environment

Barnstable, Dukes, and Nantucket Counties, Massachusetts

Barnstable, Dukes, and Nantucket Counties are notable for the importance of coastal tourism and recreation to their economy and their high proportion of seasonal housing. Barnstable County is made up of the 15 municipalities that form the Cape Cod peninsula, while Dukes and Nantucket Counties cover the islands of Martha's Vineyard and Nantucket, respectively. Each of these areas has a significant seasonal population that, when considered, greatly increases the population density of the area.

Data on population, demographics, income, and employment for the state of Massachusetts and for Barnstable, Dukes, and Nantucket Counties are provided in Table 3.6.3-1 and Table 3.6.3-2. The population of Barnstable County declined by 1.8 percent from 2010 to 2019, while the population of Dukes and Nantucket Counties grew by 7.2 and 10.9 percent, respectively. Dukes and Nantucket Counties have the smallest population of any counties in Massachusetts. The population of Barnstable and Dukes Counties are older, on average, than the population of surrounding counties and Massachusetts as a whole, with a median age of 53.3 and 47.1, respectively, compared to the statewide median age of 39.5. These communities also have a higher percentage of residents aged 65 and up, with 29.8 percent in Barnstable County and 23.3 percent in Dukes County, compared to 16.2 percent in Massachusetts (U.S. Census Bureau 2022a). Unemployment rates in the three-county area are similar to those of Massachusetts as a whole. In 2020 unemployment was 5.8 percent in Nantucket County, 4.1 percent in Barnstable County, and 5.1 percent in Dukes County, as opposed to 5.1 percent in Massachusetts. Nantucket County's per capita income of $57,246 is greater than the statewide average of $45,555, while Barnstable and Dukes Counties are $47,315 and $43,994, respectively (U.S. Census Bureau 2022b).

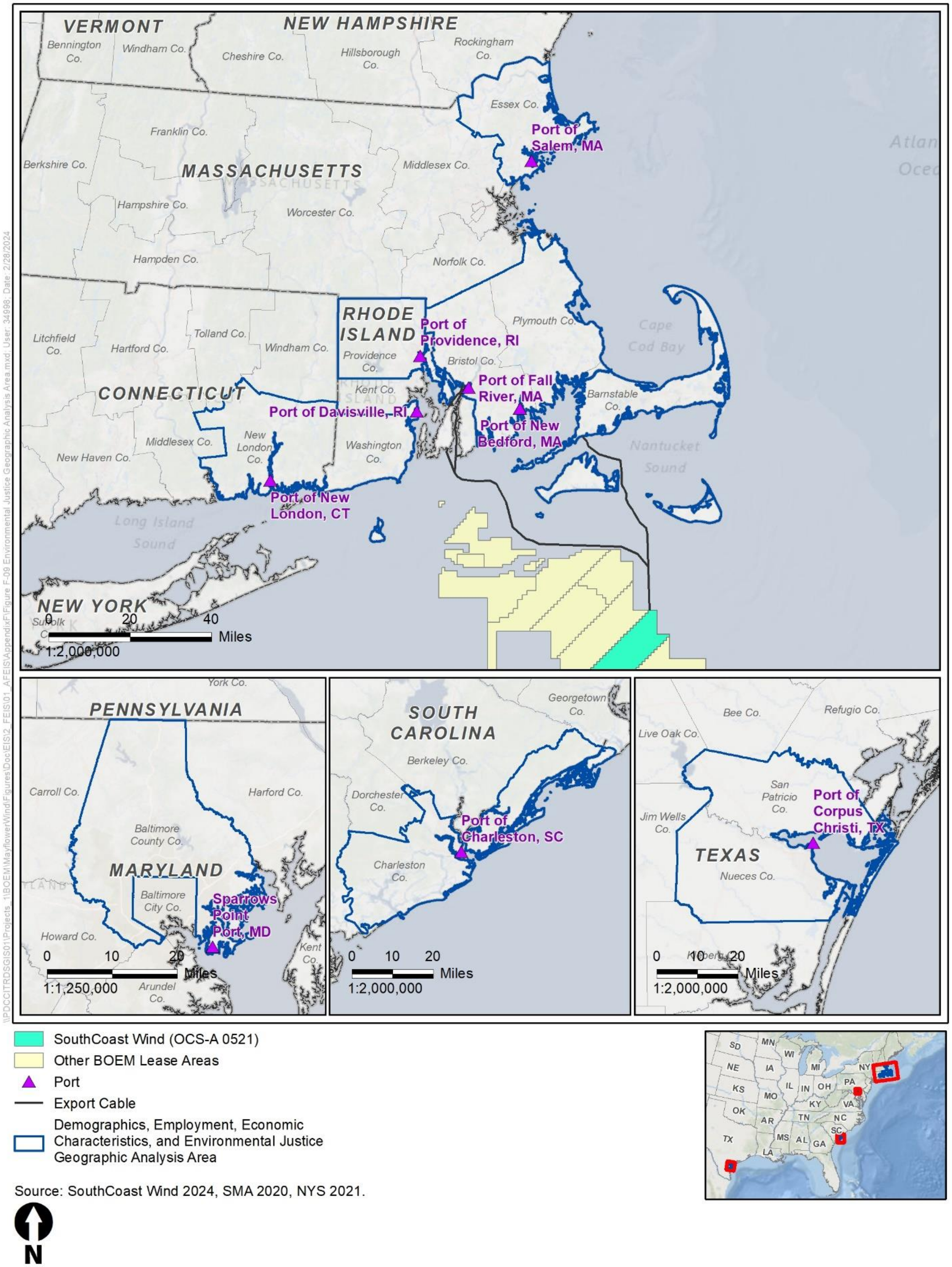

Figure 3.6.3-1. Demographics, employment, and economics geographic analysis area

Table 3.6.3-1. Demographic trends (2010–2019)

Jurisdiction	2010 Population	2019 Population	Population Change, percent (2010–2019)	2019 Percent Population 18–64 Years	2019 Percent of Population 65 or Older	2019 Median Age
Massachusetts	6,477,096	6,850,553	5.8%	64%	16.2%	39.5
Barnstable County	217,483	213,496	-1.8%	55%	29.8%	53.3
Bristol County	546,433	561,037	2.7%	63%	16.6%	41.0
Dukes County	16,155	17,312	7.2%	58%	23.3%	47.1
Nantucket County	10,069	11,168	10.9%	65%	14.6%	40.3
Plymouth County	490,784	515,303	5.0%	61%	17.6%	42.7
Essex County	735,642	783,676	6.5%	62%	16.7%	40.9
Rhode Island	1,056,389	1,057,231	0.1%	64%	16.8%	39.9
Bristol County	50,501	48,764	-3.4%	62%	19.4%	44.3
Newport County	83,253	82,801	-0.5%	61%	21.7%	45.2
Providence County	628,413	635,737	1.2%	64%	15.0%	37.4
Washington County	126,987	126,060	-0.7%	63%	20%	44.6
Connecticut	3,545,837	3,575,074	0.8%	62%	16.8%	41.0
New London County	272,360	267,390	-1.8%	63%	17.7%	41.4
Maryland	5,696,423	6,018,848	5.7%	63%	15.0%	38.7
Baltimore County	799,195	828,018	3.6%	62%	16.8%	39.4
South Carolina	4,511,428	5,020,806	11.3%	61%	17.2%	39.4
Charleston County	342,434	401,165	17.2%	64%	15.9%	37.8
Texas	24,311,891	28,260,856	16.2%	62%	12.3%	34.6
Nueces County	334,370	361,540	8.1%	61%	14.1%	35.5
San Patricio County	66,100	67,008	1.4%	58%	14.6%	35.5

Source: U.S. Census Bureau 2022a.

Table 3.6.3-2. Population, income, and employment data

Jurisdiction	Population (2019)	Population Density (persons per mi^2)	Per Capita Income (2020)	Total Employment (jobs, 2020)	Unemployment Rate (2020)
Massachusetts	6,850,553	648.42	45,555	3,615,725	5.1%
Barnstable County	213,496	163.47	47,315	105,798	4.1%
Bristol County	561,037	811.92	36,900	283,747	5.4%
Dukes County	17,312	35.26	43,994	8,902	5.1%
Nantucket County	11,168	106.06	57,246	6,419	5.8%

Jurisdiction	Population (2019)	Population Density (persons per mi²)	Per Capita Income (2020)	Total Employment (jobs, 2020)	Unemployment Rate (2020)
Plymouth County	515,303	471.46	45,378	269,959	5.1%
Essex County	783,676	843.57	43,948	409,549	5.2%
Rhode Island	1,057,231	870.87	37,504	535,140	5.5%
Bristol County	48,764	1,083.64	48,321	24,636	3.4%
Newport County	82,801	263.70	50,514	41,154	5.8%
Providence County	635,737	1,552.47	32,739	316,776	5.9%
Washington County	126,060	382.81	44,325	64,854	5.9%
Connecticut	3,575,074	644.97	45,668	1,807,525	6.0%
New London County	267,390	346.36	40,995	132,072	5.3%
Maryland	6,018,848	619.95	43,352	3,076,280	5.2%
Baltimore County	828,018	1,383.72	41,089	420,275	5.0%
South Carolina	5,020,806	167.05	30,727	2,312,831	5.5%
Charleston County	401,165	436.95	43,141	207,897	3.7%
Texas	28,260,856	108.20	32,177	13,461,358	5.3%
Nueces County	361,540	430.82	28,078	163,776	5.8%
San Patricio County	67,008	96.65	26,714	28,244	5.0%

Source: U.S. Census Bureau 2022b.
mi^2 = square mile.

Barnstable, Dukes, and Nantucket Counties are notable for the importance of tourism and visitors to their economy and their high proportion of seasonal housing. Table 3.6.3-3 includes housing data for the geographic area of interest. In Massachusetts as a whole, approximately 4.4 percent of housing units are seasonally occupied, as compared to 38.3 percent of homes in Barnstable County, 59.7 percent of homes in Dukes County, and 63.7 percent of homes in Nantucket County. The median owner-occupied home value in Dukes and Nantucket Counties is significantly higher than the statewide average. The median values in Dukes and Nantucket Counties are $699,500 and $1,084,700, respectively, while the median home value across Massachusetts is $381,600 (U.S. Census Bureau 2022c).

Table 3.6.3-3. Housing data (2019)

Jurisdiction	Housing Units	Seasonal Vacant Units	Vacant Units (Non-Seasonal)	Non-Seasonal Vacancy Rate	Median Value (Owner-Occupied)	Median Monthly Rent (Renter-Occupied)
Massachusetts	2,897,259	127,398	152,364	5%	381,600	1,282
Barnstable County	163,557	62,643	6,591	4%	393,500	1,311
Bristol County	235,275	2,892	14,471	6%	299,800	901
Dukes County	17,902	10,681	456	3%	699,500	1,459
Nantucket County	12,345	7,860	772	6%	1,084,700	1,764
Plymouth County	207,003	10,514	9,029	4%	370,300	1,279
Essex County	313,956	5,236	11,466	4%	436,600	1,298
Rhode Island	468,335	17,478	40,368	9%	261,900	1,004
Bristol County	21,053	224	1,612	8%	358,100	1,037
Newport County	42,563	4,284	3,502	8%	387,900	1,285
Providence County	266,624	1,669	27,637	10%	248,500	989
Washington County	64,016	11,074	3,840	6%	343,000	1,133
Connecticut	1,521,199	29,669	106,093	7%	279,700	1,201
New London County	123,849	4,981	9,252	7%	246,800	1,144
Maryland	2,448,422	58,876	184,342	8%	314,800	1,392
Baltimore County	337,052	1,142	22,391	7%	261,500	1,302
South Carolina	2,286,826	128,239	236,725	10%	162,300	894
Charleston County	187,953	11,410	17,348	9%	315,600	1,190
Texas	10,937,026	247,358	998,021	9%	172,500	1,045
Nueces County	149,287	4,704	15,132	10%	138,700	1,017
San Patricio County	28,226	1,035	4,293	15%	122,100	975

Source: U.S. Census Bureau 2022c

Table 3.6.3-4 and Table 3.6.3-5include data on the industries where residents in these counties work. The industries that employ workers reflect recreation and tourism's importance to these counties. A greater proportion of residents in these counties work jobs in arts, entertainment, and recreation and accommodation and food services (11.7 percent in Barnstable County and 10.3 percent in Nantucket County) than in Massachusetts as a whole (8.7 percent). Table 3.6.3-6 and Table 3.6.3-7 contain data on at-place employment by industry in the geographic area of interest. A higher proportion of jobs in these counties are again in arts, entertainment, and recreation and accommodation and food services (8.5 percent in Barnstable County, 9.4 percent in Dukes County, and 7.3 percent in Nantucket County), as well as retail trade (11.2 percent in Barnstable County, 6.3 percent in Dukes County, and 11.2 percent in Nantucket County) than in Massachusetts as a whole (5.7 and 8.2 percent, respectively) (U.S. Census Bureau 2022d).

NOAA tracks economic activity dependent upon the ocean in its "Ocean Economy" data, which generally include, among other categories, commercial fishing and seafood processing, marine construction, commercial shipping, and cargo-handling facilities, ship and boat building, marine minerals, harbor and port authorities, passenger transportation, boat dealers, and coastal tourism and recreation. Tourism and recreation accounted for 86 percent of the overall Ocean Economy Gross Domestic Product (GDP) in Barnstable County, and 100 percent in Dukes and Nantucket Counties (NOAA 2022). This category includes recreational and charter fishing, as well as commercial ferry services based in Hyannis Harbor and Woods Hole, which provide service to Nantucket, Martha's Vineyard, and other locations. The Woods Hole, Martha's Vineyard, and Nantucket Steamship Authority generated over $104 million in revenue in 2018 with almost 24,000 trips and 3,055,347 passengers carried (Steamship Authority 2018).

The "living resource" sector of the Ocean Economy includes commercial fishing, aquaculture, seafood processing, and seafood markets. The living resource sector accounts for 2.6 percent of employment and 3.2 percent of the GDP of the U.S marine economy. Seafood markets are the largest producer in the living resources sector, accounting for 41.5 percent of the sector's GDP and accounting for the most employed workers in the sector (NOAA 2021). Although the number employed or self-employed in this sector in Barnstable, Dukes, and Nantucket Counties is small compared to recreation and tourism, local fishing fleets form an important part of the identity and tourist attraction of local communities. In Martha's Vineyard, the fishing industry has formed the Martha's Vineyard Fishermen's Preservation Trust, a nonprofit organization that raises funds to purchase fishing permits and lease their affiliated quota, or the right to catch a certain number of fish or shellfish, to local small-scale fishermen, in an effort to ensure a viable commercial fishing community (Martha's Vineyard Fishermen's Preservation Trust 2017).

Table 3.6.3-4. Employment of residents by industry: Massachusetts, Rhode Island, and Connecticut (2019)

Industry	Massachusetts	Barnstable County	Bristol County	Dukes County	Nantucket County	Plymouth County	Essex County	Rhode Island	Bristol County	Newport County	Providence County	Washington County	Connecticut	New London County
Agriculture, forestry, fishing and hunting, and mining	0.4%	1.0%	0.6%	2.8%	1.6%	0.6%	0.4%	0.4%	0.3%	1.0%	0.3%	1.0%	0.4%	0.6%
Construction	5.7%	9.8%	7.6%	14.7%	15.8%	7.6%	5.7%	5.5%	4.3%	6.8%	5.9%	7.4%	6.1%	5.9%
Manufacturing	8.8%	3.9%	11.0%	3.0%	2.6%	6.7%	10.6%	10.8%	8.8%	7.2%	11.2%	14.1%	10.5%	13.9%
Wholesale trade	2.2%	1.9%	3.2%	1.8%	2.6%	2.7%	2.1%	2.4%	1.9%	2.3%	2.3%	2.7%	2.4%	1.7%
Retail trade	10.3%	13.7%	12.8%	9.0%	12.7%	12.0%	11.0%	11.8%	9.7%	9.3%	12.2%	8.5%	10.5%	10.5%
Transportation and warehousing, and utilities	3.9%	3.8%	4.4%	5.6%	2.6%	4.8%	4.3%	4.0%	2.6%	3.1%	4.5%	3.3%	4.3%	4.0%
Information	2.3%	1.7%	1.6%	1.9%	0.6%	1.9%	2.1%	1.6%	1.6%	1.5%	1.5%	1.5%	2.0%	1.3%
Finance and insurance, and real estate and rental and leasing	7.3%	5.9%	5.8%	6.7%	7.3%	8.7%	6.9%	6.8%	8.1%	6.9%	6.3%	7.2%	9.1%	4.5%
Professional, scientific, and management, and administrative and waste management services	14.0%	12.1%	9.1%	13.3%	16.0%	11.4%	14.0%	10.3%	10.2%	12.6%	10.3%	11.1%	11.7%	9.0%

Industry	Massachusetts	Barnstable County	Bristol County	Dukes County	Nantucket County	Plymouth County	Essex County	Rhode Island	Bristol County	Newport County	Providence County	Washington County	Connecticut	New London County
Educational services, and health care and social assistance	28.2%	24.1%	27.0%	23.2%	18.1%	25.4%	25.3%	27.5%	34.2%	26.0%	27.3%	26.7%	26.5%	24.9%
Arts, entertainment, and recreation, and accommodation and food services	8.7%	11.7%	8.7%	7.9%	10.3%	9.3%	8.7%	10.4%	10.5%	12.8%	9.7%	7.6%	8.3%	14.3%
Other services, except public administration	4.5%	5.5%	4.2%	6.0%	5.1%	4.6%	4.7%	4.5%	3.8%	5.0%	4.9%	3.4%	4.6%	4.3%
Public administration	3.8%	4.9%	4.0%	4.1%	4.8%	4.3%	4.0%	4.0%	4.1%	5.5%	3.7%	5.5%	3.7%	5.2%

Source: U.S. Census Bureau 2022d.

Table 3.6.3-5. Employment of residents by industry: Maryland, South Carolina, and Texas (2019)

Industry	Maryland	Baltimore County	South Carolina	Charleston County	Texas	Nueces County	San Patricio County
Agriculture, forestry, fishing and hunting, and mining	0.4%	0.2%	1.0%	0.4%	3.4%	3.0%	6.4%
Construction	7.6%	6.3%	7.4%	8.4%	9.3%	11.4%	16.0%
Manufacturing	5.2%	6.2%	16.6%	7.3%	10.0%	7.5%	10.0%
Wholesale trade	2.0%	2.5%	2.8%	2.8%	3.3%	2.6%	2.9%
Retail trade	7.4%	8.5%	9.9%	8.9%	9.8%	10.2%	8.2%
Transportation and warehousing, and utilities	5.0%	5.5%	5.8%	4.5%	6.4%	5.3%	6.5%
Information	2.2%	2.0%	1.8%	2.2%	1.8%	1.4%	0.7%
Finance and insurance, and real estate and rental and leasing	6.8%	9.2%	6.6%	7.2%	7.5%	6.3%	5.4%
Professional, scientific, and management, and administrative and waste management services	16.8%	14.3%	10.3%	16.2%	11.8%	8.8%	7.7%
Educational services, and health care and social assistance	22.1%	25.5%	21.3%	22.8%	20.9%	22.3%	21.0%
Arts, entertainment, and recreation, and accommodation and food services	5.7%	5.4%	6.9%	10.5%	6.4%	9.1%	6.3%
Other services, except public administration	4.9%	4.2%	4.3%	4.2%	4.4%	4.7%	3.0%
Public administration	13.7%	10.2%	5.5%	4.7%	4.9%	7.4%	5.9%

Source: U.S. Census Bureau 2022d.

Table 3.6.3-6. At-place employment by industry: Massachusetts, Rhode Island, and Connecticut (2019)

Industry	Massachusetts	Barnstable County	Bristol County	Dukes County	Nantucket County	Plymouth County	Essex County	Rhode Island	Bristol County	Newport County	Providence County	Washington County	Connecticut	New London County
Agriculture, forestry, fishing and hunting, and mining	0.3%	0.6%	0.5%	3.5%	0.6%	0.6%	0.4%	0.4%	0.1%	0.6%	0.3%	1.0%	0.4%	0.7%
Construction	6.3%	11.6%	8.6%	15.7%	16.3%	8.9%	6.2%	5.9%	4.5%	6.6%	6.4%	6.1%	6.5%	6.3%
Manufacturing	11.2%	5.2%	14.0%	2.4%	2.0%	8.4%	13.4%	13.7%	11.5%	9.1%	14.0%	10.5%	13.3%	18.5%
Wholesale trade	2.6%	2.4%	4.0%	0.8%	3.1%	3.3%	2.5%	3.0%	2.5%	2.8%	2.9%	2.2%	2.9%	2.0%
Retail trade	8.2%	11.2%	10.6%	6.3%	11.2%	9.2%	8.7%	10.0%	7.9%	8.5%	10.2%	10.8%	8.4%	8.7%
Transportation and warehousing, and utilities	4.2%	4.2%	4.8%	4.9%	3.2%	5.3%	4.6%	4.2%	2.3%	3.2%	4.6%	3.0%	4.6%	4.3%
Information	2.6%	1.9%	1.8%	1.5%	0.8%	2.3%	2.6%	1.7%	1.7%	1.7%	1.5%	1.4%	2.2%	1.5%
Finance and insurance, and real estate and rental and leasing	9.0%	6.9%	7.3%	8.1%	9.1%	10.8%	8.3%	8.4%	9.9%	8.0%	7.9%	5.9%	11.3%	5.5%
Professional, scientific, and management, and administrative and waste management services	15.4%	12.6%	9.7%	14.5%	16.0%	12.4%	14.8%	10.6%	10.9%	13.9%	10.6%	10.4%	12.4%	9.9%
Educational services, and health care and social assistance	25.9%	23.5%	24.8%	22.6%	19.3%	23.3%	23.4%	26.0%	33.7%	24.7%	25.9%	27.9%	24.3%	21.9%

Industry	Massachusetts	Barnstable County	Bristol County	Dukes County	Nantucket County	Plymouth County	Essex County	Rhode Island	Bristol County	Newport County	Providence County	Washington County	Connecticut	New London County
Arts, entertainment, and recreation, and accommodation and food services	5.7%	8.5%	5.3%	9.4%	7.3%	5.5%	5.7%	6.8%	6.7%	9.2%	6.7%	12.7%	5.4%	10.9%
Other services, except public administration	3.8%	5.0%	3.6%	4.4%	3.7%	4.1%	4.2%	4.0%	2.6%	4.2%	4.2%	4.3%	3.8%	3.3%
Public administration	4.8%	6.4%	5.1%	5.7%	7.4%	5.7%	5.1%	5.4%	5.7%	7.5%	4.9%	3.9%	4.6%	6.5%

Source: U.S. Census Bureau 2022d.

Table 3.6.3-7. At-place employment by industry: Maryland, South Carolina and Texas (2019)

Industry	Maryland	Baltimore County	South Carolina	Charleston County	Texas	Nueces County	San Patricio County
Agriculture, forestry, fishing and hunting, and mining	0.5%	0.3%	1.0%	0.4%	3.0%	2.6%	1,635
Construction	6.9%	5.6%	6.8%	7.4%	8.6%	10.4%	3,951
Manufacturing	4.4%	5.3%	13.7%	6.3%	8.5%	6.3%	2,396
Wholesale trade	1.7%	2.2%	2.4%	2.3%	2.9%	2.2%	783
Retail trade	9.4%	10.4%	11.9%	10.2%	11.4%	11.5%	2,826
Transportation and warehousing, and utilities	4.8%	5.0%	5.1%	4.3%	5.9%	4.7%	1,695
Information	2.0%	1.9%	1.6%	2.1%	1.7%	1.3%	198
Finance and insurance, and real estate and rental and leasing	6.0%	7.8%	5.8%	6.6%	6.7%	5.8%	1,500
Professional, scientific, and management, and administrative and waste management services	15.7%	13.3%	10.2%	15.4%	11.5%	9.0%	2,144
Educational services, and health care and social assistance	23.7%	27.0%	21.8%	22.6%	21.6%	22.8%	6,568
Arts, entertainment, and recreation, and accommodation and food services	8.5%	8.2%	10.2%	13.3%	9.2%	11.8%	2,494
Other services, except public administration	5.6%	5.0%	5.2%	5.0%	5.2%	5.7%	921
Public administration	10.9%	8.1%	4.4%	4.0%	4.0%	5.9%	1,428

Source: U.S. Census Bureau 2022d.

Bristol, Essex, and Plymouth Counties, Massachusetts

Bristol County is a manufacturing center and has an ocean-based economy dominated by shipping, seafood processing, and commercial fishing. New Bedford in Bristol County is a nationally important commercial fishing center. Bristol County is more densely populated than Massachusetts as a whole and had lower per capita income and housing values. Manufacturing and wholesale trade jobs account for more than 18 percent of the county's at-place employment, compared to 13 percent statewide (U.S. Census Bureau 2022d). In 2019, living resources accounted for 80 percent of Bristol County's total Ocean Economy value (NOAA 2022). The unemployment rate in Bristol County was 5.4 percent in 2019, similar to the statewide rate (U.S. Census Bureau 2022b). The Port of New Bedford, a full-service port with well-established fishing and cargo handling industries, generated 14,429 jobs in 2018 (direct, indirect, and induced), mostly from commercial fishing and seafood processing activity (Martin Associates 2019). The seafood processing industry at New Bedford handles seafood landed at New Bedford Harbor, as well as seafood from other domestic and international sources. A total of 571 jobs were generated directly by non-seafood cargo and recreational boating activity (ferries, water taxis, and marinas). An additional 26,499 related jobs were generated by downstream logistics operations in seafood processing, after the seafood leaves the port processing operations and cold storage facilities (Martin Associates 2019).

Plymouth County is located in southeastern Massachusetts, just north of the Cape Cod peninsula. Unlike Barnstable, Dukes, and Newport Counties, Plymouth has a relatively small seasonal population, as only 5.1 percent of all housing units are seasonal units. However, tourism and recreation are still significant in the county, likely attributed to its position along the East Coast. In 2019, tourism and recreation accounted for 71 percent of Plymouth County's total Ocean Economy value (NOAA 2022).

Essex County is located in northeast Massachusetts and similar to previously discussed Massachusetts counties, contains a significant ocean-based economy and large coastline. Tourism and recreation accounted for 76 percent of the county's total Ocean Economy value in 2019 (NOAA 2022). However, only 1.7 percent of all housing units are seasonal (U.S. Census Bureau 2022c). From 2010 to 2019, the population of Essex County grew by 6.5 percent, and the median age in the county is 40.9, close to the statewide median age of 39.5. A higher proportion of jobs in Essex County are in the manufacturing sector (10.6 percent) than in Massachusetts as a whole (8.8 percent) (U.S. Census Bureau 2022d).

Newport, Bristol, Providence, and Washington Counties, Rhode Island

Similar to the described Massachusetts counties, Newport and Bristol Counties, located in southeast Rhode Island, are notably tied to tourism and recreation, which accounted for 56 and 77 percent of their overall Ocean Economy GDP, respectively (NOAA 2022). Both counties are home to a declining population that is older than that of Rhode Island. The 2019 median age was 45.2 in Newport County and 44.3 in Bristol County, compared to 39.9 across all of Rhode Island (U.S. Census Bureau 2022a). The median owner-occupied home value in both counties is also higher than the statewide average. The median value in Newport County is $387,900 and $358,100 in Bristol County, while the median home value across Rhode Island is $261,900 (U.S. Census Bureau 2022c). A higher proportion of jobs in

Newport County are in arts, entertainment, and recreation and accommodation and food services (9.2 percent) than in Rhode Island as a whole (6.8 percent) (U.S. Census Bureau 2022d).

Providence County is north of Newport and Bristol County. From 2010 to 2019, the population of Providence County grew by 1.2 percent, while the population of Rhode Island grew by only 0.1 percent (U.S. Census Bureau 2022a). The population of the county is younger than that of Rhode Island, with a median age of 37.4 (U.S. Census Bureau 2022a). The per capita income in Providence County is lower than that of the previously described Rhode Island counties at $32,739, while the unemployment rate of 5.9 percent is higher than the rest of the state (U.S. Census Bureau 2022b). A higher proportion of residents in Providence County work in retail trade (12.2 percent) than in Bristol or Newport County (9.7 percent and 9.3 percent, respectively) (U.S. Census Bureau 2022d).

Washington County is the southernmost county in Rhode Island, containing the island of Block Island and bordering the Block Island Sound at the southern coast of Rhode Island. The Port of Davisville is located in Washington County, near the mouth of Narragansett Bay. The population of Washington County shrank by 0.7 percent between 2010 and 2019, and in 2019 was on average older than the whole of Rhode Island (with a median age of 44.6, compared to Rhode Island's 39.9). Twenty percent of Washington County's population was over the age of 65 in 2019 (U.S. Census Bureau 2022a). Per capita income in Washington County is slightly higher than the state of Rhode Island's, but the unemployment rate was also slightly higher, at 5.9 percent (U.S. Census Bureau 2022b). Median home values and rental rates are higher than the state (U.S. Census Bureau 2022c). Tourism is an important business in Washington County, with the arts, entertainment, recreation, and accommodation and food services industries accounting for 12.7 percent of at-place employment in the county (U.S. Census Bureau 2022d).

New London, Connecticut

New London County, located in southeast Connecticut, borders the state of Rhode Island, and contains a large coastline situated along Long Island Sound. The city of New London sits directly on the coast and along the Thames River. From 2010 to 2019, the population of New London County decreased by 1.8 percent (U.S. Census Bureau 2022a). The median age in New London County is slightly older than the statewide median, and the proportion of the population that is age 65 or older (17.7 percent) is greater than that of the state (16.8 percent) (U.S. Census Bureau 2022a). A higher proportion of jobs in New London County are in manufacturing and arts, entertainment, and recreation and accommodation and food services, as well as manufacturing (14.3 and 13.9 percent, respectively), than in Connecticut as a whole (8.3 and 10.5 percent, respectively) (U.S. Census Bureau 2022d).

Baltimore County, Maryland

Located in northern Maryland, Baltimore County is home to the Port of Sparrows Point. The population of Baltimore County grew 3.6 percent between 2010 and 2019, slightly less than the population growth of the state of Maryland. The median age of Baltimore County is similar to that of Rhode Island, at 39.4 years (U.S. Census Bureau 2022a). The median income in Baltimore County is somewhat less than that of Maryland as a whole, while the unemployment rate is also slightly less, at 5.0 percent (U.S.

Census Bureau 2022b). At $261,500, the median home value in Baltimore County is less than the median home value in Maryland; median monthly rent is slightly less in the county than in the state, at $1,302 (U.S. Census Bureau 2022c). The educational services and health care and social assistance industry is somewhat bigger in Baltimore County than in Maryland, while the arts, entertainment, recreation, and accommodation and food services industries employ a lower proportion of people in Baltimore County than in Maryland as a whole (U.S. Census Bureau 2022d).

Charleston County, South Carolina

The Port of Charleston is in Charleston County, South Carolina. Between 2010 and 2019, the population in Charleston County grew 17.2 percent, the most of any county analyzed in the geographic analysis area. The median age in Charleston County is relatively young at 37.8 years and is slightly less than South Carolina as a whole (U.S. Census Bureau 2022a). Median income is much higher in Charleston County than South Carolina, at $43,141 versus $30,727. The unemployment rate is also lower in Charleston County at 3.7 percent, while the unemployment rate overall in South Carolina is 5.5 percent (U.S. Census Bureau 2022b). The median home value in Charleston County is nearly twice the median value in South Carolina, at $315,600. Median monthly rents are also higher (U.S. Census Bureau 2022c). Tourism is a large industry in the county, with arts, entertainment, and recreation, and accommodation and food services industries employing 13.3 percent of people in the county, higher than the proportion of those employed across the state (U.S. Census Bureau 2022d).

Nueces and San Patricio Counties, Texas

The Port of Corpus Christi is in Nueces and San Patricio Counties, Texas. The Port of Corpus Christi may be used to support Project construction. The populations of both counties grew between 2010 and 2019, with Nueces County growing 8.1 percent and San Patricio County growing 1.4 percent. Both counties are somewhat younger than the other counties in the geographic analysis area, with a median age of 35.5 years in each. The median age in both counties is slightly higher than in the state of Texas, the median age in which is 34.6 years (U.S. Census Bureau 2022a). The per capita income was slightly less in both counties than the per capita income in Texas. The unemployment rate in Nueces County was slightly higher than the state of Texas at 5.8 percent, while the unemployment rate in San Patricio County was slightly lower at 5.0 percent (U.S. Census Bureau 2022b). Both counties had somewhat high non-seasonal housing vacancy rates, with 10 percent in Nueces County and 15 percent in San Patricio County. The median home value and median monthly rent was slightly lower in San Patricio County than in Nueces County, and slightly lower in both than in the state of Texas (U.S. Census Bureau 2022c). Arts, entertainment, recreation, and accommodation and food services are important industries in Nueces County, employing 9.1 percent of residents. This is higher than both the state of Texas and San Patricio County’s rate of employment in the industry, at 6.4 percent and 6.3 percent, respectively. Educational services; health care and social assistance; construction; and retail trade are also strong industries in both counties (U.S. Census Bureau 2022d).

3.6.3.2 Impact Level Definitions for Demographics, Employment, and Economics

Definitions of impact levels are provided in Table 3.6.3-8.

Table 3.6.3-8. Impact level definitions for demographics, employment, and economics

Impact Level	Adverse or Beneficial	Definition
Negligible	Adverse	No impacts would occur, or impacts would be so small as to be unmeasurable.
	Beneficial	Either no effect or no measurable benefit.
Minor	Adverse	Impacts on the affected activity or geographic place would not disrupt the normal or routine functions of the affected activity or geographic place.
	Beneficial	Small but measurable benefit on demographics, employment, or economic activity.
Moderate	Adverse	The affected activity or geographic place would have to adjust somewhat to account for disruptions due to impacts of the Project.
	Beneficial	Notable and measurable benefit on demographics, employment, or economic activity.
Major	Adverse	The affected activity or geographic place would experience disruptions to a degree beyond what is normally acceptable.
	Beneficial	Large local or notable regional benefit to the economy as a whole.

3.6.3.3 Impacts of Alternative A - No Action on Demographics, Employment, and Economics

When analyzing the impacts of the No Action Alternative on demographics, employment, and economics, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for demographics, employment, and economics. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D, *Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for demographics, employment, and economics of the geographic analysis area described in Section 3.4.2.1, *Description of the Affected Environment and Future Baseline Conditions*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities. Tourism, recreation, and marine industries (e.g., fishing) would continue to be important components of the regional economy. Ongoing activities in the geographic analysis area that would contribute to impacts on demographics, employment, and economics include continued commercial shipping and commercial fishing; ongoing port maintenance and upgrades; periodic channel dredging; maintenance of piers, pilings, seawalls, and buoys; the use of small-scale, onshore renewable energy and climate change. Coasts are sensitive to sea level rise, changes in the frequency and intensity of storms, increases in precipitation, and warmer ocean temperatures. Sea level rise and increased storm frequency and severity could result in property or infrastructure damage, increase insurance cost, and reduce the economic viability of coastal communities. Impacts on marine life due to ocean acidification, altered habitats and migration patterns, and disease frequency would affect industries that rely on these species. The impacts of climate change are likely to, over time, worsen problems that coastal areas already face (Moser et al. 2014). The socioeconomic impact of ongoing activities varies depending on each activity. Activities that generate economic activity, such as port maintenance and channel dredging, would generally benefit the local economy by providing job opportunities and generating indirect economic activity from suppliers and other businesses that support activity along coastal areas. Conversely, ongoing activities that disrupt economic activity, such as climate change, may adversely affect businesses, resulting in impacts on employment and wages.

Offshore wind energy is anticipated to reduce the reliance and impact of fossil fuels (Section 3.4.1, *Air Quality)* which may affect employment within the fossil fuel industry in the region. According to the U.S. Energy Information Administration, in 2023, the majority of electricity in Massachusetts was generated by natural gas-fired power plants (U.S. Energy Information Administration 2024). According to the US Energy and Employment Report 2021, Massachusetts had about 31,000 jobs related to electric power generation (U.S. Department of Energy 2021). Nearly half of these jobs (about 15,000) were in solar electric generation, about 4,300 from natural gas generation, 1,400 from coal, and about 400 from oil and other fossil fuels (U.S. Department of Energy 2021). Only about 2,300 Massachusetts jobs were related to electricity generated by wind. As offshore wind projects including the Proposed Action and other activities in the geographic analysis area come on line, it is a reasonable assumption that there will be increased demand for jobs in the wind energy sector at the same time that jobs related to electric power generated by fossil fuels may be reduced. Ongoing offshore wind activities in the geographic analysis area that contribute to impacts on demographics, employment, and economics include ongoing construction of the Vineyard Wind 1 project (62 WTGs and 1 OSP) in OCS-A 0501, the South Fork project (12 WTGs and 1 OSP) in OCS-A 0517, and the Revolution Wind project (65 WTGs and two OSPs) in OCS-A 0486. Ongoing construction of the Vineyard Wind 1, South Fork, and Revolution Wind projects would affect demographics, employment, and economics through the IPFs of lighting, cable emplacement and maintenance, noise, port utilization, presence of structures, and land disturbance. Ongoing offshore wind activities would have the same type of impacts that are described in *Cumulative Impacts of the No Action Alternative* for ongoing and planned offshore wind activities, but the impacts would be of lower intensity.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Planned non-offshore wind activities that may affect demographics, employment, and economics include development of diversified, small-scale, onshore renewable energy sources; ongoing onshore development at or near current rates; continued increases in the size of commercial vessels; potential port expansion and channel-deepening activities; and efforts to protect against potential increased storm damage and sea level rise (see Appendix D, Section D.2, for a description of planned activities). Similar to ongoing activities, other planned non-offshore wind activities may result in beneficial socioeconomic impacts by generating economic activity that boosts employment, but there is also the potential for some adverse impacts.

Offshore wind could become a new industry for the Atlantic states and the nation. Although most offshore wind component manufacturing and installation capacity exists outside of the United States, some studies acknowledge that domestic capacity is poised to increase. This EIS uses available data, analysis, and projections to make informed conclusions on offshore wind's potential economic and employment impacts within the geographic analysis area.

AWEA estimates that the offshore wind industry will invest between $80 and $106 billion in U.S. offshore wind development by 2030, of which $28 to $57 billion will be invested within the United States. This figure depends on installation levels and supply chain growth, as other investment would occur in countries manufacturing or assembling wind energy components for U.S.-based projects. While most economic and employment impacts would be concentrated in Atlantic coastal states where offshore wind development will occur—there are over $1.3 billion of announced domestic investments in wind energy manufacturing facilities, ports, and vessel construction—there would be nationwide effects as well (AWEA 2020). The AWEA report analyzes base and high scenarios for offshore wind direct impacts, turbine and supply chain impacts, and induced impacts. The base scenario assumes 20 GW of offshore wind power by 2030 and domestic content increasing to 30 percent in 2025 and 50 percent in 2030, while the high scenario assumes 30 GW of offshore wind power by 2030 and domestic content increasing to 40 percent in 2025 and 60 percent in 2030. Offshore wind energy development would support $14.2 billion in economic output and $7 billion in value added by 2030 under the base scenario. Offshore wind energy development would support $25.4 billion in economic output and $12.5 billion in value added under the high scenario. It is unclear where in the U.S. supply chain growth would occur.

The University of Delaware projects that offshore wind power will generate 30 GW along the Atlantic coast through 2030. This initiative would require capital expenditures of $100 billion over the next 10 years (University of Delaware 2021). Although the industry supply chain is global and foreign sources would be responsible for some expenditures, more U.S. suppliers are expected to enter the industry.

Compared to the $14.2 to $25.4 billion in offshore wind economic output (AWEA 2020), the 2020 annual GDP for states with offshore wind projects (Connecticut, Massachusetts, Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina) ranged from $60.6 billion in Rhode Island to $1.72 trillion in New York (U.S. Bureau of Economic Analysis 2022) and totaled nearly $4.3 trillion. The $14.2 to $25.4 billion in offshore wind industry output would represent 0.3 to 0.6 percent of the combined GDP of these states.

AWEA estimates that in 2030, offshore wind would support 45,500 (base scenario) to 82,500 (high scenario) full-time equivalent (FTE) jobs nationwide, including direct, supply chain, and induced jobs. Most offshore wind jobs (about 60 percent) would be created during the temporary construction phase while the remaining 40 percent would be long-term O&M jobs. RODA estimated in 2020 that offshore wind projects would create 55,989 to 86,138 job years through 2030 in construction and 5,003 to 6,994 long-term jobs in O&M (Georgetown Economic Services 2020). These estimates are generally consistent with the AWEA study in total jobs supported, although the RODA study concludes that a greater proportion of jobs would be in the construction phase. The two studies conclude that states hosting offshore wind projects would have more offshore wind energy jobs, while states with manufacturing and other supply chain activities may generate additional jobs.

In 2020, employment in Massachusetts was 3.6 million (Table 3.6.3-2). While the extent to which there would be impacts in the geographic analysis area is unclear due to the geographic versatility of offshore wind jobs, a substantial portion of the planned offshore wind projects off the coast of Massachusetts and Rhode Island would likely be within commuting distance of ports in New Bedford, Fall River, and Salem, Massachusetts; New London, Connecticut; Davisville and Providence, Rhode Island; and other ports that would be used for offshore wind staging, construction, and operations.

The sections below summarize the potential impacts of ongoing and planned offshore wind activities on demographics, employment, and economics during construction, O&M, and decommissioning of the projects. Ongoing and planned offshore wind projects in the geographic analysis area that would contribute to impacts on demographics, employment, and economics include those projects within all or portions of OCS-A-0486 (Revolution Wind), OCS-A-0487 (Sunrise Wind), OCS-A-0500 (Bay State Wind), OCS-A 0501 (Vineyard Wind 1), OCS-A 0517 (South Fork Wind), OCS-A-0520 (Beacon Wind), OCS-A 0522 (Vineyard Wind Northeast), and OCS-A 0534 (New England Wind) (Appendix D, Table D2-1). BOEM expects offshore wind development to affect demographics, employment, and economics through the following primary IPFs.

Lighting: Offshore WTGs require aviation warning lighting that could have economic impacts in certain locations. Aviation hazard lighting from up to 901 WTGs could be visible from some beaches, coastlines, and elevated inland areas, depending on vegetation, topography, weather, and atmospheric conditions. Visitors may make different decisions on coastal locations to visit and potential residents may choose to select different residences because of nighttime views of lights on offshore wind energy structures. A University of Delaware study evaluating the impacts of visible offshore WTGs on beach use found that WTGs visible more than 15 miles from the viewer would have negligible impacts on businesses dependent on recreation and tourism activity (Parsons and Firestone 2018). In a subsequent study, 1,723 beachgoers were surveyed to determine the impact of WTGs, and the conclusion was that the further away the WTGs, the less of an impact. Nearly 70 percent of beachgoers said that WTGs 15 miles offshore would neither worsen nor increase their experience (Parsons et al. 2020). The majority of the WTG positions envisioned offshore of the geographic analysis area would be more than 15 miles (24.1 kilometers) from coastal locations with views of the WTGs and so impacts are anticipated to be negligible. These lights would be incrementally added over the construction period and would be visible for the operating lives of offshore wind activities. Distance from shore, topography, and atmospheric conditions would affect light visibility.

If implemented, ADLS would reduce the amount of time that WTG lighting is visible. Visibility would depend on distance from shore, topography, and atmospheric conditions. Such systems would likely reduce impacts on demographics, employment, and economics associated with lighting. Lighting for transit or construction could occur during nighttime transit or work activities. Construction of 12 offshore wind projects would occur within the Massachusetts/Rhode Island lease areas between 2023 and 2030, with a maximum of eight projects under construction concurrently (number of projects includes lease remainders; see Appendix D, Table D-2). Vessel lights would be visible from coastal businesses, especially near the ports used to support offshore wind construction (COP Volume 2, Section 8.2.2.1; SouthCoast Wind 2024).

Cable emplacement and maintenance: Cable installation for each project could temporarily cause commercial fishing vessels, static gear fishing vessels, and recreational vessels to relocate away from work areas and disrupt fish stocks, thereby reducing income and increasing costs during installation. Fishing vessels are not likely to access affected areas during active construction. About 9,832 acres (3,979 hectares) of seafloor disturbance would occur associated with offshore cable and interarray cable installation (Appendix D, Table D2-2). In the long term, concrete mattresses covering cables in hard-bottom areas could hinder commercial trawlers and dredgers (COP Volume 2, Section 11.2.3.2; SouthCoast Wind 2024). Assuming similar installation procedures as under the Proposed Action, the duration and range of impacts would be limited, and the disturbance to marine species important to recreational fishing and sightseeing would recover following the disturbance (COP Volume 2, Section 10.3.2; SouthCoast Wind 2024). Impacts of onshore cable installation would depend on the specific location but could temporarily disrupt beaches and other recreational coastal areas. Disruptions may result in conflict over other fishing grounds, increased operating costs for vessels, and lower revenue. Seafood processing and wholesaling businesses could also experience short-term reductions in productivity. Disruptions from new cable emplacement would have localized, short-term and minor impacts on demographics, employment, and economics. Maintenance is anticipated to have long-term intermittent and negligible impacts on demographics, employment, and economics.

Noise: Noise from O&M, pile driving, cable laying and trenching, and vessel traffic could result in temporary impacts on demographics, employment, and economics due to impacts on commercial/for-hire fishing businesses, recreational businesses, and marine sightseeing activities.

Assuming other offshore wind facilities generate vessel traffic similar to the vessel trips projected for the Proposed Action, construction of each offshore wind project would generate between 15 and 35 vessels operating at any given time (Section 3.6.6, *Navigation and Vessel Traffic*). Noise from vessel traffic during the maintenance and construction phases could affect species important to commercial/for-hire fishing, recreational fishing, and marine sightseeing activities (COP Volume 2, Section 6.8.2.1.2; SouthCoast Wind 2024). This noise may also make these facilities less attractive to fishing operators and recreational boaters (COP Volume 2, Section 11.2.1.1; SouthCoast Wind 2024). Similarly, noise from pile driving from offshore wind activities would affect fish populations that are crucial to commercial fishing and marine recreational businesses (COP Volume 2, Section 6.8.2.1.1; SouthCoast Wind 2024). These impacts would be greater if multiple construction activities occur in close spatial and temporal proximity. An estimated 920 foundations (WTGs and OSPs) would be installed within the Massachusetts and Rhode Island lease areas between 2023 and 2030.

Onshore construction noise could result in a short-term reduction of economic activity for businesses near installation sites for onshore cables or substations, temporarily inconveniencing workers, residents, and visitors. Noise would have intermittent, short-term, and negligible impacts on demographics, employment, and economics.

Port utilization: Offshore wind installation would require port facilities for berthing, staging, and loadout. Development activities would bolster port investment and employment, while also supporting jobs and businesses in supporting industries. Offshore wind development would also support planned expansions and modifications at ports in the geographic analysis area, including the ports of New London, Connecticut; Providence and Davisville, Rhode Island; New Bedford, Salem, and Fall River, Massachusetts; Sparrows Point Port, Maryland; Port of Charleston, South Carolina; and the Port of Corpus Christi marine terminal in Corpus Christi, Texas. While simultaneous construction or decommissioning (and, to a lesser degree, operation) activities for multiple offshore wind projects in the geographic analysis area could stress port capacity, it would also generate considerable economic activity and benefit the regional economy and infrastructure investment.

Port utilization would require a trained workforce for the offshore wind industry including additional shore-based and marine workers that would contribute to local and regional economic activity. Improvements to existing ports and channels would be beneficial to other port activity. Port utilization in the geographic analysis area would occur primarily during development and construction projects, anticipated to occur primarily between 2023 and 2030. Ongoing O&M activities would sustain port activity and employment at a lower level after construction.

Offshore wind activities and associated port investment and usage would have long-term, moderate beneficial impacts on employment and economic activity by providing employment and industries, such as marine construction, ship construction and servicing, and related manufacturing. The greatest benefits would occur during offshore wind project construction between 2023 and 2030. If offshore wind construction results in competition for scarce berthing space and port service, port usage could have short- to medium-term adverse impacts on commercial shipping.

Presence of structures: The addition of up to 920 offshore wind structures (WTGs and substations) with 1,247 acres (505 hectares) of foundation and scour protection and 414 acres (168 hectares) of offshore export cable hard protection would increase the risk of gear loss connected with cable mattresses and structures along the East Coast (Appendix D, Table D2-2). Fisheries using bottom gear may be permanently disrupted, which would increase economic impacts on the commercial/for-hire recreational fishing industries. These offshore facilities would also pose allision and height hazard risks, creating obstructions and navigational complexity for marine vehicles, which would impose fuel costs, time, and risk and require adequate technological aids and trained personnel for safe navigation. In the event of an allision, vessel damage and spills could result in both direct and indirect costs for commercial/for-hire recreational fishing.

Due to the locations of offshore wind lease areas, it is possible that some commercial fishing areas would be displaced. Because of this, fishermen are likely to switch to their next best fishing location.

These locations may involve lower catches per unit, catches of alternative species with different prices, or increased congestion, which would have its own effects, such as increased fishing costs among fishing fleets. In a study on the socioeconomic effects of offshore wind off the coast of Rhode Island and Massachusetts, Hoagland et al. (2015) found that losses associated with a reduction in commercial fishing may be distributed in unexpected ways across the coastal economy. Regional coastal economies are linked across onshore industry sectors and offshore activities, and impacts on commercial fishing would not just affect fishing fleets and related coastal businesses. The study's authors found that impacts may be most pronounced in areas that are not located in close proximity to the coastline (Hoagland et al. 2015), highlighting the potential for broad, regional socioeconomic impacts.

The potential for 920 offshore wind energy structures in the geographic analysis area could encourage fish aggregation and generate reef effects that attract recreational fishing vessels (COP Volume 2, Section 11.2.2.2; SouthCoast Wind 2024). Fish aggregation could increase human fishing activities, but this attraction would likely be limited to the minority of recreational fishing vessels that already travel as far from the shore as the wind energy facilities. Fish aggregation could result in broad changes in recreational fishing practices if these effects are widespread enough to encourage more participants to travel farther from shore.

The 1,247 acres (505 hectares) of hard coverage for offshore wind foundations could create foraging opportunities for harbor and gray seals, sea turtles, bats, northern gannets, loons, and peregrine falcons, possibly attracting private or commercial recreational sightseeing vessels. As a result, the presence of new habitat could increase economic activity associated with offshore sightseeing. New structures would be added intermittently between 2023 and 2030 and could benefit structure-oriented species as long as the structures remain (COP Volume 2, Section 6.8.2.4.2; SouthCoast Wind 2024).

As a result of fish aggregation and reef effects associated with the presence of offshore wind structures, there would be long-term impacts on commercial fishing operations and support businesses, such as seafood processing. The fishing industry is expected to be able to adapt its fishing practices over time in response to these changes. These effects could simultaneously provide new business opportunities, such as fishing and tourism.

The views of offshore WTGs could have impacts on certain businesses serving the recreation and tourism industry. Impacts could be adverse for particular locations if visitors and customers avoid certain businesses (i.e., hotels or rental dwellings) due to views of the WTGs; impacts could be neutral or beneficial if views do not affect visitor decisions or influence some visitors positively. Recreation and tourism economies and employment could be affected if visitors are attracted to or deterred from an area due to the presence of visible structures. Visible project components can have an adverse economic effect if the structure or activity is close to businesses that are highly dependent on an area's views or pristine setting. Depending on attitudes and sensitivities of tourist populations, the presence of WTGs, OSPs, or maintenance vessels may deter visitors who desire a pristine natural view. Visible structures could also have a positive impact on recreation and tourism economies. Research on wind farms in the United Kingdom and Europe indicate that there is potential for wind farms to be beneficial to tourism economies through wind-based tourism, such as boat tours of wind facilities (ICF 2012).

Studies in the United States of the Block Island Wind Farm have found beneficial impacts on tourism and recreation economies after the construction of the wind farm. A survey of tourists found no negative impact on trips taken to the Block Island Wind Farm after construction and found that, via stated preference, tourists would pay more for tourism and recreation experiences with views of wind turbines (Trandafir et al. 2020). A study found that after installation of the wind farm, catch of black sea bass and Atlantic cod increased as these species are attracted to the turbine structures, while there was no statistical difference in catch for most other fish species (Wilber et al. 2022). See also Section 3.6.8, *Recreation and Tourism*.

Overall, the presence of offshore wind structures would have continuous, long-term minor adverse impacts and minor beneficial impacts on demographics, employment, and economics. The commercial fishing industry is anticipated to be able to adjust to changes in fishing practices to maintain the viability of the industry in the presence of offshore wind structures. The presence of structures could also result in beneficial impacts for the recreational fishing and tourism industries.

Traffic: Offshore wind construction and decommissioning and, to a lesser extent, offshore wind operations would generate increased vessel traffic. This additional traffic would support increased employment and economic activity for marine transportation and supporting businesses and investment in ports. Assuming other offshore wind facilities generate vessel traffic similar to the projected Proposed Action vessel trips, construction of each offshore wind project would generate on average between 13 and 35 vessels operating at any given time. As stated previously, construction of 12 offshore wind projects could occur within the Massachusetts and Rhode Island lease areas between 2023 and 2030, with a maximum of eight projects under construction concurrently (Appendix D, Table D2-1). Increased vessel traffic would have continuous, beneficial impacts during all project phases, with minor impacts during construction and decommissioning.

Impacts of short-term, increased vessel traffic during construction could include marine congestion, delays at ports, and a risk for collisions between vessels. Increased vessel traffic would be localized near affected ports and offshore construction areas. Congestion and delays could increase fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decrease productivity for commercial shipping, fishing, and recreational vessel businesses, whose income depends on the ability to spend time out of port. Collisions could lead to vessel damage and spills, which could have direct costs (i.e., vessel repairs and spill cleanup), as well as indirect costs from damage caused by spills. As a result of potential delays from increased congestion and increased risk of damage from collisions, vessel traffic is anticipated to have continuous, short-term, and minor impacts during construction and negligible impacts during operations.

Vessel traffic would occur among ports (outside the geographic analysis area) and offshore wind work areas. Most vessel traffic would travel to the WTG installation area with fewer vessels needed along the cable installation routes (COP Volume 1, Section 3.3.14; SouthCoast Wind 2024).

Land disturbance: Land disturbance could result in localized, temporary disturbances of businesses near cable routes and construction sites for substations and other electrical infrastructure, due to typical construction impacts, such as increased noise, traffic, and road disturbances. These impacts would be similar in character and duration to other common construction projects, such as utility installations, road repairs, and industrial site construction. Impacts on employment would be localized, temporary, and both beneficial (jobs and revenues to local businesses that participate in onshore construction) and adverse (lost revenue due to construction disturbances). Land disturbance impacts on demographics, employment, and economics would be minor.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, the geographic analysis area would continue to be influenced by regional demographic and economic trends. Ongoing non-offshore wind activities and offshore wind activities would continue to sustain and support economic activity and growth in the geographic analysis area based on anticipated population growth and ongoing development of businesses and industry. Tourism and recreation would continue to be important to the economies of the coastal areas, especially Barnstable, Dukes, and Nantucket Counties. Marine industries, such as commercial fishing and shipping would continue to be active and important components of the regional economy. Counties in the geographic analysis area would continue to seek to diversify their economies—including maintaining or increasing their year-round population—and protect environmental resources. BOEM anticipates that the No Action Alternative would result in **minor** adverse and **minor beneficial** impacts on demographics, employment, and economics.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, ongoing and planned offshore wind and non-offshore wind activities would affect ocean-based employment and economics, driven primarily by the continued operation of existing marine industries, especially commercial fishing, recreation/tourism, and shipping; increased pressure for environmental protection of coastal resources; the need for port maintenance and upgrades; and the risks of storm damage and sea level rise. Increased investment in land and marine ports, shipping, and logistics capability is expected to result along with component laydown and assembly facilities, job training, and other services and infrastructure necessary for offshore wind construction and operations. Additional manufacturing and servicing businesses would result either in the geographic analysis area or other locations in the United States if supply chains develop as expected. While it is not possible to estimate the extent of job growth and economic output in the geographic analysis area specifically, there would be notable and measurable benefits to employment, economic output, infrastructure improvements, and community services, especially job training, because of offshore wind development.

Many of the jobs generated by offshore wind projects are temporary construction jobs. The combination of these jobs over multiple activities and projects will create notable benefits during the construction phases of these projects. This will particularly be the case as the domestic supply chain for offshore wind evolves over time. Offshore wind projects also support long-term O&M jobs (25–35 years); long-term tax revenues; long-term economic benefits of improved ports and other industrial land areas; diversification of marine industries, especially in areas currently dominated by recreation and tourism; and growth in a skilled marine construction workforce.

Offshore wind activities are expected to affect commercial and for-hire fishing businesses and marine recreational businesses (tour boats, marine suppliers) primarily through cable emplacement, noise and vessel traffic during construction, and the presence of offshore structures during operations. These IPFs would temporarily disturb marine species and displace commercial or for-hire fishing vessels, which could cause conflicts over other fishing grounds, increased operating costs, and lower revenue for marine industries and supporting businesses. The long-term presence of offshore wind structures would also lead to increased navigational constraints and risks and potential gear entanglement and loss.

BOEM anticipates that the cumulative impacts of the No Action Alternative would likely have **minor** adverse and **moderate beneficial** impacts on demographics, employment, and economics.

3.6.3.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on demographic, employment, or economic characteristics.

- Overall size of project (up to approximately 2,400 MW) and number of WTGs (up to 147).
- The extent to which SouthCoast Wind hires local residents and obtains supplies and services from local vendors.
- The port(s) selected to support construction, installation, and decommissioning and the port(s) selected to support O&M.
- The design parameters that could affect commercial fishing and recreation and tourism because impacts on these activities affect employment and economic activity.

The size of the Project would affect the overall investment and economic impacts; fewer WTGs would mean less materials purchased, fewer vessels, and less labor and equipment required. Beneficial economic impacts in the geographic analysis area would depend on the proportion of workers, materials, vessels, equipment, and services that can be locally sourced and the specific ports used by the Project.

SouthCoast Wind has committed to measures to minimize impacts on demographics, employment, and economics, which include, but are not limited to, maintaining a stakeholder engagement plan and encouraging the hiring of skilled and unskilled labor from the Project region (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

3.6.3.5 Impacts of Alternative B - Proposed Action on Demographics, Employment, and Economics

The Proposed Action's beneficial impacts on demographics, employment, and economics depend on what proportion of workers, materials, vessels, equipment, and services can be locally sourced.

SouthCoast Wind's economic impact study estimates that the Proposed Action would support the following employment in Massachusetts alone in direct, indirect, and induced job-years:[1] 14,860 direct FTE job-years, 4,300 indirect FTE job-years, and 7,780 induced job-years, further defined by an estimated 530 FTE job-years[2] during development, 5,760 FTE job-years during construction, 20,330 FTE job-years (an annual average of 678 jobs) during operations, and 310 FTE job-years during decommissioning (COP Volume 2, Section 10.1.2.1, Table 10-8; SouthCoast Wind 2024).

The Proposed Action would generate employment during construction, installation, O&M, and decommissioning of the Project. The Proposed Action would support a range of positions such as engineers, environmental scientists, financial analysts, administrative personnel, various trade workers (such as electricians, technicians, steel workers, welders, and ship workers), as well as other construction jobs during construction and installation of the Proposed Action. O&M would create jobs for maintenance crews, substation and turbine technicians, and other support roles. The decommissioning phase would also generate professional and trade jobs and support roles. Therefore, all phases of the Proposed Action would lead to local employment and economic activity.

Assuming that conditions are similar to those of the Vineyard Wind 1 project, job compensation (including benefits) is estimated to average between $88,000 and $96,000 for the construction phase, with occupations including engineers, construction managers, trade workers, and construction technicians. O&M occupations would consist of turbine technicians, plant managers, water transportation workers, and engineers. A study from the New York Workforce Development Institute provided estimates of salaries for jobs in the wind energy industry that concur with the Vineyard Wind 1 project's projections. The expected salary range for trade workers and technicians ranges from $43,000 to $96,000, $65,000 to $73,000 for ships' crew and officers, and $64,000 to $150,000 for managers and engineers (Gould and Cresswell 2017).

The hiring of local workers would stimulate economic activity through increased demand for housing, food, transportation, entertainment, and other goods and services. A large number of seasonal housing units are available in the vicinity of the Project area. During the summer, competition for temporary accommodations may arise, leading to higher rents (COP Volume 2, Section 10.1.2.4; SouthCoast Wind 2024). However, this effect would be temporary during the active construction period and could be reduced if construction is scheduled outside the busy summer season. Permanent workers are expected to reside locally; there is adequate housing supply to accommodate the increase in the local workforce (Table 3.6.3-3).

SouthCoast Wind has committed to investments in community development and workforce training. SouthCoast Wind is encouraging the hiring of local personnel to fill the positions required for the various

[1] Direct employment refers to jobs created by the direct hiring of workers. Indirect employment refers to jobs created through increased demand for materials, equipment, and services. Induced employment refers to jobs created at businesses where offshore wind industry workers would spend their incomes. Job-years is an economic term that converts dollars spent into job equivalents based upon historical multipliers that consider factors, such as salary, overhead, and hours worked.

[2] A job-year is defined as one job held for 1 year.

preparation and construction activities. In 2022, SouthCoast Wind signed a Memorandum of Understanding (MOU) with North America's Building Trades Unions and the United Brotherhood of Carpenters regarding the onshore and offshore construction work for the delivery of the first 1,200 MW from the Lease Area. In March 2024, SouthCoast Wind renewed this MOU under the new ownership of Ocean Winds North America. The MOU includes commitments to create jobs for local and diverse workers and to comply with the labor requirements of the Inflation Reduction Act, including paying prevailing wages and using apprentices. SouthCoast Wind has further committed to making operations and maintenance jobs locally based in the state(s) that procure energy from the Project. Regarding job agreements with environmental justice communities, SouthCoast Wind has established a Protected Species Observer Training Program, where they are working to provide local Native American communities with cost-free training and all certifications to work as a Protected Species Observer.

Tax revenues for state and local governments would increase as a result of the Project. Equipment, fuel, and some construction materials would likely be purchased from local or regional vendors. These purchases would result in short-term impacts on local businesses by generating additional revenues and contributing to the tax base. Once the Project is operational, property taxes would be assessed on the value of the SouthCoast Wind facilities. The increased tax base during operations would be a long-term, beneficial impact on local governments in the Project area.

The Project would generate up to 2,400 MW of energy that would supply electric power to customers in the northeastern United States, including Massachusetts, Connecticut, and Rhode Island. The price of the power generated by the Project would be determined by offtake agreements, also known as power purchase agreements, negotiated between SouthCoast Wind and electric distribution companies, subject to each state's offshore wind procurement laws and regulations. The electric distribution companies that acquire the power from the Project would distribute and sell the power to their customers. While SouthCoast Wind's offtake agreements may influence the electricity prices paid by ratepayers in the states where the Project's power is purchased, the exact cost cannot be known at this time as electricity rates are affected by myriad factors including current demand for electricity, the mix and price of other generation sources (e.g., other offshore wind projects, natural-gas power plants), and other factors, including natural events like high summertime temperatures. In electricity markets where wind power is generated, the electricity cost for ratepayers may be variable, such as when the market is saturated with electricity due to windy seasons (Mills et al. 2018), or conversely, when there is less wind, the power demand may be higher, causing rates to increase.

Lighting: Both onshore and offshore structures emit light that could be visible from some beaches, coastlines, and elevated inland areas, depending on vegetation, topography, weather, and atmospheric conditions. Offshore, aviation hazard lighting on WTGs could affect employment and economics in these areas if the lighting discourages visits or vacation home rentals or purchases in coastal locations where the Proposed Action's WTG lighting would be visible. SouthCoast Wind proposes to implement an ADLS to automatically turn the aviation obstruction lights on and off in response to the presence of aircraft in proximity to the wind farm. Such a system may reduce the amount of time that the lights are on, thereby potentially minimizing the visibility of the WTGs from shore and related effects on the local economy. In summary, impacts related to structure lighting would have localized, long-term, and negligible impacts on demographics, employment, and economics.

The anticipated increase in vessel traffic would result in growth in the nighttime traffic of vessels with lighting. Lighting from vessels would occur during nighttime Project construction or maintenance. This lighting would be visible from coastal locations, especially near the ports used to support Proposed Action construction. Short-term vessel lighting is not anticipated to discourage tourist-related business activities and would not affect other businesses; therefore, the impact of vessel lighting would be short term and negligible.

Cable emplacement and maintenance: The Proposed Action's cable emplacement would generate vessel anchoring and dredging at the worksite, requiring recreational vessels to avoid and navigate around the worksites and resulting in short-term disturbance to species important to recreation and tourism, with potential adverse effects on employment and income. Interarray cable installation would require a maximum of three vessels (COP Volume 1, Table 3-21; SouthCoast Wind 2024). Offshore export cable installation would require a maximum of five vessels (COP Volume 1, Table 3-21; SouthCoast Wind 2024). While it is not specified how long vessels would be present at a given location, there would be at least one location where cable splicing is necessary, which could require a vessel to remain at the same location for several days (COP Volume 1, Section 3.3.7; SouthCoast Wind 2024).

The seafloor disturbance (associated with export cable and interarray cable installation), disruption of fish stocks, and concrete mattresses covering cables in hard-bottom areas could hinder commercial trawlers/dredgers, potentially reducing income and increasing costs for affected businesses over the long term. Cable installation would have localized, short-term, minor impacts on demographics, employment, and economics, while maintenance of the Proposed Action and other existing submarine cables would have intermittent, long-term, negligible impacts.

Noise: Noise from vessel traffic would affect commercial fishing businesses and recreational businesses due to impacts on species important to commercial/for-hire fishing, recreational fishing, and marine sightseeing activities as well as noise from maintenance and repair operations that make the wind energy facilities less attractive to fishing operators and recreational boaters (COP Volume 2, Section 11.2.1.2; SouthCoast Wind 2024). Noise from O&M activities would have localized, intermittent, long-term, negligible impacts on demographics, employment, and economics.

The estimated maximum of 149 foundations (WTGs and substations) would generate noise from pile driving, one of the most impactful noises on marine species, especially if multiple project construction activities occur in close spatial and temporal proximity. These disturbances would be temporary and localized and extend only a short distance beyond the work area. Pile driving could harm marine species or cause avoidance by commercial fish populations, which would, in turn, affect commercial and for-hire fishing, as well as recreational vessels that depend on these animals (COP Volume 2, Section 11.2.2.1; SouthCoast Wind 2024). Pile driving and associated noise would have localized, short-term, and minor impacts on demographics, employment, and economics.

Infrequent trenching from cable-laying activities would emit noise. This noise could temporarily disrupt commercial fishing, marine recreational businesses, and onshore recreational businesses. Noise from trenching and trenchless technology would affect marine life populations, which would in turn affect commercial and recreational fishing businesses. Impacts on marine life would also affect onshore recreational businesses due to noise near public beaches, parks, residences, and offices. The use of trenchless technology at natural and sensitive landfall locations where possible would minimize direct impacts (COP Volume 1, Section 2.2.2; SouthCoast Wind 2024). Cable laying and trenching would have localized, intermittent, short-term, and negligible impacts on demographics, employment, and economics.

Vessel noise could affect marine species relied upon by commercial fishing businesses, marine recreational businesses, recreational boaters, and marine sightseeing activities. Vessel traffic would occur between ports (outside the geographic analysis area) and offshore wind work areas. Most vessel traffic would travel to the WTG installation area, with fewer vessels needed along the cable installation routes (COP Volume 1, Section 3.3.14; SouthCoast Wind 2024). Noise from vessels would have short-term, intermittent, negligible impacts on demographics, employment, and economics.

Port utilization: Proposed Action activities at ports would support port investment and employment and would also support jobs and businesses in supporting industries and commerce. Several ports are indicated as possibly supporting proposed Project construction: New Bedford, Fall River, and Salem, Massachusetts; Davisville and Providence, Rhode Island; New London, Connecticut; Sparrows Point, Maryland; Charleston, South Carolina; Corpus Christi, Texas; as well as some international ports. These ports would require a trained workforce for the offshore wind industry including additional shore-based and marine workers that would contribute to local and regional economic activity.

The economic benefits would be greatest during construction when the most jobs and most economic activity at ports supporting the Proposed Action would occur. During operations, activities would be concentrated in Massachusetts, where the Project's onshore O&M facility is anticipated to be located, and in other ports that may support Project-related vessel traffic. The O&M facility would help to diversify the local economy by providing a source of skilled, year-round jobs. Overall, operation of the Proposed Action would generate an estimated 20,330 direct, indirect, and induced job-years (an annual average of 678 jobs) in Massachusetts while in operation, in addition to 900 job-years created elsewhere in the region, including Rhode Island (COP Volume 2, Section 10.1.2.1.2; SouthCoast Wind 2024). The Proposed Action would have a minor beneficial impact on demographics, employment, and economics from port utilization due to greater economic activity and increased employment at ports used by the Proposed Action.

Presence of structures: The Proposed Action would add up to 149 offshore wind structures (up to 147 WTGs and up to 5 OSPs) with foundation scour protection and offshore export cable hard protection, which could affect marine-based businesses (i.e., commercial and for-hire recreational fishing businesses, offshore recreational businesses, and related businesses) through entanglement and gear loss/damage, navigational hazard and risk of allisions, fish aggregation, habitat alteration, and space use conflicts. These structures may cause vessel operators to reroute, which would affect their fuel costs, operating time, and revenue. Due to the risk of gear entanglement, fisheries using bottom gear may be permanently disrupted, which would increase economic impacts on the commercial and for-hire recreational fishing industries. Marine-based businesses may be adversely affected due to the possible displacement of mobile species and the potential for WTGs to become an exclusion area for fishing. Shoreside support services, such as bait and ice shops, vessels and infrastructure, insurance and maintenance services, processing, markets, and domestic/international shipping services, are anticipated to experience impacts proportional to those felt by the fishing industry itself (BOEM 2017). As described in Section 3.6.1, *Commercial Fisheries and For Hire Recreational Fishing*, considering the small number of vessels and fishing activity that would be affected, the impacts on other fishing industry sectors, including seafood processors and distributers and shoreside support services, would be adverse, with the level of impact depending on the fishery in question. The presence of structures would have continuous, long-term, and negligible to minor impacts on demographics, employment, and economics.

Offshore wind structures could encourage fish aggregation and generate reef effects that attract recreational fishing vessels. These effects would only affect the minority of recreational fishing vessels that reach the wind energy facilities. This would have long-term, negligible benefits on demographics, employment, and economics. Proposed Action structures could increase economic activity associated with offshore sightseeing because these structures create foraging opportunities for harbor and gray seals, sea turtles, bats, northern gannets, loons, and peregrine falcons. These forms of marine life could attract private or commercial recreational sightseeing vessels (COP Volume 2, Section 10.3.2.2.2; SouthCoast Wind 2024). This would have long-term, negligible beneficial impacts on demographics, employment, and economics.

Views of WTGs could have impacts on businesses serving the recreation and tourism industry on Martha’s Vineyard and Nantucket. The presence of offshore wind structures could affect shore-based activities (e.g., visiting the Nantucket Historic District), surface water activities, wildlife and sightseeing activities, diving/snorkeling, recreational fishing, and recreational boating (Section 3.6.8, *Recreation and Tourism*). The WTGs would be in open ocean approximately 20 nm (37 kilometers) from Nantucket and 26 nm (48 kilometers) from Martha’s Vineyard. At maximum vertical extension, the blade tips of the WTGs (1,066.3 feet or 325.0 meters) would be theoretically visible to a viewer at a 5-foot (1.5-meter) eye level above the ocean surface or beach shoreline elevation at distances up to 42.8 miles (68.9 kilometers) on clear-day conditions. As described in Section 3.6.8, impacts of visible WTGs on recreation and tourist facilities and activities during O&M of the Proposed Action would be long term, continuous, and minor.

Stakeholders have raised questions regarding whether the Proposed Action would affect property values; any impacts on property values could also affect local property tax receipts. Hoen et al. (2013) analyzed housing prices from home sales occurring within 10 miles (16 kilometers) of onshore wind facilities in nine U.S. states and found no statistical evidence that home values were affected in the post-announcement/preconstruction or post-construction periods. The Massachusetts Clean Energy Center also commissioned a report—*Relationship between Wind Turbines and Residential Property Values in Massachusetts* (Atkinson Palombo and Hoen 2014)—to study if home values were affected by their proximity to onshore WTGs. The study analyzed 122,198 home sales occurring between 1998 and 2012 of homes within 5 miles (8 kilometers) of 41 Massachusetts wind turbines. Results of this study indicated that there were no effects on nearby home prices resulting from the development of a wind farm in a community. Brunner et al. (2024) found that onshore wind farms in the United States had temporary adverse impacts on property values within a limited distance (1–2 miles) and that wind farms further away did not adversely affect property values. A 2017 study found that when placed more than 8 miles (7 nm [13 kilometers]) from shore, there is a minimal effect on vacation rental values associated with offshore wind farms (Lutzeyer et al. 2017). A 2018 study also found that there was no impact on property values when the wind farm was located 5.6 miles (9 kilometers) offshore (Jensen et al. 2018). Dong and Lang (2022) found that the Block Island Wind Farm did not adversely affect property values on Block Island or on the Rhode Island mainland. Since the Project would be located a substantial distance from shore—with the closest WTGs 23 miles (37 kilometers) from Nantucket and 30 miles (48 kilometers) from Martha's Vineyard—any impacts on property values are expected to be negligible.

Traffic: The Proposed Action would generate vessel traffic in the Project area and to and from the ports supporting project construction, O&M, and decommissioning. SouthCoast Wind estimates that construction activity would generate on average between 15 and 35 vessels operating at any given time (refer to Section 3.6.6, *Navigation and Vessel Traffic*, for additional information regarding anticipated vessel traffic). The vessel traffic generated by the Proposed Action could result in temporary, periodic congestion within and near ports, leading to potential delays and increased risk of allision, collision, and spills, which would result in economic costs for vessel owners. As a result of potential delays from increased congestion and increased risk of damage from collisions, the Proposed Action would have continuous, short-term, and minor impacts during construction and negligible impacts during operations.

Land disturbance: Construction of the Proposed Action would require onshore cable installation and new substation/converter stations construction. During peak tourist season, construction-related impacts associated with land disturbance, including road construction in Falmouth (associated with the Falmouth POI) and Aquidneck Island (associated with the Brayton Point POI), could cause traffic delays and inconveniences to local businesses and residents.[3] Temporary blockage of some roads during installation activities may restrict access to some local areas, although it is unlikely that access to specific establishments would be completely inhibited. The impact would be greatest if the Cape Cod Aggregates substation site in the Falmouth Onshore Project area was selected as this would require temporary road closure and disruptions along 8.5 miles of road where the onshore cable would be installed. The disruptions in access would occur for a short period at any given location as installation of equipment progresses along the underground onshore export cables. Impacts would be temporary during construction and SouthCoast Wind has committed to implementing a Traffic Management Plan to minimize disruptions to residences and commercial establishments. The employment and economic impact of the Proposed Action caused by disturbance of businesses and potential revenue loss near the

[3] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action*, Brayton Point is the preferred ECC for both Project 1 and Project 2, and Falmouth is the variant ECC for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

onshore cable routes and substation and converter station sites would result in localized, short-term, minor impacts.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities and other planned offshore wind activities. Between 2025 and 2031, WTG lighting from other offshore wind activities would be added to the geographic analysis area, some of which would be visible from the same locations as the Proposed Action's WTGs and could affect demographics, employment, and economics if lighting discourages tourism and recreation-based businesses. The Proposed Action would contribute an undetectable increment to the cumulative lighting impacts from ongoing and planned activities, which would be negligible. Cable emplacement from the Proposed Action and other ongoing and planned activities could hinder commercial fishing operations, potentially reducing income and increasing business costs. Because installation impacts would be short term and most cables would be buried such that they would not interfere with fishing operations, cumulative impacts are anticipated to be negligible. Construction of the Proposed Action would contribute to increased noise impacts during periods of simultaneous construction activity with other offshore wind projects (Appendix D, Table D2-1), potentially affecting commercial fish stock and other marine based businesses. While operational activity would overlap, noise impacts during operations would be far less than during construction. The Proposed Action would contribute an undetectable increment to the cumulative noise impacts on demographics, employment, and economics from ongoing and planned activities, which would be short term and negligible.

Other offshore wind energy activity would provide business activities at the same ports as the Proposed Action, as well as other ports in the geographic analysis area. Port investments are ongoing and planned in response to offshore wind activity. Maintenance and dredging of shipping channels are expected to increase, which would benefit other port users. In context of reasonably foreseeable environmental trends, the cumulative impact of the Proposed Action in combination with other ongoing and planned activities on port utilization would be long term and moderate beneficial.

Across the Massachusetts and Rhode Island lease areas, up to 1,069 offshore structures, 149 of which would be attributable to the Proposed Action, would affect employment and economics by affecting marine-based businesses. Presence of structures would have both beneficial impacts, such as by providing sightseeing opportunities and fish aggregation that benefit recreational businesses, and adverse effects, such as by causing fishing gear loss, navigational hazards, and viewshed impacts that could affect business operations and income. In context of reasonably foreseeable environmental trends, the Proposed Action would contribute a noticeable increment to the cumulative impacts from other ongoing and planned activities, which would be long-term and moderate due to impacts on commercial and for-hire recreational fishing, for-hire recreational boating, and associated businesses.

Increased vessel traffic from the Proposed Action and other ongoing and planned activities would produce demand for supporting marine services, with beneficial impacts on employment and economics during all Project phases, including minor to moderate beneficial impacts during construction and decommissioning and negligible beneficial impacts during operations. In context of reasonably foreseeable environmental trends, increased vessel traffic congestion and collision risk from the Proposed Action and other ongoing and planned activities would have long-term, continuous impacts on marine businesses during all project phases, with minor impacts during construction and decommissioning and negligible impacts during operations.

The exact extent of land disturbance associated with other projects would depend on the locations of landfall, onshore transmission cable routes, and onshore substations for offshore wind energy projects. The cumulative impact on land disturbance would be short term and minor due to the short-term and localized disruption of onshore businesses.

Conclusions

Impacts of the Proposed Action: BOEM anticipates that the Proposed Action would have negligible impacts on demographics in the geographic analysis area. While it is likely that some workers would relocate to the area because of the Proposed Action, this volume of workers would not be substantial compared to the current population and housing supply. The Proposed Action alone would affect employment and economics through job creation, expenditures on local businesses, tax revenues, grant funds, and support for additional regional offshore wind development, which would have minor beneficial impacts. Construction would have a minor beneficial impact on employment and economics due to jobs and revenue creation over the short duration of the construction period. The beneficial impact of employment and expenditures during O&M would have a modest magnitude over the 35-year duration of the Project. Although tax revenues and grant funds would be modest in magnitude, they also would provide a beneficial impact on public expenditures and local workforce and supply chain development for offshore wind. If the Proposed Action becomes decommissioned, the impacts on demographics, employment, and economics would be minor and beneficial due to the construction activity necessary to remove wind facility structures and equipment. After decommissioning, the Proposed Action would no longer affect employment or produce other offshore wind-related revenues.

While the Proposed Action’s investments in wind energy would largely benefit the local and regional economies through job creation, workforce development, and income and tax revenue, adverse impacts on individual businesses and communities would also occur. Short-term increases in noise during construction, cable emplacement, land disturbance, and the long-term presence of offshore lighting and structures would have negligible to minor adverse impacts on demographics, employment, and economics. The commercial fishing industry and other businesses that depend on local seafood production would experience impacts during construction. Overall, the impacts on commercial fishing and onshore seafood businesses would have minor impacts on demographics, employment, and economics for this component of the geographic analysis area’s economy. Although commercial fishing is a small component of the regional economy, it is important to the identity of local communities within the region. The IPFs associated with the Proposed Action alone would also result in impacts on certain recreation and tourism businesses that range from negligible to minor, with an overall minor impact on employment and economic activity for this component of the analysis area’s economy.

In summary, the Proposed Action would have **minor** adverse and **minor beneficial** impacts on demographics, employment, and economics.

Cumulative Impacts of the Proposed Action: BOEM anticipates that cumulative impacts on demographics, employment, and economics would be **minor** adverse and **moderate beneficial**. The moderate beneficial impacts primarily would be associated with the investment in offshore wind, job creation and workforce development, income and tax revenue, and infrastructure improvements, while the minor adverse effects would result from aviation hazard lighting on WTGs, new cable emplacement and maintenance, the presence of structures, vessel traffic and collisions during construction, and land disturbance. Impacts on commercial and for-hire recreational fishing are anticipated to be moderate but only one component of the overall impacts. Because they are not expected to disrupt normal demographic, employment, and economic trends, the overall impacts in the geographical analysis area likely would be minor.

3.6.3.6 Impacts of Alternative C on Demographics, Employment, and Economics

Impacts of Alternative C: Alternative C would result in similar but slightly greater impacts on demographics, employment, and economics compared to the Proposed Action, but the overall impact magnitudes would be the same. To avoid sensitive fish habitat in the Sakonnet River, the export cable route to Brayton Point under Alternative C would be rerouted onshore. The onshore export cable would be installed in trenches within existing road ROWs where feasible, including road shoulders and medians, and could potentially require pathways on private properties. The Alternative C-1 onshore export cable route would be installed primarily along Route 138, on Aquidneck Island, increasing the total length of the onshore cable route by approximately 9 miles (14 kilometers). The Alternative C-2 onshore export cable route would be installed primarily along Routes 77 and 177, in Little Compton and Tiverton, increasing the total length of the onshore cable route by approximately 13 miles (21 kilometers). Similar to the Proposed Action, onshore cable installation activities would result in temporary traffic delays, disruptions to business or residential access, noise, and related construction impacts, which could result in a short-term reduction of economic activity for businesses near installation sites for onshore cables, temporarily inconveniencing workers, residents, and visitors. Construction impacts would have intermittent and short-term impacts on demographics, employment, and economics.

Because the onshore cable routes would be longer than the Proposed Action, the number of businesses and residents affected would be greater and the duration of impacts from construction would be longer, with Alternative C-2 having the greatest impact. The overall onshore construction schedule would be longer than the Proposed Action due to the length of the routes, the larger number of private properties affected, and the cable routes' locations in coastal communities that are popular tourist destinations in the summer months, which may lead to seasonal limitations on construction. Both alternative cable routes would traverse along roadways through mostly rural residential neighborhoods and agricultural land, with some denser residential neighborhoods and local commercial businesses located along the cable routes in Portsmouth at the northern end of Aquidneck Island (Alternative C-1) and in Tiverton (Alternative C-2). The disruptions in access would occur for a short period at any given location as installation of equipment progresses along the onshore export cables. The same avoidance measures that SouthCoast Wind has proposed for the Proposed Action would apply for Alternative C, including implementing a Traffic Management Plan to minimize disruptions to local communities and developing a construction schedule to minimize effects to tourism related activities to the extent practicable (COP Volume 2, Table 16-1; SouthCoast Wind 2024). Because these impacts would be temporary, lasting only during installation activities, and with implementation of the avoidance measures proposed by SouthCoast Wind, impacts under Alternative C are anticipated to be localized, short term, and minor.

Cumulative Impacts of Alternative C: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C would be similar to those described under the Proposed Action.

Conclusions

Impacts of Alternative C: While the onshore cable route to Brayton Point would differ under Alternative C, the overall impact magnitudes are anticipated to be the same as those of the Proposed Action, which is anticipated to be **minor** adverse and **minor** beneficial on demographics, employment, and economics.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternative C would be the same as under the Proposed Action and would be **minor** adverse and **moderate beneficial**.

3.6.3.7 Impacts of Alternative D (Preferred Alternative) on Demographics, Employment, and Economics

Impacts of Alternative D: Alternative D would result in a slight reduction in both adverse and beneficial impacts on demographics, employment, and economics compared to the Proposed Action, but the overall impact magnitudes would be the same. Under Alternative D, six fewer WTGs would be constructed than the Proposed Action to reduce impacts on foraging habitat adjacent to Nantucket Shoals. Construction of fewer WTGs would result in a shorter duration of noise impacts and less vessel traffic, which could reduce impacts on commercial and for-hire recreational fishing. Conversely, the reduced number of WTGs would also mean that the Project would generate less energy and would, therefore, result in slightly lower beneficial impacts associated with delivering a reliable supply of energy. Because Alternative D would produce less energy, it would also offset fewer GHG emissions from fossil-fueled power generation compared to the Proposed Action, further reducing beneficial impacts. A reduced number of WTGs would also generate less economic activity, which would reduce port utilization and result in lower expenditures in general. However, the change in these impacts would not change the overall impact rating compared to the Proposed Action.

Cumulative Impacts of Alternative D: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative D would be similar to those described under the Proposed Action.

Conclusions

Impacts of Alternative D: Alternative D would result in slightly lower adverse impacts and slightly lower beneficial impacts compared to the Proposed Action, but would not change the overall impact level, which is anticipated to be **minor** adverse and **minor** beneficial on demographics, employment, and economics.

Cumulative Impacts of Alternative D: In context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternative D would be the same as under the Proposed Action—**minor** adverse impacts and **moderate beneficial** impacts.

3.6.3.8 Impacts of Alternatives E and F on Demographics, Employment, and Economics

Impacts of Alternatives E and F: Alternative E, which would involve installing a range of foundation types, and Alternative F, which would involve reducing the number of Falmouth offshore export cables from five to three, would not have measurable impacts on demographics, employment, and economics that are materially different from the impacts of the Proposed Action. While Alternative E-2 and Alternative E-3 would avoid foundations requiring pile driving, in contrast to Alternative E-1, which would only install piled foundations, any differences in noise impacts on commercial fisheries would be temporary and localized during foundation installation; therefore, the overall impact magnitude of Alternative E on demographics, employment, and economics would be the same and would not differ from the Proposed Action. Reducing the number of Falmouth offshore cables to minimize seabed impacts under Alternative F would result in no measurable differences in impacts compared to the Proposed Action.

Cumulative Impacts of Alternatives E and F: In the context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives E and F would be similar to those described under the Proposed Action.

Conclusions

Impacts of Alternatives E and F: The impacts of Alternatives E and F on demographics, employment, and economics would be about the same as those of the Proposed Action. Impacts would be **minor** adverse impacts and **minor beneficial**.

Cumulative Impacts of Alternatives E and F: In context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternative E and Alternative F would be the same as under the Proposed Action—**minor** adverse impacts and **moderate beneficial** impacts.

3.6.3.9 Comparison of Alternatives

The **minor** and **minor beneficial** impacts on demographics, employment, and economics under the Proposed Action would be the same for Alternatives C, D, E, and F. Alternatives D, E, and F only differ because of changes to offshore components, and the offshore components of the proposed Project would not contribute to significant impacts on demographics, employment, and economics. Alternative C would require rerouting the Brayton Point export cable onshore with two possible routes, Alternatives C-1 and C-2 and would increase the cable length in comparison to the Proposed Action by 9 and 13 miles, respectively; impacts are expected to be greater than the Proposed Action but the overall impact magnitude would remain the same.

In context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternatives C, D, E, and F when each is combined with the impacts of ongoing and planned activities would be the same as the Proposed Action—**minor** and **moderate beneficial**.

3.6.3.10 Proposed Mitigation Measures

No measures to mitigate impacts on demographics, employment, and economics have been proposed for analysis.

3.6 Socioeconomic Conditions and Cultural Resources

3.6.5 Land Use and Coastal Infrastructure

This section discusses potential impacts on land use and coastal infrastructure from the proposed Project, alternatives, and ongoing and planned activities in the geographic analysis area. The geographic analysis area, as shown on Figure 3.6.5-1, includes Barnstable and Bristol Counties in Massachusetts, Newport County in Rhode Island, Falmouth and Somerset in Massachusetts, and Portsmouth in Rhode Island, as well as municipal boundaries surrounding the ports that may be used for the Project. SouthCoast Wind proposes the use of ports in New Bedford, Fall River, and Salem, Massachusetts; Davisville and Providence, Rhode Island; New London, Connecticut; Sparrows Point, Maryland; Charleston, South Carolina; Corpus Christi, Texas; as well as some international ports.

3.6.5.1 Description of the Affected Environment

Within the geographic analysis area, land use is diverse, including water, marine, open land, conservation land, forest, parks, recreational, residential, business, industrial, urban, and agricultural land uses. The dominant land uses along the onshore cable corridors are commercial, residential, and public use. The Proposed Action includes one preferred ECC to Brayton Point and one variant ECC to Falmouth.[1] The Brayton Point onshore export cable corridors are in Somerset, Massachusetts, and on Aquidneck Island in Portsmouth, Rhode Island. Land uses in the vicinity of the Brayton Point route are urban development, non-urban developed, reserve, Narragansett Indian Lands, farmland, parks and open space, water bodies commercial, industrial, mixed use, residential, right-of-way, and tax exempt. The primary uses along the corridor are a combination of industrial, parks and open space, and urban (COP Volume 2, Figures 12-21 and 12-22; SouthCoast Wind 2024).

The Falmouth onshore export cable routes are in Falmouth, Massachusetts. Based on ArcGIS and MassGIS land use cover data, land uses in the vicinity of the Falmouth cable route are classified as agriculture, commercial, forest, industrial, mixed use, recreation, residential, right-of-way, and tax exempt (COP Volume 2, Figure 12-20; SouthCoast Wind 2024). Some recreational areas are located in proximity to the onshore export cable routes, including Falmouth Heights Beach, Surf Drive Beach, Worcester Avenue Park, Central Park, and Crescent Park; and the area includes a variety of residential development types (single family, multi-family, other) (COP Volume 2, Section 12.1.4.1 and Figure 12-20; SouthCoast Wind 2024). In Falmouth, Massachusetts, the dominant land uses are residential and open space (COP Volume 2, Figure 12-20; SouthCoast Wind 2024).

[1] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action,* Brayton Point is the preferred ECC for both Project 1 and Project 2, and Falmouth is the variant ECC for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

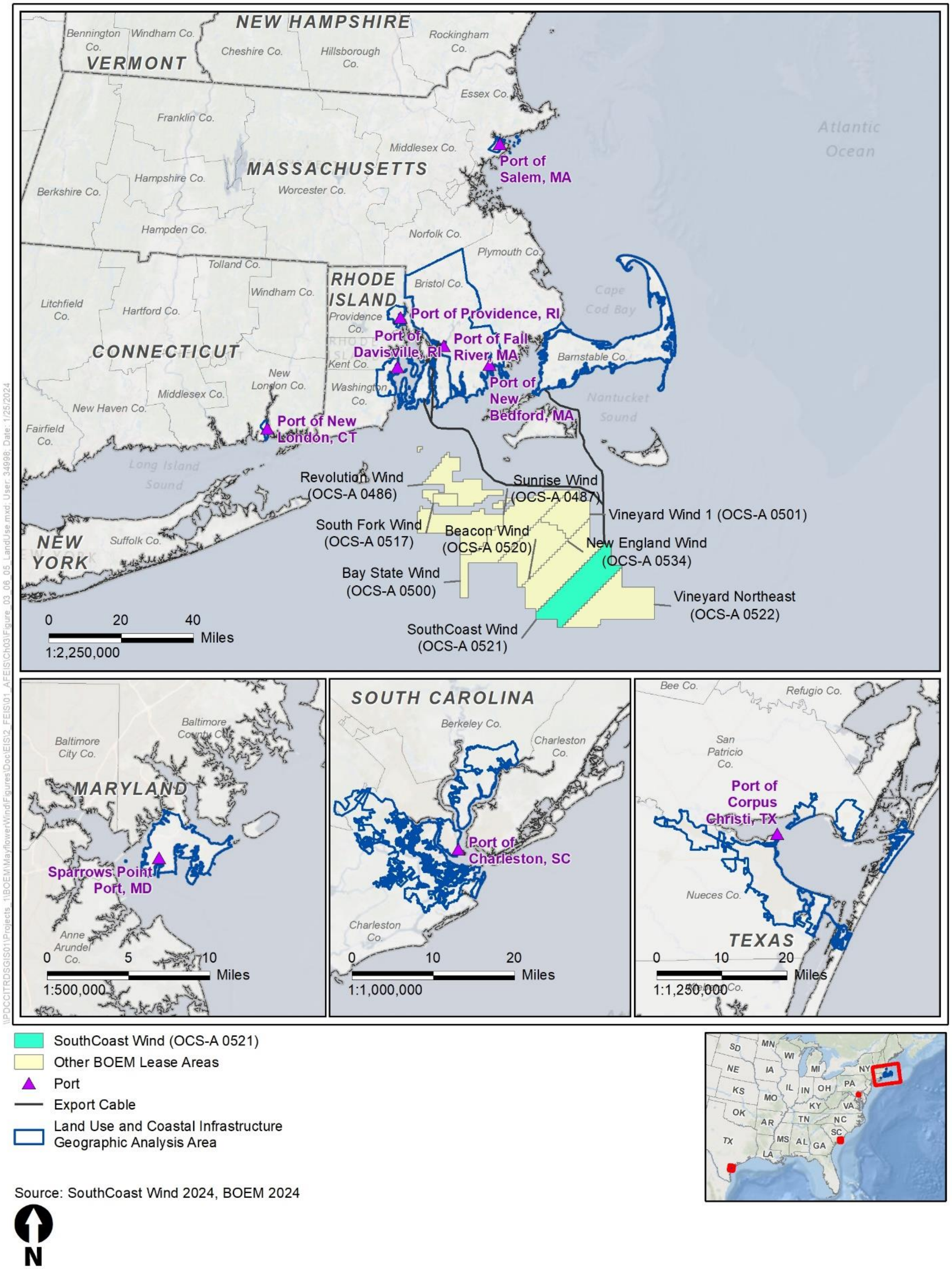

Figure 3.6.5-1. Land Use and Coastal Infrastructure geographic analysis area

Important landscape features near both Falmouth and Brayton Point include a combination of natural views such as beaches, shorelines, inlets, and scenic vistas, and human-made views such as historic districts, parks, and other cultural features. Portions of the Onshore Project area are part of the Cape Cod/Long Island EcoRegion, which features a unique variety of landscapes and habitat regions such as inlets, ocean bays and sounds, and historic districts (COP Appendix T, Section 6.2; SouthCoast Wind 2024).

The Project would use various ports for marshalling during construction, O&M, and decommissioning. The ports under consideration to support construction include New Bedford, Fall River, and Salem, Massachusetts; Davisville and Providence, Rhode Island; New London, Connecticut; Sparrows Point, Maryland; Charleston, South Carolina; Corpus Christi, Texas; as well as some international ports, including ports in Canada and Mexico. O&M vessel trips would originate primarily from the ports of New Bedford and Fall River, Massachusetts, and New London, Connecticut, with the potential for occasional repair and supply delivery trips originating from ports in Davisville and Providence, Rhode Island; Salem, Massachusetts; Sparrows Point, Maryland; and Charleston, South Carolina. The Ports of New Bedford and Fall River, Massachusetts would be the most likely ports for O&M activity. SouthCoast Wind expects the ports used for construction and O&M would also be used for decommissioning. The Port of New London is surrounded by land zoned as Open Space (OS), Maritime District (MD), Two Family Residential (R-2), and General Business (C-1) (City of New London 2020). The Port of New Bedford is surrounded by land zoned as Industrial A and Mixed-Use Business (City of New Bedford 2015). The Port of Salem is surrounded by land zoned as industrial (City of Salem 2012). The Port of Providence is surrounded by land zoned as waterfront and industrial (City of Providence 2021 The Davisville Port is located on land that is zoned as the Quonset Business Park District (North Kingstown 2024).The Port of Fall River is within land zoned as Waterfront and Transit-Oriented Development District (City of Fall River 2022). The Port of Corpus Christi is zoned as a General Commercial Zoning District (City of Corpus Christi GIS Services 2018). The Port of Sparrows Point is predominantly zoned for Commercial and Industrial uses (Baltimore County 2022). The Port of Charleston is surrounded by land zoned as Light Industrial (City of Charleston 2012).

3.6.5.2 Impact Level Definitions for Land Use and Coastal Infrastructure

Definitions of impact levels are provided in Table 3.6.5-1.

Table 3.6.5-1. Impact level definitions for land use and coastal infrastructure

Impact 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.

Impact Level	Impact Type	Definition
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.

3.6.5.3 Impacts of the No Action Alternative on Land Use and Coastal Infrastructure

When analyzing the impacts of the No Action Alternative on land use and coastal infrastructure, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for land use and coastal infrastructure. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D, *Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for land use and coastal infrastructure in the geographic analysis area as described in Section 3.6.5.1, *Description of the Affected Environment and Future Baseline Conditions*, would continue to be affected by ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities that affect land use and coastal infrastructure include ongoing port maintenance and upgrades and onshore development. Ongoing offshore wind activities that may contribute to impacts on land use and coastal infrastructure include construction of the Vineyard Wind 1 (OCS-A 0501), South Fork projects (OCS-A 0517), and the Revolution Wind project (65 WTGs and two OSPs) in OCS-A 0486. 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. Much of the geographic analysis area is highly developed, and most construction projects would likely affect land that has already been disturbed from past development, although some development on undeveloped land may also occur. Ports in the geographic analysis area would continue to serve marine traffic and industries and experience periodic dredging and improvement projects to meet ongoing needs.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Other planned non-offshore wind activities that would affect land use and coastal infrastructure in the geographic analysis area include dredging and port improvement projects, military use, onshore development, port expansion and offshore cable emplacement and maintenance (Appendix D, *Planned Activities Scenario*). Planned activities would contribute to impacts on land use and coastal infrastructure through the primary IPFs of accidental releases, light, port utilization, presence of structures, land disturbance, noise, traffic, and EMFs.

The following sections summarize the potential impacts of ongoing and planned offshore wind activities in the geographic analysis area during construction, O&M, and decommissioning of the projects. Ongoing and planned offshore wind projects in the geographic analysis area that would contribute to impacts on land use include those projects within all or portions of OCS-A-0486 (Revolution Wind), OCS-A-0487 (Sunrise Wind), OCS-A-0500 (Bay State Wind), OCS-A 0501 (Vineyard Wind 1), OCS-A 0517 (South Fork Wind), OCS-A-0520 (Beacon Wind), OCS-A 0522 (Vineyard Wind Northeast), and OCS-A 0534 (New England Wind) (Appendix D, Table D2-1). BOEM expects other offshore wind development activities to affect land use and coastal infrastructure through the following primary IPFs.

Accidental releases: Accidental releases of fuel/fluids/hazardous materials may increase because of offshore wind activities. Accidental release risks would be highest during construction, but still pose a risk during operation and decommissioning of offshore wind facilities. BOEM assumes all projects and activities would comply with laws and regulations to minimize releases. The overall impact of accidental releases on land use and coastal infrastructure is anticipated to be localized, short term, and negligible and could result in temporary restrictions on use of adjacent properties and coastal infrastructure during the cleanup process.

Light: As described in Section 3.6.9, *Scenic and Visual Resources,* aviation hazard lighting on offshore wind projects (encompassing 901 WTGs) could potentially be visible from beaches and coastal areas in and near the geographic analysis area. Visibility would depend on distance from shore, topography, atmospheric conditions, and whether ADLS technology is implemented, but would be long term. Nighttime lighting for construction and decommissioning of landfalls, onshore export cables, and interconnection cables could disrupt existing uses on adjacent properties. These impacts would be localized and short term. Nighttime lighting from operation of onshore substations, O&M facilities, and port facilities could disrupt existing or planned uses on adjacent properties in the long term, depending on the specific location of these facilities, the land use and zoning of adjacent properties, and the extent of visual screening incorporated into the design of planned offshore wind facilities. Given the existing level of development in the geographic analysis area and that facilities would be sited consistent with local zoning regulations, BOEM anticipates the impact of facility lighting on land use and coastal infrastructure would be minor.

Port utilization: Offshore wind energy projects would make productive use of port facilities for shipping, berthing, and staging throughout construction, operations, and decommissioning. Offshore wind would likely increase port utilization, and ports would experience beneficial impacts such as greater economic activity and increased employment due to demand for vessel maintenance services and related supplies, vessel berthing, loading and unloading, warehousing and fabrication facilities for offshore wind components, and other business activity related to offshore wind.

Offshore wind activity would support planned dredging and improvement projects at ports in the geographic analysis area. For example, the New Bedford Port Authority recently completed a $17 million expansion project to add 150,000 square feet of terminal space and has been award $24 million to reconstruct and extend Leonard's Wharf to support commercial fishing and the offshore wind industry (Port of New Bedford 2022; *Standard Times* 2022, 2023). The Connecticut Port Authority is redeveloping the Port of New London State Pier as a heavy-lift capable port facility that would support wind turbine construction staging and pre-assembly (Connecticut Port Authority 2021a, 2021b; *CT Examiner* 2022). The Sparrows Point Container Terminal project will construct a new container terminal and intermodal yard located on 330 acres within the Tradepoint Atlantic industrial development site on Sparrows Point. If multiple offshore wind energy projects rely on the same ports, this simultaneous use could stress port resources and could increase the marine and road traffic, noise, and air pollution in the area. Overall, other offshore wind projects would have constant, long-term, minor beneficial impacts on port utilization due to the productive use of ports designated for offshore wind activity, as well as localized, short-term, minor adverse impacts in cases where individual ports are stressed due to simultaneous project activity.

Presence of structures: As described in Section 3.6.9, *Scenic and Visual Resources*, 901 WTGs associated with offshore wind projects other than the Proposed Action could be visible from some shorelines (depending on vegetation, topography, and atmospheric conditions). Visibility would vary with distance from shore, topography, and atmospheric conditions, and impacts would generally be localized, constant, and long term. The presence of WTGs would have negligible impacts on land use because, while WTGs could be visible from some shoreline locations in the geographic analysis area, the WTGs would be at such a distance that effects would be limited. Moreover, land use patterns are well-established in areas from which WTGs would be visible; it is not reasonably foreseeable that these well-established patterns would change as a result of far offshore WTG installation and operation.

The presence of onshore transmission cable infrastructure is anticipated to have minimal long-term impacts on land use. BOEM anticipates that new substations for offshore wind projects would be within or near existing substations, or in locations designated for such uses. Consistent with the Proposed Action, BOEM also assumes that cable conduits would primarily be underground and co-located with roads or other utilities (COP Volume 1, Section 3.3.7; SouthCoast Wind 2024). As a result, operation of substations and cable conduits would not affect the established and planned land uses for a local area and would have negligible impacts on land use.

Land disturbance: Offshore wind installation would require installation of onshore transmission cable infrastructure and substations, which would cause temporary traffic delays and could temporarily affect access to adjacent properties. These impacts would only last through construction and occasionally during maintenance events. The exact extent of impacts would depend on the locations of landfall and onshore transmission cable routes for offshore wind energy projects; however, other offshore wind projects would generally have localized, negligible, and short-term impacts during construction or maintenance and no long-term impacts on land use.

Noise: Offshore wind projects would generate noise, primarily associated with onshore cable trenching and substation construction and operation. Noise from offshore wind construction activities is not expected to reach the geographic analysis area. This IPF may affect land use if noise levels influence business activity or residents' and visitors' decisions on where to visit or live. Noise from onshore construction and substation operations is anticipated to be similar to noise from other ongoing construction projects and substation operation in the geographic analysis area and therefore would have a minor, short- to long-term impact on land use.

Traffic: Offshore wind projects could result in increased road traffic and congestion that may affect land use and coastal infrastructure because traffic volumes may dictate where residents and businesses choose to locate. Onshore construction of cables for offshore wind projects will likely disrupt road traffic for a short period. Occasional, temporary traffic delays would result from repairs and maintenance. The exact extent of impacts would depend on the locations of landfall and onshore transmission cable routes for offshore wind energy projects and traffic management plans developed with local governments. Traffic impacts on land use and coastal infrastructure are anticipated to be minor.

EMFs: Onshore export cables in the geographic analysis area would generate EMFs during operation of wind farms. Residents and visitors may be exposed to EMFs where cables are installed near businesses, residences, or in public areas. Common household items including television sets, hair dryers, and electric drills can emit magnetic fields similar to or higher in intensity than those emitted by power cables (CSA Ocean Sciences, Inc. and Exponent 2019). Assuming other offshore wind export cables produce similar EMF levels as the Proposed Action, at a burial depth of 3 feet (1 meter), maximum emissions directly above the onshore export cables would be 403 milliGauss, based on a cable operating voltage of 275-kV (COP Appendix P1; SouthCoast Wind 2024). This value is well below the reported human health reference levels of 2,000 milliGauss for the general population (International Commission on Non-ionizing Radiation Protection 2010). Even if other offshore wind export cables were of higher voltage or buried closer to the surface, EMF levels are still anticipated to be well below the human health reference levels; therefore, EMF impacts on land use would be long term but negligible.

Conclusions

Impacts of the No Action Alternative: Under the No Action Alternative, land use and coastal infrastructure would continue to be affected by existing environmental trends and ongoing activities. BOEM expects ongoing activities to have continuing temporary and permanent impacts on land use and coastal infrastructure, primarily through the IPFs of accidental releases, light, port utilization, presence of structures, land disturbance, noise, traffic, and EMFs. BOEM anticipates that the impacts of ongoing activities would have both **minor beneficial** and **minor** adverse impacts in the geographic analysis area.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue to be affected by the primary IPFs of accidental releases, light, port utilization, presence of structures, land disturbance, noise, traffic, and EMFs. Planned non-offshore wind activities, primarily increased port maintenance and expansion and construction activity, would have impacts similar to those of ongoing activities. Planned offshore wind activities would contribute to effects on land use through land disturbance (during installation of onshore cable and substations) and accidental releases during onshore construction, as well as through the presence of offshore lighting on wind energy structures and views of the structures themselves that could affect the use and value of onshore properties. Beneficial impacts on land use and coastal infrastructure would result because the development of offshore wind would support the productive use of ports and related infrastructure designed or appropriate for offshore wind activity (including construction and installation, O&M, and decommissioning). BOEM anticipates that the cumulative impact of the No Action Alternative would be **minor** adverse and **minor beneficial**.

3.6.5.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following proposed PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on land use and coastal infrastructure.

- Export cable route locations and onshore substation site variants within the Onshore Project area.
- The time of year during which construction occurs. Tourism and recreational activities in the geographic analysis area tend to be higher from May through September, and especially from June through August (Parsons and Firestone 2018). If Project construction were to occur during this season, impacts on roads and land uses during the busy tourist season would be exacerbated.

SouthCoast Wind has committed to measures to minimize impacts on land use and coastal infrastructure by developing crossing and proximity agreements with utility owners prior to utility crossings and developing a construction schedule to minimize effects to tourism related activities, including scheduling construction outside of major events and avoiding construction during the summer tourist season (COP Volume 2, Section 14.2.2.1.2 and Table 16-1; SouthCoast Wind 2024).

3.6.5.5 Impacts of Alternative B – Proposed Action on Land Use and Coastal Infrastructure

The Proposed Action would likely result in localized impacts that would not alter the overall character of land use and coastal infrastructure in the geographic analysis area. The most impactful IPFs would likely be land disturbance during cable installation, the visual impact of offshore WTGs, and the utilization of ports.[2] Other IPFs would likely contribute impacts of lesser intensity and extent and would occur primarily during construction but may also occur during operations and decommissioning.

Accidental releases: Accidental releases from the Proposed Action could include release of fuel/fluids/hazardous materials as a result of port usage, installation of the onshore cables and substation/converter stations, and substation/converter stations operation (COP Volume 2, Section 12.2.5; SouthCoast Wind 2024). Potential contamination may occur from unforeseen spills or accidents, and any such occurrence would be reported and addressed in accordance with the local authority. The

[2] The Proposed Action would not directly require any upgrades to port infrastructure but would make productive use of existing ports.

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. Accordingly, accidental releases from the Proposed Action alone would have localized, short-term, negligible to minor impacts on land use.

Light: The Proposed Action would include the installation and continuous use of aviation hazard avoidance lighting on WTGs and OSPs during low-light and nighttime conditions. During operations, lighting from all the Proposed Action's 147 WTGs could potentially be visible from certain coastal or elevated locations in the geographic analysis area. SouthCoast Wind proposes to implement an ADLS to automatically turn the aviation obstruction lights on and off in response to the presence of aircraft in proximity of the wind farm. Such a system may reduce the amount of time that the lights are on, thereby potentially minimizing the visibility of the WTGs from shore and related effects on land use (COP Volume 1, Section 3.3.12; SouthCoast Wind 2024). During construction, lighting technology would be used to minimize impacts on avian and bat species, which would also help reduce impacts on land use (COP Volume 2, Table 16-1; SouthCoast Wind 2024). At onshore facilities, security lighting installed along onshore substation and converter station perimeter fencing and at building entrances would be down shielded to mitigate light pollution and would be designed to comply with night-sky lighting standards (COP Volume 2, Section 8.2.2.2; SouthCoast Wind 2024). SouthCoast Wind has also committed to working with Falmouth and Somerset, Massachusetts to ensure the lighting scheme for the onshore substation and converter stations complies with town requirements. As a result, onshore substation and converter station lighting would have a long-term, continuous, negligible impact on land use in the geographic analysis area, due to potential effects on property use and value.

Port utilization: The Proposed Action includes no port expansion activities but would use ports that have expanded or would expand to support the wind energy industry generally. For instance, the New Bedford Marine Commerce Terminal, which would be one of the primary ports used by SouthCoast Wind during O&M, has been expanded specifically to support the construction of offshore wind facilities (COP Volume 2, Section 12.1.5; SouthCoast Wind 2024). In addition, SouthCoast Wind has made financial commitments for port upgrades that are intended to enhance the capabilities of the existing port facility in Fall River, Massachusetts.

Land uses and coastal infrastructure affected by construction of offshore components would include temporary construction ports including New Bedford, Fall River, and Salem, Massachusetts; Davisville and Providence, Rhode Island; and New London, Connecticut; a small number of vessel trips may also originate from the ports of Sparrows Point, Maryland; Charleston, South Carolina; and Corpus Christi, Texas. SouthCoast O&M vessel trips would originate primarily from the ports of New Bedford and Fall River, Massachusetts and New London, Connecticut, with the potential for occasional repair and supply delivery trips originating from ports in Davisville and Providence, Rhode Island; Salem, Massachusetts; Sparrows Point, Maryland; and Charleston, South Carolina. These ports are expected to be used during construction and O&M but have independent utility and would not be dedicated to the Project. Proposed uses at existing port facilities would be consistent with the current land uses occurring at these locations and are not expected to result in changes to land use or zoning. The increased activity at these ports would provide a source of investment in the coastal infrastructure.

Activities associated with Proposed Action construction would generate noise, vibration, and vehicular traffic at port locations. These impacts are typical for industrial ports and would not hinder other nearby land uses or use of coastal infrastructure. Overall, the construction and installation of offshore components, O&M, and decommissioning for the Proposed Action alone would have negligible adverse and minor beneficial impacts on land use and coastal infrastructure by supporting designated uses and infrastructure improvements at ports.

Presence of structures: The WTGs could be visible from certain coastal and elevated mainland areas (depending on vegetation, topography, and atmospheric conditions), which could have long-term impacts on land use if the views influence visitor decisions on locations or properties to visit or purchase. The WTGs would be installed over 20 nm (32.2 kilometers) from the closest point to the Massachusetts shore. As detailed in Section 3.6.9, *Scenic and Visual Resources*, the WTGs would not dominate offshore views as a result of their proposed distance from shore, even under ideal weather and atmospheric conditions for viewing. The Proposed Action alone would have a long-term, continuous, minor impact on land use and coastal infrastructure in the geographic analysis area due to views of WTGs and the potential effects on property use and value.

In general, impacts on land use and zoning from onshore construction and operations would be minimized as the Project would use existing roads, ROWs, and industrial areas to the extent practicable. The three proposed Falmouth landfalls are in locations zoned as Public Use by the Town of Falmouth, including Worcester Park, Central Park, and the Surf Drive Beach public parking area. The Public Use zoning designation does not allow the installation of electrical transmission infrastructure; any landfall option would likely require obtaining an easement from the Town of Falmouth and a zoning exemption from the state of Massachusetts (COP Volume 2, Section 12.2.1.1; SouthCoast Wind 2024). Because the overall size of the area affected would be small (less than 1 acre for the transition joint bays) and the permanent electrical infrastructure would be buried, the long-term use of the public sites (i.e., parks and parking area) would not be adversely affected. From the landfall locations, the Falmouth onshore cable route would travel north below the surface of existing roadways/public rights-of-way to the onshore substation, and would be in proximity to primarily residential, commercial, and Public Use-zoned land. Impacts on land use and zoning would be minimized because the onshore cables would use existing roads and ROWs to the extent practicable.

If Falmouth is selected as the POI for Project 2, SouthCoast Wind would construct the Falmouth substation at one of two privately owned sites: Lawrence Lynch or Cape Cod Aggregates. The site of the preferred Lawrence Lynch substation is 27.3 acres (11.01 hectares) zoned as Light Industrial A and is a former quarry that is currently used as an asphalt plant. The site of the Cape Cod Aggregates substation is 33.6 acres (13.6 hectares) located on parcels zoned as Agricultural AA in a Water Resource Overlay District that is presently used as a sand and gravel quarry. Similar to the landfall locations, zoning relief would likely be required from the Town of Falmouth zoning bylaws for the two substation sites. As both substation sites are located on current and former quarries and are on or nearby industrially zoned areas, it is not anticipated that the substations would conflict with existing or future land uses.

On November 17, 2021, SouthCoast Wind filed a zoning petition (D.P.U 21-142) with the Massachusetts Department of Public Utilities seeking comprehensive exemption from the operation of the zoning bylaws of the Town of Falmouth, including "exemptions from the use provisions of the Falmouth Zoning Bylaw, as well as certain provisions regarding dimensional requirements, signage, height, site plan review, parking, nuisances, noise, and interference, and other local permitting provisions." The Massachusetts Department of Public Utilities may grant a zoning exemption only if it determines the proposed use of the land is "reasonably necessary for the public interest or convenience" (Massachusetts General Laws Chapter 40A§3). Due to the need for broad-scale zoning relief, impacts on land use would be moderate. However, because the proposed uses must be in the public interest for zoning relief to be granted, the onshore facilities would use existing ROWs to the extent practicable, and because the Project would not require a change to an underlying zoning designation, impacts would be minimized and there would be no long-term changes to surrounding land uses.

For Brayton Point, the intermediate landfall locations and cable routes on Aquidneck Island would be located within road or utility ROWs or privately owned land, and no impacts on local zoning laws are anticipated (COP Volume 2, Section 12.2.1.1; SouthCoast Wind 2024). Because all Project components in Somerset (converter stations, landfalls, cable routes, transmission line) are sited within Industrial District zoning, and development of converter stations and associated equipment is consistent with this use, no long-term effects on land use or zoning are anticipated.

Onshore construction is expected to result in temporary or permanent impacts on local residents, businesses, and the community along the proposed onshore export cable routes during the construction and decommissioning period. Landfall construction methods would minimize land use impacts, and areas would be restored to their previous condition after construction (COP Volume 2, Section 12.2.2.1; SouthCoast Wind 2024). Temporarily increased noise levels, lighting, and traffic during construction may affect local sensitive receptors (e.g., schools, medical facilities), but would be minimized through best management practices and would not change existing land uses. SouthCoast Wind has committed to implementing a construction schedule that would minimize effects to tourism related activities, such as scheduling construction activities to avoid the height of the summer tourist season and coordinating with stakeholders/visitors' bureaus to schedule outside of major events, to the extent feasible (COP Volume 2, Section 12.2.2.1; SouthCoast Wind 2024).

Land disturbance: The Proposed Action's onshore export cable infrastructure would be installed underground in a duct bank, generally along, under, or adjacent to existing roads or utility ROW. HDD would be used to minimize impacts on land disturbance at the Falmouth and Brayton Point landfalls and at the intermediate landfall entering and exiting Aquidneck Island. Installation of the cable landfall sites and underground cable routes would temporarily disturb neighboring land uses through construction noise, vibration, dust, and travel delays along the affected roads. These impacts are anticipated to last for the duration of construction; following construction, the cable route corridors would be returned to their previous condition and use. Cables would be installed in trenches with a maximum disturbance width of 35 feet (11 meters). The Falmouth onshore export cables and transmission line could require up to 23.3 acres (9.4 hectares) of disturbance, and the Brayton Point onshore export cables and transmission line could require up to 6.1 acres (2.5 hectares) of disturbance. O&M would not result in land disturbance except in the event that cable maintenance or replacement is required. During decommissioning, the onshore cables may be left in place for possible future reuse or removed, with impacts similar to those from construction. Land use impacts would be minimized by using existing ROWs, co-locating project components and restoring areas to pre-disturbed conditions following construction, resulting in minor land use impacts.

The construction of the onshore substation and the onshore converter stations would result in temporary and permanent impacts due to construction and the use of temporary construction workspace. Construction of these facilities would require a permanent site, including area for equipment and buildings, equipment yards, energy storage, stormwater management, and landscaping. The maximum temporary and permanent disturbance footprint for the Falmouth substation would be 26 acres (10.5 hectares), and the maximum temporary and permanent disturbance footprint for each of the up to two Brayton Point converter stations would be 10 acres (4 hectares). The facilities are not anticipated to conflict with surrounding land uses, as described under the *Presence of structures* IPF.

Noise: The Proposed Action would comply with local regulatory authority requirements to minimize impacts on nearby communities (COP Volume 2, Section 12.2.3.1; SouthCoast Wind 2024). Typical construction equipment ranges from a generator or refrigerator unit at 73 dBA at 50 feet (15 meters) to an impact pile driver at 101 dBA at 50 feet (15 meters). As the WTGs and OSPs associated with the Proposed Action would be built 20 nm (48 kilometers) offshore, noise effects from offshore construction and decommissioning would be temporary and negligible. Onshore, temporarily increased noise levels during construction may affect local sensitive receptors (such as religious locations, recreational areas, schools, and other places that are particularly sensitive to construction) but would be minimized through best management practices. Because there are no relevant regulatory limits for construction noise, the Proposed Action would follow a guideline limit of 65 dBA during the daytime. The greatest impacts would be from HDD activity at the landfall sites in Falmouth, which would require applicant-proposed mitigation measures, such as temporary construction noise barriers and equipment silencers, to achieve the 65 dBA guideline at the closest sensitive receptors (COP Volume 2, Sections 9.1.3.2.2 and 9.1.5; SouthCoast Wind 2024). With implementation of these applicant-proposed mitigation measures (refer to Table G-1 in Appendix G, *Mitigation and Monitoring*), impacts from construction noise would be short-term and minor and are not anticipated to change existing land uses.

During operations of the Proposed Action, the converter stations and substation sites would generate increased noise levels in the immediate vicinity of these sites. Based on noise modeling conducted at the two Falmouth substation sites, mitigation may be required at both sites in order to meet the MassDEP limit of 10 dBA above the measured minimum background sound levels at the closest noise-sensitive locations (COP Volume 2, Section 9.1.4.1; SouthCoast Wind 2024). The greatest potential for impacts would be at the Lawrence Lynch substation site, which is located near low-density residential housing. Applicant-proposed mitigation measures include installing noise barriers to reduce sound levels to comply with Massachusetts regulatory requirements. For Brayton Point, noise generated by converter station operation would need to be below 83 dBA to achieve compliance with local and state noise ordinances. The results of the acoustic modeling assessment indicate that the audible noise produced by an HVDC converter station is expected to be 60 dBA and would meet Town of Somerset and MassDEP standards (POWER Engineers 2023). It is anticipated a second converter station at Brayton Point would produce similar results. Because the proposed onshore substation sites and converter stations would be located on gravel quarries and a former power plant and would meet state and local noise ordinances with or without applicant-proposed measures to reduce noise levels (Appendix G, Table G-1), there would be no changes in land use. Impacts would be long-term but minor.

Traffic: Cable installation within roadways would result in temporary traffic impacts due to construction-period lane closures and potential detours. The onshore cable route for Falmouth is expected to cover up to 6.4 miles (10.2 kilometers), 0.7 mile (1 kilometer) for Brayton Point, and 3 miles (4.8 kilometers) on Aquidneck Island. Best management practices and maintenance of traffic plans would be coordinated with stakeholders, Falmouth and Somerset, Massachusetts, and Portsmouth, Rhode Island, and would adhere to a construction schedule that avoids the height of summer tourism seasons (COP Volume 2, Section 12.2.2.1). Construction staging in parking lots adjacent to or near the landfall locations at Falmouth and Aquidneck Island may temporarily reduce available parking; however, impacts would be limited because construction would be outside of the peak tourism seasons. Traffic impacts would be limited to the immediate construction area and would be minor and short-term. Roadways would be returned to preconstruction conditions, and changes to existing land use would not be expected.

EMFs: Once installed, onshore export cables would generate EMFs during operations of the Project. The cables would be installed largely in public road ROWs where visitors may be exposed to EMFs generated by the cables. Buried power cables produce weak field strengths well below the recommended threshold values for human exposure (CSA Ocean Sciences, Inc. and Exponent 2019). Based on EMF modeling of 275-kV HVAC export cables buried at a depth of 3 feet (0.9 meter), maximum emissions directly above the onshore export cables would be 403 milliGauss (COP Appendix P1; SouthCoast Wind 2024). From 10 to 25 feet (3–8 meters) from the cable centerline, emissions values drop to between 32 and 157 milliGauss. These values are well below the reported human health reference levels of 2,000 milliGauss for the general population (International Commission on Non-ionizing Radiation Protection 2010). The Project may also use HVDC cables, and while SouthCoast Wind did not conduct modeling for HVDC cables, typical EMF levels in the immediate vicinity of HVDC cables (less than 1,000 milliGauss) are not known to cause health risks (COP Appendix P2; SouthCoast Wind 2024). EMFs from onshore cable routes is not anticipated to adversely affect human health nor require a change in land use to reduce exposure to human populations. Therefore, impacts on land use would be long term but negligible.

3.6.5.6 Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities and other ongoing and planned offshore wind activities. Ongoing and planned non-offshore wind activities that affect land use and coastal infrastructure in the geographic analysis area include ongoing dredging and port maintenance, military use, and offshore cable emplacement and maintenance.

The incremental impacts contributed by the Proposed Action to the accidental release impacts on land use and coastal infrastructure from ongoing and planned activities including offshore wind would increase the risk of (and thus the potential impacts from) accidental releases of fuel/fluids/hazardous materials in the geographic analysis area. The visual impacts associated with lighting and presence of structures of 1,048 WTGs from the Proposed Action and other offshore wind projects, portions of which would be visible from coastlines and elevated inland locations, could have long-term impacts on land use if the views and nighttime lighting influence visitor decisions on locations or properties to visit or purchase. Due to the distances of the WTGs from shore, impacts would be similar to the Proposed Action alone. Cumulative impacts would be long term and negligible from lighting and long term and minor from lighting and presence of structures.

Cumulative impacts related to port utilization would be minor if increased activity levels stress port resources. Minor beneficial impacts would also result due to increased port utilization and resulting economic activity.

Impacts on land use and coastal infrastructure would be additive only if land disturbance associated with one or more other projects occurs in close spatial and temporal proximity. Assuming that new substations for offshore wind projects would be in locations designated for industrial or utility uses, and underground cable conduits would primarily be co-located with roads or other utilities, operation of substations and cable conduits would not affect the established and planned land uses for a local area. Therefore, cumulative impacts would be minor and short term due to the potential for construction-related disturbance and access limitations along the export cable routes.

Ongoing and planned offshore wind activities would generate comparable types of impacts to those of the Proposed Action from noise, traffic, and EMF impacts. Other projects would be required to comply with the same or similar noise regulations as the Proposed Action, which would minimize potential noise impacts. Cumulative impacts on traffic would only occur if construction associated with other projects generates traffic in close spatial and temporal proximity as the Proposed Action. Other offshore wind projects are anticipated to result in similar, insignificant EMF levels as the Proposed Action. BOEM expects the cumulative impacts of noise, traffic, and EMFs on land use and coastal infrastructure to be localized and minor.

Conclusions

Impacts of the Proposed Action: BOEM anticipates that impacts on land use and coastal infrastructure from the Proposed Action alone would range from negligible to moderate with minor beneficial impacts. The Proposed Action would have negligible impacts resulting from port utilization, minor impacts resulting from land disturbance during onshore installation of the cable route and substation, negligible to minor impacts resulting from accidental spills, and localized minor impacts from noise and traffic. There would be moderate impacts associated with the Falmouth landfall sites and substations, which would require zoning relief from the Town of Falmouth zoning bylaws. Overall, BOEM anticipates there would be **moderate adverse** impacts with **minor beneficial** impacts on land use and coastal infrastructure.

Cumulative Impacts of the Proposed Action: BOEM anticipates that the cumulative impacts associated with the Proposed Action when combined with the impacts from ongoing and planned activities including offshore wind would result in **moderate adverse** impacts and **minor beneficial** impacts on land use and coastal infrastructure in the geographic analysis area.

3.6.5.7 Impacts of Alternative C on Land Use and Coastal Infrastructure

Impacts of Alternative C: The impacts of Alternative C on land use and coastal infrastructure would be similar to those of the Proposed Action except for land disturbance, traffic, and noise associated with the onshore export cable corridor route. Under both Alternatives C-1 and C-2, the export cable route to Brayton Point would be rerouted onshore to avoid sensitive fish habitat in the Sakonnet River. The onshore export cables would be installed in trenches within the existing roadways where feasible, but may require pathways on road shoulders, medians, and private property.

Land disturbance: Alternatives C-1 and C-2 would increase the total length of the Brayton Point onshore cable route by approximately 9 miles and 13 miles (14 and 21 kilometers), respectively. Similar to the Proposed Action, temporary impacts on land disturbance would occur largely within the existing roadways or along the immediate edge of the road ROW. The roadbed would be restored immediately following construction. There is some potential for the onshore export cables to require pathways on private property, transmission ROWs, and railroad ROWs, which may require SouthCoast Wind to obtain easements. Impacts would be most pronounced along the southern portions of both alternatives where the roads are 20 feet (6.1 meters) wide with no shoulder and lined with historic stonewalls, hedges, old growth trees and historic structures, which may be disturbed during construction. The Alternative C-1 landfall location would be sited in the parking lot of Second Beach in an Open Space zoning district in Middletown (Town of Middletown 2022). The Alternative C-2 landfall locations would be in the parking lot of the Sakonnet Point Marina in Little Compton and on a private parcel zoned as Waterfront off Schooner Drive in Tiverton (Town of Little Compton 2022; Town of Tiverton 2022). While local zoning laws generally allow for electrical infrastructure in these areas, further coordination would be required with affected municipalities to facilitate authorization of the land use. Impacts on surrounding land uses are anticipated to be moderate because Alternative C would affect a larger area than the Proposed Action, but impacts would be short-term and underground installation of utility infrastructure in public ROWs would not result in long-term land use changes.

Traffic: Due to the increase in the total length of the onshore export cable corridor route under Alternative C, construction associated with the cable installation within or adjacent to the roadway would result in an increase in temporary traffic impacts such as lane closures, shifted traffic patterns, or closed roadways and parking areas compared to the Proposed Action. Because the onshore cable routes would be longer than under the Proposed Action, the amount of roadway and the duration of impacts from construction would be longer, with Alternative C-2 having the greater impact. From the landfall, the Alternative C-1 onshore route would head north from Middletown, Rhode Island along one of two variations and then follow Route 138 through mostly rural residential and agricultural land into the town of Portsmouth, before following the same route as the Proposed Action into Mount Hope Bay. The Alternative C-1 onshore route includes emergency facilities, which may result in potential temporary access limitations to these facilities during construction. Alternative C-2 would follow mostly Routes 77 and 177 through Little Compton and Tiverton along rural residential communities and agricultural land.

The southern portions of the roadways that would be used for both alternatives are narrow two-lane roads with no shoulder, and construction would cause the greatest traffic delays in these areas. Road closures during construction of the onshore export cable route would temporarily restrict access to certain portions of the surrounding areas. Roadways would be returned to pre-construction conditions and permanent changes to traffic and traffic patterns would not occur.

Noise: Alternative C would involve more onshore construction activities and related noise impacts as a result of the increased length of the onshore export cable route. Impacts from noise under Alternative C would be minimized through the use of existing ROWs and complying with best management practices to minimize noise impacts during construction (COP Volume 2, Table 16-1; SouthCoast Wind 2024). While the increased export cable route would likely result in extended construction with potentially increased impacts on surrounding land uses from noise, the overall impacts of construction under Alternative C would be of the same magnitude as those of the Proposed Action.

Cumulative Impacts of Alternative C: In the context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C would be similar to those described under the Proposed Action.

Conclusions

Impacts of Alternative C: Alternative C would increase the length of onshore cable route, resulting in increased impacts on temporary and permanent land disturbance compared to the Proposed Action, with Alternative C-2 resulting in the most impacts. The overall impact magnitudes would be the same as the Proposed Action because the cable corridors are anticipated to be largely installed in existing roadways, and the primary impacts would be limited to the duration of construction. Overall, impacts on land use and coastal infrastructure would be **moderate adverse** and **minor beneficial** impacts.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, cumulative impacts of Alternative C on land use and coastal infrastructure would be similar to those of the Proposed Action: **moderate adverse** and **minor beneficial** on land use and coastal infrastructure.

3.6.5.8 Impacts of Alternatives D (Preferred Alternative), E, and F on Land Use and Coastal Infrastructure

Impacts of Alternatives D, E, and F: The impacts of Alternatives D, E, and F on land use and coastal infrastructure would be similar to those of the Proposed Action because these alternatives differ only with respect to offshore components, which would have minimal effects on land use. The impacts on land use resulting from land disturbance and maintenance associated with onshore construction under Alternatives D, E, and F are expected to be the same as those of the Proposed Action.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives D, E, and F would be the same as described under the Proposed Action.

Conclusions

Impacts of Alternatives D, E, and F: The impacts associated with the Proposed Action alone would not change under Alternatives D, E, and F because the alternatives only differ in offshore components, and offshore components would not substantially contribute to impacts on land use and coastal infrastructure; the same construction and installation, O&M, and conceptual decommissioning activities would still occur. Overall, impacts on land use and coastal infrastructure would be **moderate adverse** with **minor beneficial** impacts.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives D, E, and F would be the same as the Proposed Action: **moderate adverse** and **minor beneficial**.

3.6.5.1 Comparison of Alternatives

The moderate adverse impacts with minor beneficial impacts on land use under the Proposed Action would be the same for Alternatives D, E, and F because these alternatives would differ only with respect to offshore components, and offshore components would not substantially contribute to impacts on land use and coastal infrastructure.

Alternatives C-1 and C-2 would increase the length of the Brayton Point onshore cable route, resulting in increased impacts from land disturbance, traffic, and noise compared to the Proposed Action and other action alternatives. Because of the longer length of the cable route, Alternative C-2 is anticipated to result in the greatest impacts on land use of any of the alternatives. However, because impacts from onshore construction would be short-term and would not result in long-term changes to traffic patterns or land use, the overall impact magnitude would remain moderate and minor beneficial.

3.6.5.2 Proposed Mitigation Measures

No measures to mitigate impacts on land use and coastal infrastructure have been proposed for analysis.

3.6 Socioeconomic Conditions and Cultural Resources

3.6.6 Navigation and Vessel Traffic

This section discusses navigation and vessel traffic characteristics and potential impacts on waterways and water approaches from the proposed Project, alternatives, and ongoing and planned activities in the navigation and vessel traffic geographic analysis area. The navigation and vessel traffic geographic analysis area, as shown on Figure 3.6.6-1 includes coastal and marine waters within a 10-mile (16.1-kilometer) buffer of the Offshore Project area and adjacent lease areas off Massachusetts and Rhode Island, as well as waterways leading to ports that may be used by the Project. Information presented in this section draws primarily upon the NSRA[1] (COP Appendix X; SouthCoast Wind 2024), which was conducted per the guidance in USCG *Navigation and Vessel Inspection Circular 01-19* (USCG 2019).

3.6.6.1 Description of the Affected Environment

Regional Setting

Proposed Project facilities would be approximately 26 nm (48 kilometers) south of Martha's Vineyard and 20 nm (37 kilometers) south of Nantucket, Massachusetts under a Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0521). Figure 3.6.6-2 shows vessel traffic in the vicinity of the Lease Area based on Automatic Identification System (AIS) data and nearby routing measures (traffic separation zones, precautionary areas). There are several routing measures[2] that assist with routing vessel traffic to help avoid navigation hazards in the vicinity of the Lease Area. Two Traffic Separation Systems[3] influence deep-draft vessel routes in the geographic analysis area: the Nantucket/Ambrose Shipping Safety Fairway (referred to hereafter as Nantucket Ambrose Fairway) and the Narragansett Bay Traffic Separation System in Rhode Island Sound (Figure 3.6.6-2).

[1] The "Study Area" used in the NSRA (COP Volume 2, Figure 13-1; SouthCoast Wind 2024) is inclusive of the Project area and offshore waters extending at least 20 nm (37 kilometers) on all sides of the Project area and offshore ECCs. The navigation and vessel traffic geographic analysis area is generally consistent with the NSRA Study Area but also includes more distant ports that may be used by the Project. Where this EIS references risk analysis from the NSRA, it is specific to the geographic scope of the NSRA Study Area.

[2] The term *routing* measure originates from the International Maritime Organization. USCG submits and obtains approval for routing measures within U.S. navigable waters to the International Maritime Organization. Areas to Be Avoided, Inshore Traffic Zones, No Anchoring Areas, Precautionary Areas, Roundabouts, and Traffic Separation Schemes are all routing measures (USCG 2020: Appendix B).

[3] A Traffic Separation System, is an internationally recognized measure that minimizes the risk of collision by separating vessels into opposing streams of traffic through establishment of traffic lanes. Vessel use of Traffic Separation System is voluntary.

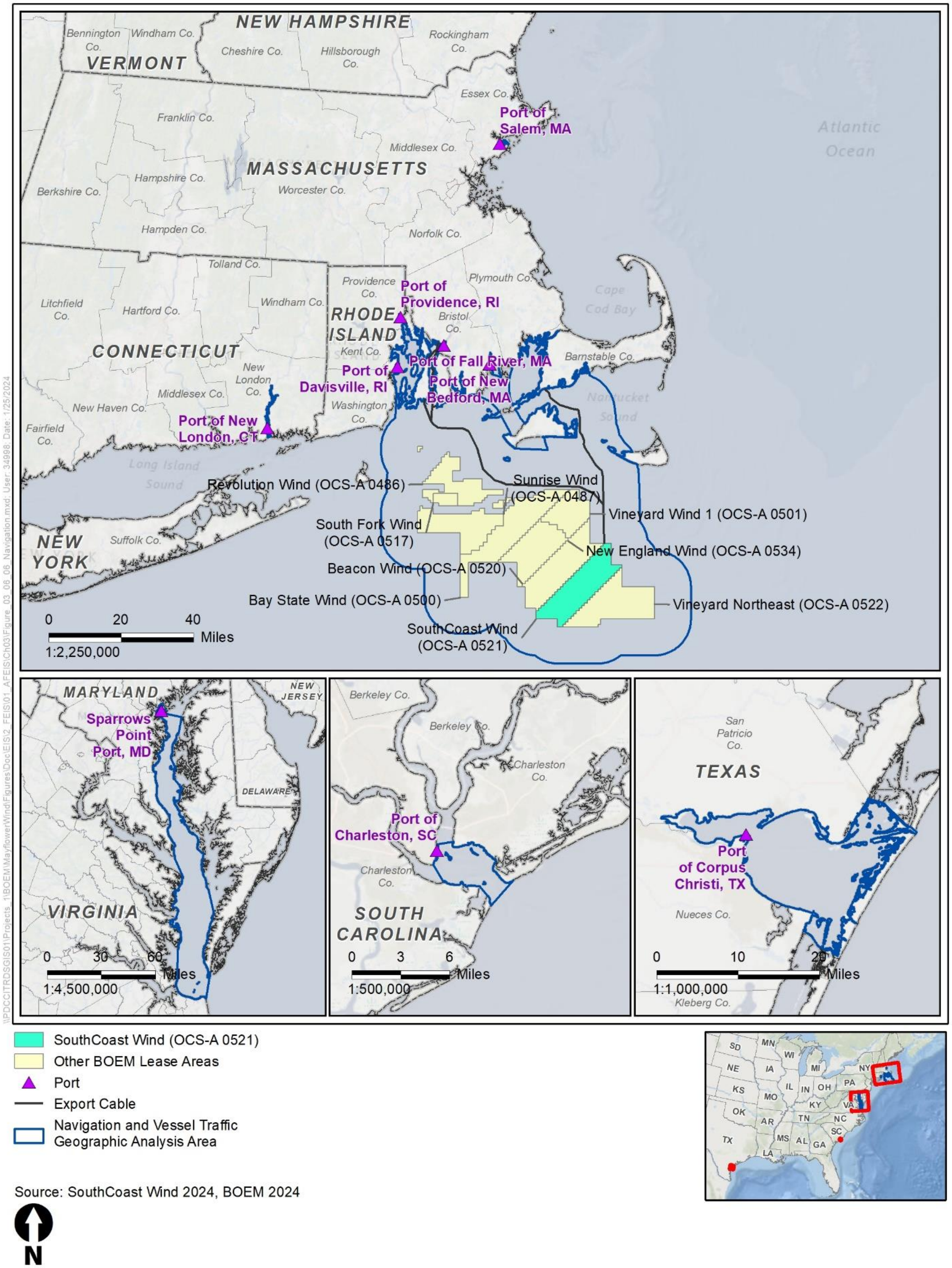

Figure 3.6.6-1. Navigation and vessel traffic geographic analysis area

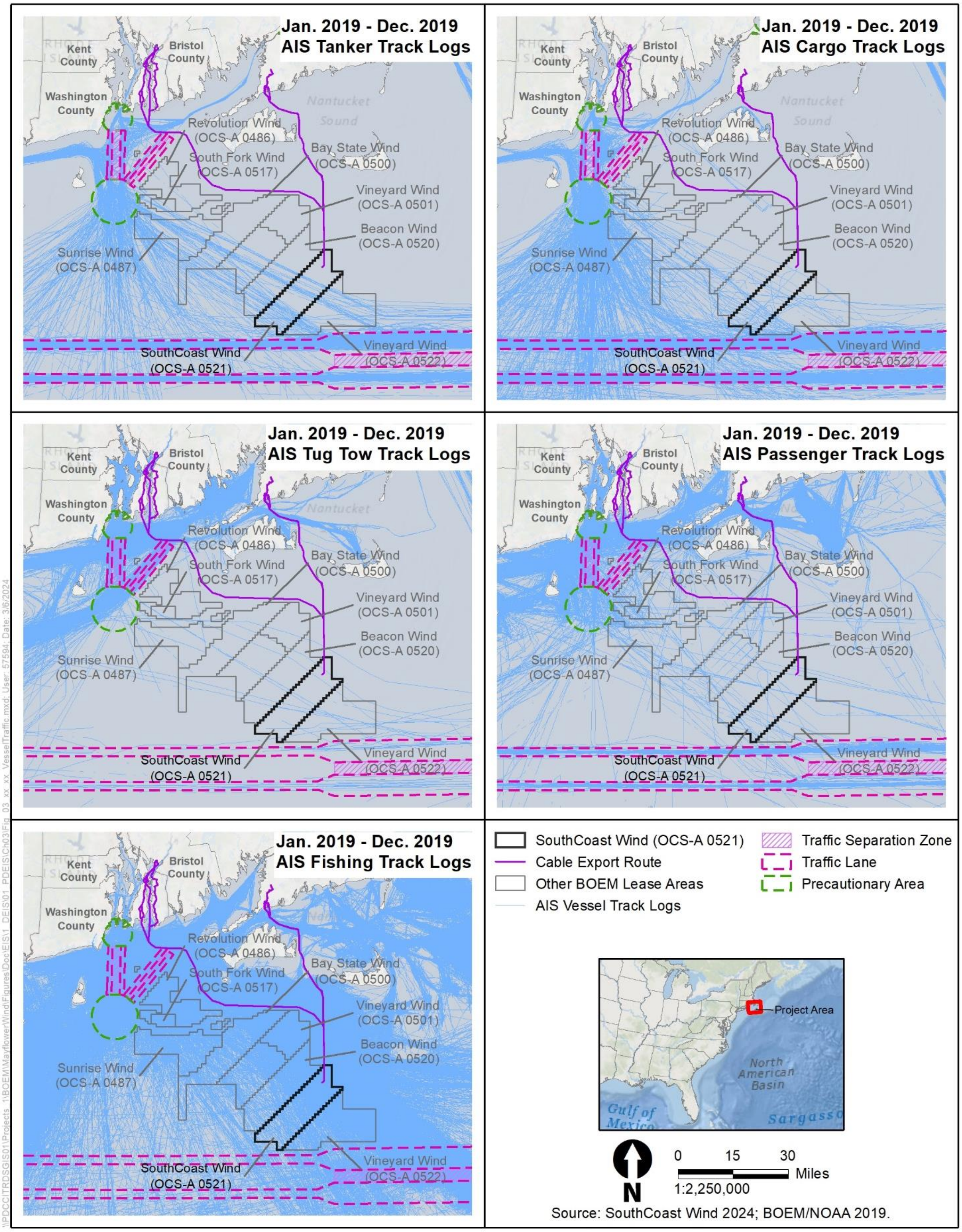

Figure 3.6.6-2. Vessel traffic in the vicinity of the Lease Area

Most commercial vessels, such as cargo vessels, carriers, and tankers, make use of the two Traffic Separation Systems on approach to and departure from ports. The majority of deep-draft vessel transits occur in the traffic lanes along the southern edge of the geographic analysis area within the Nantucket Ambrose Fairway (Figure 3.6.6-2) (COP Appendix X, Section 2.1.1.1; SouthCoast Wind 2024). To the northeast and east of the Project area, the International Maritime Organization has designated Nantucket Shoals, a shallow area that presents hazards for deep-draft vessels, as an Area to be Avoided.

The USCG prepares port access route studies to review potential traffic density and the need for safe access routes for vessels. MARIPARS is the primary study relevant to the geographic analysis area, which provides recommendations regarding offshore wind energy development in the Rhode Island and Massachusetts Wind Energy Areas (USCG 2020). The recommendations include development of WTGs along a standard and uniform grid pattern with standard spacing to accommodate vessel transits and fishing operations. In December 2021, USCG released the Northern New York Bight port access route study, which recommends combining the two separate Nantucket-Ambrose lanes south of the Lease Area into a single fairway (USCG 2021a).

Vessel Traffic

There is wide variance in traffic density, vessel types, and vessel sizes in the geographic analysis area. The sources employed to identify vessel traffic patterns in the NSRA include Nationwide AIS data for 2019, VMS data from NMFS through 2016, vessel trip report data from 2011 to 2015, the MARIPARS (USCG 2020), and interactions with recreational boating, fishing, and towing industry organizations, agencies, and other stakeholders. Based on the information in the NSRA, vessel traffic in the northern portion of the geographic analysis area (within Nantucket Sound, the Sakonnet River, and Mount Hope Bay) comprises smaller vessels with a high seasonal influence. The vessel traffic in the southern portion of the analysis area, which encompasses the Lease Area, is more varied, with a mixture of deep-draft vessels and commercial fishing vessels engaged in fishing or transiting to fishing grounds outside the Project area.

Table 3.6.6-1 shows the number of vessel tracks that intersected the Lease Area and offshore export cable routes based on AIS data from NOAA Office for Coastal Management from January 1, 2019 to December 31, 2019. As per USCG (33 CFR 164.46), AIS is required on several types of vessels including commercial vessels with a length of 65 feet (19.8 meters) or longer. While some smaller recreational and fishing vessels carry AIS, the data in the table most likely underrepresents vessels less than 65 feet (19.8 meters) long that traverse the Project area. Nonetheless, over 75 percent of AIS tracks in the Project area were from fishing and pleasure vessels.

Table 3.6.6-1. Vessel tracks in the Offshore Project area (January 1–December 31, 2019)

Vessel Type	Vessel Tracks	Percent of Total
Cargo	163	1%
Fishing [a]	11,303	38%
Passenger	2,803	9%
Pleasure Craft/Sailing [b]	11,251	38%
Tanker	180	1%
Tug/Tow	1,708	6%
Other/Not Available [b]	2,326	8%
Total	**29,734**	**100%**

Source: Office for Coastal Management 2022.
[a] AIS track counts for fishing and pleasure vessels underrepresent these vessel types, as not all of these vessel types are required to have AIS on board per USCG regulations.
[b] Other/Not Available vessel types include research, military, law enforcement, and unspecified vessels.

Most cargo, carrier, and tanker vessel traffic in the geographic analysis area use the Nantucket Ambrose Fairway and Narragansett Bay Traffic Separation System. The densest vessel tracks are within the Nantucket Ambrose Fairway, located between the approaches to New York and waters south of Nantucket. Some deep-draft vessels cross the Lease Area when transiting between the Nantucket Ambrose Fairway and the Narragansett Bay Traffic Separation System. Minimal cargo and tanker activity occurs in the Sakonnet River and Rhode Island Sound, with slightly higher activity in Mount Hope Bay (COP Volume 2, Section 13.1.1; SouthCoast Wind 2024).

In the geographic analysis area, the area with the most commercial fishing vessel traffic is in the northwest-southeast corridor from Martha's Vineyard and along Nantucket Shoals intersecting the Falmouth ECC. Near the Brayton Point ECC, the most commercial fishing activity occurs in Rhode Island Sound with limited activity in Mount Hope Bay and the Sakonnet River, with the exception of high levels of monkfish fishing and limited gillnet fishing (COP Volume 2, Section 13.1.1; SouthCoast Wind 2024).[4]

Most passenger vessels present in the geographic analysis area occur between Cape Cod, Martha's Vineyard, and Nantucket. There are also cruise ships that transit the Nantucket Ambrose Fairway and some pleasure vessel transits in Nantucket Sound and Rhode Island Sound, the Sakonnet River, and Mount Hope Bay (COP Volume 2, Section 13.1.1; SouthCoast Wind 2024).

Vessel Incidents

The NSRA modeled baseline vessel incidents based on vessel traffic patterns without the Proposed Action. Expected and modeled accident frequencies in the Lease Area for allision are zero, as there are

[4] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action,* Brayton Point is the preferred POI for both Project 1 and Project 2, and Falmouth is the variant POI for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

currently no wind turbines in the Lease Area that present a risk for allision. The accident frequency for collisions is 0.005 accident per year, or 5 accidents in 1,000 years. The greatest collision risk is from groundings, with an accident frequency of 0.058 accident per year. Most of the overall accident frequency (90 percent) is from fishing vessels, which transit close to the shoreline (COP Appendix X, Section E.3.1; SouthCoast Wind 2024).

Aids to Navigation

The closest federal aid to navigation to the Lease Area is the Muskeget Channel "MC" buoy, which is approximately 21 nm (39 kilometers) from the Lease Area and marks the southern entrance to the channel (COP Appendix X; SouthCoast Wind 2024). Additional federal and private aids to navigation are located in proximity to the Falmouth offshore ECC in Nantucket Sound and the Brayton Point offshore ECC in the Sakonnet River and Mount Hope Bay. Aids to navigation are developed by the USCG to assist mariners in determining their position and identifying safe courses and to warn of dangers and obstructions.

Ports, Harbors, and Navigation Channels

The major ports in the vicinity of the Project area include the ports of Providence and Davisville in Rhode Island, and the ports of Fall River and New Bedford in Massachusetts. These ports serve the commercial fishing industry, passenger cruise lines, cargo and other maritime activities. Of these, the largest deep-draft port by volume is Providence Port. The primary vessel traffic and commercial shipping lanes to these ports are outside the Lease Area. Other ports in the geographic analysis area include the Port of Salem, Massachusetts; Port of New London, Connecticut; Sparrows Point, Maryland; Charleston, South Carolina; and Corpus Christi, Texas.

3.6.6.2 Impact Level Definitions for Navigation and Vessel Traffic

Definitions of impact levels are provided in Table 3.6.6-2. There would be no beneficial impacts on navigation and vessel traffic.

Table 3.6.6-2. Impact level definitions for navigation and vessel traffic

Impact Level	Impact Type	Definition
Negligible	Adverse	No measurable impacts would occur.
Minor	Adverse	Impacts would be small, localized, and temporary. Normal or routine functions associated with vessel navigation would not be disrupted.
Moderate	Adverse	Impacts would be unavoidable. Vessel traffic would have to adjust somewhat to account for disruptions due to impacts of the Project.
Major	Adverse	Vessel traffic would experience unavoidable disruptions to a degree beyond what is normally acceptable, including potential loss of vessels and life.

3.6.6.3 Impacts of Alternative A – No Action on Navigation and Vessel Traffic

When analyzing the impacts of the No Action Alternative on navigation and vessel traffic, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for navigation and vessel traffic. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D*, Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for navigation and vessel traffic described in Section 3.6.6.1, *Description of the Affected Environment and Future Baseline Conditions,* 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 that affect navigation and vessel traffic in the geographic analysis area include marine transportation, military use, NMFS activities and scientific research, and fisheries use and management. Impacts from these activities would increase vessel traffic in the area, adding to congestion in waterways and increasing the potential for maritime accidents.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on navigation and vessel traffic include ongoing construction of the Vineyard Wind 1 project (62 WTGs and 1 OSP) in OCS-A 0501, the South Fork project (12 WTGs and 1 OSP) in OCS-A 0517, and the Revolution Wind project (65 WTGs and two OSPs) in OCS-A 0486. Ongoing construction of the Vineyard Wind 1, South Fork, and Revolution Wind projects would have the same type of impacts on navigation and vessel traffic that are described in *Cumulative Impacts of the No Action Alternative* for ongoing and planned offshore wind activities, but the impacts would be of lower intensity.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Other planned non-offshore wind activities that may affect navigation and vessel traffic in the geographic analysis area include port improvement projects, dredging projects, and installation of new structures on the OCS. These activities may result in a moderate increase in port maintenance activities, port upgrades to accommodate larger deep-draft vessels, and temporary increases in vessel traffic for offshore cable emplacement and maintenance. See Appendix D, *Planned Activities Scenario*, for a summary of potential impacts associated with ongoing and planned non-offshore wind activities by IPF for navigation and vessel traffic.

The sections below summarize the potential impacts of ongoing and planned offshore wind activities in the geographic analysis area on navigation and vessel traffic during construction, O&M, and decommissioning of the projects. Ongoing and planned offshore wind projects in the geographic analysis area that would contribute to impacts on navigation and vessel traffic include those projects in all or portions of OCS-A-0486 (Revolution Wind), OCS-A-0487 (Sunrise Wind), OCS-A-0500 (Bay State Wind), OCS-A 0501 (Vineyard Wind 1), OCS-A 0517 (South Fork Wind), OCS-A-0520 (Beacon Wind), OCS-A 0522 (Vineyard Wind Northeast), and OCS-A 0534 (New England Wind) (Table D2-1, Appendix D). BOEM expects other offshore wind development in the geographic analysis area to affect navigation and vessel traffic through the following IPFs.

Anchoring: Offshore wind developers are expected to coordinate with the maritime community and USCG to avoid laying export cables through any traditional or designated lightering/anchorage areas, meaning that any risk for deep-draft vessels would come from anchoring in an emergency scenario. In addition, cables would be identified on nautical charts, which vessel operators would be expected to consult prior to dropping anchor. Generally, larger vessels accidently dropping anchor on top of an export cable (buried or mattress protected) to prevent drifting in the event of vessel power failure would result in damage to the export cable, damage to the vessel anchor and/or anchor chain, and risks associated with an anchor contacting an electrified cable.

Smaller commercial or recreational vessels anchoring in the offshore wind lease areas may have issues with anchors failing to hold near foundations and any scour protection. Considering the small size of the geographic analysis area compared to the remaining area of open ocean near the Project area, as well as the low likelihood that any anchoring risk would occur in an emergency scenario, it is unlikely that offshore wind activities would affect vessel-anchoring activities, and impacts would likely be negligible.

Port utilization: Other offshore wind development would support planned expansions and modifications at ports in the geographic analysis area for navigation and vessel traffic. Simultaneous construction or decommissioning (and, to a lesser degree, operation) activities for multiple offshore wind projects in the geographic analysis area could stress port capacity and resources and could concentrate vessel traffic in port areas. Such concentrated activities could lead to increased risk of allision, collision, and vessel delay.

The increase in port utilization due to offshore wind activity would vary across ports and would depend on the specific port or ports supporting each offshore wind project. It is unlikely that all projects would use the same ports; therefore, the total increase in vessel traffic would be distributed across multiple ports in the region. Port utilization in the geographic analysis area would occur primarily during construction. Offshore wind construction activities may result in competition for berthing space and port services potentially causing short- to medium-term adverse impacts on commercial shipping. During peak activity, impacts on port utilization would be moderate, short term, and continuous at the ports and their maritime approaches.

After offshore wind projects are constructed, related port utilization would decrease. During operations, project-related port utilization would have minor, long-term, intermittent, localized impacts on overall vessel traffic and navigation. Port utilization would increase again during decommissioning at the end of the operating period of each project, which BOEM anticipates to be approximately 35 years, with magnitudes and impacts similar to those described for construction.

Presence of structures: Approximately 920 WTGs and OSPs would be constructed in the geographic analysis area that would pose navigational hazards to vessels transiting in and around areas leased for offshore wind projects. Offshore wind projects would increase navigational complexity and ocean space use conflicts, including the presence of WTG and OSP structures in areas where no such structures currently exist, potential compression of vessel traffic both outside and within offshore wind lease areas, and potential difficulty seeing other vessels due to a cluttered view field. All offshore wind projects would be required to light and mark their projects in compliance with the guidelines in BOEM's *Lighting and Marking Guidelines* (BOEM 2021), in addition to procuring valid PATON permits from USCG First District. The increasing presence of structures as new offshore wind farm areas are developed could lead to increased congestion and navigational complexity, which could result in increased allisions, collisions, and vessel fuel spills.

Another potential impact of offshore wind structures is interference with marine vessel radars, when in or near lease areas. The MARIPARS report notes (USCG 2020) that various factors play a role in potential marine radar interference by offshore wind infrastructure, stating that "the potential for interference with marine radar is site specific and depends on many factors including, but not limited to, turbine size, array layouts, number of turbines, construction material(s), and the vessel types." In the event of radar interference, other navigational tools are available to ship captains. BOEM expects the industry to adopt both technological and non-technology-based measures to reduce impacts on marine radar, including greater use of AIS and electronic charting systems, new technologies like LiDAR, employing more watchstanders,[5] and avoiding wind farms altogether.

The fish aggregation and reef effects of offshore wind structures would also provide new opportunities for recreational fishing. The additional recreational vessel activity focused on aggregation and reef effects would incrementally increase vessel congestion and the risk of allision, collision, and spills near WTGs. Overall, the impacts of this IPF on navigation and vessel traffic would be moderate, long term (as long as structures remain, approximately 35 years), regional (throughout the entire geographic analysis area for navigation and vessel traffic), and constant.

Cable emplacement and maintenance: Other offshore wind projects in the geographic analysis area would require installation of 3,520 miles (5,665 kilometers) of offshore export and interarray cables. Emplacement and maintenance of cables for these offshore wind projects would generate vessel traffic and would specifically add slower-moving vessel traffic above cable routes. Vessels not involved in cable emplacement or maintenance would need to take additional care when crossing cable routes during installation and maintenance activities. BOEM anticipates that there would likely be simultaneous cable-laying activities from multiple projects based on the estimated construction timeline. While simultaneous cable-laying activities may disrupt vessel traffic over a larger area than if activities

[5] Watchstander is a person on watch on a ship. Employing additional watchstanders and lookouts, particularly when navigating through or adjacent to a wind farm, could improve situational awareness (National Academies of Sciences, Engineering, and Medicine 2022).

occurred sequentially, the total time of disruption would be less than if each project were to conduct cable-laying activities sequentially. The impacts of this IPF on vessel traffic and navigation would be minor to moderate because impacts would be short term, localized, and most disruptive during peak construction activity of the offshore wind projects in 2024 and 2025.

Traffic: Offshore wind projects would generate vessel traffic during construction, operation, and decommissioning in the geographic analysis area. Other vessel traffic in the region (e.g., from commercial fishing, for-hire and individual recreational use, shipping activities, military uses) would overlap with offshore wind-related vessel activity in the open ocean and near ports supporting the offshore wind projects. BOEM anticipates that the total increase in vessel traffic would be distributed across multiple ports in the region.

Up to 12 offshore wind projects (number of projects includes lease remainders; see Appendix D, Table D-2) would be constructed in the geographic analysis area between 2023 and 2030. Based on the estimated construction schedules for these projects, vessel traffic would likely be highest between 2024 and 2025 when up to 10 projects could be under construction at the same time. For purposes of estimating total vessel traffic, BOEM assumed that construction vessel traffic for these projects would be similar to the Proposed Action of between 15 to 35 vessels operating at any given time (the Proposed Action proposes the most WTGs of any of the 12 other offshore wind projects in the geographic analysis area so this is a conservative assumption). At peak construction between 2024 and 2025, other offshore wind projects could generate between 150 and 350 vessels operating in and near the geographic analysis area. The presence of offshore wind project vessels would add to the overall Atlantic Coast vessel traffic levels as new offshore wind farm areas are developed, leading to increased collisions and allisions, and vessel fuel spills. Increased offshore wind-related vessel traffic during construction would have moderate, short-term, constant, localized impacts on overall (wind and non-wind) vessel traffic and navigation.

After offshore wind projects are constructed, related vessel activity would decrease. Vessel activity related to the operation of offshore wind facilities would consist of scheduled inspection and maintenance activities with corrective maintenance as needed. For purposes of estimating total operational vessel traffic in the geographic analysis area, BOEM assumed that vessel traffic for these projects would be similar to the Proposed Action estimates of one to three vessels per day. Combined, the 12 offshore wind projects in the geographic analysis area would generate approximately 36 vessels per day during normal O&M beginning in 2030. During operations, project-related vessel traffic would have minor, long-term, intermittent, localized impacts on overall vessel traffic and navigation. Vessel activity would increase again during decommissioning at the end of the assumed 35-year operating period of each project, with magnitudes and impacts similar to those described for construction.

Conclusions

Impacts of the No Action Alternative: BOEM expects ongoing activities, including non-offshore wind and offshore wind activities to have continuing short- and long-term impacts on navigation and vessel traffic, primarily through the presence of structures, port utilization, and vessel traffic. BOEM anticipates that the impacts of ongoing activities, especially port utilization, presence of structures, and vessel traffic, would be **moderate adverse**.

Cumulative Impacts of the No Action Alternative: Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and navigation and vessel traffic would continue to be affected by the primary IPFs of port utilization, presence of structures, cable emplacement, and vessel traffic. Planned non-offshore wind activities, including port improvement projects, dredging projects, and offshore cable emplacement and maintenance, would contribute to impacts on navigation and vessel traffic.

Planned offshore wind activities would increase vessel activity, which could lead to congestion at affected ports, the possible need for port upgrades beyond those currently envisioned, and an increased likelihood of collisions and allisions, with resultant increased risk of accidental releases. The planned construction of offshore wind projects would add new structures in areas where no such structures currently exist, increasing the risk for collisions, allisions, and resultant accidental releases and threats to human health and safety. BOEM anticipates that the cumulative impacts of the No Action Alternative would result in **moderate adverse** impacts primarily due to the presence of structures.

3.6.6.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following proposed PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on navigation and vessel traffic.

- The Project layout including the number, type, and placement of the WTGs and OSPs including the location, width, and orientation of the Wind Farm Area rows and columns.
- The number of vessels used for construction and installation.
- The offshore electric cable corridor routes/locations.
- Time of year of construction.
- Ports selected to support construction and installation and O&M.

SouthCoast Wind has committed to measures to minimize impacts on navigation and vessel traffic, which include, but are not limited to, implementing construction safety zones in consultation with USCG, using on-scene safety vessel(s) and/or personnel to advise mariners of construction activity, as necessary, and marking of structures to align with letter and number marking of all offshore structures within the Massachusetts and Rhode Island wind energy area, improving general navigation (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

3.6.6.5 Impacts of Alternative B – Proposed Action on Navigation and Vessel Traffic

Impacts from the Proposed Action alone would include increased vessel traffic in and near the Wind Farm Area and on the approach to ports used by the Proposed Action, as well as obstructions to navigation caused by Proposed Action activity. COP Volume 1, Table 3-21 and Table 3-23 (SouthCoast Wind 2024) summarize the anticipated Project-related vessel traffic during construction and O&M, respectively.

Changes in traffic from the Project are anticipated to include the following.

- Project-related vessel traffic related to construction, O&M, and decommissioning activities.
- Additional non-Project traffic that might be generated by the presence of the Wind Farm Area, for example, pleasure vessel trips for sight-seeing or recreational fishing.
- The modification of usual traffic routes for some ship types due to the presence of wind farm structures.

The NSRA risk analysis modeled the frequency of non-Project vessel accidents that could result from installation of the Proposed Action wind farm structures. The model estimates frequencies for marine accidents accounting for Project- and location-specific environmental, traffic, and operational parameters. Baseline vessel traffic data used in the model are described in Section 3.6.6.1, *Description of the Affected Environment and Future Baseline Conditions*. Detailed information about the risk analysis is included in COP Appendix X (SouthCoast Wind 2024). The risk analysis calculated the frequency of hazards due to drift allision, powered allision, drift grounding, powered grounding, and collision. Results of the NSRA risk modeling are described below under the IPF headings for *Presence of Structures* and *Traffic*.

Anchoring: The nearest established anchorage to the Lease Area is Anchorage G located 13 nm (24 kilometers) to the north. As indicated by AIS data, there is no significant anchorage activity in the vicinity of the Lease Area. Therefore, construction and operation of the Wind Farm Area is not anticipated to have a measurable effect on navigation and safety related to anchorages (COP Appendix X, Section 2.2.3.1; SouthCoast Wind 2024). Smaller vessels anchoring in the Wind Farm Area may have issues with anchors failing to hold near foundations and any associated scour protection, or, alternately, where the anchors may become snagged and potentially lost. During construction, installation, and decommissioning operations, smaller recreational and fishing vessels would most likely not transit the Wind Farm Area and, therefore, not anchor in the geographic analysis area. Consequently, any potential impacts from smaller vessels anchoring in the Wind Farm Area would primarily occur during the O&M phase.

There are several anchorage areas in proximity to and overlapping the proposed offshore export cable routes (COP Appendix X, Figure 2-35; SouthCoast Wind 2024). The Falmouth offshore export cable route would cross Anchorages G, H, and I (in and around Nantucket Sound), and the Brayton Point offshore export cable route would pass in proximity to Anchorages E and F (in and around Vineyard Sound). Based on AIS data, these anchorages would likely be used mostly by smaller vessels such as passenger and pleasure crafts (COP Appendix X, Figure 2-25; SouthCoast Wind 2024). Anchors for these vessels are unlikely to penetrate to the depth that would make contact with the buried cable. Additionally, cables would be charted and SouthCoast Wind would take into consideration anchoring impacts in cable design in areas where anchoring may occur, reducing the potential for anchoring impacts (COP, Section 3.4.1.1.1; SouthCoast Wind 2024).

Deviations from “normal” anchorage activities, such as vessels anchoring in an emergency scenario, pose a potential hazard to subsea cables. Depending upon the anchor weight, vessels with a tonnage greater than 10,000 deadweight tonnage (DWT) would be the most likely to carry anchors that could penetrate to the Project cable burial depth if anchoring in an emergency scenario in the vicinity of the ECC (Sharples 2011). For comparison, 2019 AIS data indicates the average passenger or pleasure vessel in the geographic analysis area is less than 1,000 DWT (COP Appendix X, Figure 2-28; SouthCoast Wind 2024). However, anchor penetration is dependent upon factors other than ship size and anchor weight, such as the type of soil on the seabed and whether the anchor is dragged after the initial drop (Sharples 2011). SouthCoast Wind has conducted a Cable Burial Risk Assessment to calculate the target cable lowering depth to minimize risks to the offshore export cables from damage, and to mitigate potential conflicts between commercial or recreational fishermen and the new structure (COP Volume 2, Section 11.2.3.2; SouthCoast Wind 2024). To minimize conflicts between fishing gear and the proposed Project’s interarray and offshore export cables, the interarray cables would be buried at a depth of 3.2 to 8.2 feet (1.0 to 2.5 meters), and the offshore export cables would be buried at a depth of 3.2 to 13.1 feet (1.0 to 4.0 meters). A cable burial depth targeted at 5 to 6 feet (1.5 to 1.8 meters) has resulted in cable interactions approaching zero incidents, based on observations in the U.S. telecommunications industry since 2000 (North American Submarine Cable Association 2019).

If sufficient burial depth cannot be achieved, armoring or other cable protection would be used to protect cables from external damage. Cable protection methods may include rock placement, concrete mattresses, frond mattresses, rock bags, and seabed spacers (COP Volume 1, Section 3.3.5.3; SouthCoast Wind 2024). In the event an anchor does make contact with a buried export cable, impacts could include damage to the export cable and potential damage to the vessel anchor and/or anchor chain. Depending on the extent of the damage to the export cable the risks associated with an anchor contacting an electrified cable can pose issues to Project equipment (an overload and shut-down of converter or transformer stations) but is not going to cause electrical shock to the ship involved since seawater is a good conductor of electricity (Sharples 2011). If the export cable is damaged to the point of requiring repair, there could be impacts associated with additional vessel activity to conduct damage assessment and repair. Secondary impacts are repercussions on the vessel operator’s liability and insurance. Combined with the low likelihood that any anchoring would occur in an emergency scenario, impacts on navigation and vessel traffic would be negligible.

Port utilization: The Proposed Action is considering multiple ports for construction including New Bedford, Fall River, and Salem, Massachusetts; Davisville and Providence, Rhode Island; New London, Connecticut; Sparrows Point, Maryland; Charleston, South Carolina; Corpus Christi, Texas; as well as some international ports, including the Port of Altamira, Mexico and ports in Canada. O&M vessel trips would originate primarily from the ports of New Bedford and Fall River, Massachusetts; New London, Connecticut, or Providence, Rhode Island, with the potential for occasional repair and supply delivery trips originating from ports in Davisville and Providence, Rhode Island; Salem, Massachusetts; Sparrows Point, Maryland; and Charleston, South Carolina. The Proposed Action would generate trips by support vessels, such as crew transports vessels, hotel vessels, tugs, and miscellaneous vessels, which would increase congestion at ports, especially during construction and decommissioning. Construction of the Proposed Action would generate on average 15 to 35 vessels (with a maximum peak of 50 vessels) operating in the Wind Farm Area or over the offshore ECC route at any given time (COP Volume 1, Table 3-21; SouthCoast Wind 2024). On average, the Proposed Action would generate approximately one to three vessel trips per day between the Lease Area and ports during regular operations. The presence of these vessels could cause delays for non-Proposed Action vessels and could cause some fishing or recreational vessel operators to change routes or use an alternative port. The Proposed Action's impacts on vessel traffic due to port utilization would be moderate, short term, and continuous through construction and installation. During O&M, impacts would be minor, long-term, and intermittent. Impacts would increase to moderate for decommissioning comparable to construction and installation impacts.

Presence of structures: The Proposed Action would include up to 147 WTGs and 5 OSPs, for up to 149 structure positions, operating for approximately 35 years in the Wind Farm Area where no such structures currently exist. The 149 positions would conform to a 1-nm-by-1-nm (1.9-kilometer-by-1.9-kilometer) grid layout with an east–west and north–south orientation across the entire Massachusetts and Rhode Island lease areas, as agreed upon by SouthCoast Wind and other leaseholders. This uniform grid pattern and spacing is consistent with recommendations in the MARIPARS final report concerning WTG layout (USCG 2020) and minimizes the risks of vessel accidents and space use conflicts in the Wind Farm Area.

Proposed Action structures would increase the risk of allision, as well as collision with other vessels navigating through WTGs and could interfere with marine radars (although other navigation tools are available to ship captains). Nearly all vessels that travel through the Wind Farm Area would need to navigate with greater caution under the Proposed Action to avoid WTGs and OSPs; however, there would be no restrictions on use or navigation in the geographic analysis area. WTGs with approved lighting and marking could serve as additional aids to navigation. SouthCoast Wind intends to submit requests to USCG for up to 149 PATONs, one for each of the WTG or OSP positions. Many vessels that currently navigate that area would continue to be able to navigate through the geographic analysis area safely. Vessels that exceed a height of 75.5 feet (23 meters) would be at risk of alliding with WTG blades at mean high water, and would need to navigate around the Wind Farm Area or navigate with caution through the Wind Farm Area to avoid the WTGs. Cargo/carrier, tanker, cruise ships, and tug vessels are anticipated to choose routes around the turbine array (COP Appendix X, Section 2.3; SouthCoast Wind 2024).

While some non-Project vessel traffic may navigate through the Project area, many vessels would most likely choose not to pass through the area during construction (due to the presence of construction-related activities and the emergence of fixed structures), during the life of the Project (due to the presence of fixed structures), and during decommissioning. NSRA modeled the frequency of marine accidents under the Proposed Action assuming there would be a rerouting of common vessel traffic routes around the Wind Farm Area for cargo/carrier, tankers, passenger (cruise ships), and tugs. NSRA assumed that other vessel types, including fishing, pleasure and other vessels, would not reroute around the Wind Farm Area. The primary increase in marine accidents (derived by comparing future-case with base-case vessel traffic conditions) related to the presence of structures would be due to drift allision, resulting in an increase of 0.215 accident per year, and powered allision, resulting in an increase in 0.138 accident per year (COP Appendix X, Table E-40; SouthCoast Wind 2024). The estimated increase in allision accident frequency is attributed to those vessel types that would not reroute around the Project area (fishing, other, and pleasure). Cargo, tugs, and tankers would experience only a minor increase in allision frequency.

O&M of the Proposed Action would likely affect marine vessel radar performance near or within the Wind Farm Area. National Academies of Sciences, Engineering, and Medicine (2022) notes that WTG interference decreases the effectiveness of marine vessel radar mounted on all vessel classes. There is currently no standard system of active radar tailored to a WTG environment. Smaller vessels operating in the vicinity of the Project may experience the same challenges as larger vessels if equipped with marine vessel radar, such as clutter due to the WTGs or ambiguous detections, and may also be harder to identify as distinct targets or become lost contacts by larger vessels while in the proximity of WTGs (National Academies of Sciences, Engineering, and Medicine 2022). While radar is one of several navigational tools available to vessel captains, including navigational charts, GPS, and navigation lights mounted on the WTGs, radar is the main tool used to help locate other nearby vessels that are not otherwise visible particularly in adverse weather when visibility is limited. The navigational complexity of transiting through the Wind Farm Area, including the potential effects of WTGs and OSPs on marine radars, would increase risk of collision with other vessels (including non-Project vessels and Proposed Action vessels). Overall, the Proposed Action would have a long-term, continuous, moderate impact on navigation and vessel traffic.

Cable emplacement and maintenance: The Proposed Action would require the installation of offshore export cables and interarray and substation interconnector cables (COP Volume 1, Table 3-14; SouthCoast Wind 2024). The presence of slow-moving (or stationary) installation or maintenance vessels would increase the risk of collisions and spills. Offshore export cable installation activities include site preparation, such as sand wave and boulder clearance. In areas where sand waves are present, multiple passes may be required. Vessels engaged in cable emplacement are, by definition, restricted in their ability to maneuver and other power-driven vessels must give way.[6] Cable-laying vessels would display lights at nighttime, or day shapes during the daytime to communicate with other vessels that they are restricted in their ability to maneuver. USCG “Local Notice to Mariners” may also include information affecting local waterways, such as cable emplacement activity. Vessels not involved in cable emplacement or maintenance would need to take additional care when crossing cable routes or avoid installation or maintenance areas entirely during installation and maintenance activities. Depending on the exact route of the Falmouth and Brayton Point offshore export cables within the proposed corridors, cable-installation activities may temporarily affect private and federal aids to navigation. SouthCoast Wind has committed to implementing construction safety zones for offshore export cable installation in consultation with the USCG, which would include consulting in regard to potential impacts on aids to

[6] International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS), rules 3, 18, and 27.

navigation. Installation and maintenance of submarine cables would have minor to moderate, localized, short-term, intermittent impacts on navigation and vessel traffic.

Traffic: Construction of the Proposed Action could generate between 15 and 35 vessels operating in the Lease Area or over the offshore export cable route at any given time (COP Volume 1, Table 3-21; SouthCoast Wind 2024). Various vessel types would be deployed throughout the Offshore Project area during the construction and installation phase, increasing the risk of allisions and collisions. During offshore export cable route construction, non-Project vessels required to travel a more restricted (narrow) lane could potentially experience greater delays waiting for cable-laying vessels to pass. Non-Project vessels transiting between the Proposed Action ports and the Project area would be able to avoid Proposed Action vessels, components, and any safety zones (where USCG is authorized and elects to establish such zones)[7] through routine adjustments to navigation. The Proposed Action's construction and installation vessel traffic would have moderate, localized, short-term impacts on overall navigation and vessel traffic in opens waters and near ports.

Operation of the Proposed Action would generate approximately one to three trips per day from O&M ports to the Wind Farm Area. Vessel traffic generated by the Proposed Action could restrict maneuvering room and cause delays accessing the port. Although vessel traffic in the Lease Area is expected to decrease once the WTGs and OSPs are in place, O&M of the Proposed Action would result in the same types of vessel traffic and navigation impacts as those described during construction. Operation of the Proposed Action would have minor, long-term, intermittent, and localized impacts on overall navigation and vessel traffic near ports and in open waters.

The NSRA risk modeling suggests that under the Proposed Action, accident frequency would increase by 0.357 marine incident per year, an average of 1 additional accident every 2.8 years (COP Appendix X, Section 11.1-1; SouthCoast Wind 2024). Marine accidents involving fishing vessels represent 70 percent of the increase (Table 3.6.6-3). The increase in accident frequency represents all accidents, including accidents with small and zero consequence, such as bumping into a Project structure while drifting.

[7] Under the current captain of the Port Authority, USCG does not regulate the safety and security risks associated with the construction and operation of Offshore Renewable Energy Installations beyond 12 nm (USCG 2021b).

Table 3.6.6-3. NSRA modeled change in accident frequencies from the Proposed Action

Vessel Type	Increase in Frequency (number per year)	Percentage of Total (%)
Cargo/Carrier	0.012	3.4
Fishing	0.248	69.5
Other/Undefined	0.057	16.0
Passenger	0.003	0.9
Pleasure	0.029	8.1
Tanker	0.002	0.5
Tanker - Oil	0.005	1.4
Tug/Service	0.001	0.2
Total	**0.357**	**100**

Source: COP Appendix X, Table ES-1; SouthCoast Wind 2024.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities and ongoing and planned offshore wind activities. Ongoing and planned non-offshore wind activities related to marine transportation, military use, NMFS activities and scientific research, and fisheries use and management would contribute to impacts from increased vessel traffic, adding to congestion in waterways and increasing the potential for maritime accidents. The construction, O&M, and decommissioning of offshore wind activities would contribute to impacts on navigation and vessel traffic through the primary IPFs of anchoring, port utilization, presence of structures, cable emplacement and maintenance, and traffic.

The combined impacts of the Proposed Action and other ongoing and planned offshore wind activities on navigation and vessel traffic from anchoring would be short term and minor due to the small size of the offshore wind lease areas compared to the remaining area of open ocean, as well as the low likelihood that any anchoring risk would occur in an emergency scenario.

Other offshore wind projects would generate comparable types and volumes of vessel traffic in ports and would require similar types of port facilities as the Proposed Action. In the geographic analysis area, the Proposed Action could overlap in construction with 10 other offshore wind projects in 2024 and 2025. The increase in port utilization due to other offshore wind project vessel activity would be limited during construction and installation of the Proposed Action. It is unlikely that all projects would use the same ports; therefore, the total increase in vessel traffic would likely be distributed across multiple ports in the region. However, there could be delays for vessels using those ports if two or more projects are under construction at the same time. Accordingly, combined port utilization impacts on navigation and vessel traffic from ongoing and planned activities, including the Proposed Action, would be continuous and moderate.

The construction of 1,048 structures under the Proposed Action and the other offshore wind projects in the geographic analysis area would increase the navigational complexity in the region, resulting in an increased risk of collisions and allisions and overall moderate impacts.

Cable installation and maintenance for other offshore wind activities would generate comparable types of impacts to those of the Proposed Action for each offshore export cable route and interarray and interconnector cable system. Simultaneous construction of export and interarray cables of other offshore wind projects would have an additive effect, although it is assumed that installation vessels would only be present above a portion of a project's cable system at any given time. Substantial areas of open ocean are likely to separate simultaneous offshore export and interarray cable installation activities for other offshore wind project. The combined impacts from ongoing and planned activities, including the Proposed Action, on navigation and vessel traffic from cable installation and maintenance would be localized, short term, intermittent, and minor.

Other offshore wind projects in the geographic analysis area would contribute similar impacts from increased vessel traffic associated with construction and operation. Construction of the Proposed Action would overlap with the construction of 10 other offshore wind projects. During peak construction activity between 2024 and 2025, the Proposed Action and other projects could generate between 165 and 385 vessels operating in and near the geographic analysis area. Following construction, up to 13 offshore wind projects, including the Proposed Action, could operate in the geographic analysis area and generate 39 vessel trips per day. Traffic from these projects would likely be spread among multiple ports within and outside of the geographic analysis area for navigation and vessel traffic, thus potentially moderating the effect of offshore wind-related vessel traffic at any single location. The contribution of the Proposed Action to vessel traffic impacts from ongoing and planned activities would be moderate, localized, short term, and intermittent.

Conclusions

Impacts of the Proposed Action: Construction and installation, O&M, and decommissioning of the Proposed Action would have adverse impacts on navigation and vessel traffic. The impacts of the Proposed Action alone on navigation and vessel traffic would be **moderate adverse**. Impacts on non-Project vessels would include changes in navigation routes, delays in ports, and degraded communication and radar signals, all of which would increase navigational safety risks. Some commercial fishing, recreational, and other vessels would avoid the Wind Farm Area altogether, leading to potential congestion of vessel traffic along the Project area borders.

Cumulative Impacts of the Proposed Action: In context of reasonably foreseeable environmental trends, the combination of the Proposed Action and other ongoing and planned activities would result in **moderate adverse** impacts on navigation and vessel traffic. The main IPF is the presence of structures, which would increase the risk of collision/allision and navigational complexity, particularly when adjoining offshore wind projects do not share a common WTG layout or spacing and do not include a separation between adjoining lease areas.

3.6.6.6 Impacts of Alternative C on Navigation and Vessel Traffic

Impacts of Alternative C: Routing the Brayton Point offshore export cable onshore to avoid sensitive fish habitat in the Sakonnet River under Alternatives C-1 and C-2 would slightly reduce the impacts on navigation and vessel traffic from between 9 and 12 fewer miles of cable installation activities, respectively. In the narrow navigable waterway of the Sakonnet River, this would reduce the potential for collisions with slow-moving cable-laying vessels, but any reduction in impacts would be temporary during installation and would not change the overall impact magnitude. Alternatives C-1 and C-2 would also avoid potential impacts on aids to navigation in the Sakonnet River, but any impacts from cable installation would be reduced or avoided through consultation with USCG, regardless of alternative, so impacts would not be meaningfully different between the Proposed Action and Alternatives C-1 or C-2.

Whereas the Alternative C-1 export cables would exit Aquidneck Island into Mount Hope Bay following the same route as the Proposed Action, the Alternative C-2 export cables would enter Mount Hope Bay on the east side of the Sakonnet River from Tiverton, Rhode Island. In Mount Hope Bay, Alternative C-2 would cross the Fall River Harbor Federal Navigation Channel Project in three locations (Figure 3.6.6-3). Federal navigation channels are waterways maintained by the USACE to allow vessels to transit confined nearshore areas and use ports or harbors. The vessel traffic in this area of the Fall River Harbor Federal Navigation Channel Project comprises primarily of shallow draft vessels including passenger and pleasure. Alternative C-2 would result in temporary disruption to vessels transiting the channel during the construction and installation phase and when maintenance activities are required during the O&M phase. As this area involves crossing the Fall River Harbor Federal Navigation Project, USACE will conduct dredging operations in the Federal Navigation Project at some point in the future. Therefore, any USACE Section 408 permission will require the cable placement to be at sufficient burial depth that it would not affect or impede future dredging operations. Crossing the federal navigation channel under Alternative C-2 would increase short- and long-term impacts compared to the Proposed Action, but the overall impact magnitude on navigation and vessel traffic is anticipated to be the same.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, cumulative impacts of Alternatives C-1 and C-2 would be similar to those of the Proposed Action.

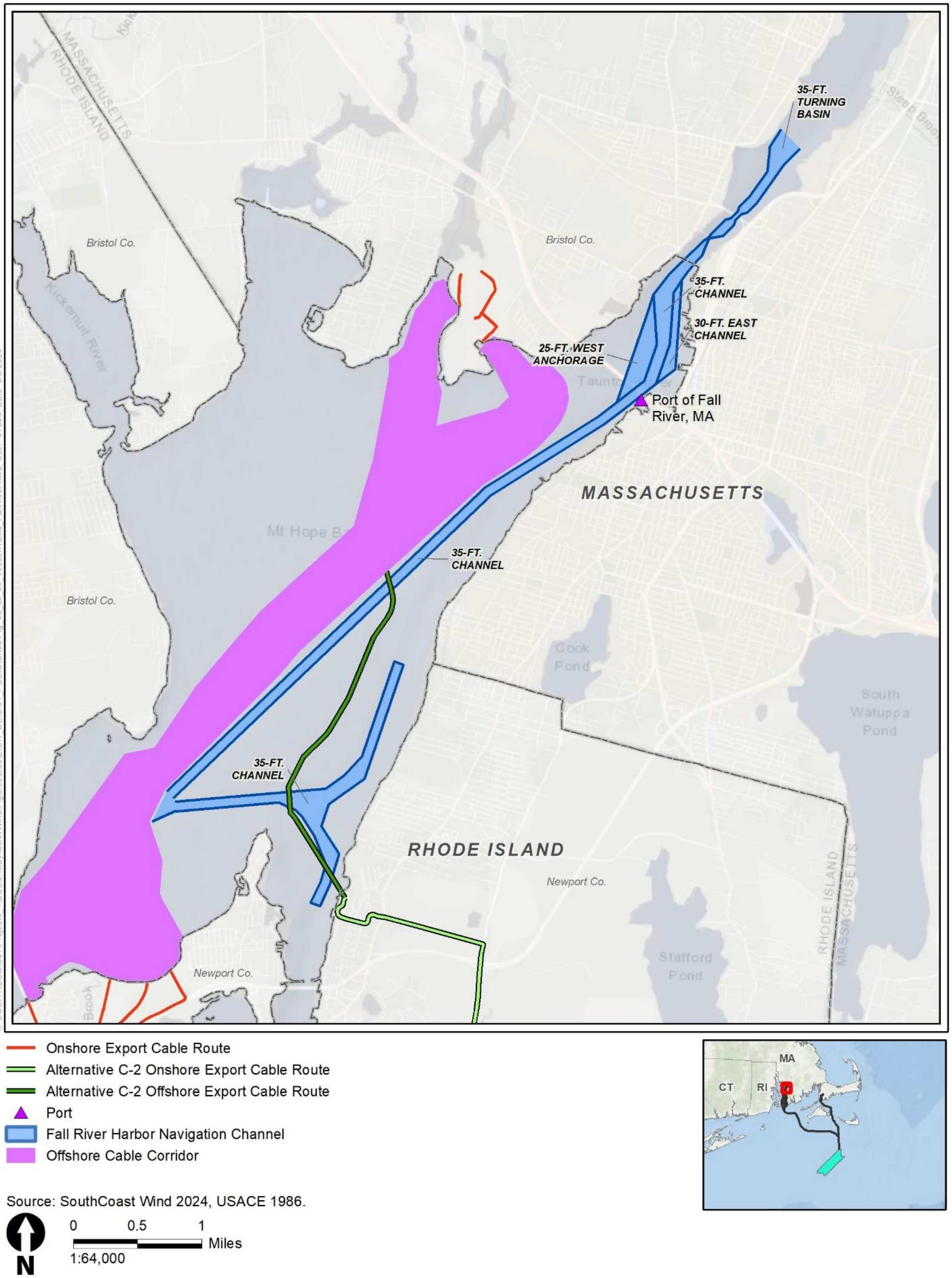

Figure 3.6.6-3. Alternative C-2 and the Fall River Harbor Federal Navigation Channel Project

Conclusions

Impacts of Alternative C: Alternative C-1 would avoid installing offshore export cable in the Sakonnet River, which would slightly reduce but not change the overall **moderate adverse** impact on navigation and vessel traffic compared to the Proposed Action. Alternative C-2 would also avoid installing offshore export cable in the Sakonnet River but would increase navigational impacts from crossing the Fall River Harbor Federal Navigation Channel Project. Impacts from Alternative C-2 would remain **moderate adverse**.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives C-1 and C-2 would result in the same **moderate adverse** impacts on navigation and vessel traffic as the Proposed Action.

3.6.6.7 Impacts of Alternatives D (Preferred Alternative), E, and F on Navigation and Vessel Traffic

Impacts of Alternatives D, E, and F: The reduction in the number of WTGs under Alternative D, the use of specific foundation types under Alternative E, and the modifications to the offshore export cable routes under Alternative F would result in similar impacts as the Proposed Action on navigation and vessel traffic. Alternative D would exclude six WTGs in the northeast portion of the Lease Area nearest to Nantucket Shoals. Based on the 1-nm-by-1-nm spacing of the Lease Area, this 4 percent reduction in WTGs would leave up to 1.5 nm of open ocean at the edge of the Lease Area, which represents a small portion of the 25.5-nm length of the Lease Area (at its longest point). The WTG locations in Alternative D would incrementally decrease impacts on vessel traffic compared to the Proposed Action by providing additional space closer to Nantucket Shoals and coastal areas, which are more frequently used by fishing and recreational vessels. While Alternative D would decrease impacts on navigation and vessel traffic, it would not change the overall impact magnitudes described for the Proposed Action.

Under Alternative E, piled, suction bucket, and GBS foundations would be installed, respectively, which may slightly change the duration of foundation construction and the number of vessels, but any differences would be small and last only for the duration of construction. The overall impact on navigation and vessel traffic from the long-term presence of structures under Alternative E would not be substantively different than the Proposed Action. Under Alternative F, up to three cables would be used for the Falmouth offshore export cable, as opposed to the maximum of five cables proposed under the PDE. This may result in a slight reduction in cable-laying vessel construction activity, but overall impacts would be similar to those of the Proposed Action.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, cumulative impacts of Alternatives D, E, and F would be similar to those of the Proposed Action.

Conclusions

Impacts of Alternatives D, E, and F: Alternatives D, E, and F would result in the same **moderate adverse** impacts on navigation and vessel traffic compared to the Proposed Action. By reducing the number of

WTGs in the northeast portion of the Lease Area, Alternative D would slightly reduce, but not change, the overall impact level on navigation and vessel traffic compared to the Proposed Action. The required use of specific foundation types under Alternative E would result in similar impacts as the Proposed Action. The reduction in the number of Falmouth offshore export cables under Alternative F would not have a meaningful difference in impacts compared to the Proposed Action.

Cumulative Impacts of Alternatives D, E, and F: In context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternatives D, E, and F would result in the same **moderate adverse** impacts on navigation and vessel traffic as the Proposed Action.

3.6.6.8 Comparison of Alternatives

Construction, O&M, and decommissioning of Alternatives C, D, E, and F would have the same negligible to moderate adverse impacts on navigation and vessel traffic as described under the Proposed Action. Although Alternative D would have reduced impacts due to the reduction in WTG positions, the magnitude of impacts would not be materially different from that of the Proposed Action. The installation of different foundation types under Alternative E may slightly change the duration of foundation construction and the number of vessels but would not affect the impact magnitude compared to the other alternatives. Similarly, restricting the number of cables to three for the Falmouth ECC would not have a meaningful change in impacts on navigation and vessel traffic. For Alternative C-1, the avoidance of the Sakonnet River by taking an onshore route on Aquidneck Island would minimize navigation impacts from the presence of installation vessels compared to other alternatives, but the reduction in impacts would be temporary. In contrast, Alternative C-2, while avoiding temporary navigation impacts in the Sakonnet River, would cross the Fall River Harbor Federal Navigation Channel Project in three locations and would increase short- and long-term impacts compared to the Proposed Action, although overall impact magnitude would remain the same.

3.6.6.9 Proposed Mitigation Measures

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix G, Tables G-2 and G-3 and summarized and assessed in Table 3.6.6-4. If one or more of the measures analyzed here are adopted by BOEM or cooperating agencies, some adverse impacts on navigation and vessel traffic could be further reduced.

Table 3.6.6-4. BOEM or agency-proposed measures (also identified in Appendix G, Table G-3): navigation and vessel traffic

Measure	Description	Effect
Consult on aid to navigation impacts	Prior to cable installation, SouthCoast Wind would consult with the USCG regarding potential impacts on federal aids to navigation from cable installation and maintenance.	Requiring consultation with the USCG regarding cable emplacement would ensure impacts on aids to navigation are avoided during installation and maintenance of cables. This would mean aids to navigation would continue to serve their purpose for vessels in the area. Coordination with USCG would minimize impacts but the overall impact rating would not change.
Operations Center	SouthCoast Wind will operate a 24-hour operations center with direct communications with the USCG.	Requiring a 24-hour operations center with direct communications with the USCG would assist with addressing any real-time operational conflicts and/or safety issues. Coordination with USCG would minimize impacts but the overall impact rating would not change.
Mariner Communication and Outreach Plan	SouthCoast Wind would develop and implement a Mariner Communication and Outreach Plan that covers all Project phases from pre-construction to decommissioning and that facilitates coordination with all mariners, including the commercial shipping industry, commercial and for-hire fishing industries, and other recreational users. The Mariner Communication and Outreach Plan will include the following components: a. During Project design, coordinating in-water construction activities to avoid and minimize disruptions; b. At least 90 days prior to commencing in-water construction activities in any construction season, consultation with stakeholders on an approximate schedule of activities and existing uses within the Project area. Make good faith efforts to accommodate those existing uses. The results of these good	BOEM's requirement of a Mariner Communication and Outreach Plan would ensure that stakeholders and users of the affected waterways are kept informed of and have access to information related to all aspects of the project from preconstruction to decommissioning. Moreover, stakeholder feedback through consultations would inform project schedules potentially minimizing disruptions of scheduled activities and existing uses within the Project area during in-water construction activities. Although the measures within a mariner communication and outreach plan, if implemented, would potentially reduce the risk of vessel collisions and resultant oil spills, vessel traffic would still have to take action to avoid or mitigate any exposure to the construction, maintenance, and decommissioning activities taking place within their area of operation. Therefore, impacts would remain negligible to moderate for the Proposed Action and other action alternatives.

Measure	Description	Effect
	faith consultations can be summarized in a report and submitted to the federal agency(ies) prior to the start of each construction season; c. Following COP approval, notice of proposed changes which have the potential to impact fishing or maritime resources or activities; d. Notices to commence construction activities, conduct maintenance activities, and commence decommissioning; e. Status reports during construction with specific information on construction activities and locations for upcoming activities in the next 1–2 weeks; f. Post-construction notice of: (i) all cable protection measure locations (including protection type and charted location); (ii) any areas where the identified burial depth is less than target burial depth; and (iii) other obstructions to navigation created by the Project; and Post all notices described above to the Project website with information on how to opt-in for alerts.	

Measures Incorporated in the Preferred Alternative

BOEM has identified the additional measures in Table 3.6.6-4 as incorporated in the Preferred Alternative. These measures, if adopted, would reduce potential impacts on navigational safety, thereby reducing overall impacts on navigation and vessel traffic to moderate.

3.6 Socioeconomic Conditions and Cultural Resources

3.6.8 Recreation and Tourism

This section discusses potential impacts on recreation and tourism resources and activities from the proposed Project, alternatives, and ongoing and planned activities in the geographic analysis area. The geographic analysis area for recreation and tourism, as shown on Figure 3.6.8-1, corresponds to the scenic and visual resources geographic analysis area (Section 3.6.9, *Scenic and Visual Resources*) and includes a 42.8-mile (68.9-kilometer) buffer around the Lease Area, a 3-mile (4.8-kilometer) buffer around the onshore substation (associated with Falmouth POI) and/or converter station sites (associated with Brayton Point POI),[1] and a 0.5-mile (0.8-kilometer) buffer around the export cables. The geographic analysis area encompasses Barnstable, Bristol, Dukes, and Nantucket Counties in Massachusetts, and Bristol and Newport Counties, in Rhode Island. Section 3.6.3, *Demographics, Employment, and Economics*, discusses the economic aspects of recreation and tourism in the Project area.

3.6.8.1 Description of the Affected Environment

Regional Setting

Proposed Project facilities would be within and off the coast of Massachusetts and Rhode Island. The coastal areas support ocean-based recreation and tourist activities that include boating, swimming, surfing, scuba diving, sailing, and paddle sports. As indicated in Section 3.6.3, *Demographics, Employment, and Economics*, recreation and tourism contribute substantially to the economies of Massachusetts' and Rhode Island's coastal counties. Tourism in these coastal communities is a multibillion-dollar industry. There were 4,096,104 visits to the Cape Cod National Seashore in 2019 (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024).

Coastal Massachusetts and Rhode Island have a wide range of visual characteristics, with communities and landscapes ranging from large cities to small towns, suburbs, rural areas, and wildlife preserves. As a result of the proximity of the Atlantic Ocean, as well as the views associated with the shoreline, the Massachusetts and Rhode Island shores have been extensively developed for water-based recreation and tourism.

The scenic quality of the coastal environment is important to the identity, attraction, and economic health of many of the coastal communities. Additionally, the visual qualities of these historic coastal towns, which include marine activities in small-scale harbors, and the ability to view birds and marine life are important community characteristics.

[1] As described in Chapter 2, Section 2.1.2, *Alternative B – Proposed Action*, Brayton Point is the preferred ECC for both Project 1 and Project 2, and Falmouth is the variant ECC for Project 2, which would be used if SouthCoast Wind is prevented from using Brayton Point for Project 2.

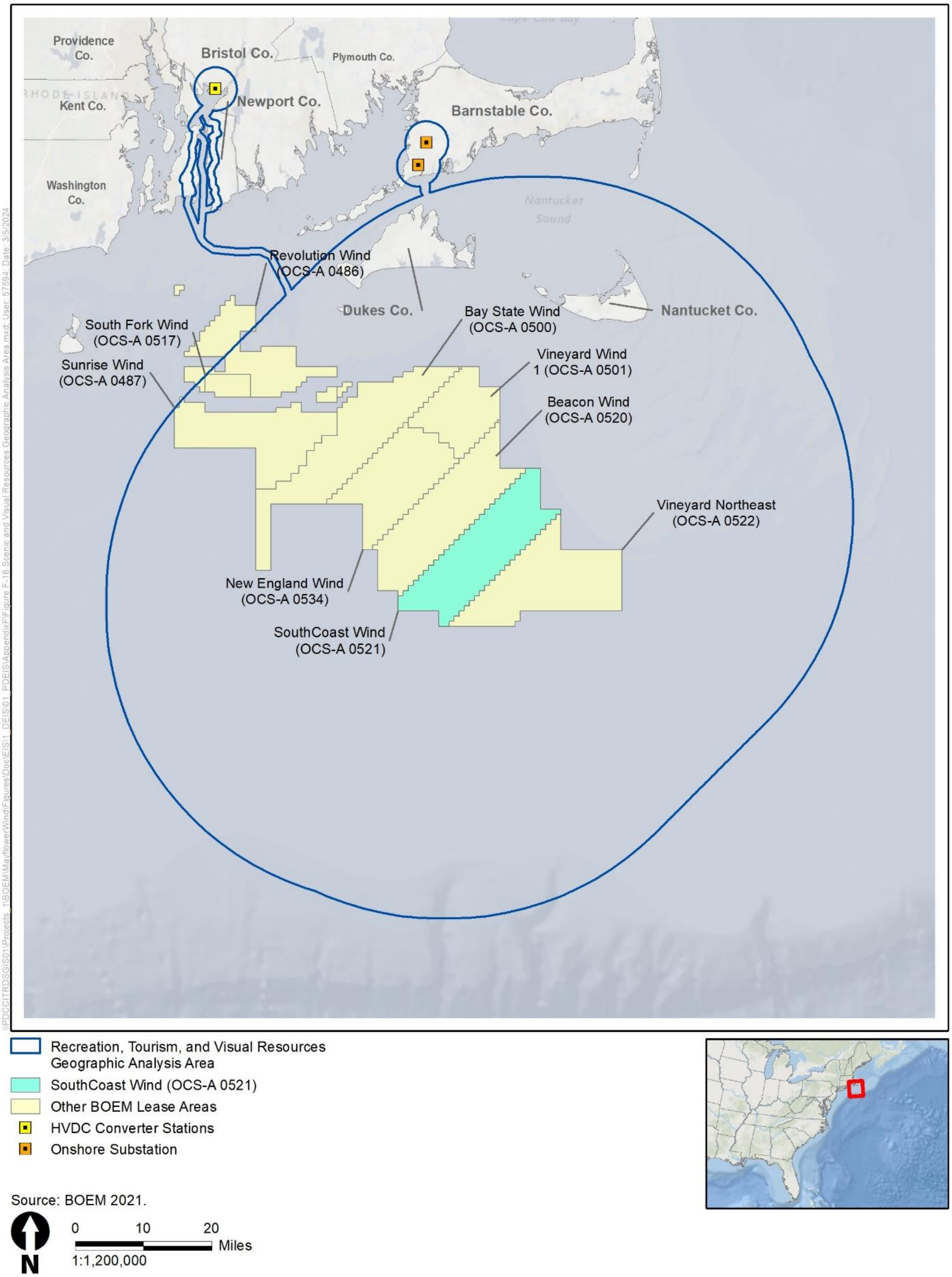

Figure 3.6.8-1. Recreation and tourism geographic analysis area

Project Area

Recreational and tourist-oriented activities are concentrated in the coastal communities in Barnstable, Bristol, Dukes, and Nantucket Counties in Massachusetts, and Bristol and Newport Counties, in Rhode Island. Coastal communities provide hospitality, entertainment, and recreation for hundreds of thousands of visitors each year. Although many of the coastal and ocean amenities, such as beaches, that attract visitors to these regions are accessible to the public for free and, thus, do not directly generate employment, these nonmarket features function as key drivers for recreation and tourism businesses.

Water-oriented recreational activities in the Project area include boating, visiting beaches, hiking, fishing, shellfishing, and bird and wildlife viewing. Boating covers a wide range of activities, from ocean-going vessels to small boats used by residents and tourists in sheltered waters, and includes sailing, sailboat races, fishing, shellfishing, kayaking, canoeing, and paddleboarding.

Commercial businesses offer boat rentals, private charter boats for fishing, whale watching and other wildlife viewing, and tours with canoes and kayaks. As discussed in Section 3.6.3, recreation and hospitality are major sectors of the economy in Barnstable, Bristol, Dukes, and Nantucket Counties in Massachusetts, and Bristol and Newport Counties, in Rhode Island, supported by the ocean-based recreation uses.

Inland recreational facilities are also popular but bear less of a relationship to possible impacts of the Project; this section does not address them in detail. These include inland waters, such as ponds and rivers, wildlife sanctuaries, golf courses, athletic facilities, parks, and picnic grounds.

Coastal and Offshore Recreation

Recreational boating activities occur along the coastline, especially during the summer months (COP Volume 2, Section 10.3.1.2.1; SouthCoast Wind 2024). Swimming and surfing are also popular during the summer months along the miles of white sand beaches. Surfers frequent several towns and cities along the coastline, including those in Cape Cod and the City of Newport (COP Volume 2, Sections 10.3.1.1.1 and 10.3.1.1.2.2; SouthCoast Wind 2024). Scuba diving and snorkeling are identified as popular uses offshore from the Cape Cod Peninsula with dive sites that include shipwrecks, artificial reefs, beach dives, and various inland sites (COP Volume 2, Sections 10.3.1.1.1 and 11.1.3.3.2; SouthCoast Wind 2024). The sailing and boating season typically runs from May to October with a peak in July and August and occurs both along the coastline, in the bays and inlets, as well as further off shore where long-distance sailing races are regularly held (McCann et al. 2013).

There is a large and robust recreational fishing industry in Massachusetts and Rhode Island. The *Fisheries Economics of the United States Report of 2019* estimates that recreational fishing had a $286 million impact on Massachusetts and Rhode Island’s economy in 2019 (NOAA 2022a). Collectively, there were close to 2 million recreational angler trips (i.e., party boats, rental/private boats, and shore) made per year in Massachusetts and Rhode Island from 2007 to 2012 (COP Volume 2, Section 10.3.1.2.2; SouthCoast Wind 2024). Fishing activity mainly takes place along the coast near Falmouth, as well as

Tisbury and Oak Bluffs on Martha's Vineyard (COP Volume 2, Section 10.3.1.2.2; SouthCoast Wind 2024). There are also up to 60 saltwater fishing tournaments held annually during the summer in coastal towns. Saltwater fishing tournaments target a variety of fish Atlantic cod, black sea bass, bluefish, striped bass, haddock, and bluefin and yellowfin tuna (COP Volume 2, Section 10.3.1.2.2; SouthCoast Wind 2024). According to NOAA Fisheries One Stop Shop database, recreational anglers off the coast of Massachusetts and Rhode Island caught 133,509,942 pounds of fish in 2017; 23,735,123 pounds in 2018; 24,820,923 pounds in 2019; and 16,323,813 pounds in 2020 (NOAA 2022b).

NOAA's social indicator mapping tool (NOAA 2022d) identifies the importance or level of dependence of recreational fishing to coastal communities. The tool classifies communities based on recreational fishing reliance, which measures the presence of recreational fishing in relation to the population size of a community, and recreational fishing engagement, which measures the presence of recreational fishing through fishing activity estimates. Within the geographic analysis area, only one community, Bourne, Massachusetts has a high reliance on recreational fishing but there are several communities with a medium reliance in Barnstable and Nantucket Counties. Communities with high and medium high recreational fishing engagement are Nantucket, Barnstable Town, Yarmouth, Dennis, Sandwich, Bourne, Forestdale, and Westport in Massachusetts and Newport in Rhode Island. The communities with the highest recreational fishing reliance and recreational fishing engagement would be most affected by impacts on recreational fishing from offshore wind development.

Wildlife viewing is popular as well, occurring along the coast of the Elizabeth Islands and along the eastern coast of Nantucket (COP Volume 2, Section 10.3.1.2.2; SouthCoast Wind 2024).

Barnstable County (Massachusetts)

Barnstable County lies in southeastern Massachusetts and encompasses approximately 394 square miles of land (U.S. Census Bureau 2021a). The county consists of 15 historic towns and contains the Cape Cod Peninsula (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024). There are 30 harbors, 40 marinas and boatyards, and about 24 private boating and yacht clubs. It has approximately 550 miles (884 kilometers) of coastline and over 150 beaches. Popular recreational activities in the area include beach going, snorkeling, windsurfing, boating, fishing, paddle sports, and diving. Canoeing, kayaking, and paddle boarding typically occur within 1 mile (1.6 kilometers) of the coastline.

Bristol County

Bristol County is in the southeastern part of Massachusetts, bordering Rhode Island, and is approximately 553 square miles (890 square kilometers) of land (U.S. Census Bureau 2021b and COP Volume 2, Section 10.3.1.1.2.1; SouthCoast Wind 2024). The county consists of 20 municipalities, including the town of Somerset (COP Volume 2, Section 10.1.1.1.4; SouthCoast Wind 2024). Popular recreational activities in the area include swimming, fishing, and wildlife viewing (COP Volume 2, Section 10.3.1.1.2.1; SouthCoast Wind 2024). People also take part in whale watching at the New Bedford Whaling National Historical Park (COP Volume 2, Section 10.3.1.2.2; SouthCoast Wind 2024).

Dukes County

Dukes County is in southeastern Massachusetts and encompasses 103 square miles of land area (U.S. Census Bureau 2021c). The county contains Martha's Vineyard, the Elizabeth Islands, and Nomans Land (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024). There are many public and private beaches, harbors, marinas/boatyards, yacht clubs, and public launch facilities in the county. Due to tourists and seasonal residents, the population of Martha's Vineyard increases by a factor of ten in the summer months (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024). Popular tourist destinations include the West Chop Lighthouse, located near Vineyard Haven, the East Chop Lighthouse, located in Oak Bluffs, and the Menemsha fishing village and harbor, located in Chilmark (Martha's Vineyard Chamber of Commerce 2022).

Nantucket County

Nantucket County is south of Cape Cod and encompasses approximately 44.97 square miles (72.37 square kilometers) of land (U.S. Census Bureau 2021d). It is 14 miles long and 3.5 miles wide (Town & County of Nantucket, MA 2022a). The county includes the island of Nantucket, which is an extremely popular summer tourist destination. In the summer months, the population of the Island of Nantucket increases by a factor of five due to tourists and seasonal residents (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024). The county is home to many beaches, such as Brant Point Beach, which is home to the Brant Point Lighthouse. On the north end of the island, one of the most popular beaches is Jetties Beach, which has a café, restaurant, and tourist shop during the summer (Town & County of Nantucket, MA 2022b). On the south shore of the island, Surfside, Cisco, Madaket, Miacomet, and Ladies beaches are among the many beaches popular for beachgoing, onshore fishing, surfing, and other recreational activities.

Bristol County (Rhode Island)

Bristol County, located in eastern Rhode Island, is approximately 24 square miles of land (U.S. Census Bureau 2019a). The county includes the towns of Barrington, Bristol, and Warren and is connected to Newport County and Aquidneck Island by the Mount Hope Bridge (COP Volume 2, Section 10.3.1.1.2.3; SouthCoast Wind 2024). Tourists visit the county for its miles of coastlines, beaches, and boating opportunities. There are many boat ramps that support the boating community, such as Colt State Park Boat Ramp, Mount Hope Boat Ramp, and Independence Park Boat Ramp (Town of Bristol 2022).

Newport County

Newport County is located in eastern Rhode Island and encompasses about 102 square miles of land (U.S. Census Bureau 2019b). The county is made up of nine municipalities across Aquidneck Island in the southeastern region of Rhode Island and various islands in Narragansett Bay (COP Volume 2, Section 10.1.1.1.5; SouthCoast Wind 2024). It includes the City of Newport, and towns of Jamestown, Little Compton, Middletown, Portsmouth, and Tiverton. The City of Newport is located in the southwest corner of the county, and Portsmouth is located in the northeastern corner of the county. The City of Newport is especially popular among tourists for its sailing, swimming, and surfing opportunities (COP Volume 2, Section 10.3.1.1.2.2; SouthCoast Wind 2024).

Onshore Recreation

Barnstable County

Barnstable County is home to about 1,000 freshwater ponds and over 100,000 acres of habitat, wetlands, and protected open space (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024). In 2017, the county's tourism industry generated $1.1 billion in direct spending and $122 in state and local taxes. The town of Falmouth has many restaurants, galleries, theaters, and concerts, as well as opportunities for hiking, camping, and bird watching. About 32 percent of the 62,705 residential units located in the county are used for seasonal, occupational, or occasional use.

Bristol County (Massachusetts)

Bristol County is home to Buttonwood Park, Freetown-Fall River National Forest, Horseneck Beach State Reservation, and New Bedford Whaling National Historic Park (COP Volume 2, Section 10.3.1.1.2.1; SouthCoast Wind 2024). Popular recreational activities include biking, hiking, and camping throughout the county. Inland marine recreational activities, such as fishing and boating, are also popular in the Taunton, Acushnet, Ten Mile, Westport, and Warren Rivers and in the North and South Watuppa ponds.

Dukes County

Dukes County contains only one federally protected area called Nomans Land Island National Wildlife Refuge (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024). The county has many short-term lodgings, food and drink establishments, and other amenities. About 40 percent of Martha's Vineyard (19,968 acres [8,100 hectares]) is conserved open space (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024). Areas of interest include the cultural district of Vineyard Haven, in which people can shop, dine, lodge, and attend theater and historic sites (Martha's Vineyard Chamber of Commerce 2022). Oak Bluffs is known for its shops, restaurants, carousel, and museums. Edgartown has a historic downtown with many museums, and Aquinnah is the western-most town on the island, which is home to colorful cliffs and the Aquinnah Circle Cultural District.

Nantucket County

Nantucket County is home to only one federally protected area, the Nantucket National Wildlife Refuge, which consists of 24 acres (9.7 hectares) of federally protected land, and about 50 percent of Nantucket is conserved open space (COP Volume 2, Section 10.3.1.1.1; SouthCoast Wind 2024). The county is home to over 40 miles of bike paths and walking trails and three lighthouses. Popular bike paths on the island include Cliff Road Path, Eel Point Road Path, and Surfside Road Path (Town & County of Nantucket, MA 2022c). The county hosts many food festivals throughout the year, such as the Nantucket Wine and Food Festival, as well as musical events and fairs, such as the Boston Pops at Jetties Beach and the Nantucket Island Fair (Culture & Tourism 2022). Further, Nantucket is widely known and appreciated by both residents and visitors for its historic character. The Nantucket Historic District encompasses the entire island of Nantucket (more than 27,000 acres) and contains thousands of historic resources, many of which are concentrated in Nantucket Town.

Bristol County (Rhode Island)

Bristol County encompasses Colt State Park, which has 464 acres (188 hectares) of lawns and 4 miles (6 kilometers) of paved pathways, hiking trails, historic stone walls, and shoreline. The park borders Narragansett Bay on its west side and is a popular destination for boating, biking, and wildlife viewing (Rhode Island State Parks 2022a). The county is also home to the East Bay Bike Path, which is 13.8 miles (22.2 kilometers) long and connects eight parks (Rhode Island State Parks 2022b). The Montaup Country Club is a popular and semi-private golf course in the county (COP Volume 2, Section 10.3.1.1.2.3; SouthCoast Wind 2024).

Newport County

Newport County is home to many parks with sports fields, concession stands, and historic buildings, including Aquidneck Park, Ballard Park, Brenton Point State Park, and Morton Park (City of Newport 2019). Popular tourist activities include museum and mansion tours, as well as the Cliff Walk, a 3.5-mile (5.6-kilometer) public access walk located along the eastern shore of the City of Newport (COP Volume 2, Section 10.3.1.1.2.2; SouthCoast Wind 2024). Tours of wineries and breweries are also very popular due to the large number of vineyards in the county. One of the most popular activities in Newport is the 10-mile coastal drive, which also includes bike paths (Discover Newport 2021).

3.6.8.2 Impact Level Definitions for Recreation and Tourism

Definitions of impact levels are provided in Table 3.6.8-1.

Table 3.6.8-1. Impact level definitions for recreation and tourism

Impact Level	Adverse or Beneficial	Definition
Negligible	Adverse	No impacts would occur, or impacts would be so small as to be unmeasurable.
	Beneficial	No effect or no measurable effect.
Minor	Adverse	Impacts on the affected activity or community would not disrupt the normal or routine functions of the affected activity or community.
	Beneficial	Small or measurable effects that would result in an economic improvement.
Moderate	Adverse	The affected activity or community would have to adjust somewhat to account for disruptions due to impacts of the Project.
	Beneficial	Notable and measurable effects that would result in an economic improvement.
Major	Adverse	The affected activity or community would experience substantial disruptions due to the Project.
	Beneficial	Large local or notable regional effects that would result in an economic improvement.

3.6.8.3 Impacts of Alternative A – No Action on Recreation and Tourism

When analyzing the impacts of the No Action Alternative on recreation and tourism, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for recreation and tourism. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D*, Planned Activities Scenario*.

Impacts of the No Action Alternative

Under the No Action Alternative, recreation and tourism in the geographic analysis area would continue to be affected by ongoing non-offshore wind activities, especially ongoing vessel traffic; noise and trenching from periodic maintenance or installation of piers, pilings, seawalls, and offshore cables; and onshore development activities. These activities would contribute to periodic disruptions to recreational and tourism activities but are a typical part of daily life along the Massachusetts and Rhode Island coastline and would not substantially affect recreational enjoyment in the geographic analysis area. Visitors would continue to pursue activities that rely on the area's coastal and ocean environment, scenic qualities, natural resources, and establishments that provide services for tourism and recreation. The geographic analysis area has a strong tourism industry and abundant coastal and offshore recreational facilities, many of which are associated with scenic views.

Ongoing offshore wind activities in the geographic analysis area that contribute to impacts on recreation and tourism include ongoing construction of the Vineyard Wind 1 project (62 WTGs and 1 OSP) in OCS-A 0501, the South Fork project (12 WTGs and 1 OSP) in OCS-A 0517, and the Revolution Wind project (65 WTGs and two OSPs) in OCS-A 0486. Ongoing construction of the Vineyard Wind 1, South Fork, and Revolution Wind projects would have the same type of impacts on recreation and tourism that are described in detail in *Cumulative Impacts of the No Action Alternative* for all ongoing and planned offshore wind activities, but the impacts would be of lower intensity.

Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Planned non-offshore wind activities that may affect recreation and tourism include emplacement of submarine cables and pipelines, dredging and port improvements, marine mineral use, and military use. Like ongoing activities, other planned non-offshore wind activities may result in periodic disruptions to recreation and tourism activities along the coast. However, visitors are expected to be able to continue to pursue activities that rely on other coastal and ocean environments, scenic qualities, natural resources and establishments that provide services to recreation and tourism.

The following sections summarize the potential impacts of ongoing and planned offshore wind activities in the geographic analysis area on recreation and tourism during construction, O&M, and decommissioning of the projects. Offshore wind projects other than the Proposed Action that contribute to impacts on recreation and tourism include projects within all or portions of the following lease areas: OCS-A-0486 (Revolution Wind), OCS-A-0487 (Sunrise Wind), OCS-A-0500 (Bay State Wind), OCS-A 0501

(Vineyard Wind 1), OCS-A 0517 (South Fork Wind), OCS-A-0520 (Beacon Wind), OCS-A 0522 (Vineyard Wind Northeast), and OCS-A 0534 (New England Wind) (Appendix D, Table D2-1).

Anchoring: This IPF would potentially affect recreational boating through both the presence of an increased number of anchored vessels in the geographic analysis area and the creation of offshore areas with cable hardcover or scour protection where recreational vessels may experience limitations or difficulty in anchoring.

Increased vessel anchoring during offshore wind development between 2023 and 2030 would affect recreational boaters. The greatest volume of anchored vessels would occur in offshore work areas during construction. The COP estimates there would be a maximum of 50 vessels in the Lease Area at one time (COP Volume 1, Section 3.3.14.1; SouthCoast Wind 2024). Offshore wind projects may generate similar numbers of active and anchored vessels, depending on project size and construction schedule. Anchored construction-related vessels may be within temporary safety zones established in coordination with USCG for active construction areas (COP Volume 2, Section 10.3.2.1.1; SouthCoast Wind 2024). Offshore wind development in the geographic analysis area is anticipated to result in increased survey activity and overlapping construction periods between 2023 and 2030.

Vessel anchoring would also occur during maintenance and monitoring activities during operations. Following construction of other offshore projects (if approved), the presence of operating offshore wind projects in the geographic analysis area would result in a long-term increase in the number of vessels anchored during periodic maintenance and monitoring. Vessel anchoring during maintenance and monitoring would have minor impacts on recreation and tourism.

Anchored construction, survey, or service vessels would have localized, temporary impacts on recreational boating. Recreational vessels could navigate around anchored vessels with only some brief inconvenience. The temporary turbidity from anchoring would briefly alter the behavior of species important to recreational fishing (Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*) and sightseeing (primarily whales, but also dolphins and seals) (Section 3.5.6, *Marine Mammals*). Inconvenience and navigational complexity for recreational vessels would be localized, variable, and long term, with increased frequency of anchored vessels during surveying and construction and reduced frequency of anchored vessels during operations. Construction, survey, and service vessel anchoring would have minor impacts on recreation and tourism.

Land disturbance: Other offshore wind development would require installation of onshore export cables and onshore substation infrastructure, which would cause temporary traffic delays and could temporarily affect access to adjacent properties, resulting in localized, temporary disturbances of recreational activity or tourism-based businesses near cable routes and construction sites for substations and other electrical infrastructure. These impacts would only last through construction and occasionally during maintenance events. The exact extent of impacts would depend on the locations of landfall and onshore transmission cable routes for offshore wind energy projects; however, it is anticipated these projects would generally have localized, short-term, negligible impacts during construction or maintenance and no long-term impacts on recreation and tourism use.

Lighting: Construction-related nighttime vessel lighting would be used if offshore wind development projects include nighttime, dusk, or early morning construction or material transport. In a maximum-case scenario, lights could be active throughout nighttime hours for other offshore wind projects in the geographic analysis area simultaneously under active construction (Appendix D, *Planned Activities Scenario*). Vessel lighting would enable recreational boaters to safely avoid nighttime construction areas. The impact on recreational boaters would be localized, sporadic, short term, and minimized by the limited offshore recreational activities that occur at night.

In the geographic analysis area, permanent aviation warning lighting required on the WTGs would be visible from beaches and coastlines of Martha's Vineyard and Nantucket and could have impacts on recreation and tourism in certain locations if the lighting influences visitor decisions in selecting coastal locations to visit. FAA hazard lighting systems would be in use for the duration of O&M for up to 901 WTGs. The amassing of these WTGs and associated synchronized flashing strobe lights affixed with a minimum of three red flashing lights at the mid-section of each tower and one at the top of each WTG nacelle in the offshore wind lease areas would have long-term impacts on sensitive onshore and offshore viewing locations, based on viewer distance and angle of view and assuming no obstructions. Atmospheric and environmental factors, such as haze and fog would influence visibility and perception of hazard lighting from sensitive viewing locations (Section 3.6.9, *Scenic and Visual Resources*).

A University of Delaware study evaluating the impacts of visible offshore WTGs on beach use found that WTGs visible more than 15 miles (24 kilometers) from the viewer would have negligible impacts on businesses dependent on recreation and tourism activity (Parsons and Firestone 2018). The study participants viewed visual simulations of WTGs in clear, hazy, and nighttime conditions (without ADLS). 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 [8 to 13 kilometers]) would adversely affect the rental price of properties with ocean views (Lutzeyer et al. 2017). It did not specifically address the relationship between lighting, nighttime views, and tourism for WTGs 15 or more miles (24.1 or more kilometers) from shore. Most WTG positions likely to be present based on anticipated offshore wind lease area build-out in the geographic analysis area would be more than 15 miles (24.1 kilometers) from coastal locations with views of the WTGs.

In addition to recreational fishing, some recreational boating in the region involves whale watching and other wildlife-viewing activity. A 2013 BOEM study evaluated the impacts of WTG lighting on birds, bats, marine mammals, sea turtles, and fish. The study found that existing guidelines "appear to provide for the marking and lighting of [WTGs] that will pose minimal if any impacts on birds, bats, marine mammals, sea turtles or fish" (Orr et al. 2013). By extension, existing lighting guidelines or ADLS (if implemented) would impose a minimal impact on recreational fishing or wildlife viewing.

As a result, although lighting on WTGs would have a continuous, long-term, minor adverse impact on recreation and tourism, the impact in the geographic analysis area is likely to be limited to individual decisions by visitors to the shorefronts of Martha's Vineyard and Nantucket and elevated areas, with less impact on the recreation and tourism industry as a whole.

The implementation of ADLS would activate the hazard lighting system in response to detection of nearby aircraft. The synchronized flashing of the navigational lights, if ADLS is implemented, would result in shorter-duration night sky impacts on the seascape, landscape, and viewers. The shorter-duration synchronized flashing of the ADLS is anticipated to have reduced visual impacts at night as compared to the standard continuous, medium-intensity red strobe FAA warning system due to the duration of activation. ADLS controlled obstruction lights would be activated in the Lease Area for less than 5 hours per year (COP Appendix T, Section 5.1.3; SouthCoast Wind 2024). It is anticipated that the reduced time of FAA hazard lighting resulting from an implemented ADLS would reduce the duration of potential impacts of nighttime aviation lighting to less than 1 percent of the normal operating time that would occur without using ADLS.

Cable emplacement and maintenance: Other offshore wind export cables in the geographic analysis area could total 1,738 miles (2,797 kilometers), while interarray cables could total 1,782 miles (2,868 kilometers) (excluding the Proposed Action). Cables for other offshore wind projects would likely be emplaced in the geographic analysis area between 2023 and 2030. Offshore cable emplacement for offshore wind development projects would have temporary, localized, adverse impacts on recreational boating while cables are being installed, because vessels would need to navigate around work areas, and recreational boaters would likely prefer to avoid the noise and disruption caused by installation. Cable installation could also have temporary impacts on fish and invertebrates of interest for recreational fishing, due to the required dredging, turbulence, and disturbance; however, species would recover upon completion (Section 3.5.5, *Finfish, Invertebrates, and Essential Fish Habitat*). The degree of temporal and geographic overlap of each cable is unknown, although cables for some projects could be installed simultaneously. Active work and restricted areas would only occur over the cable segment being emplaced at a given time. Once installed, cables would affect recreational boating only during maintenance operations, except that the mattresses covering cables in hard-bottom areas could hinder anchoring and result in gear entanglement or loss.

Impacts of cable emplacement and maintenance on recreational boating and tourism would be short term, continuous, adverse, and localized. Disruptions from cable emplacement and maintenance are anticipated to have a minor impact on recreation and tourism.

Noise: Noise from construction, pile driving, HRG survey activities, trenching, O&M, and vessels could result in minor adverse impacts on recreation and tourism.

Onshore construction noise from cable installation at the landfall sites, and inland if cable routes are near parkland, recreation areas, or other areas of public interest, would temporarily disturb the quiet enjoyment of the site (in locations where such quiet is an expected or typical condition). Similarly, offshore noise from HRG survey activities, pile driving, trenching, and construction-related vessels would intrude upon the natural sounds of the marine environment. This noise could cause some boaters to avoid areas of noise-generating activity, although some of the most intense noise could be within safety zones that USCG may establish within 12 nm of the coast for areas of active construction, which would be off-limits to boaters. BOEM conducted a qualitative analysis of impacts on recreational fisheries for the construction phases of offshore wind development in the Atlantic OCS region. Results showed the construction phase is expected to have a slightly negative to neutral impact on recreational fisheries due to both direct exclusion of fishing activities and displacement of mobile target species by the construction noise (Kirkpatrick et al. 2017). The impact of noise on recreation and tourism during construction would be adverse, intense, and disruptive, but short term and localized.

Adverse impacts of noise on recreation and tourism would also result from the adverse impacts on species important to recreational fishing and sightseeing in the geographic analysis area and along cable routes. Because most recreational fishing takes place closer to shore, only a small proportion of recreational fishing would be affected by construction noise of WTGs. Recreational fishing for highly migratory species, such as tuna, shark, and marlin, is more likely to be affected, as the highly migratory species fishery usually occurs farther offshore than most recreational fisheries and, therefore, is more likely to experience temporary impacts resulting from the noise generated by offshore wind construction. Construction noise could contribute to temporary impacts on marine mammals, with resulting impacts on marine sightseeing that relies on the presence of mammals, primarily whales. However, as noted in Section 3.5.6, *Marine Mammals*, other projects are expected to comply with mitigation measures (e.g., exclusion zones, protected species observers) that would avoid and minimize underwater noise impacts on marine mammals.

Offshore wind surveying and construction would occur in the geographic analysis area between 2023 and 2030. Based on the discussion above, offshore wind construction would result in short-term, localized, adverse impacts on recreational fishing and marine sightseeing related to fish and marine mammal populations. Multiple construction projects would increase the spatial and temporal extent of temporary disturbance to marine species in the geographic analysis area. As indicated in Appendix D, *Planned Activities Scenario*, up to 901 offshore WTGs could be installed between 2023 and 2030 in the geographic analysis area, not including the Proposed Action. No long-term, adverse impacts are anticipated that would result in population-level harm to fish and marine mammal populations.

During operations, the continuous noise generated by WTG operation would occur at least 12 miles (32 kilometers) from any onshore noise-sensitive locations and is not expected to produce sound in excess of background levels at any onshore locations. Noise from operational WTGs would be expected to have little effect on finfish, invertebrates, and marine mammals and, therefore, little effect on recreational fishing or sightseeing. The impact of noise during O&M would be negligible, localized, continuous, and long term, with brief, more-intensive noise during occasional repair activities.

Port utilization: Ports in the geographic analysis area for recreation and tourism that could be used for construction and O&M of offshore wind development include ports off the coast of Massachusetts, Rhode Island, Connecticut, and Virginia (COP Volume 1, Section 3.3.13; SouthCoast Wind 2024). These ports may also provide facilities for recreational vessels or may be on waterways shared with recreational marinas, and may experience increased activity, expansion, or dredging. Regional ports suitable for staging and construction of other offshore wind development are primarily industrial in character, with recreational activity as a secondary use.

Port improvements could result in negligible impacts as a result of short-term delays and crowding during construction but could provide long-term benefits to recreational boating if the improvements result in increased berths and amenities for recreational vessels or improved navigational channels.

Presence of structures: The placement of 901 WTGs (excluding the Proposed Action) in the geographic analysis area would contribute to impacts on recreational fishing and boating. The offshore structures would have long-term, adverse impacts on recreational boating and fishing through the risk of allision; risk of gear entanglement, damage, or loss; navigational hazards; space use conflicts; presence of cable infrastructure; and visual impacts (additional information provided in Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing*). However, offshore wind structures could have beneficial impacts on recreation through fish aggregation and reef effects. The WTGs installed for offshore wind development (excluding the Proposed Action) are expected to serve as additional artificial reef structures, providing additional locations for recreational for-hire fishing trips, potentially increasing the number of trips and revenue. The increased number of fishing trips out of nearby ports could also support increased angler expenditures at local bait shops, gas stations, and other shore-side dependents.

Offshore wind development could require adjustment of routes for recreational boaters, anglers, sailboat races, and sightseeing boats, but the adverse impact of the offshore wind structures on recreational boating would be limited by the distance offshore. Most recreational boating takes place within 3 nm (5.5 kilometers) of the shore and within state waters (COP Volume 2, Section 10.3.1.2.1; SouthCoast Wind 2024). Boating routes with the highest density in Nantucket Sound were located in the channel between Falmouth and Martha’s Vineyard and north of the Nantucket Boat Basin. In addition, sailing in the geographic analysis area primarily occurs in relatively small areas in the bays and inlets and just along the coastline. Private recreational anglers may avoid fishing near WTG structures due to concerns about their ability to safely fish in or navigate through the area. Kirkpatrick et al. (2017) analyzed recreational fishing exposure from offshore wind development by quantifying the total recreational fishing activity that may be affected by offshore wind development in a given area if anglers opt to no longer fish in this area and cannot go to a different location. For the Massachusetts WEA, recreational fishing was considered “exposed” to potential impact if at least part of the trip occurred within 1 nm (1.9 kilometers) of the Massachusetts WEA during the study period (2007–2012). During the study period, angler trips from Fall River and New Bedford, Massachusetts, would be most exposed to the Massachusetts WEA. From Fall River, about 4,133 private angler trips, or 10.0 percent of total angler trips, would be exposed. From New Bedford, about 4,067 private angler trips, or 9.6 percent of total angler trips, would be exposed (Kirkpatrick et al. 2017). See Section 3.6.1, *Commercial Fisheries and For-Hire Recreational Fishing,* for more discussion on for-hire fishing.

WTG foundations, associated scour protection, and cable protection for export and interarray cables would result in an increased risk of entanglement. The cable protection would also present a hazard for anchoring, because anchors could have difficulty holding or become snagged and lost. Accurate marine charts could make operators of recreational vessels aware of the locations of the cable protection and scour protection. If the hazards are not noted on charts, operators may lose anchors, leading to increased risks associated with drifting vessels that are not securely anchored.

Offshore WTGs could provide new opportunities for offshore tourism by attracting recreational fishing and sightseeing. The structures could produce artificial reef effects. The “reef effect” refers to the introduction of a new hard-bottom habitat that has been shown to attract numerous species of algae, shellfish, finfish, and sea turtles to new benthic habitat (COP Volume 2, Section 6.7.4.3, Table 6-56; SouthCoast Wind 2024). The reef effect could attract species of interest for recreational fishing and result in an increase in recreational boaters traveling farther from shore to fish in the geographic analysis area.

As it relates to the visual impacts of structures, the vertical presence of WTGs on the offshore horizon may affect recreational experience and tourism in the geographic analysis area. Section 3.6.9, *Scenic and Visual Resources*, describes the visual impacts from offshore wind infrastructure. Studies and surveys that have evaluated the impacts of offshore wind facilities on tourism found that established offshore wind facilities in Europe did not result in decreased tourist numbers, tourist experience, or tourist revenue, and that Block Island Wind Farm’s WTGs provide excellent sites for fishing and shellfishing (Smythe et al. 2018). A survey-based study found that, for prospective offshore wind facilities (based on visual simulations), proximity of WTGs to shore is correlated to the share of respondents who would expect a worsened experience visiting the coast (Parsons and Firestone 2018).

- At 15 miles (24.1 kilometers), the percentage of respondents who reported that their beach experience would be worsened by the visibility of WTGs was about the same as the percentage of those who reported that their experience would be improved (e.g., by knowledge of the benefits of offshore wind).
- About 68 percent of respondents indicated that the visibility of WTGs would neither improve nor worsen their experience.
- Reported trip loss (respondents who stated that they would visit a different beach without offshore wind development) averaged 8 percent when wind projects were 12.5 miles (20 kilometers) offshore, 6 percent when 15 miles (24.1 kilometers) offshore, and 5 percent when 20 miles (32 kilometers) offshore.
- About 2.6 percent of respondents were more likely to visit a beach with visible offshore wind facilities at any distance.

A 2019 survey of 553 coastal recreation users in New Hampshire included participants in water-based recreational activities, such as fishing from shore and boats, motorized and non-motorized boating, beach activities, and surfing at the New Hampshire seacoast. Most (77 percent) supported offshore wind development along the New Hampshire coast, while 12 percent opposed it and 11 percent were neutral. Regarding the impact on their outdoor recreation experience, 43 percent anticipated that offshore wind development would have a beneficial impact, 31 percent anticipated a neutral impact, and 26 percent anticipated an adverse impact (BOEM 2021).

The wind turbines considered in the studies cited above anticipated smaller WTGs than are proposed for the planned offshore wind projects in the region, including the Proposed Action. The 2018 Parsons and Firestone study was based on turbines with blade tips of 574 feet (175 meters) at distances of 2.5 to 20 miles (4 to 32 kilometers) offshore. In comparison, the Proposed Action's WTGs would have a blade tip height of up to 1,066.3 feet (325.0 meters) but would be located 23 miles (37 kilometers) from shore at the closest point. Both the WTGs examined in the studies and the WTGs considered as part of planned offshore wind projects would have WTG hubs, nacelles, navigation lights, and rotor blades visible to viewers on the nearest beaches. The visibility of the WTGs would be variable, depending on meteorological, moonlight, and sunlight conditions. In views seaward, there would be periods of high, moderate, low and no visibility. Therefore, both the 2018 Parsons and Firestone study and this EIS conclude that the WTGs' hubs, nacelles, navigation lights, and rotor blades would be visible to viewers on the nearest beaches. The taller WTGs associated with planned offshore wind projects would result in increased numbers of WTGs visible, but they would be at greater distances compared to the cited studies; therefore, the results of the studies are still relevant to this analysis.

Portions of the WTGs in the geographic analysis area associated with other offshore wind projects could be visible from shorelines (depending on vegetation, topography, weather, atmospheric conditions, and the viewers' visual acuity). WTGs visible from some shoreline locations in the geographic analysis area would have adverse impacts on visual resources when discernable due to the introduction of industrial elements in previously undeveloped views. A 2020 survey-based preference study to determine attitude toward offshore wind and if the presence of offshore wind turbines affects the number of trips a beachgoer makes to the beach found that developed beaches with boardwalks and beaches that were designated as local, state, or national parks had the lowest amount of reported trip cancellations (Parsons et al. 2020). The beachgoers at local, state, or national park beaches self-reported as more favorable toward wind power and correspondingly appeared less inclined to cancel a trip due to the presence of wind turbines. Refer also to Section 3.6.3, *Demographics, Employment, and Economics*, for additional discussion of the economic impacts on recreation and tourism from the visual presence of WTGs and OSPs.

Based on the relationship between visual impacts and impacts on recreational experience, the impact of visible WTGs on recreation would be moderate, long term, continuous, and adverse. Seaside locations could experience some reduced recreational and tourism activity, but the visible presence of WTGs would be unlikely to affect shore-based or marine recreation and tourism in the geographic analysis area as a whole.

Traffic: Other offshore wind project construction and decommissioning and, to a lesser extent, offshore wind project operation would generate increased vessel traffic that could inconvenience recreational vessel traffic in the geographic analysis area. The impacts would occur primarily during construction, along routes between ports and the offshore wind construction areas. Vessel traffic for each project is not known but is anticipated to be similar to that of the Proposed Action, which is projected to generate between 15 and 35 vessels operating in the Wind Farm Area or over the offshore export cable route at any given time (COP Volume 1, Section 3.3.14.1; SouthCoast Wind 2024). Between 2023 and 2030 as many as 12 offshore wind projects (not including the Proposed Action) could be under construction. During periods of overlapping construction and assuming similar vessel counts as under the Proposed Action, construction of offshore wind projects would generate up to 420 vessels (either underway or at anchor) at any given time in the geographic analysis area.

Increased vessel traffic would require increased alertness on the part of recreational or tourist-related vessels and would result in minor delays or route adjustments. The likelihood of vessel collisions would increase as a result of the higher volumes of vessel traffic during construction. The possibility of delays and risk of collisions would increase if more than one offshore wind facility is under construction at the same time. Vessel traffic associated with offshore wind would have long-term, variable, minor adverse impacts on vessel traffic related to recreation and tourism. Higher volumes during construction would result in greater inconvenience, disruption of the natural marine environment, and risk of collision. Vessel traffic during operations would represent only a modest increase in the background volumes of vessel traffic, with minimal impacts on recreational vessels.

Conclusions

Impacts of the No Action Alternative: BOEM expects ongoing non-offshore wind activities and offshore wind activities to have continuing impacts on recreation and tourism. The impacts of ongoing activities, including ongoing construction of the Vineyard Wind 1 and South Fork projects, ongoing vessel traffic, presence of structures, and the noise and trenching from periodic maintenance or installation of piers, pilings, seawalls, or offshore cables, would be **minor**.

Cumulative Impacts of the No Action Alternative: BOEM anticipates that planned activities would have a noticeable incremental effect on the cumulative impacts of the No Action Alternative, which would be **moderate** adverse and **minor beneficial**. Planned offshore wind activities are expected to contribute considerably to several IPFs, the most prominent being noise and vessel traffic during construction and the presence of offshore structures during operations. Noise and vessel traffic would have impacts on visitors, who may avoid onshore and offshore noise sources and vessels, and on recreational fishing and sightseeing as a result of the impacts on fish, invertebrates, and marine mammals. BOEM also anticipates that the offshore wind activities in the geographic analysis area would result in minor beneficial impacts due to the presence of offshore structures and cable hardcover, which could provide opportunities for fishing and sightseeing. Planned non-offshore activities including emplacement of submarine cables and pipelines, dredging and port improvements, marine mineral use, and military use would also contribute to impacts, but any disruptions to recreational activity would be temporary and minimal.

3.6.8.4 Relevant Design Parameters and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than described in the following sections. The following proposed PDE parameters (Appendix C, *Project Design Envelope and Maximum-Case Scenario*) would influence the magnitude of the impacts on recreation and tourism.

- The Project layout including the number, type, height, and placement of the WTGs and OSPs, and the design and visibility of lighting on the structures.
- Arrangement of WTGs and accessibility of the Wind Farm Area to recreational boaters.
- The time of year during which onshore and nearshore construction occurs.

Variability of the proposed Project design exists as outlined in Appendix C. Below is a summary of potential variances in impacts.

- WTG number, size, location, and lighting: More WTGs and larger turbine sizes closer to shore could increase visual impacts that affect onshore recreation and tourism, as well as recreational boaters. Arrangement and type of lighting systems would affect nighttime visibility of WTGs onshore.
- WTG arrangement and orientation: Different arrangements of WTG arrays may affect navigational patterns and safety of recreational boaters.
- Time of construction: Tourism and recreational activities in the geographic analysis area tend to be higher from May through September, and especially from June through August (Parsons and Firestone 2018). Impacts on recreation and tourism would be greater if Project construction were to occur during this season.

SouthCoast Wind has committed to measures to minimize impacts on recreation and tourism, which include, but are not limited to, developing, and implementing a Traffic Management Plan to minimize disruptions to residences and commercial establishments in the vicinity of onshore construction activities and development of an onshore construction schedule to minimize effects on recreational uses and tourism-related activities to the extent feasible (COP Volume 2, Table 16-1; SouthCoast Wind 2024).

3.6.8.5 Impacts of Alternative B – Proposed Action on Recreation and Tourism

The Proposed Action would have long-term, minor impacts on recreation and tourism in the geographic analysis area due to the visual impact of the 147 WTGs from coastal locations and the greater navigational risks for recreational vessels in the Wind Farm Area. It would also have long-term, minor beneficial impacts due to the fish aggregation and habitat conversion impacts of the WTGs and OSPs, resulting in new fishing and sightseeing opportunities. The Proposed Action would have short-term, minor impacts during construction due to the temporary impacts of noise and vessel traffic on recreational vessel traffic, the natural environment, and species important for recreational fishing and sightseeing.

Anchoring: Anchoring by Proposed Action construction, O&M, and decommissioning vessels would contribute to disturbance of marine species and inconvenience to recreational vessels that must navigate around the anchored vessels. Construction of the Proposed Action would generate between 15 and 35 vessels operating in the Wind Farm Area or over the offshore export cable route at any given time (COP Volume 1, Section 3.3.14.1; SouthCoast Wind 2024). SouthCoast Wind has proposed implementing safety zones around offshore construction areas in consultation with the USCG, which would minimize the potential for recreational boater interaction with anchored construction vessels in these areas (COP Volume 2, Section 10.3.2.1.1; SouthCoast Wind 2024). Vessel anchoring for construction of the Proposed Action would have localized, short-term, minor impacts on tourism and recreation due to the need to navigate around vessels and work areas and the disturbance of species important to recreational fishing.

Land disturbance: Onshore construction would affect recreation and tourism where construction activity interferes with access to recreation sites or increases traffic, noise, or temporary emissions that degrade the recreational experience. Ground disturbance from installation of the cables would be localized to the immediate vicinity of construction (COP Volume 1, Section 3.4.1.4.1; SouthCoast Wind 2024). Several of the proposed landfall sites for both export cable corridors would occur within or adjacent to recreational areas. For the Falmouth onshore export cable, these areas include a landfall in Worcester Park near Falmouth Heights Beach, within Central Park at Falmouth Heights Beach, and at a public parking area at Surf Drive Beach. For the Brayton Point onshore export cable, these areas include the entry landfall near Island Park Beach, HDD-installed cables underneath Bertha K. Russel Preserve, and an exit landfall within a parking lot at the Montaup Country Club at the intermediate landfall on Aquidneck Island. During HDD activity at these landfalls, recreational users of these and nearby sites would experience temporary disruptions including elevated noise, emissions, and visual disturbances that may decrease recreational enjoyment. Sites may need to be fully or partially closed while construction activity is taking place, further restricting the recreational use of these areas. Because the HDD landfall sites are proposed inland, no impacts on beach access or recreational fishing is expected, with the exception of the Falmouth landfall in the public parking area at Surf Drive Beach where use of the parking lot may be restricted during construction. Based on NOAA's Marine Recreational Information Program (NOAA 2022c), no public fishing sites are in the immediate vicinity to these landfall sites that would be affected by HDD or other cable installation activities.

Following construction, these sites would be returned to their previous condition, with the exception of a transition joint/vault that can be accessed for maintenance, and recreational use would be restored. From the point of landfall, cables would be installed in trenches within existing roadways where feasible (COP Volume 1, 3.3.7.1; SouthCoast Wind 2024). Because the onshore cable routes would mostly follow existing road rights-of-way, there would be no direct impacts on recreational sites or activities, although there may be some temporary indirect impacts due to temporary lane closures, detours, and vehicle congestion. Overall, installation of the landfall locations and onshore cable routes would result in localized, short-term, and minor impacts on recreation and tourism. The proposed onshore substations, if Falmouth is selected as the POI for Project 2, and converter stations would be located on gravel quarry sites and a former power plant where no recreational activity occurs. Therefore, impacts from onshore construction of these facilities would be localized, temporary, and negligible.

As discussed in Section 3.6.3, *Demographics, Employment, and Economics*, the employment and economic impact would be localized, short term, and minor. As discussed in Section 3.6.5, *Land Use and Coastal Infrastructure*, technologies may be used to minimize impacts on land disturbance. SouthCoast Wind has committed to implementing a construction schedule to minimize activities in the onshore export cable route during the peak summer recreation and tourism season and to coordinate with local municipalities to minimize impacts on popular events in the area during construction, to the extent practicable (COP Volume 2, Section 16, Table 16-1; SouthCoast Wind 2024). These measures would minimize impacts on recreation and tourism from construction activities.

Lighting: When nighttime construction occurs, the vessel lighting for vessels traveling to and working at the Proposed Action's offshore construction areas may be visible from onshore locations depending upon the distance from shore, vessel height, and atmospheric conditions. Visibility would be sporadic and variable. Although most construction is expected to occur during daylight hours, construction vessels would use work lights to improve visibility during night or poor visibility, in accordance with USCG requirements.

During operations, the Proposed Action would have a discrete contribution to nighttime visibility of the WTGs due to required aviation hazard lighting. SouthCoast Wind has committed to voluntarily implementing ADLS, which would activate the Proposed Action's WTG lighting only when aircraft approach the WTGs (COP Volume 2, Section 8.2.2.2; SouthCoast Wind 2024). The implementation of ADLS would reduce the duration of the potential impacts of nighttime aviation lighting to less than 1 percent of the normal operating time that would occur without using ADLS (COP Appendix T, Section 5.1.3; SouthCoast Wind 2024). During times when the Proposed Action's aviation warning lighting is visible, this lighting would add a developed/industrial visual element to views that were previously characterized by dark, open ocean. Due to the limited duration and frequency of such events and the distance of the Proposed Action's WTGs from shore, visible aviation hazard lighting for the Proposed Action would result in a long-term, intermittent, negligible impact on recreation and tourism. For the onshore substations, SouthCoast Wind will work with Falmouth and Somerset, Massachusetts to ensure the lighting scheme for the onshore substation and/or converter stations complies with Town requirements. Operational lighting would be down-shielded to mitigate light pollution and will be designed to comply with nigh sky lighting standards (COP Volume 2, Section 8.2.2.2; SouthCoast Wind 2024).

Cable emplacement and maintenance: The Proposed Action's cable emplacement would generate vessel anchoring and dredging at the worksite, requiring recreational vessels to avoid and navigate around the worksites and resulting in short-term disturbance to species important to recreation and tourism. The Proposed Action would require export cables that would be 1,179 statute miles (1,897 kilometers) long and interarray cables that would be 497 statute miles (800 kilometers) long (Appendix D, Table D2-1). Cable installation would require a maximum of eight vessels (three cable lay barges and five cable transport and lay vessels) (COP Volume 1, Section 3.3.14.1, Table 3-21; SouthCoast Wind 2024). Recreational vessels traveling near the offshore export cable routes would need to navigate around vessels and access-restricted areas associated with the offshore export cable installation. The proposed Falmouth and Brayton Point offshore export cable routes intersect and pass adjacent to several popular offshore fishing areas, including the Owl and Mutton Shoal (COP Volume 2, Figure 11-22, SouthCoast Wind 2024). SouthCoast Wind has committed to developing a communication plan to inform recreational fishers, among others, of construction and maintenance activities and vessel movements, which would minimize potential adverse impacts associated with cable emplacement and maintenance activity (COP Volume 2, Section 10.3.2.2.2; SouthCoast Wind 2024). The localized, temporary need for changes in navigation routes due to Proposed Action construction would constitute a minor impact.

Cable installation could also affect fish and marine mammals of interest for recreational fishing and sightseeing through dredging and turbulence, although species would recover upon completion (Section 3.5.6, *Marine Mammals*, and Section 3.5.7, *Sea Turtles*), resulting in localized, short-term, minor impacts on recreation and tourism. Cable emplacement and maintenance that occur near beaches, fishing sites, or nearshore recreational activities could contribute to recreational impacts due to temporary water quality impacts during construction and maintenance.

Noise: Noise from onshore cable installation, O&M, pile driving and trenching, and vessels could result in impacts on recreation and tourism. Temporary impacts on recreation and tourism would result from impacts in the Wind Farm Area and along the offshore export cable route on species important to recreational fishing and marine sightseeing. The temporary disruptions to or changes in offshore fish, shellfish, and whale populations (Sections 3.5.5 and 3.5.6) would have a minor impact on recreational fishing or marine sightseeing.

In addition to the temporary disruption to fish and shellfish, noise generated by offshore construction and onshore cable installation would have impacts on the recreational enjoyment of the marine and coastal environments, with minor impacts on recreation and tourism. Offshore construction noise would occur from vessels, pile driving, and other installation activities along the offshore export cable route and in the Wind Farm Area. As the Proposed Action would be built 20 nm (48 kilometers) offshore, noise effects from offshore construction noise on onshore recreational activities would be temporary and negligible. Recreational boaters in the vicinity of the WTG and offshore cable installation may experience increased noise from construction, which would temporarily inconvenience recreational boaters.

SouthCoast Wind conducted noise modeling for onshore construction activities (e.g., HDD) and onshore substation and converter stations operations to assess the impact on sensitive receptors and conformance with acoustic regulatory thresholds (COP Volume 2, Section 9; SouthCoast Wind 2024). The analysis determined that noise from construction and operations would comply with applicable thresholds assuming implementation of applicant-proposed measures, such as installing sound barriers (refer to COP Volume 2, Section 9.1.5 for a description of the proposed measures [SouthCoast Wind 2024]). While temporary noise increases could affect the enjoyment of some recreators in the vicinity of construction activity, the effects would be localized, short-term and minor. Because the proposed onshore substations and converter stations would be located on sand and gravel quarries and a former power plant where no recreational use occurs, and SouthCoast Wind would implement applicant-proposed measures to minimize noise levels, the effects of operational noise on recreation would be long-term but negligible.

Overall, construction noise from the Proposed Action alone would have localized, short-term, minor impacts on recreation and tourism. Offshore operational noise from the WTGs would be similar to the noise described for other projects under the No Action Alternative and would, therefore, have continuous, long-term, negligible impacts.

Port utilization: In the geographic analysis area, the Proposed Action would use facilities primarily off the coast of Massachusetts and Rhode Island for construction and O&M (COP Volume 1, Section 3.3.13; SouthCoast Wind 2024). No port upgrades are proposed as part of the Proposed Action upgrades. Vessel traffic in the port areas may result in short-term delays and crowding during construction, which could temporarily affect recreational vessel use. The Proposed Action would have a short-term, negligible impact on recreation and tourism due to port utilization in the geographic analysis area.

Presence of structures: The Proposed Action's 149 WTGs and five OSPs would affect recreation and tourism through increased navigational complexity; attraction of recreational vessels to offshore wind structures for fishing and sightseeing; the adjustment of vessel routes for recreational fishing; the risk of fishing gear loss or damage by entanglement due to scour or cable protection; difficulties in anchoring over scour or cable protection; and visual impacts.

Construction and installation, expected to begin in 2025, would affect recreational boaters. Risk of allision with anchored vessels would increase incrementally during construction, as more anchored vessels would be in the recreation and tourism geographic analysis area. SouthCoast Wind has committed to developing a communication plan to inform the public of construction and maintenance activities and vessel movements, which would minimize potential adverse impacts associated with structure construction activities (COP Volume 2, Section 10.3.2.2.2; SouthCoast Wind 2024). Most recreational boating takes place within 3 nm (5.5 kilometers) of the shore and within state waters (COP Volume 2, Section 10.3.1.2.1; SouthCoast Wind 2024). Boating routes with the highest density in vicinity of Nantucket Sound were located in the channel between Falmouth and Martha's Vineyard and north of the Nantucket Boat Basin. Given the Lease Area's relative distance from shore and marina facilities, recreational boating activity in the Lease Area is less intense than in areas closer to the coast. SouthCoast Wind proposes to minimize impacts through the navigation-related AMMs listed in the COP Volume 2 Table 16-1.

During O&M of the Proposed Action, the permanent presence of WTGs would create obstacles for recreational vessels. At their lowest point, WTG blade tips would be 75.5 feet (23 meters) above the highest astronomical tide (COP Volume 1, Section 3.3.2; SouthCoast Wind 2024). At this height, larger sailboats would need to navigate around the Wind Farm Area, while smaller vessels could navigate unobstructed (except for the WTG monopiles).

There are several popular offshore fishing areas in the geographic analysis area as shown in the COP Volume 2 Figure 11-22, but none of these areas overlap the Lease Area (SouthCoast Wind 2024). As noted in Section 3.6.1, *Commercial Fisheries and For Hire Recreational Fishing*, navigational hazards and scour/cable protection due to the presence of structures from ongoing and planned activities, including the Proposed Action, would result in substantial adverse impacts on commercial fisheries and for-hire recreational fishing. Some beneficial impacts on recreational fishing due to the artificial reef effect are expected. Evidence from Block Island Wind Farm indicates an increase in recreational fishing near the WTGs (Smythe et al. 2018). However, the magnitude of benefits to recreational fishermen resulting from the Project may be reduced due to the greater distance of these structures from the shore (Starbuck and Lipsky 2013). As noted, surveys of recreational boaters along the northeastern United States coast found that the highest density of recreational vessels occurs within 1 nm of the coastline (Starbuck and Lipsky 2013). BOEM does not anticipate that habitat conversion and fish aggregation due to the presence of structures would result in considerable changes in fish distributions across the geographic analysis area. Overall, the impacts on recreational fishing, boating, and sailing generally would be negligible, while the impacts on for-hire fishing would be minor because these enterprises are more likely to be materially affected by displacement.

As it relates to visual impacts of presence of structures, the Proposed Action's WTGs would also affect recreation and tourism through visual impacts. During construction, viewers on Martha's Vineyard and Nantucket would see the upper portions of tall equipment, such as mobile cranes. These cranes would move from turbine to turbine as construction progresses and, thus, would not be long-term fixtures. Based on the duration of construction activity, visual contrast associated with construction of the Proposed Action would have a temporary, negligible impact on recreation and tourism.

The WTGs would be in open ocean approximately 20 nm (37 kilometers) east from the coast. The maximum-case WTGs would have a hub height of 605.1 feet (184.4 meters) above mean lower low water (COP Volume 1, Section 3.3, Table 3-1; SouthCoast Wind 2024), a navigation light at the top of the nacelle, and a mid-tower light. At maximum vertical extension, the blade tips of the WTGs (1,066.3 feet or 325.0 meters) would be theoretically visible to a viewer at a 5-foot (1.5-meter) eye level above the ocean surface or beach shoreline elevation at distances up to 42.8 miles (68.9 kilometers) on clear-day conditions. Between 33.6 (54.1 kilometers) and 42.8 miles (68.9 kilometers), only the WTG blades would be potentially visible above the horizon from the perspective of a beach-elevation viewer. The blades, navigation light, nacelle, hub, tower, and mid-tower light would be theoretically visible to viewers on the ocean surface or beach shoreline at distances between 24.2 (38.9 kilometers) and 42.8 miles (68.9 kilometers). SouthCoast Wind has voluntarily committed to use ADLS and non-reflective pure white (RAL Number 9010) or light gray (RAL Number 7035) paint colors to reduce impacts (COP Appendix T, Section 5.4; SouthCoast Wind 2024). Section 3.6.9, *Scenic and Visual Resources,* describes the visual impacts from offshore wind infrastructure.

The visual impact of future offshore wind structures could affect recreation and tourism, including on Martha's Vineyard and Nantucket where the WTGs are visible. The visual contrast created by the WTGs could have a beneficial, adverse, or neutral impact on the quality of the recreation and tourism experience depending on the viewer's orientation, activity, and purpose for visiting the area. For example, on Nantucket, the view of WTGs from the Nantucket Historic District may affect heritage tourists, for which the historic character of the area is an important feature (refer to Section 3.6.2, *Cultural Resources*, for a discussion of the effects on the Nantucket Historic District and BOEM's consultation under Section 106 of the NHPA to mitigate effects). Studies and surveys that have evaluated the impacts of offshore wind facilities on tourism have identified variable reactions to offshore wind, with respondents having positive, neutral, or negative views of the effect that offshore wind infrastructure would have on their experience of coastal recreation (Parsons and Firestone 2018; BOEM 2021), while a study in Europe found that established offshore wind facilities did not result in decreased tourist numbers, tourist experience, or tourist revenue (Smythe et al. 2018). Beaches with views of WTGs could gain trips from the estimated 2.5 percent of beach visitors for whom viewing the WTGs would be a positive result, offsetting some lost trips from visitors who consider views of WTGs to be negative and the 8 percent of respondents who stated they would visit a different beach without offshore wind development (Parsons and Firestone 2018). Additional research on the link between visual impacts of future offshore wind, and resultant impacts on recreation and tourism, is summarized in Section 3.6.8.3, *Impacts of Alternative A – No Action on Recreation and Tourism*. Refer also to Section 3.6.3, *Demographics, Employment, and Economics*, for a discussion of the economic impacts on tourism and recreation from the visible presence of the Proposed Action's WTGs and OSPs. BOEM expects the impact of visible WTGs on the use and enjoyment of recreation and tourist facilities and activities during O&M of the Proposed Action to be long term, continuous, and minor.

Traffic: The Proposed Action would contribute to increased vessel traffic and associated vessel collision risk, primarily during Project construction and decommissioning, along routes between ports and the offshore construction areas. Construction of the Proposed Action would generate between 15 and 35 vessels operating in the Wind Farm Area or over the offshore export cable route at any given time (COP Volume 1, Section 3.3.14.1; SouthCoast Wind 2024). Recreational vessels may experience delays in the ports serving construction, but most recreational boaters in the geographic analysis area would experience only minor inconvenience from construction-related vessel traffic. Vessel travel requiring a specific route that crosses or approaches the offshore export cable routes could potentially experience minor impacts. Operation of the Proposed Action would have localized, long-term, intermittent, minor impacts on recreational vessel traffic near ports and in open waters. Impacts during decommissioning would be similar to the impacts during construction and installation.

Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned activities. The cumulative impacts from vessels anchoring would be short-term and minor and would be most pronounced when multiple offshore wind projects are under construction at one time. The Proposed Action would incrementally contribute to land disturbance impacts from ongoing and planned activities that disrupt recreational access or enjoyment. Because most land disturbance impacts would be temporary, and overlapping construction activity from the Proposed Action and other projects is anticipated to be minimal, cumulative impacts would be short-term and minor.

The Proposed Action would add to the combined lighting impacts from ongoing and planned activities including offshore wind. The Proposed Action, in combination with other ongoing and planned offshore wind projects, would cause aviation hazard lighting to be potentially visible from 1,048 total WTGs. ADLS would reduce the nighttime impact significance on recreation and tourism to negligible due to substantially limited hours of lighting (COP Appendix T, Section 5.1.3; SouthCoast Wind 2024).

The cumulative impacts of the Proposed Action related to cable emplacement would have minor impacts on recreation and tourism, due to the localized and temporary nature of the impacts and ability of displaced users to use alternate nearby locations during construction and installation, O&M, and decommissioning of offshore export cables. Similarly, noise created as a result of the Proposed Action in combination with other ongoing and planned activities would have minor impacts on recreation and tourism, as construction noise would be temporary and users could avoid elevated noise levels by using alternative locations. Impacts of noise on recreation and tourism during operations would be negligible and long term. The Proposed Action would incrementally contribute to increased port utilization that, combined with other ongoing and planned activities, would have negligible impacts on recreation and tourism because any delays at ports would be short in duration and temporary.

The Proposed Action would contribute incrementally to the combined impacts on recreational boating, fishing, and other marine recreational activity from ongoing and planned activities associated with the presence of structures. The geographic extent of impacts would increase as additional offshore wind projects are constructed, resulting in negligible to minor adverse impacts on recreational fishing, recreational sailing and boating, and for-hire recreational fishing, as well as minor beneficial impacts associated with the artificial reef effect.

Portions of 1,048 WTGs from the Proposed Action combined with future offshore wind projects could be visible from coastal and elevated locations in the geographic analysis area and contribute to impacts on recreation and tourism. The Proposed Action WTGs would contribute the most from the closest locations, including Wasque Point on the southeastern end of Chappaquiddick Island (east of Martha's Vineyard) and Ladies Beach on the southern edge of Nantucket (COP Appendix T, Section 5.3.1, Tables 5-8 and 5-9; SouthCoast Wind 2024). Atmospheric conditions could limit the number of WTGs discernable during daylight hours for a significant portion of the year (COP Appendix T, Section 5.1.3; SouthCoast Wind 2024). The combined visual impacts on recreation and tourism from ongoing and planned activities including offshore wind would be long term, continuous, and minor in the overall geographic area, with moderate impacts on shoreline areas with views of WTGs.

Overlapping construction schedules of the Proposed Action and other offshore wind projects in the geographic analysis area would increase traffic between ports and work areas, requiring increased alertness on the part of recreational or tourist-related vessels, and possibly resulting in a greater number of minor delays or route adjustments. The likelihood of vessel collisions would increase as a result of the higher volumes of vessel traffic during construction. Modest levels of vessel traffic are anticipated from offshore wind operations. In context of reasonably foreseeable environmental trends, incremental impacts contributed by the Proposed Action to the combined vessel traffic impacts on recreation and tourism from ongoing and planned activities would be localized, short term, and minor.

Conclusions

Impacts of the Proposed Action: The impacts of the Proposed Action would be **minor** and **minor beneficial**. Impacts would result from short-term impacts during construction: noise, anchored vessels, and hindrances to navigation from the installation of the export cable and WTGs, as well as the long-term presence of cable hardcover and structures in the Wind Farm Area during operations, with resulting impacts on recreational vessel navigation and visual quality. Beneficial impacts would result from the reef effect and sightseeing attraction of offshore wind energy structures.

Cumulative Impacts of the Proposed Action: In context of other reasonably foreseeable environmental trends, the combination of the Proposed Action and other ongoing and planned activities would result in **moderate** impacts with **minor beneficial** impacts. The main drivers for this impact rating are the visual impacts associated with the presence of structures and lighting; impacts on fishing and other recreational activity from noise, vessel traffic, and cable emplacement during construction; and beneficial impacts on fishing from the reef effect.

3.6.8.6 Impacts of Alternative C on Recreation and Tourism

Impacts of Alternative C: Alternative C would result in similar but slightly greater impacts on recreation and tourism compared to the Proposed Action, but the overall impact magnitudes would be the same. To avoid sensitive fish habitat in the Sakonnet River, the export cable route to Brayton Point under Alternative C-1 and Alternative C-2 would be rerouted onshore. The onshore export cables would be installed in trenches within existing road ROWs where feasible, including road shoulders and medians, but could require pathways on private properties. The Alternative C-1 onshore export cable route would be installed primarily along Route 138, on Aquidneck Island, increasing the total length of the onshore cable route by approximately 9 miles. The Alternative C-2 onshore export cable route would be installed primarily along Routes 77 and 177, in Little Compton and Tiverton, increasing the total length of the onshore cable route by approximately 13 miles (21 kilometers). Similar to the Proposed Action, onshore construction and installation of the export cables would affect recreation and tourism where construction activity interferes with access to recreational sites and from increases in traffic, noise, or temporary emissions that degrade the recreational experience. Construction impacts would have intermittent and short-term impacts on recreation.

Whereas the Proposed Action would make landfall on Aquidneck Island across the road from Island Park Beach, Alternative C-1 would make landfall in the parking lot of Second Beach and Alternative C-2 would make landfall in the parking lot of the Sakonnet Point Marina. Impacts among the landfall locations would be similar, resulting in temporary disruptions to access and increased noise and construction activity that may degrade the recreational experience at these sites during HDD activities. Based on NOAA’s Marine Recreational Information Program (NOAA 2022c), shoreside recreational fishing sites may potentially be affected during cable placement activity and maintenance of the Alternative C-1 and Alternative C-2 cable landfalls. Recreational fishing and related sites in proximity to the Alternative C-1 export cable route include Second Beach in Middletown, Rhode Island. Recreational fishing and related sites in proximity to the Alternative C-2 export cable route include the Sakonnet Point Club and Breakwater and Sakonnet Harbor Ramp in Little Compton, Rhode Island, and the Boat House Dock in Tiverton, Rhode Island. Impacts would be temporary during cable installation and use of the sites would not be affected in the long term.

Impacts would be greatest if construction of the landfalls and export cables occurred during the busy summer tourist season. Because the cables are anticipated to be installed largely within existing road ROWs, there would be no permanent impacts on recreational sites, but construction activity could lead to temporarily reduced access to recreational sites and increased traffic, especially on Route 138 in Portsmouth under Alternative C-1, which is a well-traveled four-lane road with year-round tourist traffic. Disruptions in access and increased traffic would occur for a short period at any given location as installation of equipment progresses along the cable routes. The same avoidance measures that SouthCoast Wind has proposed for the Proposed Action would apply for Alternative C, including implementing a Traffic Management Plan and a construction schedule to minimize effects to tourism related activities, including coordinating with stakeholders/visitors’ bureaus to schedule outside of major events and avoiding construction during the summer tourist season (COP Volume 2, Table 16-1; SouthCoast Wind 2024). Because these impacts would be temporary, lasting only during installation activities, and with implementation of the avoidance measures proposed by SouthCoast Wind, impacts under Alternative C are anticipated to localized, short-term, minor.

Cumulative Impacts of Alternative C: In the context of reasonably foreseeable environmental trends, the cumulative impacts of Alternative C would be similar to those described under the Proposed Action.

Conclusions

Impacts of Alternative C: While the onshore cable route to Brayton Point would differ under Alternatives C-1 and C-2, the overall impact magnitudes are anticipated to be the same as those of the Proposed Action, which is anticipated to be **minor** adverse and **minor** beneficial on recreation and tourism.

Cumulative Impacts of Alternative C: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative C would be the same as the Proposed Action—**moderate** and **minor beneficial**.

3.6.8.7 Impacts of Alternative D (Preferred Alternative) on Recreation and Tourism

Impacts of Alternative D: Alternative D would involve the installation of six fewer WTGs than the Proposed Action, which would reduce the construction impact footprint and installation period. Construction of fewer WTGs would result in a negligible reduction of impacts on visual resources compared to the Proposed Action, unnoticeable to the casual viewer. Alternative D could reduce gear entanglements and loss, as well as allisions, and recreational fishing may slightly decrease due to fewer structures providing reef habitat for targeted species. Fewer vessels and vessel trips would be expected, which would reduce the risk of discharges, fuel spills, and trash in the area and the risk of collision with marine mammals and sea turtles.

Cumulative Impacts of Alternative D: In the context of reasonably foreseeable environmental trends, the cumulative impacts of Alternative D would be similar to those described under the Proposed Action.

Conclusions

Impacts of Alternative D: The **minor** impacts and **minor beneficial** impact associated with the Proposed Action would not change substantially under Alternative D. The impacts associated with Alternative D would be slight improvements over the Proposed Action's impacts, but the impact level would not change.

Cumulative Impacts of Alternative D: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternative D would be the same as the Proposed Action—**moderate** and **minor beneficial**.

3.6.8.8 Impacts of Alternatives E and F on Recreation and Tourism

Impacts of Alternatives E and F: Alternative E, which would involve installing a range of foundation types (piled foundations under Alternative E-1; suction bucket foundations under Alternative E-2; or GBS under Alternative E-3), and Alternative F, which would allow for up to three HVDC offshore export cables to Falmouth (as opposed to the maximum of 5 as proposed under the Proposed Action), would not have measurable impacts on recreation and tourism that are materially different from the impacts of the Proposed Action.

Cumulative Impacts of Alternatives E and F: In the context of reasonably foreseeable environmental trends, the cumulative impacts of Alternatives E and F would be similar to those described under the Proposed Action.

Conclusions

Impacts of Alternatives E and F: The impacts of Alternatives E and F on recreation and tourism would be the same as those of the Proposed Action. Impacts would be **minor** impacts and **minor beneficial**.

Cumulative Impacts of Alternatives E and F: In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impacts of Alternatives E and F would be the same as the Proposed Action—**moderate** and **minor beneficial**.

3.6.8.9 Comparison of Alternatives

Alternative C would reroute the Brayton Point offshore export cable corridor onshore to avoid sensitive fish habitat in the Sakonnet River. Similar to the Proposed Action, onshore construction and installation of the export cables would affect recreation and tourism where construction activity interferes with access to recreational sites and from increases in traffic, noise, or temporary emissions that degrade the recreational experience. Under Alternative D, six fewer WTGs would be installed, which would reduce the construction impact footprint and installation period, and result in a negligible reduction of impacts on recreation and tourism as compared to the Proposed Action. Alternatives E and F would result in modifications to offshore aspects of the PDE that are unlikely to have impacts on recreation and tourism and would not result in impacts that are materially different from the impacts of the Proposed Action. Although Alternatives C, D, E, and F modify components of the PDE or restrict what aspects of the PDE are approved, the modifications would not materially change the analysis of any IPF for any resource analyzed under recreation and tourism when compared to the Proposed Action; therefore, the overall impact level would be the same as under the Proposed Action: **minor** adverse and **minor beneficial** impacts.

In the context of reasonably foreseeable environmental trends, the contributions of Alternatives C, D, E, and F to the cumulative impacts on recreation and tourism would be the same as that described under the Proposed Action: **moderate** adverse and **minor beneficial**.

3.6.8.10 Proposed Mitigation Measures

No measures to mitigate impacts on recreation and tourism have been proposed for analysis.