



LIBERTY WIND

PROPOSALS FOR PURCHASE OF OFFSHORE WIND RENEWABLE ENERGY CERTIFICATES ORECRFP20-1



Prepared for

**The New York State Energy
Research and Development Authority**

Submitted by



VINEYARD WIND

October 20, 2020

PUBLIC

4.5

Environmental Mitigation Plan

Response to New York State Energy Research and Development
Authority Request for Proposals ORECRFP20-1



Photo Credit: Dan Poleschook

Environmental Mitigation Plan for Liberty Wind Version 1.0

Prepared pursuant to [contract number, date (TBD)]

with

New York State Energy Research and Development Authority

Albany, NY

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1. Environmental Mitigation Plan Summary

1.1 Overall philosophy and principles

This section should describe the overall philosophy and principles the Developer will follow to avoid, minimize, restore, and off-set potential environmental impacts.

Vineyard Wind (the “Proposer”) is committed to developing, permitting, and deploying well-sited offshore wind projects with minimal environmental impact. To do so, the Proposer: (1) employs project design and siting measures aimed at avoiding potential impacts from the outset; (2) extensively surveys and monitors offshore areas in support of baseline characterization; (3) works collaboratively with regulators and interested stakeholders to identify appropriate and practicable solutions to further avoid, minimize, restore, and/or offset likely potential impacts; and (4) incorporates data, research, and stakeholder feedback into the final design of its projects. Vineyard Wind has applied this approach in developing the nation’s first commercial-scale offshore wind project—Vineyard Wind 1— and is using the same approach for the Liberty Wind (the “Project”) and Park City Wind projects.

1.2 Overall approach to incorporating data and stakeholder feedback

This section should describe how the Developer will use research, data, and stakeholder feedback to update the EMP and support decision-making throughout the life cycle of the project (preconstruction, surveys, site design, construction, operations, and decommissioning).

Vineyard Wind is committed to working with stakeholders, supporting research, and taking steps to implement appropriate mitigation measures where Liberty Wind’s impacts cannot be avoided. In line with this commitment:

- Vineyard Wind will seek consultation and coordinate with relevant stakeholders.
- Vineyard Wind will review existing research and data and seek input from stakeholders regarding data gaps to inform decisions made throughout the Project life cycle.
- Vineyard Wind will review and seek input from stakeholders on proposed and conducted survey rationales and methodologies as well as design, construction and operation, and decommissioning plans for the Project.
- To the extent that the timeline allows, pre- and post-construction monitoring will be designed to improve the understanding of impacts of offshore wind energy development and operations on wildlife.
- Vineyard Wind anticipates periodically assessing information gathered through pre-, during, and post-construction surveys and other means to determine if adjustments to avoidance, minimization, and mitigation measures are needed.

- Vineyard Wind will rely on research, data, and stakeholder feedback to update this Environmental Mitigation Plan (EMP) and support decision-making throughout the life cycle of the Project.

1.3 Existing guidance and best practices that will be followed

This section should present a list of existing guidance documents, publications, tools, and/or plans that will be followed to support the EMP. Include links, if available, for all references.

- Vineyard Wind will continue to follow and implement best practices appropriate and relevant to the Project, including those outlined in:
 - Appendix A of the Bureau of Ocean Energy Management’s (BOEM) (2020) Information Guidelines for a Renewable Energy Construction and Operations Plan (COP)—Version 4.0: <https://www.boem.gov/sites/default/files/documents/about-boem/COP%20Guidelines.pdf>
 - BOEM’s (2018) Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan and other related BOEM guidelines/guidance documents: <https://www.boem.gov/sites/default/files/renewable-energy-program/Draft-Design-Envelope-Guidance.pdf>
 - Best practice guidance tools that have been or may be developed through initiatives
 - such as the New York State Energy Research and Development Authority’s (NYSERDA) Fisheries Technical Working Group (F-TWG), NYSERDA’s Environmental Technical Working Group (E-TWG), Responsible Offshore Development Alliance (RODA) Joint Industry Task Force, Responsible Offshore Science Alliance (ROSA), and other groups.
- Vineyard Wind anticipates consulting a number of publications, tools, and plans for the Project, including those listed in Sections 4.1, 5.1, and 6.1.
- Vineyard Wind will also build on the lessons learned and critical hands-on experience gained developing, permitting, and constructing the Vineyard Wind 1 and Park City Wind projects.

2. Communications and Collaboration Approach

2.1 Overview and communication plan objectives

This section should provide an overview of the communication plan and objectives and its importance in environmental mitigation.

Early, often, and inclusive communication with a range of stakeholders is a hallmark of Vineyard Wind’s collaborative development approach. The Proposer’s communication efforts prioritize information sharing, soliciting feedback on the design and execution of the Project, and supporting an efficient and timely permitting process. Towards that end:

- Vineyard Wind will seek methods and processes to allow for a two-way flow of information between key stakeholders and developers, specifically highlighting how the Proposer uses this feedback to inform the Proposer’s decision making.
- Vineyard Wind will provide updates to environmental stakeholders in an appropriate manner that is easily accessed and widely distributed.
- Throughout the life cycle of the Project, Vineyard Wind will continue to actively engage and communicate with stakeholders, foster, build, and maintain trusted relationships, and work to address concerns.

2.2 Communication officers/positions, responsibilities, and contact information

This section will provide a list of communication officers, their role, and name and contact information. The list should provide stakeholders with an understanding of who should be called for a particular issue or question. It will also include links to the project website so readers know where to find additional information.

Name/Title	Role/Responsibilities	Contact Information
Matt Robertson, Director of Environmental Affairs	Managing environmental activities	508-717-8964 mrobertson@vineyardwind.com
Nathaniel Mayo, Director of Public Affairs	Managing stakeholder and community engagement	508-717-8964 nmayo@vineyardwind.com

Project website: <https://www.vineyardwind.com/>

Fisheries Website: <https://www.vineyardwind.com/fisheries>

2.3 Identification of stakeholders

This section should describe the process by which stakeholders relevant to environmental issues will be identified and classified by stakeholder group.

Vineyard Wind is in active and regular communication with a wide variety of stakeholders relevant to environmental issues and the Project. Among other things, Vineyard Wind intends to:

- continue to implement the stakeholder engagement methods outlined in Vineyard Wind’s Fisheries Communication Plan and Liberty Wind’s Community Engagement Plan;
- expand environmental engagement efforts prior to filing Liberty Wind’s federal and state permit applications;
- work with Project partners in New York to further identify stakeholders relevant to environmental issues and the Project;
- maintain consultations with the relevant regulatory and agency stakeholders and state technical working groups; and
- continue engagement in regional science efforts through the Regional Wildlife Science Entity (RWSE) and ROSA.

2.4 Participation in stakeholder and technical working groups

2.4.1 Communication with E-TWG

This should describe the communication and collaboration approach with members of the E-TWG and consultations.

- Vineyard Wind will coordinate with the E-TWG (in accordance with Section 12.04 of the Agreement) and stakeholders to address concerns and mitigate impacts to the wildlife and environmental resources.
- Vineyard Wind will dedicate Project-specific technical resources to the E-TWG, namely Vineyard Wind’s Director of Environmental Affairs.
- To the extent practicable, Vineyard Wind will work with the E-TWG and will attend E-TWG meetings and workshops.
- Vineyard Wind will continue to actively participate in the E-TWG and provide Project updates at appropriate intervals.

2.4.2 Communication with other New York State agencies

This should describe communication with New York State agencies during each phase of the project.

- Vineyard Wind has communicated with New York State agencies, including Consulting State Agencies, during the initial development phase of the Project to inform Project plans, siting measures, and permitting plans and timelines.
- Vineyard Wind will communicate with Consulting State Agencies on the Project’s Site Assessment Plan and COP, including meeting with Consulting State Agencies that request a meeting in order to attempt to resolve any identified issues.
- Vineyard Wind will meet with New York State agencies, including Consulting State Agencies, at their reasonable request, during the development, construction, and operational phases of the Project.

2.4.3 Communication with other stakeholder and working groups

This should describe any relevant participation with other stakeholder groups that would help inform the EMP.

- Vineyard Wind will continue to actively participate in and engage with technical, state, and regional working groups, including:
 - Atlantic States Marine Fisheries Commission;
 - Connecticut Commission on Environmental Standards;
 - International Council on Exploration of the Seas (member of Working Group on Offshore Wind Development and Fisheries);
 - Massachusetts Fisheries Working Group on Offshore Wind Energy;
 - Massachusetts Habitat Working Group on Offshore Wind Energy;
 - Mid-Atlantic Fishery Management Council;
 - New England Fishery Management Council;
 - NYSERDA’s E-TWG;
 - NYSERDA’s F-TWG;
 - Project Advisory Committee for Automated Radio Telemetry at Offshore Wind Farms;
 - Rhode Island Fisheries Advisory Board meetings;
 - RODA Joint Industry Task Force;
 - ROSA (Board and Council member); and
 - RWSE.
- Vineyard Wind will continue to collaborate with academic and research institutions, state and federal agencies, environmental non-governmental organizations (eNGOs), and others to advance regional science strategies and initiatives.

2.5 Communication methods and tools by phase

This section should describe the communication and outreach methods and tools that will be employed for each stakeholder group during each phase of the project.

Proposed Outreach Method/Tools	Phase*			
	1	2	3	4
Website	X	X	X	X
Social media platforms, digital advertisements, e-newsletters	X	X	X	X
The E-TWG, the F-TWG, and similar technical, state, and working group meetings and forums	X	X	X	X
Virtual meetings, webinars, phone calls, e-mail updates, e-mail communication	X	X	X	X
In-person meetings, event attendance/hosting/sponsorships, open houses, community meetings	X	X	X	X
Letters to abutters, flyers, post cards, marketing materials, print advertisements	X	X	X	X
<i>*Phase: 1: Survey/Define Project Envelope/Permitting; 2: Construction; 3: Operation; 4: Decommissioning</i>				

3. Supporting Other Research

3.1 Support of collaborative research

This section should describe how opportunities for developing or investing in collaborative research with the environmental community to collect ecological data will be identified and undertaken. The description must account for the need to coordinate with members of the E- TWG during data gathering and assessment.

- Vineyard Wind is committed to supporting collaborative research with the environmental community to collect ecological data and will continue to work with a wide array of environmental interests, including members of the E-TWG, to identify collaborative research opportunities.
- Vineyard Wind will continue to identify opportunities to support collaborative research through the engagement processes described above and below.
- Vineyard Wind will build on the collaborative research efforts already underway among adjacent Massachusetts Wind Energy Area (MA WEA) and Rhode Island/Massachusetts Wind Energy Area (RI/MA WEA) developers. This will occur through ROSA, the RWSE, and in partnership with leading academic and research institutions, subject matter expertise within agencies, and other engaged parties such as eNGOs. These parties are well-represented within the E-TWG, and Vineyard Wind anticipates consulting with the E-TWG as part of this commitment.

3.2 Handing/processing requests

This section should describe how requests for coordination with third-party supported scientists will be processed - including providing reasonably-requested Project data and access to the Project area for independent scientists examining environmental sensitivities and/or the impacts of offshore wind energy development on the environment for the purpose of publication in peer-reviewed journals.

- Vineyard Wind will review any requests for coordination with third-party supported scientists on a case-by-case basis to the extent that such requests do not concern environmental and fisheries data that Vineyard Wind already intends to make public, as described in Section 3.3.
- Vineyard Wind has already responded to environmental data requests from NYSERDA and numerous others and will continue to do so.

3.3 Data availability

This section should describe how data will be made available in accordance with Section 2.2.6 of the RFP

- Vineyard Wind will make non-proprietary environmental and fisheries data publicly available in a format and manner best suited for efficient distribution.

3.4 Proposed restrictions

This section should describe any restrictions on data provision or access that may be required to protect trade secrets or maintain site security.

- Vineyard Wind will seek to explain why identified data types are considered commercially sensitive.
- Vineyard Wind may impose restrictions on data provision or site access to protect competitively sensitive information, maintain site security, and ensure safety. All requests for such information will be considered and discussed with the requestor and not unreasonably denied.
- Vineyard Wind notes that some data, while not proprietary, may be time consuming or costly to produce depending on the specific request and the primary format it was collected in. Vineyard Wind will work to advance such requests, but also hopes that the regional science entities will make accessing data from all developers easier and more standardized to, at least in part, address this potential issue.

3.5 Financial commitment for third party research

This section should provide a level of financial commitment, if elected, that will be appropriated to leverage third-party environmental research funding, including federal or State-supported research. Or, if elected, provide the level of commitment to a general fund for supporting third-party research into potential environmental effects of offshore wind energy development.

- Vineyard Wind has made a financial commitment to leverage third-party environmental research funding. The details of this commitment will be finalized and announced at a future date.
- Vineyard Wind also plans to carefully consider all funding opportunities that arise through the regional science entities (RWSE and ROSA). These groups will be raising funds from other entities and, with support from offshore wind developers, will be able to expand the scope and impact of their efforts to better understand the potential environmental effects of offshore wind energy development.

3.6 Proposed or existing commitments/collaborations

This section should describe proposed or existing commitments and collaborations with third-party researchers in support of monitoring activities and assessing impacts.

- Vineyard Wind is currently engaged in a number of collaborations with third-party researchers in support of monitoring activities and assessing impacts, including the following:
- Vineyard Wind is working with the University of Massachusetts School for Marine Science and Technology (SMAST) to support fisheries-related monitoring activities in Vineyard Wind’s lease areas.
- Vineyard Wind is working with APEM and Biodiversity Research Institute to conduct aerial digital surveys and boat-based avian surveys in Vineyard Wind’s lease areas. Vineyard Wind is also conducting an additional survey over a nearshore avian “hotspot” to continue to improve species identification from aerial digital surveys.
- Vineyard Wind has committed to \$3 million to a marine mammals and innovation fund to support the development and demonstration of innovative methods and technologies to enhance marine mammal protections.
- Vineyard Wind has made a financial commitment to support fisheries research and education led by the University of Connecticut’s Department of Marine Sciences in conjunction with the Connecticut Initiative on Environmental Research of Offshore Wind, which aims to improve the understanding of environmental impacts from offshore wind.
- Vineyard Wind has made a financial commitment to Mystic Aquarium to further the understanding of underwater noise generated by offshore wind projects and the potential impacts on cetacean and pinniped behavior, hearing, and physiology.
- Vineyard Wind has partnered with Greentown Labs, the largest climatetech startup incubator in North America, to launch the Offshore Wind Challenge, an accelerator program focused on advances in marine mammal monitoring, specifically for data collection and real-time transmission or data analysis.
- Vineyard Wind has partnered with the New England Aquarium Anderson Cabot Center for Ocean Life to document highly migratory species presence across the MA WEA and RI/MA WEA with help from the pelagic recreational fleet.
- Vineyard Wind has partnered with Orsted, Equinor, Mayflower, Massachusetts Clean Energy Center (MassCEC), and the New England Aquarium to continue the Northeast Large Pelagic Survey Collaborative aerial surveys for large whales and sea turtles.
- Vineyard Wind is participating in formation of a Regional Science Entity to advance regional understanding of avian and marine mammal species’ relationship with offshore wind.
- Vineyard Wind is a founding board member and council member of ROSA and has committed to both start-up and on-going funding support of that organization.

4. Proposed Mitigation of Impacts to Marine Mammals and Sea Turtles

4.1 Baseline characterization

4.1.1 Available information

Describe existing key literature and datasets that are available for baseline characterization.

- Numerous data sources characterize the distribution and abundance of marine mammals and sea turtles potentially affected by Project activities. Key sources include, but are not limited to:
 - Marine Mammal Stock Assessment Reports released by the National Marine Fisheries Service (NMFS)
 - Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles (Kraus et al. 2016)
 - Atlantic Marine Assessment Program for Protected Species (AMAPPS) surveys
 - Duke University Habitat-based Cetacean Density Models (Roberts et al. 2016a; 2016b; 2017; 2018; 2020)
 - National Oceanic and Atmospheric Administration's (NOAA) Fisheries Sea Turtle Stranding and Salvage Network (STSSN)
 - North Atlantic Right Whale Consortium (NARWC) Database
 - The North Atlantic Right Whale Sighting Survey and Right Whale Sighting Advisory System
 - Navy Operations Area Density Estimates (NODEs)
 - Wildlife Conservation Society/Woods Hole Oceanographic Institution New York Bight Acoustic Buoy
 - NYSERDA's Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy and Remote Marine and Onshore Technology (ReMOTe)
 - NYSERDA's (2017) Marine Mammals and Sea Turtles Study
 - Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP) Model Repository
 - Northeast Ocean Data Portal
 - BOEM studies and environmental assessments, including:
 - BOEM's (2014) Revised Environmental Assessment for the MA WEA
 - BOEM's (2018) Vineyard Wind Offshore Wind Energy Project Biological Assessment for NOAA
 - BOEM's (2018) Draft Environmental Impact Statement (DEIS) for Vineyard Wind 1
 - Assessments performed for other Vineyard Wind projects, including the Vineyard Wind COP for Vineyard Wind 1
 - Protected species observer (PSO) reports from Vineyard Wind's geophysical and geotechnical (G&G) surveys

4.1.2 Data being collected

Describe data collected, or will be collected, to support baseline characterization.

- As part of a future COP for Liberty Wind, Vineyard Wind will conduct an in-depth desktop study that includes the data sources listed above as well as recently completed and ongoing studies, which are expected to include:
 - Ongoing Phase III AMAPPS surveys
 - The recently completed New York Bight Whale Monitoring Program Aerial and Acoustic Surveys
 - Data from other New York Bight monitoring to the extent that it is available
- Vineyard Wind is continuing high-resolution digital aerial surveys of Lease Area OCS-A 0522 (the “Lease Area”) to collect spatial data on wildlife including marine mammals and sea turtles. Twenty surveys have been completed (from June 2019 through September 14, 2020) and additional surveys are planned.
- Vineyard Wind is collecting additional information on the presence and abundance of marine mammals and sea turtles via opportunistic observations by PSOs that occur during any G&G surveys within Lease Areas OCS-A 0522 and OCS-A 0501.
- During the Project, observations of all North Atlantic right whales (NARW) and dead, entangled, or distressed marine mammals will be communicated to federal authorities.
- Vineyard Wind will comply with BOEM’s site characterization requirements in 30 CFR § 585.626(a)(3) as part of a future COP and expects to follow BOEM’s *Guidelines for Providing Information on Marine Mammals and Sea Turtles for Renewable Energy development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 Subpart F*.

4.2 Species at risk

Describe which species the Developer believes to be of greatest concern and why.

- Of the 38 marine mammal species documented in the Northwest Atlantic Outer Continental Shelf (OCS) region, Vineyard Wind believes the following four Endangered Species Act (ESA)-listed species are likely to be the species of greatest concern given their biology, habitat use, low abundance, ESA status, existing threats, and potential to occur at least seasonally in and around Lease Area OCS-A 0522 and the OECC: NARW, fin whale, sei whale, and sperm whale. Although blue whales are also listed under the ESA, due to habitat preferences and distribution information, this species is not expected to occur in Lease Area OCS-A 0522.
- The three sea turtle species likely to occur in and around Lease Area OCS-A 0522 and the OECC are loggerhead sea turtle, the Kemp’s Ridley sea turtle, and the leatherback sea turtle. In light of sea turtles’ status under the ESA and their occurrence in and around the MA WEA, all three species of sea turtle are considered species of concern.

- Vineyard Wind’s assessment will be confirmed through additional analysis of existing and collected data conducted as part of a future COP and its subsequent review.
- While Vineyard Wind has heightened concern regarding the species identified above, Vineyard Wind treats all marine mammals and sea turtles with great concern and will implement protective measures for all marine mammal and sea turtle species. In addition, the species above are already impacted by other anthropogenic factors, including fishing gear, pollution, and climate change. Vineyard Wind will therefore endeavor to support science that furthers our understanding of potential stressors to these species beyond those that may result from the Project in order to ensure the marine community at-large is working to find solutions for the species at risk.

4.3 Potential impacts and mitigation measures by phase

The table below should list the potential impacts to marine mammals and sea turtles and proposed mitigation measures. To this end, a description of proposed measures to minimize the impacts of sound on marine mammals and sea turtles during all phases to Project development should be included. In addition, provide a description of the anticipated pre- and post- construction survey techniques to establish an ecological baseline and changes to that baseline within the Project site; the minimum size of exclusion zone intended to be monitored during geophysical surveys and construction; planned approaches to understanding marine mammal and sea turtle presence and absence within development site exclusion zone during site assessment and construction (e.g., a combination of visual monitoring by protected species observers and passive acoustic monitoring, the use of night vision and infra-red cameras during nighttime activities, etc.); proposed temporal constraints on construction activities and geophysical surveys with noise levels that could cause injury to harassment in marine mammals (e.g., seasonal restrictions during periods of heightened vulnerability for priority species; commencing activities during daylight hours and good visibility conditions, dynamic adjustments following the detection of a marine mammal); and proposed equipment and technologies the Developer would use to reduce the amount of sound at the source, if any.

- As a general principle, Vineyard Wind expects there to be more knowledge on impacts and advancements in monitoring and noise mitigation by the time Liberty Wind is under construction. Vineyard Wind notes that some of the commitments below may not represent the best opportunities for marine mammal and sea turtle protection at the time of construction. Vineyard Wind will advance the approach for Liberty Wind through the lengthy regulatory review process as understanding, best practices, and available technologies advance.

Potential Impacts	Proposed Mitigation Measures ¹	Phase*			
		1	2	3	4
Underwater noise impacts from geophysical survey equipment	<ul style="list-style-type: none"> Exclusion, clearance, and monitoring zones will be maintained around noise-generating activities of concern to help measure and mitigate potential noise-related effects on marine mammals. The size of these zones will be based on best available science and applicable thresholds (as defined by NOAA) and will be determined in consultation with BOEM and NOAA. Monitoring during noise-generating activities will be done through an integrated monitoring approach, including the use of passive acoustic monitoring (PAM), NMFS- approved PSOs, and/or other proven technologies, as appropriate, in compliance with federal regulation. Due to extensive BOEM survey requirements, survey work must occur on a 24/7 basis in order to permit the Project in a timely and efficient manner. It is current best practice to use alternative technologies during low visibility conditions to ensure protection to marine mammals and sea turtles. Shut down and ramp-up procedures will be employed. 	X	X	X	X
Underwater noise impacts from construction and installation activities	<ul style="list-style-type: none"> Vineyard Wind will seek to use noise attenuation technologies to reduce sound from pile driving of foundations (if pile driving is conducted). Technology currently under consideration for the Project includes piling equipment that is optimized for sound reduction (e.g., Integrated Pile Installer), underwater noise abatement systems (e.g., AdBm encapsulated bubble sleeve), and/or bubble curtains. Monitoring during noise-generating activities is expected to be done through an integrated monitoring approach, including the use of PAM, NMFS-approved PSOs, and other proven technologies, as appropriate, to the extent practicable. The size of monitoring, clearance, and/or exclusion zones are anticipated to be determined using acoustic modeling in consultation with BOEM and NOAA. As practicable, a ramp-up (i.e., soft-start) will be used at the commencement of a pile driving activity. Vineyard Wind expects to adhere to a time-of-year restriction on pile driving during construction of Liberty Wind. 		X		

Potential Impacts	Proposed Mitigation Measures ¹	Phase*			
		1	2	3	4
Vessel strikes on marine mammals and sea turtles	<ul style="list-style-type: none"> • Vineyard Wind is committed to maintaining the required 1,640-foot (500-meter) setback distance between all transiting construction-related vessels and NARWs. • Project vessels will also comply with the NMFS Regional Viewing Guidelines while in transit, which offers additional protections to all marine mammals and sea turtles. Additionally, as safe and practicable, NOAA’s vessel strike guidance will be implemented. • Vineyard Wind will ensure that all vessel personnel are trained regarding animal identification and protocols when sightings occur. • Vineyard Wind will provide reference materials on board all Project vessels for identification of marine mammals and sea turtles. 	X	X	X	X
Electromagnetic Fields (EMF), resulting in potential disturbance to marine mammals/sea turtles and/or their prey resource	<ul style="list-style-type: none"> • The Project will use proper shielding to reduce EMF impacts. This can be achieved through sheathing and burial of cables; where sufficient burial depth cannot be achieved, the cables can be covered by cable protection (which would shield EMF). • Vineyard Wind expects to conduct EMF modeling and assessments to identify potential mitigation requirements as part of the permitting process. 	X	X	X	
<p><i>*Phase: 1: Survey/Define Project Envelope/Permitting; 2: Construction; 3: Operation; 4: Decommissioning</i></p> <p><i>1. The proposed mitigation measures described in the table are preliminary in nature and subject to review and approval from jurisdictional agencies in accordance with regulatory and permitting requirements. Final mitigation measures will be determined pursuant to applicable permitting processes and may vary from the list provided herein.</i></p>					

4.4 Monitor for potential impacts during each phase

Describe how potential impacts will be monitored on marine mammals and sea turtles during each phase of physical work for the Project (site assessment, construction, operation, and decommissioning) to inform mitigation planning for later phases of the Project as well as for future Projects.

- Vineyard Wind will seek to collaborate with regulatory agencies and stakeholder groups to identify research needs and opportunities.
- Vineyard Wind is continuing high-resolution digital aerial surveys of Lease Area OCS-A 0522 to collect baseline data on marine mammals and sea turtles.
- PSOs monitoring during pile driving and surveys are expected to follow standard monitoring protocols and actively observe established clearance zones around the sound source and record behavioral information.
- Vineyard Wind will work with federal and New York State agencies to develop appropriate and practicable post-construction survey/monitoring techniques to document any observed impact to marine mammals and sea turtles. Monitoring techniques for these species typically include use of digital aerial surveys, boat surveys, and/or PAM (specific to marine mammals); however, as new techniques and technologies become proven, additional tools may also be utilized. The monitoring measures will be informed by those that have been put in place for Vineyard Wind 1 and Park City Wind and will be developed with stakeholder input.

4.4.1 Assess and quantify changes

Describe how changes to environmental resources will be quantified using statistically sound methods.

- Vineyard Wind will continue to collaborate with federal and state agencies to design surveys that align with established survey methods so that data generated can be compared to previous data and ongoing regional studies to support longer-term monitoring of the regional impacts of offshore wind development. This will allow for a more statistically robust assessment of changes to environmental resources. In doing so, Vineyard Wind will prioritize research that is responsive to environmental concerns and addresses remaining data gaps.
- Ideally, specific questions and focal taxa will be chosen for the Project either based on site-specific risk assessment, or in relation to broader regional efforts to assess variation between sites and understand cumulative impacts for sensitive species.
- Monitoring will, to the extent practicable, use appropriate study designs and methodologies to analyze risk prior to construction and evaluate impacts during construction and operation by testing hypotheses and helping to assure statistical power for meaningful data analysis.

- Vineyard Wind will assess the most appropriate statistical tools to use and will incorporate lessons learned from monitoring being conducted for Vineyard Wind 1 and Park City Wind (for example, fisheries and benthic assessments for Vineyard Wind’s other projects are using beyond Before-After-Control-Impact [BACI] and Before-After-Gradient [BAG] survey designs, with Analysis of Variance [ANOVA] tests).
- Outside expertise will, if practicable, be consulted during study design and data analysis processes.

4.4.2 Address datagaps

Describe how data gaps will be addressed.

- Extensive survey work has been conducted to characterize the distribution and abundance of marine mammals and sea turtles in the MA WEA and MA/RI WEA.
- Vineyard Wind is addressing data gaps by conducting high-resolution digital aerial surveys of the Lease Area. Vineyard Wind has also partnered with Orsted, Equinor, Mayflower, MassCEC, and the New England Aquarium to continue the Northeast Large Pelagic Survey Collaborative aerial surveys for large whales and sea turtles.
- In addition, broader concerns about data gaps are anticipated to be identified and addressed through regional science efforts such as RWSE and ROSA.
- Nevertheless, Vineyard Wind will work with stakeholders, including regulatory agencies, E-TWG, and local groups, during the design phase of the Project (as well as during permitting processes) to identify data gaps.

4.5 Strategies for developing alternate protocols

Describe the process for determining when mitigation strategies are insufficient and under what conditions they might elect to rehabilitate or restore impacted marine mammals and sea turtles in an alternative location.

- Vineyard Wind will incorporate lessons learned from Vineyard Wind 1, Park City Wind, and other offshore wind farm development, including lessons learned on the efficacy of mitigation, when developing mitigation strategies for Liberty Wind. This experience will allow Vineyard Wind to select, in consultation with regulatory authorities, those mitigation measures that are most likely to be effective and practicable and incorporate input from the E-TWG and other stakeholders.
- Vineyard Wind understands that there are ways to benefit species that may experience impacts from offshore wind in alternate locations. At this time, it is hard to say if offsite or restorative mitigation related directly to Project impacts will be appropriate for Liberty Wind. The decision to incorporate offsite mitigation would be influenced by, among other factors, the anticipated level of impact, what is known at the time about the efficacy of available mitigation measures, and whether regulatory agencies would accept these methods as appropriate mitigation for the Project.

- Vineyard Wind is open to exploring adaptive mitigation strategies further in consultation with the E-TWG, regulatory agencies, and relevant stakeholders.

5. Proposed Mitigation of Impacts to Birds and Bats

5.1 Baseline characterization

Describe how baseline data will be established on the presence of bird and bat assemblages, temporal and spatial use of the site by key species within the area of the proposed Project.

- The occurrence of birds in the MA WEA and surrounding area is well-documented, with multiple studies providing important information on avian presence and abundances at a series of useful scales. Vineyard Wind is currently supplementing these data with digital video aerial surveys across Lease Area OCS-A 0522.
- The MA WEA was designed taking bird activity south of Nantucket Island into account. As a result of avian baseline data, BOEM already excluded OCS lease area blocks that overlapped with high value sea duck habitat from the MA WEA.

5.1.1 Available information

Describe key existing literature and datasets that are available for baseline characterization.

- Studies and reports that contribute to the available information related to birds and bats occurring near the Project include but are not limited to the following:
 - Pelagic Seabirds off the East Coast of the United States 2008–2013 (Veit et al. 2015)
 - MassCEC seabird surveys as reported in Abundance and Distribution of Seabirds off Southeastern Massachusetts, 2011–2015: Final Report (Veit et al. 2016)
 - Marine-life Data and Analysis Team (MDAT) marine bird abundance and occurrence models (Winship et al. 2018; Curtice et al. 2019)
 - Tracking Offshore Occurrence of Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers with VHF Arrays (Loring et al. 2019)
 - Tracking movements of threatened migratory rufa Red Knots in U.S. Atlantic Outer Continental Shelf waters. (Loring et al. 2018).
 - Assessing the Exposure of Three Diving Bird Species to Offshore Wind Areas on the U.S. Atlantic Outer Continental Shelf using Satellite Telemetry (Stenhouse et al. 2020)
 - NYSERDA’s Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy and Remote Marine and Onshore Technology (ReMOTe)
 - NYSERDA’s (2017) Birds and Bats Study
 - NYSERDA’s (2017) Cable Landfall Permitting Study
 - NYSERDA’s Multi-Scale Relationships Between Marine Predators and Forage Fish project (ongoing)
 - Long Island Colonial Waterbird and Piping Plover Surveys
 - BOEM studies and environmental assessments, including:
- BOEM’s (2014) Revised Environmental Assessment for the MA WEA

- BOEM’s (2016) Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York
- BOEM’s (2018) DEIS for Vineyard Wind 1
- BOEM’s (2019) Vineyard Wind Offshore Wind Energy Project Biological Assessment for the US Fish and Wildlife Service
 - Vineyard Wind COP for Vineyard Wind 1

5.1.2 Data collected

Describe data collected, or will be collected, to support baseline characterization.

- To complement existing studies and reports for birds, Vineyard Wind is conducting digital video aerial surveys across Lease Area OCS-A 0522 to collect spatial and temporal distribution and abundance data on birds and other wildlife (including species listed under the ESA). These data will support exposure and risk assessments in the COP and provide a baseline for post-construction monitoring. The surveys also aim to improve the identification of protected species by surveying a known nearshore avian “hotspot” where focal species are more likely to occur. These aerial surveys cover the entire Lease Area, plus a 1.85 kilometer (1 nautical mile) buffer. The surveys are conducted monthly, with two surveys per month during the spring (April and May) and fall (August and September) migration periods. Twenty aerial surveys occurred in the Lease Area between June 2019 and September 14, 2020 and additional surveys are planned.
- Vineyard Wind also conducted four boat-based avian surveys in the northern portion of Lease Area OCS-A 0501 in spring 2018 and one year of monthly boat surveys (October 2018 to September 2019) in the southern portion of Lease Area OCS-A 0501, which can be used to corroborate baseline data for the Project given the proximity of the two lease areas.
- As part of a future COP for Liberty Wind, Vineyard Wind will conduct an in-depth assessment that includes the data sources listed above as well as recently completed and ongoing studies.

5.2 Species at risk

Describe which species the Developer believes to be of greatest concern and why.

- The bird species of greatest concern are the three species of birds federally listed as threatened or endangered under the ESA that may occur within the vicinity of the Project: roseate tern, piping plover, and red knot. Vineyard Wind’s initial assessment is that these three bird species will have limited exposure to the Project.

- The northern long-eared bat is expected to be a bat species of concern because the onshore portions of the Project may potentially include northern long-eared bat habitat and their federal status is currently being reviewed. The New York Natural Heritage Program (NYNHP) lists the towns of Huntington and Oyster Bay as having summer occurrence records of northern long-eared bat. Liberty Wind will contact NYNHP to determine the onshore facilities' proximity to known northern long-eared bat roost trees or hibernacula.

5.3 Potential impacts/risks and mitigation measures by project stage

The table below should list the potential impacts and mitigation measures to understand and minimize the Project's risk to birds and bats. At a minimum this should include the steps the Developer will pursue to minimize risk to birds and bats (e.g., lighting), and identification of technological approaches to assess impacts or any Proposals for other research or mitigations relating to birds or bats planned or under consideration at this time.

Potential Impacts	Proposed Mitigation Measures ¹	Phase*			
		1	2	3	4
Collision risk to marine birds and bats	<ul style="list-style-type: none"> • Wind turbine generators (WTGs) will have air gaps of at least 92 feet (28 m), which minimizes collision risk to marine birds given that many seabirds fly below this height. • To avoid and minimize attraction- and disorientation-related impacts to birds and bats, the Project's artificial lighting will be reduced to the extent practicable while maintaining human safety and compliance with Federal Aviation Administration, US Coast Guard, BOEM, and other regulations. • When practicable, the Project will reduce the number of lights, use low intensity lights, avoid white lights, and use flashing lights rather than steady burning lights. • When practicable, the Project will use hooded lighting, and/or down-lighting to limit bird attraction and disorientation, limit outside light to necessary/required lighting, and close blinds on all windows in boat living quarters • Vineyard Wind also expects to use an Aircraft Detection Lighting System (ADLS), subject to BOEM approval, which dramatically reduces the total amount of light produced by the Project's aviation obstruction lights. • Based on lessons learned, stakeholder input, and agency consultation, Vineyard Wind will determine if there is a need for perching-related deterrents to reduce attraction and minimize potential perching and loafing opportunities for birds. • Physical and/or other deterrents to perching (e.g., spikes and netting or other best available technology) will be implemented if there is demonstrated risk at the site (e.g., perching and roosting on infrastructure is a common occurrence) and to the extent that they do not represent a human safety hazard. 		X	X	

Potential Impacts	Proposed Mitigation Measures ¹	Phase*			
		1	2	3	4
Habitat impacts, including breeding and nesting areas	<ul style="list-style-type: none"> Siting and construction of nearshore and onshore Project components (including but not limited to nearshore export cable routes, landfall sites, onshore cable routes, and onshore substations) will be conducted in such a way as to avoid or minimize the loss or alteration of bird and bat habitat, as well as avoid or minimize disturbance and direct and indirect effects to bird and bat populations and their prey. Specifically, onshore infrastructure (i.e., landfall site, cable routes, substations) and development activities should: 1) maximize the use of previously developed or disturbed areas (e.g., by installing onshore cables within existing roadway layouts), and 2) avoid unique or protected habitats, as well as habitat for key species. If tree clearing is necessary, Vineyard Wind will avoid clearing during sensitive bat periods to minimize any potential effects to northern long-eared bat and state-listed bat species. If necessary, during onshore work, Vineyard Wind will adhere to the northern long-eared bat ESA 4(d) Rule, and any applicable local regulations for endangered or threatened species. 	X	X	X	X
<p><i>*Phase: 1: Survey/Define Project Envelope/Permitting; 2: Construction; 3: Operation; 4: Decommissioning</i></p> <p><i>1. The proposed mitigation measures described in the table are preliminary in nature and subject to review and approval from jurisdictional agencies in accordance with regulatory and permitting requirements. Final mitigation measures will be determined pursuant to applicable permitting processes and may vary from the list provided herein.</i></p>					

5.4 Monitor for impacts during each phase

Describe how potential impacts will be monitored on birds and bats during each phase of physical work for the Project (site assessment, construction, operation, and decommissioning) to inform mitigation planning for later phases of the Project as well as for future Projects.

- Vineyard Wind will implement appropriate monitoring measures to assess potential impacts to birds and bats from the Project. The measures will be informed by those that have been or will be put in place for Vineyard Wind 1 and Park City Wind.
- To the greatest extent practicable, monitoring activities will be designed to work with or operate within regional study efforts to both contribute to regional science and enable use of larger data sets to assess impacts.
- Given the Offshore Wind Generation Facility’s distance from the nearest coastline (~30.5 miles), overall exposure of bat species to the Offshore Wind Generation Facility is expected to be limited.

- Monitoring approaches during any Project phase will take in to account the limitations of the monitoring techniques (e.g., ability to identify species, monitor at night and during inclement weather, etc.), feasibility of offshore installation, if necessary, and other factors when designing a methodology.
- Vineyard Wind will consult with the E-TWG, stakeholders, and regulatory authorities to decide on which Project phases will include monitoring and what specific questions should be addressed. This will take into account efforts already underway or planned for other projects in order to avoid redundancy and address issues specific to the Project.

5.4.1 Pre/Post monitoring to assess and quantify changes

Describe how changes to environmental resources will be quantified using statistically sound methods.

- Pre- and post-construction monitoring will be designed in such a way that it improves understanding of the impacts of offshore wind energy development on birds and bats, including identifying specific questions and taxa on which to focus monitoring efforts for the proposed Project, or in relation to broader regional efforts to assess variation between sites and understand cumulative impacts for sensitive species.
- Vineyard Wind is already developing a framework for a pre- and post-construction bird monitoring program in relation to Vineyard Wind 1 that could be adapted to Liberty Wind. This framework is being developed through consultation with federal, state, and local agencies, and with input from other stakeholders.
- Vineyard Wind will consult E-TWG’s Bird and Bat Scientific Research Framework, which is expected to be completed later this year.
- Vineyard Wind is already conducting pre-construction aerial surveys of the Lease Area to gather baseline data on the occurrence of birds and other wildlife species.
- Monitoring will, to the extent practicable, use appropriate study designs and methodologies to effectively analyze risk prior to construction and evaluate impacts during construction and operation by testing hypotheses and helping to assure statistical power for meaningful data analysis.
- Outside expertise will be consulted during study design and data analysis processes.

5.4.2 Address datagaps

Describe how data gaps will be addressed.

- The occurrence of birds in the MA WEA and surrounding area is well-documented.

- To supplement this wealth of existing data and address data gaps, Vineyard Wind is conducting high-resolution digital aerial surveys across Lease Area OCS-A 0522 to collect spatial and temporal distribution and abundance data on birds and other wildlife.
- In addition, broader concerns about data gaps are anticipated to be identified and addressed through regional science efforts such as RWSE and ROSA.
- Nevertheless, Vineyard Wind will work with stakeholders, including regulatory agencies, E-TWG, and local groups, in the design phase of the Project to identify data gaps to be addressed through surveys or permitting applications.

5.5 Strategies for developing alternate protocols

Describe the process for determining when mitigation strategies are insufficient and under what conditions they might elect to rehabilitate or restore impacted birds and bats in an alternative location.

- Vineyard Wind will incorporate lessons learned from Vineyard Wind 1, Park City Wind, and other offshore wind farm development, including lessons learned on the efficacy of mitigation, when developing mitigation strategies for Liberty Wind. This experience will allow Vineyard Wind to select, in consultation with regulatory authorities, those mitigation measures that are most likely to be effective and practicable and incorporate input from the E-TWG and other stakeholders.
- Vineyard Wind understands that there are ways to benefit species that may experience impacts from offshore wind in alternate locations. At this time, it is hard to say if offsite or restorative mitigation related directly to Project impacts will be appropriate for Liberty Wind. The decision to incorporate offsite mitigation would be influenced by, among other factors, the anticipated level of impact, what is known at the time about the efficacy of available mitigation measures, and whether regulatory agencies would accept these methods as appropriate mitigation for the Project.
- As necessary, Vineyard Wind is open to exploring adaptive mitigation strategies further in consultation with the E-TWG, regulatory agencies, and relevant stakeholders.

6. Proposed Mitigation of Impacts to Fish, Invertebrates and their Habitats

6.1 Baseline characterization

Describe what is known about the proposed site in terms fish and invertebrate assemblage, and temporal and spatial variations in fish, invertebrates and their habitats at the proposed site. The use of collaborative monitoring models with the fishing community is encouraged to develop trusted baseline data.

6.1.1 Available information

Describe key existing literature and datasets that are available for baseline characterization.

- Numerous data sources characterize the temporal and spatial distribution, abundance, and community composition of fish, invertebrates, and their habitats potentially affected by Project activities. Key sources by include, but are not limited to:
 - Northeast Fisheries Science Center (NEFSC) multispecies bottom trawl surveys and other databases
 - Massachusetts Department of Marine Fisheries trawl surveys
 - Northeast Ocean Data Portal
 - Comprehensive Seafloor Substrate Mapping and Model Validation in the New York Bight (Battista et al. 2019)
 - SMAST video survey of the western portion of the MA WEA (2013; 2014) and other SMAST databases
 - NYSERDA's Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy and Remote Marine and Onshore Technology (ReMOTe)
 - NYSERDA's (2017) Fish and Fisheries Study
 - NOAA's Fisheries and Endangered Species [Internet] databases and Deep-Sea Coral Data Portal
 - Habitat Mapping and Assessment of Northeast Wind Energy Areas (Guida et al. 2017)
 - Northeast Area Monitoring and Assessment Program (NEAMAP)
 - The Nature Conservancy and SMAST Offshore Video Survey and Oceanographic Analysis: Georges Bank to the Chesapeake (2003–2012) (Bethoney et al. 2015)
 - Southern New England Juvenile Fish Habitat Research Study (2017)
 - Spatial and Temporal Distributions of Lobsters and Crabs in the Rhode Island/Massachusetts Wind Energy Area (Collie and King 2016)
 - Southern New England Industry-Based Yellowtail Flounder Survey (2003–2005) (Valliere 2007)
 - BOEM studies and environmental assessments, including:
 - BOEM's (2014) Revised Environmental Assessment for the MA WEA
 - BOEM's (2018) Vineyard Wind Offshore Wind Energy Project Biological Assessment for NOAA

- BOEM's (2018) DEIS for Vineyard Wind 1
- BOEM's (2019) Vineyard Wind Offshore Wind Energy Project Essential Fish Habitat Assessment

6.1.2 Data being collected

Describe data collected, or will be collected, to support baseline characterization.

- Vineyard Wind has initiated and supported multiple ongoing seasonal fisheries and benthic macroinvertebrate field surveys and studies to characterize baseline conditions in Lease Areas OCS-A 0522 and OCS-A 0501. These studies were developed with input from fishermen, fisheries scientists, and regulatory agencies. The offshore work is conducted on fishing vessels. The surveys use a range of established survey methods to assess different facets of the regional ecology using accepted protocols that are designed to be compatible with previous data and ongoing regional surveys. The data collection includes:
- Vineyard Wind is already conducting trawl and drop camera surveys in Lease Area OCS-A 0522 in collaboration with SMAST. Trawl surveys occur each season (spring, summer, winter, fall) and drop camera surveys occur twice per year.
- Vineyard Wind is collecting benthic habitat data via surficial and subsurface sonar systems, underwater video, and benthic grab samples as part of its G&G surveys in Lease Area OCS-A 0522.
- SMAST is also conducting trawl and drop camera surveys in Lease Area OCS-A 0501 and has conducted an American Lobster, Black Sea Bass, Larval Lobster Abundance Survey, and Lobster Tagging Study in the northern portion of Lease Area OCS-A 0501.
- Vineyard Wind has also partnered with the New England Aquarium to study highly migratory species presence across the MA WEA and RI/MA WEA, with help from the pelagic recreational fleet. The study determined that recreational effort for highly migratory species is widespread, with the highest levels of recreational fishing activity occurring to the west of Lease Area OCS-A 0522.
- Vineyard Wind has conducted comprehensive desktop studies of existing literature on fish and invertebrates as well as essential fish habitat assessments for Vineyard Wind 1 and Park City Wind.
- Vineyard Wind will conduct an in-depth desktop study that includes the data sources listed above as well as recently completed and ongoing studies, including BOEM and NOAA NEFSC's Fishery Physical Habitat and Epibenthic Invertebrate Baseline Data Collection program.

6.2 Species at risk

Describe which species the Developer believes to be of greatest concern and why.

- Vineyard Wind will undertake further desktop research and consult with fisheries stakeholders and experts to determine which fish species, invertebrate species, and habitats are most likely to be impacted by the Project and are of greatest concern. Vineyard Wind’s initial review suggests that this assessment could include hard bottom habitat areas as well as federally-listed species and the predominant commercial fishing species.

6.3 Potential impacts/risks and mitigation measures by project stage

The table below should list the potential impacts to fish, invertebrates, and their habitats and proposed mitigation measures. To this end, this section should describe how the Developers will minimize risk to fish, invertebrates and their habitats (e.g., foundation type, scour protection, cable shielding for electromagnetic fields, construction windows, siltation/turbidity controls, use of dynamic-positioning vessels and jet plow embedment).

Potential Impacts	Proposed Mitigation Measures ¹	Phase*			
		1	2	3	4
Micro-siting conflicts with habitats and fishery resources	<ul style="list-style-type: none"> • Vineyard Wind will seek input from regulatory authorities, the fishing industry, and maritime industry to locate foundations and cable routes in the least impactful manner that is practicable. • To the greatest extent feasible, Vineyard Wind will avoid sensitive habitats when siting offshore cables. • The WTGs and electrical service platform (ESP) will be widely spaced, leaving a vast majority of the Offshore Wind Generation Facility site undisturbed by WTG and ESP installation. • Vineyard Wind has and will continue to conduct geophysical, geotechnical, and environmental surveys to inform the Project’s design and layout. 	X	X		
Temporary, alteration of the seabed and localized increases in noise and turbidity	<ul style="list-style-type: none"> • Vineyard Wind will seek to use noise attenuation technologies to reduce sound from pile driving of foundations (if such methods are used) • Scour protection may be installed around foundations, where necessary, to minimize scouring and sediment suspension around foundations. • As practicable, Vineyard Wind will minimize underwater noise during pile driving through a soft-start, which allows fish time to move away from the area. Other mitigation measures implemented to protect marine mammals and sea turtles from underwater noise will also protect fish species. • Vineyard Wind will perform sediment dispersion modeling to assess the potential impacts of cable installation activities. 		X		

Potential Impacts	Proposed Mitigation Measures ¹	Phase*			
		1	2	3	4
	<ul style="list-style-type: none"> In nearshore areas where sensitive resources are located near the potential landfall sites, horizontal directional drilling may be used to minimize disturbance of coastal habitats by drilling underneath them instead of through them. Use of mid-line anchor buoys will be considered, where feasible and considered safe, as a potential measure to reduce potential impacts from anchor line sweep. 				
Long-term changes to seabed and habitat	<ul style="list-style-type: none"> Vineyard Wind will, to the extent possible, avoid sensitive benthic habitats. The addition of foundations and scour protection, as well as cable protection in some areas, may act as an artificial reef and provide rocky habitat previously absent from the area. 		X	X	X
EMF Impacts	<ul style="list-style-type: none"> Vineyard Wind will use proper shielding to reduce EMF. This can be achieved through sheathing and burial of cables; where sufficient burial depth cannot be achieved, the cables can be covered by cable protection (which would shield EMF). Vineyard Wind expects to conduct EMF modeling and assessments to identify potential mitigation requirements as part of the permitting process. 		X	X	
Cable burial	<ul style="list-style-type: none"> Vineyard Wind will bury offshore cables to an appropriate minimal depth to reduce exposure risk. If depth cannot be reached, Vineyard Wind will add protective materials over the cable. Vineyard Wind will evaluate cable burial techniques based on their ability to maximize the likelihood of achieving sufficient cable burial, minimize the need for cable protection, and minimize suspended sediments during installation. Vineyard Wind intends to avoid or minimize the need for cable protection to the greatest extent feasible. 		X		

**Phase: 1: Survey/Define Project Envelop/Permitting; 2: Construction; 3: Operation; 4: Decommissioning
1. The proposed mitigation measures described in the table are preliminary in nature and subject to review and approval from jurisdictional agencies in accordance with regulatory and permitting requirements. Final mitigation measures will be determined pursuant to applicable permitting processes and may vary from the list provided herein.*

6.4 Monitor for impacts during each phase

Describe how potential impacts will be monitored on these types of fish and invertebrates during each phase of physical work for the Project (site assessment, construction, operation, and decommissioning) to inform mitigation planning for later phases of the Project as well as for future Projects.

6.4.1 Pre/Post monitoring to assess and quantify changes

Describe how changes to environmental resources will be quantified using statistically sound methods.

- Surveys are already underway to assess baseline conditions of fish, invertebrates, and their habitats in Lease Area OCS-A 0522. The pre-construction baseline survey data within Lease Area OCS-A 0522 are expected to be utilized in future environmental assessments to assess changes attributable to development activities.
- The monitoring measures for Liberty Wind will be informed and refined based on those that have been put in place for Vineyard Wind 1 and Park City Wind. Building on its experience from Vineyard Wind 1, Vineyard Wind may use a beyond BACI framework (recommended by BOEM) and/or a BAG framework to monitor impacts to fish and invertebrates. Details of the assessment methodology will be developed by Vineyard Wind in collaboration with relevant state and federal agencies, fisheries stakeholders, and New York fisheries scientists.
- Vineyard Wind also expects to develop a benthic habitat monitoring plan for the Project that is built upon the framework developed for Vineyard Wind 1 and/or Park City Wind but will seek to advance understanding and not revisit questions that may have already been answered.
- Ideally, specific questions and focal taxa will be chosen for the Project either based on site- specific fisheries risk assessment, or in relation to broader regional efforts to assess variation between sites and understand cumulative impacts for sensitive species.
- Monitoring will, to the extent practicable, use appropriate study designs and methodologies to effectively analyze risk prior to construction and evaluate impacts during construction and operation by testing hypotheses and helping to assure statistical power for meaningful data analysis.
- Vineyard Wind will assess the most appropriate statistical tools to use, which may include ANOVA tests, the Bray-Curtis dissimilarity index, etc.
- To the greatest extent possible, Vineyard Wind will continue to design its surveys and monitoring efforts to be compatible with previous data and ongoing regional surveys. In addition to other benefits, this will allow for a more statistically robust assessment of changes to environmental resources.
- Outside expertise will be consulted during study design and data analysis processes.

- Vineyard Wind will continue to collaborate with other regulatory agencies and stakeholder groups to identify research needs and opportunities.

6.4.2 Addressing data gaps

Describe how data gaps will be addressed.

- The MA WEA, which includes the Offshore Wind Generation Facility site, is well-studied and numerous studies already exist to characterize fish and invertebrate assemblage and their habitats in Lease Area OCS-A 0522, the OECC, and the surrounding region.
- To supplement existing data and address data gaps, Vineyard Wind is conducting trawl and drop camera surveys within Lease Area OCS-A 0522. Vineyard Wind is also collecting benthic habitat data via surficial and subsurface sonar systems, underwater video, and benthic grab samples during G&G surveys in the Lease Area.
- Nevertheless, Vineyard Wind will continue to work with stakeholders, including regulatory agencies, commercial fishermen, recreational fisherman, and the E-TWG, to identify data gaps to be addressed through surveys or permitting applications.

6.5 Strategies for developing alternate protocols

Describe the process for determining when mitigation strategies are insufficient and under what conditions they might elect to rehabilitate or restore impacted fisheries in an alternative location or when the provision of compensation of some form may be appropriate.

- Regarding mitigation strategies, Vineyard Wind will incorporate lessons learned from Vineyard Wind 1, Park City Wind, and other offshore wind farm development, including lessons learned on the efficacy of mitigation, when developing mitigation strategies for Liberty Wind. This experience will allow Vineyard Wind to select, in consultation with regulatory authorities, those mitigation measures that are most likely to be effective and practicable and incorporate input from the E-TWG and other stakeholders.
- Vineyard Wind understands that there are ways to benefit species that may experience impacts from offshore wind in alternate locations. At this time, it is hard to say if offsite or restorative mitigation related directly to Project impacts will be appropriate for Liberty Wind. The decision to incorporate offsite mitigation would be influenced by, among other factors, the anticipated level of impact, what is known at the time about the efficacy of available mitigation measures, and whether regulatory agencies would accept these methods as appropriate mitigation for the Project.
- As necessary, Vineyard Wind will explore adaptive mitigation strategies further in consultation with the E-TWG, regulatory agencies, and relevant stakeholders.

7. Project Decommissioning

7.1 Potential impacts on marine wildlife, birds, bats, and fisheries

This section should describe potential impacts to marine mammals, sea turtles, birds, bats, and fisheries and habitats from decommissioning the project, based on available information and relevant experience (if any).

- Vineyard Wind’s waste handling processes during the decommissioning of the Project will focus on re-use or recycling, with disposal as the last option.
- Vineyard Wind will collaborate with regulatory authorities and key environmental stakeholder groups to better understand the effects and potential impacts associated with decommissioning.
- Vineyard Wind will consider best management practices available at the time of decommissioning to minimize any potential impacts to marine mammals, sea turtles, birds, bats, fisheries, and habitats.

7.2 Approach for decommissioning plan and coordination with stakeholders

This section should describe how a decommissioning plan will be developed to identify and mitigate potential impacts, including coordination with stakeholders, and any elements of its contemplated decommissioning plan that can be identified at this stage.

- Vineyard Wind will decommission the Project in accordance with all necessary laws and regulations and generate a detailed Project-specific decommissioning plan.
- Vineyard Wind will seek input on the detailed Project-specific decommissioning plan from regulatory agencies, fisheries and marine stakeholders, and local communities.
- Vineyard Wind will apply lessons learned during the construction and operation of the Project to the decommissioning plan.

8. Additional Considerations

8.1 Additional mitigation strategies and EMP refinement

This section should describe any additional mitigation strategies not otherwise described herein that would improve the Plan and reduce impacts on wildlife. In addition, describe how the EMP will be updated and refined based on additional information and stakeholder feedback.

- Throughout the Project's multi-year permitting process, Vineyard Wind will continue to assess potential risks to species and identify measures to avoid, minimize, or mitigate potential impacts to wildlife in line with applicable federal and state permitting requirements. Stakeholder input as well as lessons learned from Vineyard Wind 1 and Park City Wind will inform this effort as well as refinement of the EMP.
- Vineyard Wind anticipates continuing to support collaborative efforts on potential mitigation strategies in connection with Vineyard Wind 1, Park City Wind, and/or Liberty Wind.

8.2 Process for updating the EMP

This section should describe how feedback from environmental stakeholders, E-TWG, and other agencies and working groups will be incorporated and updated in the EMP.

- Vineyard Wind will continuously evaluate and evolve this EMP, in line with applicable federal and state permitting requirements, so that all the components of the EMP are complete and sufficient.
- Vineyard Wind expects that additional guidance and information will become available throughout the planning and regulatory process and, as such will continue to consider its relevance to the EMP at the appropriate intervals.
- Updates to the EMP are intended to reflect the results of iterative exchanges with members of the E-TWG, F-TWG, and relevant stakeholders.