



NYSERDA ORECRFP23-1



Purchase of Offshore Wind Renewable Energy Credits

Submitted by Empire Offshore Wind LLC- January 25, 2024

Section 8.2 - Environmental Mitigation Plan



Powering New York. Together



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Attachments

Reference	Description
8.C	Environmental Mitigation Plan

8. RESPONSIBLE DEVELOPMENT

8.2. Environmental Mitigation Plan

Elements of the Environmental Mitigation Plan are described in detail in Appendix D. The Environmental Mitigation Plan must address any variance among Proposals. The Submission must include both Confidential and Public versions of the Environmental Mitigation Plan. The public version of the Environmental Mitigation Plan will be made publicly available upon Proposal submission and should therefore utilize language accessible to the public that demonstrates an understanding of New York's diverse stakeholders, unique coastal and marine resources, and local communities.

Proposers must include in their Proposals a detailed Environmental Mitigation Plan that describes how Proposer will mitigate adverse environmental impacts that may be caused by the Project. Proposers are advised to review the environmental studies prepared for the New York State Offshore Wind Master Plan with respect to the potential impacts of offshore wind energy development on the environment, and also are advised to include in their mitigation plan the appropriate Best Management Practices described in the Master Plan, its supporting studies and more recent relevant work. As with the Fisheries Mitigation Plan, NYSERDA recognizes that after submission to the agency, the Proposer may change and update the Environmental Mitigation Plan to reflect findings during the environmental reviews conducted by BOEM or New York State. NYSERDA encourages Proposers to consider mitigation measures beyond those that may be legally required by environmental reviews completed under NEPA, SEQRA or other review laws.

8.2.1. Environmental Mitigation Plan Summary

The Proposer must briefly present its philosophy and approach to avoiding, minimizing, restoring and offsetting the potential environmental impacts of the proposed Project and how the Proposer will use research, data and stakeholder feedback to support decision making with respect to site design, construction, operations and decommissioning.

As a governing philosophy, Empire Offshore Wind LLC ("Empire Wind") is committed to the mitigation hierarchy, and Empire Wind's implementation of this strategy is reflected in this Environmental Mitigation Plan ("EMP") and Attachment 8.C hereto. Empire Wind believes that from the outset, measures to avoid or mitigate adverse environmental impacts, while maximizing the positive beneficial environmental impacts of an offshore wind energy project, should be:

- Identified and developed in consultation and coordination with the relevant stakeholders;
- Based on robust baseline characterization that has been developed in consultation with relevant stakeholders;
- Based on evidence and the latest science, and where data gaps exist or the receptor-effect interactions are unknown, such gaps should be filled through targeted data collection, monitoring, and/or research;
- Incorporated into spatial planning, for example, in project siting and design; and

- Applied to how the project is implemented (surveys, construction methods, operations and maintenance activities, and decommissioning).

Empire Wind recognizes the importance of adaptive management and will continue to improve and mature its procedures for evaluating and mitigating impacts to environmental resources. Empire Wind also recognizes that existing environmental plans, permitting, and assessment documents have been reviewed by the Environmental Technical Working Group (“E-TWG”), and Empire Wind will continue to engage with the E-TWG as these resources continue to be developed and refined. For example, Empire Wind presented the Empire Wind EMP to the E-TWG and has applied feedback from that process into this EMP.

8.2.2. Communications and Collaboration

The New York State Offshore Wind Master Plan, the New York State Public Service Commission Order Establishing Offshore Wind Standard Framework for Phase 1 Procurement issued on July 12, 2018, the Order Adopting Modifications to the Clean Energy Standard issued on October 15, 2020 pursuant to Case no. 15-E-0302, and the Order on Power Grid Study Recommendations issued on January 20, 2022 pursuant to Case No. 20-E-0197, and this RFP emphasize the value of stakeholder engagement in the development of offshore wind energy Projects. Further, the Orders require Proposers to work with the State-supported Environmental Technical Working Group (“E-TWG”). Many other stakeholders are engaged in offshore wind energy development. The Proposer must describe how it will identify additional stakeholders relevant to both onshore and offshore environmental issues and describe how the Proposer intends to communicate with those stakeholders during survey work, and design, construction, operation and decommissioning of the Project. This description must account for communications with members of the E-TWG and consultations with New York State agencies during the various Project phases.

Empire Wind notes that openness and transparency are core values of its approach to engaging with stakeholders. Empire Wind believes consultation and coordination with relevant stakeholders is important as a means of identifying potential risks or opportunities for sufficiently avoiding and mitigating environmental impacts. This includes sharing updates, plans, results, and information regularly and at all stages of project development so that all stakeholders have sufficient opportunities to input into these processes, while also being sensitive to the potential for stakeholder fatigue.

Empire Wind has worked consistently to identify and to consult with relevant stakeholder groups to get feedback on plans, data, and mitigation. This outreach and involvement has increased “buy-in” on decisions in advance of the regulatory process. In other words, this is a “no surprises” approach. This EMP for EW1 provides information on how potential impacts may be mitigated, with further mitigation measures to be developed in further consultation with the relevant stakeholder groups, including E-TWG and New York State agencies.

Empire Wind has been active in the E-TWG since its inception and is committed to active participation to collaborate on best practices and research for offshore wind energy

development, balancing environmental concerns with responsible technically and commercially feasible development, while fostering opportunities for future offshore wind energy development. Empire Wind will continue to engage with the E-TWG on both onshore and offshore environmental issues based on its portfolio of projects in development, rather than on a project-by-project basis. This approach is intended to streamline communication by providing a single point of contact for information exchange and consistent message. Empire Wind considers the Environmental NGOs (“eNGOs”) on E-TWG as a proxy “eNGO steering committee” for engagement with the eNGO community on responsible development and to provide guidance on additional outreach that may be valuable. Empire Wind will continue to engage with regulatory agencies, eNGOs, research institutions and relevant stakeholders either via independent meetings or through environmental round tables to maximize opportunities to discuss the Empire Wind ,Phase 1 (“EW1” or “Project”) and solicit feedback. Empire Wind held its first introductory eNGO roundtable for Empire Wind on September 17, 2020, and held another engagement with the New York State Energy Research and Development Authority (“NYSERDA”), the regulatory agencies, eNGOs, E-TWG, and Fisheries Technical Working Group (“F-TWG”) on September 20, 2022. On October 30, 2023 Empire Wind held an additional eNGO roundtable. Empire Wind will also proactively engage with eNGOs not directly represented on the E-TWG through direct engagement or environmental round tables hosted by Empire Wind or others, as appropriate.

Empire Wind actively participates in numerous working groups, steering committees, or other groups focused on evaluating and reducing environmental impacts from offshore wind development. For instance, Empire Wind is a Steering Committee member (through the end of 2023) and Industry Caucus member of the Regional Wildlife Science Collaborative (“RWSC”) that is working with NYSERDA and other partners to develop and track regional research priorities and provide research support. Multiple Empire Wind subject matter experts also participate on expert subcommittees within the RWSC.

8.2.3. Environmental Monitoring and Research Pre-, During- and Post-Construction

Environmental research and peer-reviewed publication of research findings is key to advancing the scientific knowledge of how offshore wind energy development might affect marine ecosystems and wildlife. Proposers are encouraged to publish their own work in scientific journals, or other scientifically rigorous product, and to coordinate with scientists and regulators interested in investigating environmental and wind energy-related scientific questions.

Because offshore wind energy development is in early stages in the US, there is little empirical information as to the effects such development may have on ecological communities specific to the New York Bight. Transparency in new research and peer reviewed publication of results bring higher value, allowing others to build on that work. Thoughtfully planned, designed and implemented pre-, during- and post-construction monitoring and research to understand wildlife responses and potential effects from development is key for adaptive management. Further,

multiple regional sites working together and coordinating monitoring and research in a consistent manner would bring additional value to the scientific understanding of how development of offshore wind energy is affecting regional resources.

The Proposer must (to the extent possible at this stage) describe how, for large whales (particularly the North Atlantic right whale), other marine mammals, sea turtles, birds, bats, fish, sturgeon, and invertebrates, it plans to conduct scientifically sound, statistically rigorous studies to accomplish the following:

- 1. Establish baseline data on the presence of these types of wildlife within the area of the proposed Project (including areas where Project-related vessels would travel to reach the Project area);*
- 2. Assess and quantify (to the extent practical) changes attributable to Project activities; and*
- 3. Monitor for impacts on these types of wildlife 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.*

In the event that these activities cannot be clearly defined at this stage, the Proposer must describe how it will approach these questions and data gaps.

Proposers should identify collaborative efforts currently underway or in the planning stages to help highlight means by which the industry plans to standardize scientific methods, surveys, and monitoring plans across the region to enhance data compatibility and utility. Proposers are encouraged to reference Wildlife Data Standardization and Sharing: Environmental Data Transparency for New York State Offshore Wind Energy. The Proposer must describe how it plans to make environmental data available in accordance with Section 2.2.8 of the RFP.

Empire Wind is committed to collecting and evaluating existing data, conducting research studies, incorporating feedback from the environmental community, and conducting site specific or collaborative regional surveys and research to establish a baseline characterization of the lease areas' natural habitat, resources, and uses. Establishing this baseline data is necessary to identify and quantify potential impacts from the proposed offshore wind energy development, identify mitigation options to avoid or minimize impacts, and establish protocols for monitoring impacts or data gaps where appropriate. Empire Wind's efforts to establish baseline data and monitor for potential impacts are and will be conducted in accordance with best practices, including Bureau of Ocean Energy Management ("BOEM") guidance, as well as consideration of recommendations for further research from groups such as F-TWG and E-TWG and the RWSC Science Plan.

Empire Wind will explore appropriate monitoring and research protocols, including, for example, monitoring of potential behavioral responses or changes in spatial and temporal distribution of biological resources or fishing practices as a direct result of the offshore wind energy development. Marine and terrestrial monitoring plans for the Project are being developed through regular engagement with Subject Matter Experts, consultants, Federal and State regulators, academia, eNGOs, and have been presented in draft form to the E-TWG and F-TWG in late 2022. Empire Wind believes these are best formulated in consultation with the fishing

industry, regulators, interest groups, and other wind developers. Empire Wind will make data and analyses from studies that monitor the effects of its offshore wind development available to researchers and scientists, with appropriate limitations on proprietary information.

For the pre-construction, construction, and post-construction phases, Empire Wind has identified priority taxa or species, and Empire Wind is committed to using science and relying on technical experts to identify such priorities and establish appropriate monitoring and research approaches.

Pre-Construction

Empire Wind acknowledges that ongoing research and monitoring for the Empire Wind Project Area and at a wider regional scale is important to refine the understanding of impacts, potential mitigation options, and for future planning purposes for environmental resources, including facilitating the responsible leasing and development of future offshore wind energy areas within the Northeast and Mid-Atlantic Ocean. Empire Wind has been establishing baseline data on the spatial and temporal presence of environmental resources in the proposed area of the Project using key existing literature, datasets, and studies as needed. Additional data collections are being planned prior to start of construction to ensure that a robust Before-After Control-Impact (“BACI”) analysis can be conducted on key focal taxa to understand and monitor impacts, and make adjustments to plans as needed.

During Construction

Major permit documents including the Final Environmental Impact Statement (“FEIS”), the Record of Decision (“ROD”) and the Article VII Environmental Management & Construction Plan (“EM&CP”) contain specific conditions under which the Project will be constructed and operated. These have been used to inform the EMP as well as future monitoring plans which will be developed collaboratively with relevant Federal, State, academic, and eNGO entities. Empire Wind is committed to exploring appropriate monitoring protocols, for example monitoring of potential behavioral responses or changes in spatial and temporal distribution of environmental resources as a direct result of the offshore wind energy development. Monitoring and research should ideally be targeted towards interactions between offshore wind energy developments and the receptors it is being judged against. Empire Wind has established an Expert Panel (“Panel”) consisting of six external experts to help advise on mitigation measures and a monitoring program for construction phases of the Project in order to protect marine mammals. These include acousticians and biologists from Woods Hole Oceanographic Institute, University of New Hampshire, University of Rhode Island, the Wildlife Conservation Society, New England Aquarium, and the Alfred Wegener Institute. The Panel has helped provide recommendations on passive acoustic monitoring (“PAM”) buoy deployment, infrared cameras, visual observers, and other mitigation measures which the Project is actively working to integrate into construction plans, including Vessel Strike Avoidance plan and Pile-Driving Plan. Empire Wind is actively working to progress an Avian and Bat Monitoring Plan with input from the Biodiversity Research Institute, research institutions, and the U.S. Fish and Wildlife Service (“USFWS”).

Empire Wind is open to monitoring that explores other approaches to detect and quantify change, where further monitoring is appropriate, for example behavioral responses. Empire Wind will work with the regulatory agencies, E-TWG/F-TWG, and relevant stakeholders to identify research and monitoring needs and agree on methodologies. Ideally, specific questions and focal taxa shall be chosen for the Project either based on site-specific risk assessment(s), 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 evaluate impacts during construction and operation by testing hypotheses and helping to assure statistical power for meaningful data analysis. However, for some biological monitoring, this level of robustness to adequately detect change as a direct result of an offshore wind farm is not always possible, as many outside factors can influence these variations with much greater significance than the factors that can be attributed to causes from offshore wind energy developments (*e.g.*, seawater temperature, nutrient levels, etc.). Empire Wind is actively working to share data and collaborate with broader regional efforts including Project WOW (Wildlife and Offshore Wind), where Jennifer Dupont (Head of Technical Environmental Affairs) is an External Advisory Board member, as well as RWSC, to address the broader-scale change detection challenges. The Project is one of two sites that Project WOW has chosen as part of its core analyses and the Project actively communicates and collaborates with these researchers and will continue to do so through construction phases.

Post-Construction

Major permit documents contain specific conditions under which the Project will be constructed and operated. These have been used to inform the EMP as well as future monitoring plans which will be developed collaboratively with relevant Federal, State, academic and eNGO entities. Monitoring changes in pre- and post-construction of environmental resources due to the presence of an offshore wind energy development can be challenging. Empire Wind will collaborate with F-TWG and E-TWG and seek input from stakeholders on monitoring requirements and methods and, in addition to the current initiatives outlined in Section 8.2.4, is willing to explore new collaborative research and monitoring initiatives, through mechanisms such as the RWSC or others.

Any proposals for monitoring should be statistically robust, and technical experts should conduct statistical power analyses up front in the planning process before implementing future studies. Empire Wind is committed to exploring appropriate monitoring protocols, for example monitoring of potential behavioral responses or changes in spatial and temporal distribution of biological resources as a direct result of the offshore wind energy development.

Monitoring changes in pre- and post-construction of environmental resources due to the presence of an offshore wind energy development can be challenging. Empire Wind will collaborate with F-TWG and E-TWG and seek input from stakeholders on monitoring requirements and methods and, in addition to the current initiatives outlined in Section 8.2.4, is

willing to explore new collaborative research and monitoring initiatives, through mechanisms such as the RWSC or others.

8.2.4. Supporting Other Environmental Research

The selected Proposer will be required to coordinate with independent scientists supported by third parties for the purpose of research and publication in peer reviewed journals or other scientifically rigorous products. This coordination may include the provision of reasonably requested Project data, and access to the Project area to examine environmental sensitivities and/or the impacts of offshore wind energy development on the environment.

The Proposer must describe how such requests will be considered and processed, and any restrictions on data provision or access the Proposer believes may be required to protect trade secrets or maintain site security.

The Proposer shall identify ways to enhance site accessibility for the advancement of third party scientific and technological study.

The Proposer may also elect to identify a level of financial commitment that will be appropriated to leverage third-party environmental research funding, including federal or State-supported research, into relevant ecological communities and the effects of offshore wind energy development. Such financial commitments will be favorably considered in the proposal review process. Funding identified here should be separate from funding allocated under Section 2.2.7 of the RFP.

Empire Wind is committed to collaborating with the scientific community, E-TWG, relevant stakeholders, other offshore wind energy developers, and third-party groups to conduct robust and relevant research studies that relate to environmental resources and offshore wind projects. Equinor spent around \$20 million in 2023 on developing new knowledge, monitoring methods, and new solutions for a positive coexistence between offshore wind energy and nature.

Empire Wind is committed to providing researchers and scientists with data that is not commercially sensitive. Empire Wind and its affiliates have a tradition of publishing research data on their environmental studies; such published studies include studies on benthos, biomass, noise, artificial reefs, and microplastics.

Oceanographic data not deemed proprietary, for example, seawater temperature and salinity, from the “Metocean Facilities” deployed within the Lease Area can be requested. Requests can be made directly via Michelle Fogarty at mfog@equinor.com. Metocean information is [publicly available](#) at the [MARACOOS OceansMap](#). Empire Wind will make non-proprietary environmental and fisheries data publicly available in a format and manner best suited for efficient distribution.

Empire Wind also will consider making existing wind farm related vessels, buoys, or structures available for research opportunities where the research activities will not materially impact the existing objectives of those resources. Empire Wind is willing to consider requests to access Equinor Wind’s existing operating offshore wind energy developments in Europe to conduct

research and monitoring and will make an effort to meet with any interested parties when contacted to discuss prospective research.


Empire Wind is committed to supporting regional wildlife and fisheries research and monitoring initiatives through RWSC and ROSA. Empire Wind participates as an RWSC Steering Committee and Industry Caucus member and a ROSA Board and Advisory Council member. In addition, Empire participates in a number of technical subcommittees to help shape regional science, monitoring, and research plans within the organizations. Empire Wind has signed a contract with ROSA to support the development of a research administration framework (*i.e.*, project selection, RFP, and project management process). Future Monitoring funds for commercial fish stocks and wildlife of conservation concern will be issued to RWSC and ROSA to administer on behalf of the selected projects in order to build an independent and competitive solicitation process for regional research projects.

Empire Wind will make an effort to meet with any interested parties when contacted to discuss prospective research. Empire Wind is also willing to consider requests to access Equinor's existing operating offshore wind energy developments in Europe to conduct research and monitoring. With regards to any restrictions, Empire Wind will restrict confidential, propriety, and commercially sensitive data.

Empire Wind and its affiliates already are collaborating with third-party researchers in support of monitoring activities and assessing impacts in the following ways:

- Empire Wind has established an Expert Panel consisting of six external experts to help advise on mitigation measures and monitoring program for construction phases of the Empire Project in order to protect marine mammals. The Panel has helped provide recommendations on PAM buoy deployment, infrared cameras, visual observers, and other mitigation measures which the Project is actively working to integrate into construction plans.
- Empire Wind funded the deployment and testing of an infrared camera (Toyon) during a recent Munitions and Explosives of Concern ("MEC") survey in the lease area. The purpose of the test was to collect information on detection capabilities of the camera and to understand how the technology can best be used to augment visual observers. Results from the test are currently being analyzed and will be shared externally when available.
- Empire Wind has partnered with Inspire Environmental to establish and conduct Fisheries and Benthic Monitoring. This Fisheries and Benthic Research Monitoring Plan ("FMP/BMP") has been developed in accordance with recommendations set forth in "Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf" (BOEM 2019).
- Empire Wind collaborated with SUNY Stony Brook to attach four fish tag receiver gates to the Empire Wind metocean facilities. The receiver gates, used primarily for detecting Atlantic sturgeon but also capable of detecting other tagged species, were part of a previously BOEM-

funded study. Empire Wind coordinated with Stony Brook on opportunities to download and service the sensors during scheduled service visits approximately every six months.

- Empire Wind is collaborating with the Wildlife Conservation Society (“WCS”) and Woods Hole Oceanographic Institution (“WHOI”) on real-time large whale detection and notification buoys in a minimum [nine-year monitoring program](#). This includes an exhibit at the New York Aquarium and [near-real time data stream](#).
- Empire Wind metocean facilities (*e.g.*, current meters and wave buoys) were deployed from 2018 to 2020, the [historical data](#) is publicly available on [MARACOOS OceansMap](#).
- Protected Species Observer (“PSO”) data is currently being shared in support of a research study being conducted by National Marine Fisheries Service (“NMFS”) and the New England Aquarium to evaluate how PSO data can be utilized to support regional species stock assessments.
- Equinor Wind was a founding board member of Responsible Offshore Science Alliance (“ROSA”) and is committed to continue supporting ROSA. Scott Lundin (VP of Permitting, Community and Environmental Affairs) sits on the Board of Directors. EJ Marohn (Marine Affairs Manager) is a member of the Advisory Council. Empire Wind contributed \$300,000 to the startup of ROSA with a commitment for an additional \$50,000.
- Empire Wind and its affiliates are committed to continue participating in the development of the RWSC as it matures, where Jennifer Dupont Head of Technical Environmental Affairs) has served on the Steering Committee for the past three years; multiple technical member sit on each of the subcommittees (marine mammals, sea turtles, birds and bats, etc.) Empire Wind contributes \$20,000/year in membership fees to RWSC and is committed to future funding of regional research and monitoring of wildlife through the organization
- Equinor Wind is a former member of the Responsible Offshore Development Alliance (“RODA”) Task Force.
- Equinor holds a board position on the Atlantic Marine Conservation Society board.
- 
- Equinor is collaborating with leading suppliers and research communities on bird monitoring, and is testing and validating different methods to gain insight into bird migration patterns around offshore wind facilities. One of the concepts currently being tested includes monitoring from buoys, a method that combines visual monitoring with artificial intelligence (“AI”) technology.
- Equinor is currently investing in the development of the Subsea Quieter, a noise mitigation technology for pile driving. Large-scale tests of this technology will be performed in the marine environment in 2024, and a positive outcome would make the technology ready for the first full-scale tests.

Empire Wind, contingent upon a winning bid under this OREC Request for Production (“RFP”), is committed to supporting regional monitoring of wildlife and key commercial fish stocks equivalent to the specified value of \$10,000 per MW of offer capacity. Half of this will support regional monitoring of key commercial fish stocks to better understand how offshore wind energy development is potentially altering the biomass and/or distribution of these stocks; and the other half will support regional monitoring of wildlife to better understand how offshore wind energy development effects distribution and abundance of sensitive species. Future Monitoring funds for commercial fish stocks and wildlife of conservation concern will be issued to RWSC and ROSA, per signed contracts, to administer on behalf of the selected projects in order to build an independent and competitive solicitation process for regional research projects.

8.2.5. Marine Mammals and Sea Turtles

The development of offshore wind energy poses some concerns about effects on marine mammals and sea turtles, primarily related to the introduction of man-made sounds, changes in ship traffic, and the long-term presence of turbines in the ocean.

Sounds resulting from bottom surveys, ships, and pile driving may risk introducing possible changes in mammal behavior, including effective habitat reduction because of sound avoidance, interruption of life-cycle activities, and injury to hearing. For some marine mammals, low-frequency sounds such as pile driving, if performed in close proximity to an animal, can potentially cause permanent damage to hearing or temporarily make it difficult for the animal to hear predators, prey, and each other.

The Proposer must provide a description of how it will work to understand and minimize the Project’s risk to marine mammals and sea turtles, with special attention to highly vulnerable and endangered species such as the North Atlantic right whale. At a minimum this should consist of:

- 1. A basic description of what is known about the proposed site in terms of marine mammal and sea turtle assemblage, temporal and spatial use of the site, and which species the Proposer believes to be of greatest concern and why;*
- 2. A description of proposed measures to minimize the impacts of sound on marine mammals and sea turtles during all phases of Project development. This should include, at a minimum: a. Anticipated pre- and post-construction survey techniques to establish an ecological baseline and changes to that baseline within the Project site;*
 - b. Minimum size of exclusion zone intended to be monitored during geophysical surveys and construction;*
 - c. Planned approaches to understanding marine mammal and sea turtle presence and absence within the 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.);*
 - d. Proposed temporal constraints on construction activities and geophysical surveys with noise levels that could cause injury or 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

e. Proposed equipment and technologies the Proposer would use to reduce the amount of sound at the source, if any.

3. A description of how the Proposer will seek to minimize the risk of ship strikes through timing, speed restrictions (e.g., stakeholders have suggested speed restrictions of 10 knots during time periods with high densities of species of concern), use of shipping lanes, and conformance to the National Oceanic and Atmospheric Administration guidance to avoid ship collision with whales (<https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales>).

Empire Wind has undertaken detailed studies and surveys to identify the presence and behaviors of marine mammals and sea turtles in Lease OCS-A 0512.

The Project's assessments, design, and mitigations are designed in a manner meant to appropriately address the needs and requirements of all the species known to occur within the Project Area without having to prioritize some over others. Full details of species at risk, likely impact, and proposed mitigation have been described in the Empire Wind Construction and Operations Plan ("COP"), FEIS and ROD with the consultation of relevant stakeholders. Baseline data associated with marine mammals and sea turtles are provided within this section. The following is a high-level summary of Empire Wind's present knowledge.

Marine Mammals

There are 39 marine mammals (cetaceans and pinnipeds) found in the Northwest Atlantic Outer Continental Shelf ("OCS") region waters with documented ranges that include the Project Area. All 39 marine mammal species are protected by the MMPA. Of those 39 species, 20 are considered common (known to be present either year-round or seasonally in the Project Area). Five whale species are also listed as endangered under the Endangered Species Act ("ESA"); these include the fin whale, sei whale, blue whale, North Atlantic right whale, and the sperm whale. Of the five Endangered species, three are considered common in the Project Area (North Atlantic right, fin, and sei), one is uncommon (sperm) and one is rare (blue). There is no designated Critical Habitat for any marine mammal species in the Project Areas.

For a full list of marine mammals which are common in the marine waters of the Atlantic OCS (including the Project Area) please see the COP for further detail.

Sea Turtles

There are five species of sea turtles that have been documented in or within the Northwest Atlantic OCS region waters which includes waters of the Project Area. These species include Kemp's ridley (*Lepidochelys kempii*), loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricate*). The hawksbill is

considered unlikely to occur and if seen would be as incidental transients. There is no designated Critical Habitat for sea turtles in the Project Area.

In the Empire Wind Project Area waters, the four sea turtle species are found seasonally. Sea turtles are found in higher densities in the Project Area during summer and fall when the water is warmest. Winter occurrences would be expected to be rare and individuals found would likely be cold-stunned, which may result in individuals stranding on beaches. There are no sea turtle nesting sites in the Project Area, nor is there critical habitat. In New York, sea turtles are known to occur throughout the nearshore waters as far north and west as the Lower Bay portion of Gowanus Bay.

With the designation of Wind Energy Areas, BOEM and other relevant federal agencies were required under the National Environmental Policy Act to conduct environmental assessments of offshore development and construction plans. These data and results are summarized in the COP and, combined with other sources, lead to the conclusion that the loggerhead sea turtle is the most abundant and widespread throughout the area. Leatherback sea turtles are found in higher densities nearer to coastlines. In the Study Area, Kemp's ridley and green sea turtles are more likely to be found in the waters of Long Island Sound than within the Project Area. Sea turtle species are more commonly found in the warmer summer and fall months. As water temperatures throughout coastal New England rise in the spring, sea turtles begin to migrate north from their overwintering waters further south. There is no sea turtle nesting in any of the coastal areas that the Project Area encompasses.

Proposed Measures to Minimize Impacts of Sound:

Empire Wind has identified the potential for underwater noise impacts to marine mammals and sea turtles from geophysical survey equipment, construction, and installation. The following is a list of proposed mitigation measures for the Project:

Geophysical Surveys:

- Exclusion, clearance, and monitoring zones will be maintained as necessary to help measure and mitigate potential effects on marine mammals.
- Monitoring during noise-generating activities shall be done through an integrated monitoring approach, including the use NMFS-approved PSOs and other proven technologies, to the extent practicable and in compliance with federal regulation.
- Soft starts and shut-down procedures to minimize impacts associated with noise emitting survey equipment, where technically feasible and in accordance with associated authorizations.

General:

- Monitoring during construction and installation activities, including those done during times of reduced visibility, will 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;

- Empire Wind shall not commence activities that generate significant noise, including impact pile driving, during poor visibility conditions such as darkness, fog, and heavy rain, unless an alternative mitigation monitoring plan that does not rely on visual observation has been determined to be effective, to the extent compatible with practicability and worker safety.¹

Construction and Installation - Foundations:

- Empire Wind will apply monitoring and exclusion zones as appropriate to underwater noise assessments and impact thresholds as outlined in National Oceanic and Atmospheric Administration (“NOAA”) NMFS-issued Letter of Authorization including:
 - Qualified NOAA Fisheries approved PSOs;
 - Real-time monitoring systems, as appropriate;
 - Use of PAM systems; and/or
 - Use of reduced visibility monitoring tools/technologies (*e.g.*, night vision, infrared and/or thermal cameras);
- Empire Wind will consider the potential use of commercially available and technically feasible noise reducing technologies, in accordance with associated authorizations.

Proposed Measures to Minimize Risk of Ship Strikes:

Empire Wind has identified the potential for ship strike impacts to marine mammals and sea turtles from portfolio-associated activities. The following is a list of some of the proposed mitigation measures for the Project. For a complete list, please see the COP for further detail:

- Use of exclusion/safety zones, potentially based on real-time monitoring systems as well as NOAA and NMFS-approved PSOs and PAM.
- Empire Wind empowers all personnel onboard a vessel to raise an alert of potential marine mammals and sea turtle risk via the Lead PSO, with the Lead PSO given full mandate for mitigation decisions.
- Empire Wind’s vessel strike avoidance measures will (and have been) consistent with: (1) NOAA NMFS guidance to avoid ship collision with marine mammals and sea turtles; (2) conditions within the lease area; (3) and any Incidental Take Authorizations issued by NOAA NMFS.

¹ Empire Wind notes that while PAM regularly is used as an alternative to visual observations, there is growing support and recognition that alternative visual monitoring measures, such as thermal imaging, can play a role in ensuring effective mitigation during low-visibility periods. Empire Wind anticipates that any alternative mitigation monitoring plan would employ a range of available technologies and approaches to substitute for direct visual observations.

- Vessel collision avoidance mitigation measures including, but not limited to use of dedicated shipping lanes, training of crews on collision avoidance measures, compliance with speed restrictions, and compliance with minimum separation distances from certain species.
- Empire Wind also will adopt vessel collision avoidance measures for Project vessels working in or in transit to and from the Lease Areas; and
- Empire Wind will adopt vessel speed restrictions associated with seasonal management areas (“SMA”) and dynamic management areas (“DMA”) relevant to the size of the vessels used and other vessel strike avoidance measures.

Appropriate Project-related personnel onboard Project vessels will be provided marine mammal sighting and reporting procedures training appropriate for each specific phase and its potential impacts to marine mammal species, as necessary. These monitoring, sighting, and reporting protocols will be outlined in any Incidental Harassment Authorization (“IHA”) deemed necessary for the Project, in an effort to emphasize individual responsibility for marine mammal awareness and protection.

8.2.6. Birds and Bats

Offshore wind energy has the potential to adversely impact birds and bats during siting, construction, and operation. Impacts include direct mortality from collisions with wind turbines and other structures, habitat loss, displacement, and sensory disturbances from sound and light. Since offshore wind is a new industry in the Atlantic and all potential impacts are not known, it is critical that current use by birds and bats is well understood before construction and use and impacts continue to be monitored during and post- construction so that unexpected impacts can be mitigated for.

The Proposer must provide a description of how it will work to understand and minimize the Project’s risk to birds and bats. At a minimum this should include:

- 1. A description of what is known about the proposed site in terms of bird and bat assemblages, temporal and spatial use of the site by key species, and which species the Proposer believes to be of greatest concern and why;*
- 2. The planned approach that the Proposer will use to evaluate risks to birds and bats generally, and those of greatest concern specifically;*
- 3. Steps the Proposer will pursue to minimize risk to birds and bats (e.g., lighting); and*
- 4. 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.*

Birds

Over the past seven years, Empire Wind has undertaken significant efforts to understand potential impacts to birds from the Project and has committed to appropriate measures to minimize those impacts. These efforts have included support of baseline studies of birds in the Lease Area. Empire Wind also submitted a COP to BOEM that evaluated potential impacts to birds

and included a bird risk assessment and minimization measures based on the findings ([COP Appendix Q](#)). Overall, the assessment found that offshore and onshore activities associated with the Project are unlikely to affect the populations of migratory, coastal or marine birds, including listed species. The Empire Wind ROD and FEIS (2023) supports this finding, with a [minimal impact determination for birds](#), and the Project has committed to all mitigation measures in the ROD to minimize any risk. In addition, Empire Wind developed [a post-construction monitoring framework](#) for birds and bats to be implemented once turbines are operational, which has been approved by BOEM. Implementation of the framework involves using a variety of technological methods to monitor impacts to birds and bats in an adaptive approach to help refine research and mitigation needs.

In accordance with [BOEM's avian guidelines](#) (BOEM 2020) and site characterization requirements 30 C.F.R. § 585.626(3), Empire Wind supported digital aerial surveys of the Lease Area to identify the bird populations that may be present in the Lease Area ([COP Appendix P](#)). Surveys were conducted monthly from 2017 to 2018. Empire Wind contracted the Biodiversity Research Institute, one of the foremost organizations in the United States working on issues relating to wildlife and offshore wind energy, to use the results of these surveys and other best available science to conduct an avian risk assessment for both onshore and offshore components of the Project. For the offshore components, the impact assessment identified and evaluated avian occurrence and use of the Lease Area at the taxonomic and species levels using multiple data sources, including (but not limited to): the previously described integrated density models, AS NY Bight digital aerial surveys, MDAT models, Northwest Atlantic Seabird Catalog, eBird and other occurrence and phenology data, individual tracking studies, relevant current literature, and published species accounts. A semi-quantitative approach was then conducted that identified species that would potentially be exposed to the proposed wind farm area. The vulnerability of the species deemed to be exposed was then described. Finally, a weight-of-evidence approach was used, along with exposure and vulnerability assessments, to assign risk.

Bats

Over the past seven years, Empire Wind has undertaken significant efforts to understand potential impacts to bats from the Project and has committed to appropriate measures to minimize those impacts. These efforts have included support of baseline studies of bats in the Lease Area. Empire Wind also submitted a COP to BOEM that evaluated potential impacts to bats, which included a bat risk assessment and minimization measures based on the findings ([COP Appendix S](#)). Overall, offshore, and onshore activities associated with the Project are unlikely to affect the populations of tree-roosting or cave-dwelling bat species, including listed species. The Empire Wind FEIS supports this finding (BOEM 2023), with a negligible impact determination for bats, and the Project has committed to all mitigation measures in the FEIS to minimize any risk. In addition, Empire Wind developed a post-construction monitoring framework for birds and bats to be implemented once turbines are operational, which has been approved by BOEM.

Implementation of the framework involves using technological methods to monitor impacts to bats in an adaptive approach to help refine research and mitigation needs.

While no federal guidelines currently exist for surveys of bats in the offshore environment, Empire Wind proactively supported a bat acoustic survey to evaluate baseline bat activity and species composition within and near the Lease Area. The study was completed in accordance with recommendations provided by Tetra Tech bat biologists and consisted of deploying an acoustic bat detector on a geophysical research vessel operating in the area from May through December 2018 ([COP Appendix R](#)). In accordance with USFWS's Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines, Empire Wind also supported habitat assessments and acoustic surveys for listed bat species near onshore components of the Project.

Empire Wind contracted the Biodiversity Research Institute, one of the foremost organizations in the United States working on issues relating to wildlife and offshore wind energy, to use the results of these surveys and other best available science to initiate a bat risk assessment for both onshore and offshore components of the Project. This impact assessment was conducted using a weight-of-evidence approach by evaluating a) the likelihood bats will occur in the Study Areas (*i.e.*, exposure), and b) the known vulnerability of bats to collisions with wind turbines (offshore) and habitat modification (onshore). The likely presence of bat species was categorized based on criteria using the best available data and information on geographic range and habitat requirements. Literature was used to determine vulnerability for each species or group based upon behavior, habitat requirements, seasonality of use, and known impacts associated with construction, operations, and decommissioning of proposed Project infrastructure. For each species group, impact-producing factors (*e.g.*, ground disturbance and vegetation removal, lighted vessels, operating wind turbines) and associated potential effects (*e.g.*, habitat modification, collision risk) were assessed.

From the literature, nine species of bats are present in the states of New York, six of which are year-round residents, as outlined in Figure 8.1 below. These species can be divided into two major groups based on their wintering strategy: cave-hibernating bats and migratory tree bats. Both groups of bats are nocturnal insectivores that use a variety of forested and open habitats for foraging during the summer (Barbour and Davis 1969). Cave-hibernating bats are generally not observed offshore at distances where turbines are proposed (Dowling and O'Dell 2018); in the fall, these bats migrate from summer habitat to winter hibernacula in the mid-Atlantic region (Maslo and Leu 2013). Migratory tree bats fly to southern parts of the United States to overwinter and are observed offshore during migration (Hatch et al. 2013).



Figure 8.1: Bat Species Present in New York, Their Conservation Status, and Federal Endangered Species Act Listing Status

Common Name	Scientific Name	Type	NY State Status	Federal Status
Eastern small-footed bat	<i>Myotis leibii</i>	Cave-Hibernating Bat	SC	
Little brown bat	<i>Myotis lucifugus</i>	Cave-Hibernating Bat	SGCN	
Northern long-eared bat	<i>Myotis septentrionalis</i>	Cave-Hibernating Bat	T	E
Indiana bat	<i>Myotis sodalis</i>	Cave-Hibernating Bat	E	E
Tricolored bat	<i>Perimyotis subflavus</i>	Cave-Hibernating Bat	SGCN	
Big brown bat	<i>Eptesicus fuscus</i>	Cave-Hibernating Bat		
Eastern red bat	<i>Lasiurus borealis</i>	Migratory Tree Bat		
Hoary bat	<i>Lasiurus cinereus</i>	Migratory Tree Bat		
Silver-haired bat	<i>Lasionycteris noctivigans</i>	Migratory Tree Bat		

Evaluation of Risks to Birds

Based on the USFWS IPaC database, NYSERDA, and site-specific baseline studies, 61 bird species may be exposed to offshore components of the Project. However, Project activities are unlikely to affect the populations of migratory, coastal, or marine birds. The Lease Area is generally far enough offshore as to be beyond the range of most breeding terrestrial or coastal bird species. Coastal birds that may forage in the Lease Area occasionally, visit the area sporadically, or pass through on their spring and/or fall migrations, include shorebirds (e.g., sandpipers, plovers), waterbirds (e.g., grebes), waterfowl (e.g., scoters, mergansers), wading birds (e.g., herons, egrets), raptors (e.g., falcons, eagles), and songbirds (e.g., warblers, sparrows). Overall, except for migratory falcons and songbirds, coastal birds are considered to have minimal exposure to the Lease Area. Falcons, primarily Peregrine Falcons, may be exposed to the Lease Area during migration. However, considerable uncertainty exists about what proportion of migrating Peregrine Falcons (*Falco peregrinus*) might be attracted to offshore wind energy projects for perching, roosting, and foraging, and the extent to which individuals might avoid turbines or collide with them. Some migratory songbirds may also be exposed to the Lease Area during fall migration, but population level impacts are unlikely because exposure of the population to the Lease Area is expected to be minimal to low and limited to migration.

Of marine birds, terns are the only species that have a moderate risk of exposure to the Project and will be most exposed during spring migration. They may also have some vulnerability to collision when they are not avoiding turbines, although terns are generally thought to fly below

the turbine rotor swept zone. While loons were assessed as having minimum to low exposure to the Project, loons may exhibit avoidance behavior around offshore wind farms. However, displacement from the Lease Area is unlikely to affect population trends because of the relatively small size of the Lease Area in relation to available foraging habitat.

For the onshore components, the impact assessment was conducted by evaluating the habitat within the onshore Project area that would be modified by onshore Project components, identifying the birds likely to occur in these habitats, and then evaluating their potential to be affected by impact producing factors. The assessment found that onshore Project activities will largely avoid potential impacts to birds because nearly all development will be co-located with existing areas of development. Along the cable route and at substations, impacts will be minimized by conducting tree cutting outside the nesting period where appropriate or required. Since Empire Wind will largely avoid and minimize any potential impacts, onshore construction, operations, and decommissioning activities were not expected to affect the populations of breeding or migratory birds.

Federally listed bird species that may be exposed to the Project are of particular concern to Empire Wind and include the Golden Eagle (*Aquila chrysaetos*), Bald Eagle (*Haliaeetus leucocephalus*), Red Knot (*Calidris canutus*), Piping Plover (*Charadrius melodus*), and Roseate Tern (*Sterna dougallii*). However, based on the risk assessment, the listed marine and coastal species are only expected to fly through the Lease Area during migration in limited numbers and their likelihood of occurrence was assessed as minimal to low. Eagles are not expected in the Lease Area because these species are rarely detected offshore. Furthermore, in the final Biological Opinion for the Project, USFWS determined that the Project does not jeopardize the continued existence of any ESA-listed species.

Evaluation of Risks to Bats

Based on the assessment, the primary potential impact of the Project to bats onshore is habitat modification during construction. However, most of the proposed onshore export and interconnection cable route and Project infrastructure locations are in already disturbed urban areas (e.g., roadways) with little to no bat habitat present; therefore, construction and operations of the onshore export and interconnection cables, onshore substations, and operations & maintenance base are unlikely to affect bat habitat and local populations.

Offshore, the primary potential impacts of the Project to bats include collision with operating turbines and potential attraction to lighting of the components during construction and operations. Little activity by cave-hibernating bats (including northern long-eared bat and other state-listed species) is expected in the Lease Area because of its distance from shore; thus, population-level impacts to cave-hibernating bats are unlikely, and individual impacts to northern long-eared bats are unlikely. Migratory tree bats are expected to pass through the Lease Area during spring and fall migration and have been documented in the Lease Area. Construction is highly unlikely to impact individuals or populations because bats are not known to collide with

stationary or slow-moving objects such as construction equipment and vessels. While migratory tree bats are documented to collide with terrestrial turbines, impact to populations is unlikely because low numbers of individuals are expected to be exposed to the Project during migration.

Species that may be exposed to the Project of particular concern to Empire Wind are the ESA-listed northern long-eared bat and the tricolored bat, a species proposed for ESA-listing. However, northern long-eared and tricolored bats are not expected in the Lease Area given minimal acoustic detections in the offshore environment and that any movement offshore would likely occur near the mainland, and so exposure is likely to be minimal. For the onshore components, risk to these species is expected to be negligible during all phases of the Project, as they are unlikely to use the urbanized, developed areas within the onshore portions of the Project Area. Furthermore, in the final Biological Opinion for the Project, USFWS determined that the Project is not likely to adversely affect any ESA-listed bat species.

Steps to Minimize Risk to Birds and Bats:

To offset any risk the Project poses to birds in the offshore or onshore Project areas, including federally listed species, Empire Wind has committed to implementing a suite of mitigation measures to avoid or minimize impacts, which have been developed in consultation with federal and state agencies, environmental NGOs, and other key stakeholder groups. These measures are indicated in the FEIS and include the following conservation measures.

- Installing bird perching-deterrent devices on wind turbine generators (“WTGs”) and the offshore substation (“OSS”), where feasible from a health and safety perspective.
- Installing an Aircraft Detection Lighting System (“ADLS”), which will activate the Federal Aviation Administration (“FAA”) hazard lighting only when an aircraft is near the wind facility to reduce visual impacts at night.
- Using lighting technology in the offshore Project area that minimizes impacts on avian and bat species to the extent practicable, such as shielding of lighting at each WTG and OSS to minimize upward illumination, conditional on approval from the U.S. Coast Guard.
- Reviewing current technology and methods for minimizing collision risk of ESA-listed birds, and implementing those methods deemed reasonable and prudent.
- Siting of onshore components in previously disturbed areas, existing roadways, and/or ROWs to the extent practicable to reduce attraction to birds and bats.
- Implementing lighting reduction measures onshore such as downward projecting lights, lights triggered by motion sensors, and limiting artificial light to the extent practicable, where safe.
- Developing and enforcing an Oil Response Spill Plan (“ORSP”).

Empire Wind has also committed to an adaptive, industry leading and long-term monitoring approach to assess potential impacts of the Project to birds and bats once turbines are operational, consistent with [requirements in the FEIS](#) (BOEM 2023). This approach is described in the Empire Wind Offshore Wind Projects: Proposed Bird and Bat Monitoring Framework, which has been approved by BOEM, and will be developed into a formal, detailed Avian and Bat Post-

Construction Monitoring Plan (“ABPCMP”). Monitoring will include use of radio-tags to monitor movement of ESA-listed birds in the vicinity of the Project. The ABPCMP will allow for changing methods over time to regularly update and refine collision estimates for listed birds. Specific to this purpose, 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 receiving stations](#) on turbines in the Lease Area following offshore Motus recommendation.

In addition, consistent with the FEIS (BOEM 2023), Empire Wind will document and report to the appropriate federal agencies any dead or injured birds found on vessels and structures during construction, operations, and decommissioning. Empire Wind will also report the occurrence of any dead or injured ESA-listed bird as soon as practicable, but no later than 72 hours after the sighting, and if practicable, the dead specimen will be carefully collected and preserved in the best possible state.

Finally, as required in the Biological Opinion, FEIS, and ROD, Empire Wind will develop a compensatory mitigation plan, which will detail compensatory mitigation actions to offset take of Piping Plovers and Red Knots by the fifth year of WTG operation. The Compensatory Mitigation Plan will 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. Mitigation actions will be developed in coordination with various stakeholders, including BOEM, USFWS, and NY Department of Environmental Conservation.

8.2.7. Fish, Invertebrates and their Habitats

The principal potential risks of offshore wind energy development to fish, invertebrates and their habitats include possible changes to the seafloor and other habitats, increased sediment levels in the water column, noise and sensory disturbances, and direct harm to fish and invertebrate species from construction equipment, and foraging/spawning habitat loss. These changes could result in changes in predator/prey relationships, competition between species and changes to fish and invertebrate populations in and around the Project site.

The Proposer must provide a description of how it will work to understand and minimize the Project’s risk to fish and invertebrates and their habitats. At a minimum this should include:

- 1. A basic description of what is known about the proposed site in terms of 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;*
- 2. Identification of fish and invertebrate species the Proposer believes to be of greatest concern and why;*

- 3. The planned approach that the Proposer will use to evaluate risks and impacts to fish, invertebrates and their habitats generally, and the species or habitats of greatest concern specifically;*
- 4. Steps the Proposer will pursue to 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, port construction and dredging); and*
- 5. Any Proposals for other research or measures taken to reduce risk or impacts to fish, invertebrates or their habitats (e.g., ecosystem or habitat enhancements).*

The Empire Wind Project Area lies within the New York Bight, just on the border between Southern New England ecoregion and the Mid-Atlantic Bight, with the Hudson Canyon as the nominal boundary between the two ecoregions (Cook and Auster 2007). The Empire Wind Lease Area and submarine export cable route to New York is geographically within Southern New England. Ecologically, however, these geographic distinctions have little meaning because dominant species assemblages from both ecoregions are resident in or transient through the Empire Wind Project Area. With sea temperatures increasing and the Gulf Stream shifting position, historically southern species are moving north, further blurring the ecoregion boundary (Hare et al. 2016). While site-specific data are given the greatest weight in this section, recent regional reports of conditions in Southern New England and the Mid-Atlantic Bight are considered representative of the Empire Wind Project Area as appropriate.

Harvested fishes and macroinvertebrates managed under the MSFCMA or other fisheries programs occur throughout the Project Area. Most of the managed species have designated EFH in the Project Area. Additional information on managed species and designated EFH within the Project Area are presented in the Empire Wind COP Appendix U (Essential Fish Habitat Assessment).

Results of Empire Wind's extensive surveys of the Lease Area using multibeam echo sounder, digital imagery, grab samples, and SPI/PV were used to characterize the habitat as predominantly homogeneous consisting of silty sand with high occurrence of faunal beds and mobile crustaceans. The geophysical and geotechnical surveys confirmed that the Lease Area is predominantly flat with low rugosity and slope (COP Appendix T Benthic Resources Characterization Reports; Appendix H Marine Site Investigation Report). Grab samples were analyzed for sediment grain size distribution to ground-truth the sediment types observed in digital imagery. Empire Wind's geophysical surveys validated that the geophysical characterization of the Lease Area was relatively flat, unconsolidated softbottom dominated by silt and sand, with small areas of sandy mud. Other than a single hardbottom area in the approximate center of the Lease Area, no hard substrates, sensitive seafloor communities, or species of concern were identified in the Lease Area (with species of concern being informally defined as a species that NOAA's NMFS has identified as being at risk of decline but for which data are insufficient to support listing the species under the endangered Species Act. (NOAA

2009). The collective benthic video and SPI/PV imagery showed a relatively productive biological assemblage with numerous burrows, bioturbation, polychaete/amphipod tubes, and macrobenthos.

Benthic habitats are strongly influenced by the overlying ocean, especially the top 600 ft (200 m) of the ocean known as the photic zone, where sunlight supports photosynthetic phytoplankton. The water column is particularly important for planktonic eggs and larvae of demersal species and all life stages of planktivorous species. Oceanic currents, temperature, conductivity, pH, dissolved oxygen, and other features of the water column influence the occurrence and abundance of marine species in the Project Area. Pelagic habitats extend from the sea surface to near the seafloor; habitats vary by depth, temperature, light penetration, distance from shore, turbidity, and other physical and chemical characteristics. Dynamic water quality parameters such as dissolved oxygen, pH, and conductivity are influenced by currents, human activities onshore, climate and weather, and other processes. Water depth is a key feature that affects the horizontal and vertical distribution of fish and macroinvertebrates within pelagic habitats. Other important features, such as light penetration, temperature, and dissolved oxygen, generally covary with depth, although the relationships can be complex and dynamic. Water depths within the Lease Area are relatively uniform, ranging from 78 to 141 ft (24 to 43 m). The federal portion of the submarine export cable route is in water with depths that range from 19 to 116 ft (6 to 36 m). The offshore cable installation corridor in New York waters is between 0 (at the shore) and 93 ft (0 and 28 m) deep. Approximately 13 percent of the New York portion of the offshore cable installation corridor is less than 49 ft (15 m) deep.

Hardbottom habitat provides an exposed and sediment-free surfaces for sessile, epifaunal benthic organisms to attach. Hardbottom habitats are typically characterized by having coarse material (>50 % gravel, cobbles, boulders in a sand matrix). Existing data for the Empire Wind Lease Area suggested that there are no hardbottom, coarse material habitats identified with the exception of a single hardbottom area in the approximate center of the Lease Area. Limited areas of hardbottom, mostly mussel beds and gravel, were encountered during surveys of the export cable route in New York State waters. Hardbottom habitats are considered by NMFS to be complex habitats that may support sensitive seafloor communities, including cold-water corals. NMFS recommends avoidance of hardbottom habitat to the extent feasible and minimization and mitigation of impacts where disturbance is unavoidable.

The proposed submarine export cables will make landfall at the South Brooklyn Marine Terminal ("SBMT"), located in Brooklyn, New York. The portion of the submarine export cable corridor in New York waters is comprised of predominantly softbottom sediments and sands, including previously dredged areas of the New York Harbor channel, and upper and lower harbor, supporting a variety of benthic communities and anadromous fish species. The New York Harbor, including in the vicinity of the cable landfall at SBMT is tidally influenced and inhabited by species with tolerance to saline conditions. Additionally, typical sessile organisms may occur on existing

hard bottom habitat and anthropogenic structures in the harbor in the vicinity of the submarine export cable corridor, including the existing bulkheads and riprap.

The placement of concrete mattresses and/or rock for cable protection will alter the seabed habitat from predominantly soft sediments to hard substrates; however, these areas are expected to develop communities of attached benthic organisms that will increase habitat diversity and provide benefits to fish and other marine animals, including species of concern and species at risk such as Atlantic and shortnose sturgeons, described in the next section. Empire is considering using “bio-enhanced” concrete to cast the blocks for the concrete mattresses, which has been shown to develop attached biotic communities of greater diversity and abundance than conventional concrete (Sella et al., 2022). Additionally, the rock (if required) used for cable protection will be selected to mimic natural seafloor substrates and will be designed to provide three-dimensional structural complexity that creates a diversity of crevice sizes (using mixed stone sizes) with rounded edges and will be sloped such that the outer edges match the natural grade of the seabed. The benthic communities that develop on the concrete and rock placed for cable protection are expected to be substantially more productive than the biotic communities in the adjacent soft sediments (Seitz et al 2019).

Species at Risk:

Empire Wind notes that species of commercial and ecological importance in the Project Area are managed under multiple agencies including the NEFMC (17 species), MAFMC (10 species), SAFMC Coastal Migratory Pelagics (two species), NOAA Fisheries Highly Migratory Species (14 species), and ASMFC (12 species). A complete list of these species can be found in the Empire Wind COP. Essential Fish Habitat is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity” (NOAA Fisheries 1997). Under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, federal agencies are required to consult on activities that may adversely affect Essential Fish Habitat designated in Fishery Management Plans developed by the regional Fishery Management Councils. Several of the species observed are managed by NMFS in collaboration with the New England Fishery Management Council, Mid-Atlantic Fishery Management Council, and/or the Atlantic States Marine Fisheries Commission. In the Project Area, NEFMC and MAFMC share authority with NOAA Fisheries to manage and conserve fisheries in federal waters. Together with NOAA Fisheries, the councils maintain FMPs for specific species or species groups to regulate commercial and recreational fishing within their geographic regions.

Regulated marine species most likely to be impacted by the Project are a variety life stages both benthic and pelagic species, including Winter flounder, Windowpane flounder, Winter Skate, Yellowtail flounder, Summer flounder, Atlantic surf clams, and Atlantic sea scallops. These species inhabit and require softbottom sediments throughout multiple life stages, therefore impacts to these species will be primarily caused by habitat conversion from soft bottom sediments to hardbottom substrates due to construction of WTG foundations and scour

protection, cable protection measures, and other Project features. One hundred percent of the Lease Area overlaps EFH for multiple life stages of Winter flounder, Windowpane flounder, Winter Skate, Yellowtail flounder, Summer flounder, Atlantic Sea Scallop and over 50% is overlapped by EHF for Atlantic Surfclam. However, it is expected that over time certain species and life stages will be attracted to novel hardbottom substrates introduced to the marine environment from Project build out, for foraging and shelter (Tetra Tech 2022).

In addition to overlapping the Lease Area, these species also have critical life stages that overlap significant portions of the submarine cable corridor in both State and Federal waters. EFH for multiple life stages of Winter flounder, Windowpane flounder, Winter Skate, Yellowtail flounder, and Summer flounder overlap 100% of the submarine cable corridor in both State and Federal waters. However, EFH for bivalves is significantly less impacted by the submarine cable corridor as it approaches closer to shore, as they tend to inhabit deeper waters. For example, EFH for ecologically, commercially, and recreationally important invertebrates such as Atlantic Surfclam do not have any overlap in the submarine cable corridor, while overlap with EFH for Ocean Quahogs is estimated to be just 5% in State waters, but 100% in federal waters. Similarly, EFH for the Atlantic sea scallop overlaps with just 5.3% of the total submarine cable corridor within State waters, but 100% within Federal waters (Tetra Tech 2022).

Ecologically important anadromous fish such as river herring, alewife, and blueback herring, spawn in estuaries, rivers, and lakes in spring (*i.e.*, March through June) (Evans et al. 2011), while larvae use freshwater and brackish water as nursery habitat and juveniles remain in the Hudson River until July (ASMFC 2009). Barriers to historic freshwater spawning, nursery, and rearing habitat have been identified as a critical contributor to diminished river herring populations (ASMFC 2009). Migrating river herring are known to avoid waters with elevated turbidity; therefore, construction activities within State waters that would increase suspended sediments may serve as a barrier to estuarine and riverine habitat for spawning adults. Reduced dissolved oxygen and elevated turbidity may further impact the species by clogging larvae and juvenile gills and inhibiting filter feeding (ASMFC 2009; Evans et al. 2011). Similarly, anadromous striped bass spawn in riverine habitats in spring. Fertilized eggs are pelagic and drift downstream until they hatch into larvae, which utilize river deltas as nurseries; juveniles migrate out of the Hudson River in July (ASMFC 2003). As with river herring, striped bass are susceptible to impacts from suspended sediments. Egg and larval survival are jeopardized by reduced dissolved oxygen levels. Hatching is delayed for striped bass at suspended sediment concentrations of 100 milligrams per liter and mortality may occur at extended exposure to suspended sediment concentrations of 500 milligrams per liter (DOER 2000). To minimize impacts to sensitive life stages of river herring and striped bass, time of year restrictions in accordance with current Federal and State guidelines will be implemented sediment disturbing activities, as well as standard best management practices to minimize Project-related suspended sediments will be implemented (Tetra Tech 2022).

Adult and subadult Atlantic sturgeon are the only life stages likely to occur in New York Bay and the adjacent ocean waters (NMFS, 2022). The literature indicates that younger Atlantic sturgeon remain in the freshwater to lower salinity portions of the Hudson River, NY (Haley et al., 1996; Bain, 1997) but may rarely occur in New York Bay or adjacent waterbodies, as their salinity tolerance develops in the juvenile stage. Adult and subadult Atlantic sturgeon of Hudson River origin typically spend the late fall and winter months in deeper waters off the coasts of New York (Ingram et al., 2019) and New Jersey, or move south along the Atlantic Coast (Breece et al., 2016; Dunton et al., 2010, 2015). In the spring (April through early June), adults and subadults may move through New York Bay enroute to spawning and foraging areas in the Hudson River and migrate back to the ocean during summer through fall. Migrating Atlantic sturgeon are known to use deeper main-channel waters as their travel corridor (Breece et al., 2021; Frisk et al., 2020; NMFS, 2022). As a result of these migratory movements, the likelihood that Atlantic sturgeon will occur in different portions of the EW1 submarine export cable corridor will vary seasonally.

Shortnose sturgeon also occur throughout the tidal Hudson River, being most abundant in fresh and brackish waters. Spawning in the Hudson River occurs in the spring in fresh water from the Federal Dam at Troy to about Coxsackie, NY (approximately river mi 153-118; river km 246–190). Eggs, larvae, and early juveniles are intolerant of salinity and remain in fresh water. Older juveniles develop a tolerance to salinity as they age and may occur within the brackish portion of the Hudson River (Dovel et al., 1992, Bain, 1997). While the literature includes records of adult shortnose sturgeon in Upper and Lower New York Bay, and Raritan Bay, their occurrence in these waterbodies has been generally thought to consist only of occasional transient individuals (NMFS, 2022). Shortnose sturgeon are most likely to occur in the Project Area in the northernmost portion of the submarine export cable route, near the cable landfall at SBMT.

To minimize impacts to Atlantic and shortnose sturgeon, Empire Wind is implementing seasonal timing windows for the majority of seabed-disturbing work activities in New York State waters, coordinated with NYSDEC, and has committed to sturgeon monitoring and impact minimization measures when work activities must occur outside of these seasonal timing windows.

Full details of species at risk, likely impact and proposed mitigation have been described in the Empire Wind COP and are consulted on as needed with the relevant stakeholders, including presentations and updates of the Environmental and Fisheries Mitigation Plans with the E-TWG and F-TWG, respectively.

Approach to Assess Impacts to Fish, Invertebrates, and Habitats

In addition to the monitoring philosophy discussed above in Section 8.2.3, Empire Wind also understands that from the outset, any research and monitoring to assess changes and impacts should be statistically robust. However, for some biological monitoring, the level of robustness to adequately detect change as a direct result of an offshore wind farm is not always possible as many outside factors can influence these variations with much greater significance than the factors that can be attributed to causes from offshore wind energy developments (e.g., seawater

temperature, nutrient levels, etc.). As such, Empire Wind is open to monitoring that explore other approaches to detect and quantify change, where further monitoring is appropriate, for example behavioral responses. Empire Wind will work with the regulatory agencies, E-TWG and relevant stakeholders to identify research and monitoring needs and agree on methodology.

Steps to Minimize Risk to Fish, Invertebrates, and Habitats:

Empire Wind has identified the potential for impacts from portfolio-associated activities to fish, invertebrates, and their habitats. The following is a list of some of the proposed mitigations measures for the Project. For a complete list, please see the Environmental and Fisheries Mitigation Plans for further detail:

- Empire Wind will seek input from regulatory authorities, the fishing industry, and maritime industry to site foundations and cable routes in the least impactful manner that is practicable.
- Empire Wind will avoid, to the extent possible, siting structures (wind turbines, offshore substations, and submarine cables) in areas of sensitive habitat, where feasible.
- Where pile-driven foundations are utilized, Empire Wind will consider the potential use of commercially available and technically feasible noise reducing technologies, in accordance with associated authorizations.
- Empire Wind will, to the extent possible, avoid sensitive benthic habitats.
- Empire Wind will implement mitigation and avoidance measures to protect water quality, such as spill prevention. Specifically, Empire Wind will use appropriate measures for vessel operation and implementing an OSRP, which includes measures to prevent, detect, and contain accidental release of oil and other hazardous materials. Project personnel will be trained in accordance with relevant laws, regulations, and Project policies, as described in the OSRP.
- Empire Wind commits to sufficiently bury electrical cables where feasible, minimizing seabed habitat loss and reducing the effects of EMF; where deep burial is not technically feasible, rock armoring will shield the cable from the overlying water.
- Empire Wind conducted both onshore and offshore EMF assessments which are included in the Empire Wind COP.

The construction of the Project's submarine export and interarray cables is expected to have a negligible contribution of EMF to the marine environment. The area that would be affected by Project-related EMFs is small; the 375 miles (326 nm) of subsea cables associated with the Project represents less than 4% of the 11,646 miles of subsea export and interarray cables anticipated for ongoing and planned offshore wind farms in the region. 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 and physiological effects. These unburied cable segments would be short and widely dispersed.

Empire is committed to sufficiently bury electrical cables (target 6 feet or 1.2 meters) where feasible, minimizing seabed habitat loss and reducing the effects of EMF. Anywhere deep burial is not technically feasible, rock armoring will shield the cable from the overlying water.

Future research in this field is needed to better determine the effects of EMF on benthic fauna. The available literature and guidance from federal and state agencies 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. The affected area would represent an insignificant portion of the available benthic habitat; therefore, based on currently available information, impacts from planned activities on benthic resources would be minor.

8.2.8. Considerations for Subsea and Overland Cables

New York State has developed an Offshore Wind Cable Corridor Constraints Assessment (Assessment) to better understand the constraints of siting cables in New York State waters, at landfall, and along overland routes to existing points of interconnection. The potential environmental impacts of activities associated with subsea and overland cable routes should be identified.

As documented in the Article VII Joint Proposal contained in the December PSC Order, the proposed routing, installation techniques, and operations of the EW1 cables in New York State have been evaluated by the state agencies in the context of the cable siting principles developed as part of the NYSERDA Offshore Wind Cable Corridor Constraints Assessment (NYSERDA 2023). As described herein and detailed in the Article VII Certificate Conditions: the proposed cable route avoids direct impacts to known in-water and onshore sensitive environmental resources; certain unavoidable impacts to sensitive environmental resources may occur, but these have been minimized to the extent practicable:

- Empire Wind will employ methods to minimize the lateral separation distance between the EW1 submarine export cables in accordance with Certificate Condition Y12(d).
- The Project has been sited in a manner that may enable future linear infrastructure Projects to apply parallel routing and the two HVAC cables will each remain bundled for their entire length in State waters.
- Where active and potential out-of-service cable and pipeline are encountered crossings will be perpendicularly to the extent practicable to minimize the impacts associated.
- Unavoidable impacts to anchorage areas and navigation channels have been minimized to the extent practicable.
- Once onshore, the underground cables will be installed within existing ROWs infrastructure, to the extent practicable and will use trenchless crossing methods.
- Impacts to environmental justice area and disadvantaged communities have been minimized to the extent practicable with the predominantly submarine cable routing that avoids

disruptions to onshore communities combined with a range of minimization and mitigation measures addressing construction, noise, lighting, and visual impacts among others.

8.2.9. Additional Considerations

The Proposer must outline any additional mitigation strategies not otherwise described herein that would improve the Plan and reduce impacts on the environment.

Empire Wind and its affiliates aim to protect biodiversity and have set forth a biodiversity ambition that includes establishment of voluntary exclusion zones, developing a net-positive approach, increasing knowledge and access to biodiversity data, investing in nature-based solutions and advocating for ambitious biodiversity policy. A net positive impact plan will be developed for the Project, building on a pilot project that was presented at the NYSERDA E-TWG State of the Science workshop in 2022 ([2022 State of the Science Workshop | ETWG \(nyetwg.com\)](https://www.nyetwg.com)). The intent of the plan is to promote biodiversity and minimize impact to wildlife habitat. Impact to biodiversity features will be assessed, and where the measures described above might not be sufficient to fully avoid or minimize impacts, the Project will review further options to minimize, restore and offset potential significant direct impacts of the Project and consider additional conservation measures.

8.2.10. Project Decommissioning

The Proposer must describe how it will develop a decommissioning plan, including coordination with environmental stakeholders, and any elements of its contemplated decommissioning plan that can be identified at this stage. Proposals demonstrating thoughtful consideration of the full life cycle of offshore wind energy projects will be considered favorably.

Please see Sections 6.2.5 and 8.1.8 for detailed descriptions of how the Project will develop its decommissioning plan(s) at both a Federal and State level.

Section 8.2

Environmental Mitigation Plan

Attachment 8.B

Environmental Mitigation Plan



Environmental Mitigation Plan
for
Empire Wind 1 Project
Version 2.0

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

for

New York State Energy Research and Development Authority
Albany, NY

Prepared by

Empire Offshore Wind LLC

600 Washington Blvd
Stamford, CT 06901



January 2024

Communication Officers, Contact Information, Links		
Name/Title	Role	Contact Information
Scott Lundin Vice President of Permitting, Community and Technical Environmental Affairs	Primary point of contact for Equinor Wind US on permitting, community and environmental matters.	sclu@equinor.com
Jennifer Dupont Head of Technical Environmental Affairs	New York State Environmental Technical Working Group (E-TWG) Representative (primary) and point of contact for Empire Offshore Wind LLC on environmental matters.	jdup@equinor.com
Julia Lewis Head of Permitting	Point of contact for Equinor Wind US on portfolio-level permitting matters.	julew@equinor.com
Joshua Verleun Director of Permitting, Empire Wind	Point of contact for Empire Offshore Wind LLC on permitting matters.	jver@equinor.com

Links to Project information:

Project website: www.empirewind.com

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Acronyms and Abbreviations

Acronym	Definition
ABPCMP	Avian and Bat Post-Construction Monitoring Plan
ADLS	Aircraft Detection Lighting System
ANSI	American National Standards Institute
BOEM	Bureau of Ocean Energy Management
BRI	Biodiversity Research Institute
CBRA	Cable Burial Risk Assessment
COP	Construction and Operations Plan
CTV	Crew Transfer Vessels
DEPONS	Disturbance Effect on the Harbour Porpoise in the North Sea
DMA	Dynamic Management Area
EFH	essential fish habitat
EMF	electromagnetic fields
EMP	Environmental Mitigation Plan for the Empire Wind Project
Empire Wind	Empire Offshore Wind LLC
ENGOS	environmental nongovernmental organizations
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
E-TWG	New York State Environmental Technical Working Group
FAA	Federal Aviation Administration
Final EIS	Empire Offshore Wind Final Environmental Impact Statement, September 2023, BOEM
FR	Federal Register
Framework	Empire Wind Offshore Wind Projects: Proposed Bird and Bat Monitoring Framework
ft	feet
F-TWG	New York State Fisheries Technical Working Group
GARFO	Greater Atlantic Regional Office of NMFS
HDD	horizontal directional drill
IHA	Incidental Harassment Authorization
IPaC	Information for Planning and Conservation
km	kilometer
km/h	kilometer per hour
m	meters
MDAT	Marine-Life Data and Analysis Team
Motus	Motus Wildlife Tracking System
nm	nautical mile
NMFS	NOAA's National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
NYSDPS	New York State Department of Public Service
NYSERDA	New York State Energy Research and Development Authority
NYSOGS	New York State Office of General Services

Acronym	Definition
NYSOPRHP	New York State Office of Parks, Recreation and Historic Preservation
ORJIP	Offshore Renewables Joint Industry Programme
ORJIP One	UK Carbon Trust ORJIP One Bird Collision Avoidance Study
ORJIP Four	UK Carbon Trust ORJIP Four Acoustic Deterrent Devices
OSRP	Oil Spill Response Plan
PAM	passive acoustic monitoring
PSA	Purchase and Sale Agreement
Project	Empire Wind Project
PSO	Protected Species Observer
QA/QC	quality assurance and quality control
RODA	Responsible Offshore Development Alliance
ROSA	Responsible Offshore Science Alliance
RWSC	Regional Wildlife Science Collaborative
SMA	Seasonal Management Area
SOV	service operations vessel
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service
WCS	Wildlife Conservation Society
WHOI	Woods Hole Oceanographic Institute
WTG	wind turbine generator

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.

- Empire Offshore Wind LLC (“Empire Wind”) believes that from the outset, measures to avoid or mitigate adverse environmental impacts, while maximizing the positive beneficial environmental impacts of an offshore wind energy project should be:
 - Identified and developed in consultation and coordination with the relevant stakeholders;
 - Based on robust baseline characterization that has been developed in consultation with relevant stakeholders;
 - Evidence based and founded on the latest science;
 - Supplemented through targeted data collection, monitoring and/or research where data gaps exist or the receptor-effect interactions are unknown;
 - Incorporated into spatial planning, for example project siting and design; and
 - Applied to how the project is implemented, for example surveys, construction methods and operations and maintenance activities.
- Empire Wind recognizes the importance of adaptive management and will continue to evolve its procedures for the evaluation and mitigation of environmental resources.
 - For example, the Plan described herein is an update to the details described in connection with prior bid submissions, reviewed and commented on by New York State Energy Research and Development Authority (“NYSERDA”), and presented to the New York State Environmental Technical Working Group (“E-TWG”) on November 20, 2019 and September 20, 2022.

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).

- Empire Wind will seek consultation and coordinate with relevant stakeholders.
- Empire Wind will review existing research and data and seek input from stakeholders regarding data gaps to inform decisions made throughout the Empire Wind Project (“EW1” or the “Project”) life cycle.
- Empire 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.

- Pre- and post-construction monitoring will be designed to improve the understanding of impacts of offshore wind energy development and operations on wildlife, for both onshore and offshore components of the Project.
- Additionally:
 - Empire Wind believes consultation and coordination with relevant stakeholders is important as a means of identifying potential risks or opportunities for sufficiently avoiding and mitigating environmental impacts.
 - Empire Wind has identified proven steps to consult with the relevant stakeholder groups to get feedback on plans, data, mitigation, and buy in on decisions in advance of the regulatory process – a “no surprises” approach.

1.2.1 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.

- Empire Wind will follow the following guidance documents and update the guidance documents list as appropriate. Empire Wind also notes that, several nearby offshore wind projects are currently under review by BOEM and will provide case studies for best management practices and mitigation measures. Empire Wind will consider and potentially adopt or improve such practices for the Empire Wind Project to the maximum extent practicable.
 - National Oceanic and Atmospheric Administration (“NOAA”) National Marine Fisheries Service (“NMFS”) 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. April 1, 2018. Available at: <https://www.fisheries.noaa.gov/resource/document/technical-guidance-assessing-effects-anthropogenic-sound-marine-mammal-hearing>
 - NMFS Greater Atlantic Regional Office (“GARFO”). 2021. Recommendations for Mapping Fish Habitat. NMFS GARFO Habitat Conservation and Ecosystem Services Division. https://media.fisheries.noaa.gov/2021-03/March292021_NMFS_Habitat_Mapping_Recommendations.pdf?null
 - BOEM. 2019. Guidelines for Providing Information on Marine Mammals and Sea Turtles for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 C.F.R. Part 585 Subpart F. June 2019. Available at: <https://www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Marine-Mammals-and-Sea-Turtles-Guidelines.pdf>.
 - BOEM. 2023. Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 C.F.R. Part 585. March 27, 2023. Fisheries Study Guidelines. Available at <https://www.boem.gov/sites/default/files/documents/about-boem/Fishery-Survey-Guidelines.pdf>
 - BOEM. 2019. Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 C.F.R. Part 585. June 2019. Available at <https://www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Renewable-Benthic-Habitat->

- [Guidelines.pdf](#). The guidance recommends that the NMFS Essential Fish Habitat (“EFH”) mapper tool (<http://www.habitat.noaa.gov/protection/efh/habitatmapper.html>) be used for species identification and habitat characteristics at any particular location (page 7)
- BOEM. 2020. Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 C.F.R. Part 585. October 20, 2015. Available at <https://www.boem.gov/sites/default/files/documents/about-boem/Social%20%26amp%3B%20Econ%20Fishing%20Guidelines.pdf>
 - BOEM 2020. Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf. United State Department of the Interior – Bureau of Ocean Energy Management, Office of Renewable Energy Programs. May 27, 2020. Available at <https://www.boem.gov/sites/default/files/documents/newsroom/Avian%20Survey%20Guidelines.pdf>
 - Sullivan, Robert G. 2021. Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States. April 2021. OCS Study BOEM 2021-032. Available at <https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/BOEM-2021-032.pdf>
 - BOEM. 2021. Preferred Data Submission Schema for Offshore Wind Facilities Geospatial Data. September 2022. Available at <https://www.boem.gov/sites/default/files/documents/renewable-energy/Preferred-Data-Submission-Schema-for-Offshore-Wind-Facilities-Geospatial-Data.pdf>
 - BOEM. 2022. DRAFT BOEM Nationwide Recommendations for Impact Pile Driving Sound Exposure Modeling and Sound Field Measurement for Offshore Wind Construction and Operations Plans. October 2022. Available at <https://www.boem.gov/sites/default/files/documents/renewable-energy/DRAFT%20BOEM%20Impact%20Pile%20Driving%20Sound%20Exposure%20Modeling%20BOEM-2022-0057.pdf>

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.

- Empire Wind will seek methods and processes to allow for a two-way flow of information between key stakeholders and developers, specifically highlighting how the developer uses this feedback to inform their decision making.
- Empire Wind will provide updates to environmental stakeholders in an appropriate manner that would be easily accessed and widely distributed.
- Additionally:
 - Openness is a core value and cornerstone of Empire Wind’s approach to engaging with and sharing data with stakeholders.
 - Empire Wind will continue to approach Project development on a “no surprises” basis. This includes sharing Project updates, plans, results, and information regularly and at all stages of the Project so that all relevant interested parties have had sufficient opportunities to input into these processes, while also being sensitive to the potential for stakeholder fatigue.
 - Empire Wind notes that this approach has proven effective and well-received throughout the continued development of projects and the Empire Wind permitting process.

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.

A list of communication officers, roles, and contact information is provided in Table 2-1.

Table 2-1 Communication Officers, Contact Information, Links		
Name/Title	Role	Contact Information
Scott Lundin Vice President of Permitting, Community and Technical Environmental Affairs	Primary point of contact for Empire Offshore Wind on broad permitting, environment and community matters	sclu@equinor.com
Jennifer Dupont Head of Technical Environmental Affairs	E-TWG Representative (primary) Point of contact for Empire for environmental matters.	jdup@equinor.com

Julia Lewis Head of Permitting	Point of contact for cross-portfolio permitting matters for Equinor. E-TWG representative (alternate)	julew@equinor.com
Joshua Verleun Director of Permitting, Empire Wind	Point of contact for Empire permitting matters.	jver@equinor.com
Elizabeth Marchetti Fisheries Manager, Empire Wind	Point of contact for Empire Offshore Wind LLC on matter related to commercial and recreational fisheries. F-TWG representative	emarc@equinor.com

Project website: www.empirewind.com

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.

- Empire Wind will continue to engage with regulatory agencies, Environmental NGOs (“ENGOS”), research institutions, and relevant stakeholders either via independent meetings or through environmental round tables to maximize opportunities to discuss the Project and solicit feedback. The Empire Wind Project held its latest ENGO roundtable October 30, 2023.
- Empire Wind has presented study results at the NYSERDA State of the Science Workshop in 2021, has engaged in a discussion with the E-TWG on September 20, 2022 with Project and mitigation plan updates, and actively participates in the Regional Wildlife Science Collaborative (RWSC) with membership on the marine mammal, avian and bat, habitat and ecosystem, and sea turtle subcommittees, as well as the Industry Caucus and the Steering Committee.
- This process will continue throughout the development of all Empire Wind projects.
- Stakeholder lists, contact details and correspondence are listed on Empire Wind’s internal stakeholder tracking tool and classified accordingly.

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.

- Empire Wind has dedicated Project-specific technical resources to the E-TWG.
- Empire Wind continues to work with the E-TWG and attends E-TWG meetings and workshops.

- Empire Wind has identified specific individuals to serve at least one-year terms in the role of primary (Jennifer Dupont) and secondary (Michelle Fogarty) core members.
- Empire Wind continues to work with NYSERDA to plan and host Project-specific EMP consultations.
- Additionally:
 - Empire Wind has been active in the E-TWG since its inception and is committed to actively participate to collaborate on best practices and research for offshore wind energy development, balance environmental concerns with responsible technically and commercially feasible development, while fostering opportunities for future offshore wind energy development.
 - Empire Wind will engage with the E-TWG based on the portfolio of projects in development, rather than on a project-by-project basis. This approach is intended to streamline communication by providing a single point of contact for information exchange and consistent message.
 - Current representation of Empire Wind on the E-TWG can be found within the Communication Officers table located within Section 2.2 of this document.
 - Empire Wind considers the ENGOs on E-TWG as a proxy “ENGO steering committee” for engagement with the ENGO community on responsible development and to provide guidance on additional outreach that may be valuable.
 - Empire Wind will also proactively engage with ENGOs not directly represented on the E-TWG, for example through direct engagement or Environmental Round Tables hosted by Empire Wind, as appropriate.
 - Empire Wind actively participates in the Regional Wildlife Science Collaborative, with membership on the marine mammal, avian and bat, habitat and ecosystem, and sea turtle subcommittees. In addition, Equinor Wind is a member of the RWSC Steering Committee and Industry Caucus lead (rotating off in 2024 but will continue to remain engaged).

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.

- Empire Wind will continue to engage with New York (“NY”) State Agencies throughout the Project development process, including Project updates and plans, environmental data collection, baseline data, potential mitigation options, terrestrial archaeology, historic architecture, and permitting. Communication with NY State Agencies regarding the Empire Wind Project was initiated on September 25, 2020. The NYS agencies included:
 - NY State Department of Environmental Conservation (“NYSDEC”);
 - NY State Department of State (“NYSDOS”);
 - NY State Office of Parks, Recreation and Historic Preservation (“NYSOPRHP”);
 - NY State Office of General Services (“NYSOGS”);
 - NY State Energy Research and Development Authority (“NYSERDA”); and
 - NY State Department of Public Service (“NYSDPS”).

- Empire Wind will also continue to consult with additional state agencies, as appropriate.

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.

- Empire Wind is a member of the Steering Committee and Industry Caucus that is working with NYSERDA and other partners on the Regional Wildlife Science Collaborative (“RWSC”) that provides support for regional science collaboration focused on studying the potential impacts from offshore wind development on sensitive environmental receptors. Empire Wind participates actively in technical subcommittees including avian & bat, marine mammals, technology, and habitat.
- Empire Wind is a board member of the Responsible Offshore Science Alliance (“ROSA”) and active member of the Advisory Council.
- Empire Wind is a founding member of the Responsible Offshore Development Alliance (“RODA”) Joint Industry Task Force.
- Empire Wind’s Fisheries Manager is a member of the New England Fisheries Management Council Habitat Advisory Panel
- Empire Wind will continue to participate in the F-TWG and current representation can be found within Section 2.2 of this document.
- Empire Wind actively participates in the Massachusetts Habitat Working Group and Fisheries Working Group, which are similar in scope and membership to the E-TWG and F-TWG.
- Empire Wind will continue to engage with Tribal Nations, including but not limited to the Shinnecock Indian Nation, Mashpee Wampanoag Tribe, Mashantucket Pequot Tribal Nation, Wampanoag Tribe of Gay Head – Aquinnah, the Delaware Tribe of Indians, the Delaware Nation and the Stockbridge-Munsee Community Band of Mohican Indians.
- Empire Wind will continue to engage with federal agencies, including:
 - BOEM as the lead agency to ensure a smooth permitting process and soliciting feedback on baseline data requirements.
 - NOAA’s National Marine Fisheries Service (“NMFS”) in relation to development of survey plans, baseline characterization data, for example, benthic and fisheries data sources and providing feedback on Empire Wind’s data collection efforts, strategic advice on threatened and endangered species, Incidental Harassment Authorizations (IHAs) for geophysical surveys and the potential future requirements for IHAs in relation to construction activities.
 - U.S. Fish and Wildlife Service (“USFWS”).
 - U.S. Environmental Protection Agency (“EPA”).
 - U.S. Coast Guard (“USCG”) and U.S. Army Corps of Engineers (“USACE”).
 - National Park Service (“NPS”).
- Empire Wind will continue to engage with the public, which includes openhouses and public hearings to address comments and questions.

2.4.4 Communication and collaboration with other developers

This should describe any relevant participation and collaboration with other developers in the offshore space, with a focus on communication and collaboration with adjacent leaseholders. This may include but is not limited to shared research efforts, coordination of survey methods, or standardization of navigational and safety protocols.

- Empire Wind will seek to maximize the impact of research efforts such as data collection, methodology, analysis and dissemination by collaborating with other developers, particularly those in adjacent lease areas, taking on similar initiatives.
 - For example, protected species observers will often use the Mysticetus software system during survey campaigns. Several developers, including Equinor, have agreed to share PSO sightings in real-time with PSOs from other developers via the Mysticetus platform. PSO-to-PSO sharing allows for greater regional awareness of the presence of protected species during vessel operations.
- Empire Wind continues to engage actively in the development of the RWSC integrated science plan and will coordinate research efforts through the RWSC to ensure that priority regional studies are addressed and that data/results are made available for broad regional application/use.

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.

A list of proposed outreach methods and tools is provided in Table 2-2.

Table 2-2 Proposed Outreach Methods and Tools				
Event or Method	Phase*			
	1	2	3	4
Public meetings, Open houses	X	X	X	X
Stakeholder workgroups	X	X	X	X
Website promotion	X	X	X	X
Visual simulation tools	X	X	X	X
ENGO Round Tables, in person	X	X	X	X
Federal Agency Meetings, in person, webinars	X	X	X	X
State Agency Meetings, in person, webinars	X	X	X	X
E-TWG and F-TWG Meetings	X	X	X	X
Tribal Meetings; in person, webinars	X	X	X	X
Project Newsletters	X	X	X	X
Scientific and Technical Conferences	X	X	X	X
<i>*Phase: 1: Survey/Design; 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.

- Empire Wind is committed to being an active member of regional science organizations including the RWSC and ROSA. Empire Wind is a member of the RWSC Steering Committee that has worked with NYSDERA and other partners to stand-up the RWSC; Equinor representative will rotate off the Steering Committee in early 2024 but is still an active member on industry caucus and all the major technical subcommittees under the RWSC.
- Empire Wind is a board member of the ROSA and active member of the Advisory Council.
- Empire Wind is a board member of the Atlantic Marine Conservation Society, which collects data and provides regional response in support of marine mammal and turtle conservation.
- Empire Wind is committed to collaborating with the scientific community, E-TWG, relevant stakeholders, other offshore wind energy developers and third-party groups to conduct robust and relevant research studies that relate to environmental resources and offshore wind energy developments. For example:
 - Historical meteorological and oceanographic data collected by the instruments deployed in Empire Wind from 2018-2020 under the Site Assessment Plan are publicly available on [MARACOOS OceansMap](#).
 - Equinor and MARACOOS have signed a Memorandum of Understanding for Equinor projects to continue to share ocean observation data through MARACOOS and to work together to leverage MARACOOS expertise and Equinor development efforts to benefit stakeholders through enhances ocean and coastal observing data products. Empire Wind's data collection to mitigate HF radar interference by the wind turbines will be shared through MARACOOS, for example.
 - During the 2023 Empire Wind Munitions and Explosives of Concern survey campaign, the teams at Project WOW and Wildlife Conservation Society received automatic alerts of whale sightings made by protected species observers onboard the survey vessel. Sharing of these real-time observations was done to inform research efforts to find and tag whales in the New York Bight.
- Additionally, Empire Wind will:
 - Consider making existing wind farm related vessels, buoys, or structures available for research opportunities.
 - Explore appropriate monitoring protocols, for example monitoring of potential behavioral responses or changes in spatial and temporal distribution of biological resources as a direct result of the offshore wind energy development.

- Empire Wind advocates that technical experts conduct statistical power analyses up front in the planning process before implementing any future studies. In addition, F-TWG and/or E-TWG are appropriate forums in which to discuss the development of such analyses and should be part of this process.

3.2 Handling/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 or other scientifically rigorous products.

- Empire Wind will endeavor to meet with any interested parties when contacted to discuss prospective research.
- Empire Wind is willing to consider requests to access Empire Wind's affiliates' existing operating offshore wind energy developments in Europe to conduct research and monitoring. For example, in September 2023, Empire Wind project personnel hosted a group of 13 ENGOs (NWF, TNC, Ocean Conservancy, MassAudubon) and accompanied them out on 2 CTV trips to Equinor's Hywind Scotland floating offshore wind farm. In addition, there was a day's session with environment and fisheries researchers that have been studying impacts and benefits of offshore wind farms in the North Sea.

3.3 Data availability

This section should describe how data will be made available in accordance with Section 2.2.8 of the RFP.

- Empire Wind will make publicly available relevant information or data and supporting metadata that is developed across our portfolio of projects to enhance the understanding of environmental characteristics, or use by wildlife, of any offshore, nearshore or onshore areas, so long as it is not considered proprietary in nature and done in accordance with permitting timelines/requirements. This includes the following data/studies:
 - 2017 to 2019 digital aerial survey images, monthly and quarterly reports of avian species, marine mammals, sea turtles and large bony fish assemblages as observed from the 12 x monthly digital aerial surveys carried out from November 2017 to December 2019. These data and reports are available at the following website: https://remote.normandeau.com/ewind_overview.php. Data are also publicly available on Duke University's Ocean Biodiversity Information System Spatial Ecology Analysis of Megavertebate Populations (OBIS-SEAMAP) [OBIS-SEAMAP Dataset - Empire Wind Digital Aerial Wildlife Surveys for BOEM Lease Area OCS-A 0512, Equinor Wind US LLC, November 2017-October 2018 \(duke.edu\)](#) and [OBIS-SEAMAP Dataset - Empire Wind Digital Aerial Wildlife Surveys for BOEM Lease Area OCS-A 0512, Equinor Wind US LLC, February - December 2019 \(duke.edu\)](#)
 - The following studies are currently available for download from the Empire Wind website (<https://www.empirewind.com/resources/>) and <https://www.empirewind.com/environment-and-sustainability/environmental-protection/> :

- 2018 benthic survey report covering the SAP related survey locations within the lease area (benthic grab samples with grain size and macro fauna analysis, drop down video stills, habitat description);
- 2018 benthic survey report covering COP related survey locations within the lease area totaling 67 sample locations (benthic grab samples with grain size and macro fauna analysis, drop down video stills, habitat description).
- 2019 benthic survey report covering COP related survey locations within the proposed export cable corridors (sampling included Sediment Profile Imaging and Plan View imaging at 157 sample stations, with 15 reference stations and sediment grab samples for sediment grain size analysis and macrofaunal analysis for verification).
- Whales of New York, in collaboration with the Wildlife Conservation Society (“WCS”). 2023. <https://whalesofnewyork.wcs.org/>
- Empire Wind will continue to make non-proprietary environmental data publicly available as the Project continues to contribute to the development of the RWSC integrated science plan and its data sharing and governance recommendations, as these recommendations are likely to include preferred data portals and repositories. In the meantime, Empire Wind may be contacted directly to request access to environmental data not already made public.
- Prior to any disclosure, data made available by Empire Wind will undergo final quality assurance/quality control (“QA/QC”) to be performed by Empire Wind.
- Empire Wind is open to exploring outlets for sharing information (*e.g.*, the E-TWG webpage or other data portals); however, version control will be important.
- The following studies and reports are part of the COP and are available for review or download from the BOEM website at (<https://www.boem.gov/renewable-energy/state-activities/empire-wind-construction-and-operations-plan>).
 - Coastal Zone Management Consistency Statements
 - Summary of Agency and Stakeholder Engagement
 - Conceptual Project Design Drawings
 - Oil Spill Response Plan
 - Safety Management System
 - Sediment Transport Analysis
 - Air Emissions Calculations and Methodology
 - In-Air Acoustic Assessment
 - Underwater Acoustic Assessment
 - Information for Planning and Conservation (“IPaC”) Report and New York State Department of Environmental Conservation Natural Heritage Response Letters
 - Ornithological and Marine Fauna Aerial Survey
 - Avian Impact Assessment for the Proposed Empire Wind Project in the New York Bight
 - 2018 Bat Survey Report
 - Bat Impact Assessment for the Proposed Empire Wind Project in the New York Bight

- Benthic Resources Characterization Reports
- Essential Fish Habitat (“EFH”) Assessment
- Fisheries Mitigation Plan
- Marine Archaeological Resource Assessment
- Terrestrial Archaeological Resource Assessment
- Analysis of Visual Effects to Historic Properties
- Visual Impact Assessment
- Aircraft Detection Lighting System (“ADLS”)
- Obstruction Evaluation & Airspace Analysis
- Navigation Safety Risk Assessment
- Offshore Electric and Magnetic Field Assessment
- Onshore Electric and Magnetic Field Assessment

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.

- Empire Wind will restrict confidential, propriety, and commercially sensitive data (as noted above).

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. These financial commitments are outside those identified in Section 2.2.7 of the RFP and beyond those identified to fulfill state and federal regulatory permitting requirements.

- Empire Wind will support regional monitoring of wildlife and key commercial fish stocks equivalent to the specified value of \$10,000 per MWh offer capacity. Half of this will support regional monitoring of key commercial fish stocks to better understand how offshore wind energy development is potentially altering the biomass and/or distribution of these stocks; and the other half will support regional monitoring of wildlife to better understand how offshore wind energy development effects distribution and abundance of sensitive species. These monitoring efforts may be committed via regional monitoring organizations (e.g., ROSA, Regional Wildlife Science Collaborative (“RWSC”) or similar) or independently by Empire Wind.
- Additional studies and financial commitments outside of the \$10,000 per megawatt have been made by the project and planned as outlined in section 3.6 below.

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.

- Empire Wind has established an Expert Panel consisting of 6 external experts to help advise on mitigation measures and monitoring program for construction phases of the Empire Project in order to protect marine mammals. The Panel has helped provide recommendations on passive acoustic monitoring buoy deployment, infrared cameras, visual observers, and other mitigation measures which the Empire Wind project is actively working to integrate into construction plans. Hourly consulting fees apply and are disbursed to each of the panel members per contract agreements.
- Empire Wind funded the deployment and testing of an infrared camera (Toyon) during a recent MEC survey in the lease area. The purpose of the test was to collect information on detection capabilities of the camera and to understand how the technology can best be used to augment visual observers. Results from the test are currently being analyzed and will be shared externally when available. The camera has been purchased and is owned by Equinor and will be utilized on additional project marine operations/campaigns.
- Empire Wind has collaborated with SUNY Stony Brook to attach four fish tag receiver gates to the Empire Wind metocean facilities. The receiver gates, used primarily for detecting Atlantic sturgeon but also capable of detecting other tagged species, were part of a previously BOEM-funded study. Empire Wind has been coordinating with Stony Brook on opportunities to download and service the sensors during scheduled service visits approximately every 6 months. Empire Wind intends to explore continuing this collaboration.
- Empire Wind entered into a funding agreement related to a grant with the WCS and Woods Hole Oceanographic Institute (“WHOI”) through 2028 (\$9.5 million USD), which consists of two near real-time acoustic whale monitoring buoys spaced appropriately in the lease area. This funding includes maintenance of buoys, near real-time data transfer, external website data sharing ([Whales of New York > Near Real-time Data \(wcs.org\)](#)), and a kiosk at the NY Aquarium.
- Empire Wind will continue to participate in the development of regional science plans with RWSC, including payment of annual membership fee (\$20k/year).
- Empire Wind was a founding board member of ROSA and is committed to continue supporting ROSA. Empire has provided one year of administrative support funding (\$360k) to ROSA to develop a framework structure for future RFPs and research program administration. Scott Lundin (VP Permitting, Community and Technical Environmental Affairs) sits on the Board of Directors and EJ Marohn (Marine Affairs Manager) is a member of the Advisory Council.
- Empire Wind’s affiliates have funded and collaborated in the UK Carbon Trust Offshore Renewables Joint Industry Programme (“ORJIP”) One Bird Collision Avoidance Study, ORJIP Four Acoustic Deterrent Devices, WCS/WHOI passive acoustic monitoring (“PAM”) buoy deployment in Empire Wind, and the developer led study of Disturbance Effect on the Harbour Porpoise in the North Sea (DEPONS), 2015.

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.

- Data collected during NYSDEC's multi-year, monthly aerial survey data collection effort from March 2017 through February 2020. Reports, including the two annual and final 3-year compendium are available here: <https://www.dec.ny.gov/lands/113818.html>
- NYSDEC, Schlesinger and Bonacci 2014, NYSERDA, WCS, and the Atlantic Marine Assessment Program for Protected Species surveys (NOAA NEFSC 2017 and SEFSC 2016).
- NYSERDA quarterly digital aerial survey program to evaluate the NY Bight area and Empire Wind Project area
- Empire Wind evaluated the extent to which existing, and publicly available data sources were suitable for characterizing environmental resources in the relevant area, including evaluation of NYSERDA's Master Plan (2017).
- Empire Wind has referenced the NYSERDA Master Plan Marine Mammals and Sea Turtles Study (2017; Appendix L) to characterize baseline conditions. This study reviewed the available data and has provided summaries of "Best Available Data" in the form of comprehensive lists of datasets for marine mammals and sea turtles and notes that current studies will provide reliable species counts when they are complete. Empire Wind has also referenced NOAA Fisheries Stock Assessment Reports and monitoring surveys conducted for NYSDEC to characterize baseline conditions, including the following.
 - NOAA Fisheries 2019. 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. In Press. 2019.
 - Tetra Tech and LGL. 2020. Final Comprehensive New York Bight Whale Monitoring Aerial Surveys Years 1-3 Survey Report for March 2017 – February 2020. Technical Report produced By Tetra Tech and LGL for NYSDEC under Tetra Tech contract C009926. May 18, 2020.
 - WHOI. 2018. Autonomous real-time marine mammal detections – New York Bight Buoy. Woods Hole Oceanographic Institution and Wildlife Conservation Society. Available online at: http://dcs.whoi.edu/nyb0218/nyb0218_buoy.shtml.
- Empire Wind will rely on additional studies to assess the impact of noise on marine mammals and sea turtles, as follows:
 - Popper, A.N., A.D. Hawkins, R.R. Fay, D. Mann, S. Bartol, T. Carlson, S. Coombs, W.T. Ellison, R. Gentry, M.B. Halvorsen, S. Lokkeborg, P. Rogers, B.L. Southall, D.G. Zeddies, and W.N. Tavolga. 2014. ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI, ASA Press. This study found that sea turtles have fairly

limited capacity to detect sound, although all results are based on a limited number of individuals and must be interpreted cautiously.

- Limited research has shown that the upper limit of the hearing range of sea turtles is generally in the range of 1,000 to 1,200 hertz:
 - Tech Environmental, Inc. 2006. Final EIR Underwater Noise Analysis. Tech Environmental, Inc. (Report 5.3.2-2). Waltham, Massachusetts.
 - Martin, K.J., S.C. Alessi, J.C. Gaspard, A.D. Tucker, G.B. Bauer, and D.A. Mann. 2012. Underwater hearing in the loggerhead turtle (*Caretta caretta*): a comparison of behavioral and auditory evoked potential audiograms. *The Journal of Experimental Biology* 215:3001-3009.
 - McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, and K. McCabe. 2000. Marine seismic surveys: A study of environmental implications. *Apnea Journal* 692-706. This study serves as the best available information on the levels of underwater noise that may produce a startle, avoidance, and/or other behavioral or physiological response in sea turtles.
 - Noise injury thresholds established by the Fisheries Hydroacoustic Working Group and adopted by NOAA Fisheries.
 - Some data covering several years of time-series currently exists on the ambient underwater sound levels within or near to the lease area, collected from noise sensors installed by the WCS as part of their 'Blue York' real-time whale monitoring buoy.
 - NOAA-established guidance for evaluating noise impacts, which defines harassment thresholds for broad categories of marine species:
 - NOAA Fisheries. 2018a. 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.
- The National Marine Fisheries Service Endangered Species Act Section 7 Consultation Biological Opinion outlines the specific mitigation measures to sea turtles, these are incorporated into BOEM's Final Environmental Impact Statement ("Final EIS") and Record of Decision.
 - Cornell University passive acoustic monitoring survey for 6 large whale species (right, fin, sei, blue, sperm, and humpback) in NY Bight.
 - The following unpublished reports that could be made available by request of the authors:
 - Bioacoustic Research Program. 2010. Determining the Seasonal Occurrence of Cetaceans in New York Coastal Waters using Passive Acoustic Monitoring February 2008 - March 2009. Final Report 14 June 2010 Prepared for: State Wildlife Grants Program 205 Funding C/O Bureau of Fisheries New York State Dept. of Environmental Conservation R2 625 Broadway, Albany NY 12233-4753
 - Estabrook, B.J., D.V. Harris, K.B. Hodge, D.P. Salisbury, D. Ponirakis, J. Zeh, S.E. Parks,
 - A.N. Rice. 2019. "Year 1 Annual Survey Report for New York Bight Whale Monitoring Passive Acoustic Surveys October 2017- July 2018." Contract C009925. New York State Department of Environmental Conservation. East Setauket, NY.

- Estabrook, B.J., K. B. Hodge, D. P. Salisbury, D. Ponirakis, D. V. Harris, J. M. Zeh, S. E. Parks, A. N. Rice. 2020. "Year 2 Annual Survey Report for the New York Bight Whale Monitoring Passive Acoustic Surveys October 2018 - October 2019. Contract C009925. New York State Department of Environmental Conservation. East Setauket, NY.
- Other data collection efforts include the Georgia Department of Natural Resources' focus on tagging right whales and Geographic Information Gateway, CetMap, and other efforts to collect spatial data. <https://cetsound.noaa.gov/cda-index>
- Empire Wind will comply with BOEM's requirements in 30 C.F.R. § 585.626.

4.1.2 Data being collected

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

- Observations of all right whales and dead, entangled, or distressed marine mammals shall be communicated to federal authorities as soon as is practicable, and no later than 24 hours after occurrence
- Empire Wind has commissioned and funded a number of studies to collect baseline information to inform the Environmental Impact Assessment process. Details can be found in the Empire Wind Construction and Operations Plan, Final Environmental Impact Statement, and with conditions and mitigation measures issued in the Record of Decision. A summary of data is provided below:
 - Offshore site characterization surveys including, oceanographic and meteorological (metocean) measurements, geophysical and geotechnical investigations, sediment & water quality sampling, and benthic sampling;
 - Underwater acoustic modeling;
 - Sediment transport analysis;
 - Navigation Risk Safety Assessment;
 - Tourism and recreation;
 - Offshore cable burial risk assessments (still in progress); and
 - Electromagnetic Field ("EMF") modeling.
- Empire Wind contracted APEM, as supported by Normandeau, to conduct monthly digital aerial surveys, which capture digital images and of marine mammals and sea turtles in addition to avian species, large fish assemblages and opportunistic vessel sightings.
 - The Avian Survey Protocol, which included marine mammals and sea turtles, was submitted, and approved by BOEM and USFWS.
 - Data and reports from past and future surveys have been and will continue to be made available at: https://remote.normandeau.com/ewind_overview.php
- Empire Wind will use data and observations from PSOs onboard Project related offshore survey vessels across projects comprising of a northeast regional dataset, where appropriate. PSOs recorded observations from ongoing and future surveys (initiated August 2020).
- Empire Wind has worked with USFWS to deploy Motus avian acoustic receivers on metocean buoys and is contributing to the Motus database.

- WCS/WHOI collection of near real-time acoustic observations of whale species, including North Atlantic right whale, sei whale, humpback whale and fin whale. The data buoys are also recording the ambient sound environment at the eastern end of the lease area. Real-time detections are available here: <http://dcs.who.edu/>

4.2 Species at risk

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

- Empire Wind notes that 39 marine mammals and 5 sea turtles are known to occur within the waters of the NY Bight and the Lease Area. All 39 marine mammals are protected by the MMPA, and some are protected by the Endangered Species Act of 1973 (“ESA”) or NY State Law.
- There are five species of sea turtles that have been documented in or within the Northwest Atlantic OCS region waters which includes waters of the Project Area.
- Empire Wind is also aware of the importance of the species categorized with the additional protections mentioned above. Empire Wind’s assessments, design, and mitigations are developed in a manner meant to appropriately address the needs and requirements of all the species known to occur within the Project Area without having to prioritize some over others.
- Full details of species at risk, likely impact, and proposed mitigation are described in the COP, which was developed in consultation with the relevant stakeholders, including the E-TWG. The Final Environmental Impact Assessment contains the full impact picture, and the Record of Decision has been issued which includes the conditions required to mitigate impacts.

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 of 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 or 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.

Potential impacts to marine mammals and sea turtles and proposed mitigation measures are provided in Table 4-1.

Table 4-1 Potential Impacts to Marine Mammals and Sea Turtles and Proposed Mitigation Measures					
Potential Impacts	Proposed Mitigation Measures	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 to help measure and mitigate potential noise-related effects on marine mammals, including with NMFS-approved PSOs, as identified through the survey plan approval process; • Monitoring during noise-generating activities will be done through an integrated monitoring approach, including the use of PAM, NMFS-approved PSOs, and/or other proven technologies, as appropriate, to the extent practicable and in compliance with federal regulation; • Noise generating geophysical survey work shall not commence after dark or at other times of low visibility as appropriate, unless an alternative mitigation measure or monitoring plan that does not rely on visual observations has been determined to be effective, to the extent compatible with practicability and worker safety; • Soft starts and shut-down procedures to minimize impacts associated with noise emitting survey equipment, where technically feasible and in accordance with associated authorizations; and • Before beginning any geophysical surveys and when new personnel join the work, Empire Wind will conduct briefings for all staff to explain responsibilities and protected species requirements. 	X	X	X	
Underwater noise impacts from construction and installation activities	<ul style="list-style-type: none"> • Empire Wind will seek to use noise attenuation technologies to reduce sound from pile driving of foundations; • Monitoring during construction and installation activities, including those done during times of reduced visibility, will 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; • Empire Wind will not commence pile driving for foundation installation during poor visibility conditions, such as darkness, fog, and heavy rain, unless an alternative mitigation monitoring plan that does not rely on visual observation has been 		X		

Table 4-1 Potential Impacts to Marine Mammals and Sea Turtles and Proposed Mitigation Measures					
Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>determined to be effective, to the extent compatible with practicability and worker safety;</p> <ul style="list-style-type: none"> • Empire Wind will apply monitoring and exclusion zones as appropriate to underwater noise assessments and impact thresholds, enforced by: <ul style="list-style-type: none"> ○ Qualified NOAA Fisheries approved PSOs; ○ Real-time monitoring systems, as appropriate; ○ Use of PAM systems; ○ Use of reduced visibility monitoring tools/technologies (<i>e.g.</i>, night vision, infrared and/or thermal cameras); • Empire Wind may seek to use quiet foundation solutions or foundation installation technology solutions that reduce acoustic stress, where technically and commercially feasible; and • Before beginning any activities involving vessel use or pile driving and when new personnel join the work, Empire Wind will conduct briefings for all staff to explain responsibilities and protected species requirements. 				
Vessel strikes on marine mammals	<ul style="list-style-type: none"> • Empire shall ensure that all vessel personnel are trained regarding animal identification and protocols when sightings occur; • Empire Wind shall provide reference materials on board all Project vessels for identification of marine mammals and sea turtles; • Appropriate Project-related personnel onboard Project vessels will be provided marine mammal sighting and reporting procedures training appropriate for each specific phase and its potential impacts to marine mammal species, as necessary. These monitoring, sighting, and reporting protocols will be outlined in any IHA deemed necessary for the Project, in an effort to emphasize individual responsibility for marine mammal awareness and protection. • Use of exclusion/safety zones: <ul style="list-style-type: none"> ○ Real-time monitoring systems as appropriate (<i>e.g.</i>, visual observations by PSOs, passive acoustic monitoring, use of night vision and infrared during nighttime activities) to facilitate exclusion and monitoring zones for survey and 	X	X	X	X

Table 4-1 Potential Impacts to Marine Mammals and Sea Turtles and Proposed Mitigation Measures					
Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<ul style="list-style-type: none"> construction vessels; ○ NOAA NMFS approved PSOs and PAMS where appropriate for monitoring during vessel transits ● Empire Wind empowers all personnel onboard a vessel to raise an alert of potential marine mammals and sea turtle risk via the Lead PSO, with the Lead PSO given full mandate for mitigation decisions. ● Empire Wind’s vessel strike avoidance measures will (and have been) consistent with: (1) NOAA NMFS guidance to avoid ship collision with marine mammals and sea turtles; (2) conditions within the lease area; (3) and any Incidental Take Authorizations issued by NOAA NMFS. ● Vessel collision avoidance mitigation measures include: <ul style="list-style-type: none"> ○ Vessel operators and crew awareness of collision avoidance measures; ○ Project-related vessels will comply with NOAA Fisheries speed restrictions of 10 knots (18.5 km/h) or less for vessels 65 ft (20 m) or greater within the Mid- Atlantic U.S. Seasonal Management Area (“SMA”) for North Atlantic right whales during the period of November 1 through April 30, and will comply with the 10 knots or less speed recommendations in any voluntary Dynamic Management Area (DMA), as currently defined in regulations (73 FR 60173, October 10, 2008); ○ Reduction of speed to 10 knots or less if mammal identified near a vessel (within 330 ft/100 m) ○ Maintain separation distance of 1,640 ft or greater from North Atlantic right whale. If observed, must move away from whale at 10 knots or less until separation distance is achieved. If in vessels path, engines must not be engaged until it has moved outside path and beyond 330 ft/100m. ○ Maintain separation distance of 300 ft or greater from any sighted non-delphinoid cetacean. If sighted – follow similar procedures for siting North Atlantic right whale. ○ Maintain separation distance of 164 ft (50 m) or 				

Table 4-1 Potential Impacts to Marine Mammals and Sea Turtles and Proposed Mitigation Measures

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>greater from any sighted delphinoid cetacean. If sighted – follow similar procedures for siting North Atlantic right whale.</p> <ul style="list-style-type: none"> ○ Maintain a separation distance of 164 ft (50 m) or greater from any sighted pinniped ● Empire Wind will adopt vessel collision avoidance measures for Project-related vessels working in or in transit to and from the Lease Area, including a 164 ft (50 m) separation distance from all sea turtle species; ● Will adopt vessel speed restrictions associated with SMA and DMA relevant to the size of the vessels used and other vessel strike avoidance measures; ● Real-time marine mammal monitoring systems for monitoring and exclusion zones, as appropriate; ● Vessel collision avoidance mitigation measures for Project-related vessels working in or in transit to and from the Lease Area, including a 328 ft (100 m) separation distance from all marine mammals, except for the right whale, which requires a 1,640 ft (500 m) separation; ● Any vessel larger than 300 gross tonnes moving into right whale habitat will report in as part of the right whale Mandatory Ship Reporting System, where they will be immediately responded to with updated reports of right whale sightings in the area, in addition to reminders of safe vessel speeds and movements within the management area. In the event of contact with a North Atlantic right whale, a report must be made immediately to NOAA’s National Marine Mammal Stranding Network; ● Marine mammal observers and/or Project personnel will check NOAA’s website for any update on DMAs and will respond with vessel movement strategies or work hours accordingly; ● Empire Wind will consider the use of dedicated trained crew members (independent of PSOs) to help reduce the risk of collision under certain circumstances; ● Empire Wind will consider the use of a Service Operations Vessel (“SOV”) concept, supported by a 				

Table 4-1 Potential Impacts to Marine Mammals and Sea Turtles and Proposed Mitigation Measures					
Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>Crew Transfer Vessel (“CTV”), to reduce vessel traffic associated with Operations and Maintenance for the Project, if technically and commercially feasible; and</p> <ul style="list-style-type: none"> • Before beginning any activities involving vessel use and when new personnel join the work, Empire Wind will conduct briefings for all staff to explain responsibilities and protected species requirements. 				
Electromagnetic Fields (EMF), resulting in potential disturbance to marine mammals/sea turtles and/or their prey resource	<ul style="list-style-type: none"> • Empire Wind shall use proper shielding to reduce EMF impacts. • Empire Wind shall conduct EMF modeling assessments to identify potential mitigation requirements • Electrical cables shall be sufficiently buried where feasible to reduce EMF effects. • Surface cable protection where sufficient burial is not possible and where appropriate based on a Cable Burial Risk Assessment (“CBRA”) and EMF assessments (acting as a further barrier between EMF and receptor). 	X	X	X	
Additional proposed mitigations	<ul style="list-style-type: none"> • Continued engagement with regulatory agencies and ENGOs on potential mitigation and best practices, as appropriate; • Project-related vessels will operate in accordance with laws regulating the at-sea discharges of vessel-generated waste; • Empire Wind will conduct marine debris awareness training, prevention, reporting, and recovery; • During operations and maintenance, Empire Wind will commit to vessel and structure lighting, including ADLS on wind turbine generators and the offshore substation, that minimizes illumination of the sea surface where feasible and subject to approval; • Empire Wind will consider micro-siting of Project-components to avoid and minimize impacts to sensitive benthic habitat and habitat of high value to marine mammals and sea turtles, directly and 	X	X	X	X

Table 4-1 Potential Impacts to Marine Mammals and Sea Turtles and Proposed Mitigation Measures					
Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	indirectly; <ul style="list-style-type: none"> • Empire Wind will consider development of appropriate monitoring program(s) in close coordination with regulatory agencies and stakeholders; and • Continual adaptation of project monitoring programs, building on initial baseline monitoring of marine mammals and sea turtles to assess whether detectable changes are occurring associated with proposed operations and post-construction monitoring. These may include aerial or boat-based surveys and leveraging of PAM buoy data in the lease area. • Continual contribution to regional monitoring programs through RWSC and ROSA. 				
*Phase: 1: Survey/Design; 2: Construction; 3: Operation; 4: Decommission					

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.

- Empire Wind has established an Expert Panel consisting of 6 researchers (biologists and acousticians) who are helping inform the project on recommended mitigation measures and monitoring components. The results from the panel have been presented publicly (e.g., at the NARW Symposium) and will be published in peer-reviewed literature. Recommendations are currently being incorporated into construction plans.
- Empire Wind shall seek to collaborate with other regulatory agencies and stakeholder groups to identify research needs and opportunities.
- Empire Wind will leverage lessons learned and best practices in developing monitoring frameworks (e.g., additional noise mitigation and monitoring plans for marine mammals, as appropriate) from the Empire Wind Project, which has ongoing consultations with regulators and the E-TWG to scope and shape monitoring plans.

4.4.1 Assess and quantify changes

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

- Ideally, specific questions and focal taxa shall be chosen for the Project either based on site-specific environmental 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.
- Outside expertise will, if practicable, be consulted during study design and data analysis processes.
- Additionally:
 - Empire Wind will ideally target monitoring and research towards interactions between offshore wind energy developments and the potential receptors that may be impacted.
 - Empire Wind, in collaboration with WCS/WHOI, has installed two monitoring buoys to help to further understand the spatial and temporal distribution of the four large whale species within the lease area, including potential for extending deployments to post-construction monitoring.
 - The WCS/WHOI buoys offer an opportunity for real-time monitoring and detection during survey and installation activities.
 - Empire Wind will explore the use of Habitat and Agent Based Modeling to facilitate a better understanding of the spatial and temporal distribution and fine scale movements of key large whale species within the New York Bight, in particular in relation to changes in environmental conditions (e. g., prey resource, seawater temperature).
 - Empire Wind understands that from the outset, any research and monitoring to assess changes and impacts should be statistically robust. However, for some biological monitoring, this level of robustness is not always possible as many outside factors can influence these variations with much greater significance than the factors that can be attributed to causes from offshore wind energy developments (e.g., seawater temperature, nutrient levels, etc.). As such, Empire Wind is open to sharing or using oceanographic data from the Metocean facilities for a better understanding of these relationships.

4.4.2 Address data gaps

Describe how data gaps will be addressed.

- Empire Wind believes there is sufficient marine mammal and sea turtle data to inform spatial planning and support assessments in the COP and Construction Letter of Authorization Applications. However, Empire Wind is willing to collaborate on studies, research and monitoring to supplement what is required under the regulations, to inform mitigation options.
- Empire Wind will engage with relevant stakeholders, for example through the regulatory process and E-TWG to identify areas where data gaps beyond the COP document design exist for further monitoring and research and will consider proposals for research on a case-by-case basis.

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.

- As necessary, Empire Wind will explore this further in consultation with the E-TWG, regulatory agencies, and relevant stakeholders.
- Additionally:
 - Empire Wind has not finalized a process for alternative protocols but is open to exploring this further in consultation with the E-TWG, regulatory agencies and relevant stakeholders.
 - Empire Wind will take additional measures to avoid or reduce potential impacts to marine mammal and sea turtle prey resources in consultation with E-TWG and BOEM and other stakeholders, consistent with the EMP.
 - Empire Wind will continue to consult with NMFS and other key stakeholders throughout the Project development process to determine if any alternative or additional appropriate and proportionate mitigation measures may be necessary.
 - All required mitigation and monitoring measures will be integrated into the Project's "Protected Species Mitigation Protocol(s)".
 - Empire Wind is open to consulting with relevant agencies, ENGOs and E-TWG on further appropriate and proportionate mitigation options, for example, real-time monitoring or observations of marine mammals when in transit and commitments to monitor daily reports on marine mammal sightings and DMAs.

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.

5.1.1 Available information

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

- Empire Wind has followed BOEM guidelines on the baseline assessment of avian and bat species and potential impacts in support of the COP (30 C.F.R. § 585.626(a)(3)).
- A comprehensive list of information used for baseline characterization of birds and bats can be found in COP Appendix Q and Appendix S. The Final EIS and USFWS Biological Opinion for Empire Wind provide baseline information for birds and bats as well.
- Key information used for baseline characterization of birds is as follows:
 - Equinor funded digital aerial avian surveys covering the Lease Area over 12 monthly surveys. Report included as Appendix P: Ornithological and Marine Fauna Aerial Survey, of the Empire Offshore Wind: Empire Wind Project COP available at <https://www.boem.gov/renewable-energy/appendix-p-ornith-marine-fauna-survey>
 - NYSERDA funded digital aerial avian surveys covering the New York Offshore Planning Area (“OPA”) over twelve quarterly surveys. Data and reports are publicly available on https://remote.normandeau.com/portal_data.php?pj=6&public=1
 - Marine-Life Data and Analysis Team (“MDAT”) Bird Abundance and Occurrence Models (Version 2) available at <http://seamap.env.duke.edu/models/mdat/>
 - Northwest Atlantic Seabird Catalog, provided by NOAA with BOEM’s approval.
 - Mid-Atlantic Diving Bird Tracking Study
 - Spiegel, C. S., A. M. Berlin, A. T. Gilbert, C. O. Gray, W. A. Montevecchi, I. J. Stenhouse, S. L. Ford, G. H. Olsen, J. L. Fiely, L. Savoy, M. W. Goodale, and C. M. Burke (2017). Determining Fine-scale Use and Movement Patterns of Diving Bird Species in Federal Waters of the Mid-Atlantic United States Using Satellite Telemetry. OCS Study BOEM 2017-069. [Online.] Available at <https://www.boem.gov/environment/boem-2017-069pdf>
 - Migrant Raptor Studies
 - Positional data on Peregrine Falcons and Merlins during fall migration along the Atlantic flyway. Positional data available online on the Movebank Data repository, used with permission.
 - DeSorbo, C. R., K. G. Wright, and R. Gray (2012). Bird migration stopover sites: ecology of nocturnal and diurnal raptors at Monhegan Island. [Online.] Available at <https://briwildlife.org/wp-content/uploads/2022/02/DeSorbo-Wright-Gray-2012-Bird-migration-stopover-sites-ecology-of-nocturnal-and-diurnal-raptors-at-Monhegan-Island-annotated.pdf>

- DeSorbo, C. R., L. Gilpatrick, C. Persico, and W. Hanson (2018a). Pilot Study: Establishing a migrant raptor research station at the Naval and Telecommunications Area Master Station Atlantic Detachment Cutler, Cutler Maine. Biodiversity Research Institute, Portland, Maine. 6 pp.
- DeSorbo, C. R., C. Persico, and L. Gilpatrick (2018c). Studying migrant raptors using the Atlantic Flyway. Block Island Raptor Research Station, Block Island, RI: 2017 season.
- Tracking movements of vulnerable terns and shorebirds in the Northwest Atlantic using nanotags.
- Loring, P. H., P. W. C. Paton, J. D. McLaren, H. Bai, R. Janaswamy, H. F. Goyert, C. R. Griffin, and P. R. Sievert (2019). Tracking Offshore Occurrence of Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers with VHF Arrays. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-017. 140 p. [Online.] Available at https://espis.boem.gov/final%20reports/BOEM_2019-017.pdf
- Tracking movements of rufa red knots in the U.S. Atlantic outer Continental Shelf Waters.
- Loring, P., H. Goyert, C. Griffin, P. Sievert, and P. Paton (2017). Tracking Movements of Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers in the Northwest Atlantic: 2017 Annual Report to the Bureau of Ocean Energy Management (“BOEM”). In. Interagency Agreement No. M13PG00012 to U.S. Fish and Wildlife Service Northeast Region Division of Migratory Birds, Hadley, Massachusetts.
- Sea Duck Tracking Studies
- Loring, P. H., P. W. C. Paton, J. E. Osenkowski, S. G. Gilliland, J.-P. L. Savard, and S. R. McWilliams (2014). Habitat use and selection of black scoters in southern New England and siting of offshore wind energy facilities. *The Journal of Wildlife Management* 78:645–656. doi: 10.1002/jwmg.696
- Meattey, D. E., S. R. McWilliams, P. W. C. Paton, C. Lepage, S. G. Gilliland, L. Savoy, G. H. Olsen, and J. E. Osenkowski (2018). Annual cycle of White-winged Scoters (*Melanitta fusca*) in eastern North America: migratory phenology , population delineation , and connectivity. *Canadian Journal of Zoology* 96:1353–1365.
- Meattey, D. E., S. R. McWilliams, P. W. C. Paton, C. Lepage, S. G. Gilliland, G. H. Olsen, and J. E. Osenkowski (2019). Resource selection and wintering phenology of White-winged Scoters in southern New England : Implications for offshore wind energy development. 121:1–18. doi: 10.1093/condor/duy014
- Information on threatened and endangered species and/or their habitat is also available through USFWS IPaC, available at <https://ecos.fws.gov/ipac/>
- NYSDEC Environmental Resource Mapper, available at <https://www.dec.ny.gov/animals/38801.html>
- eBird data, available at <https://ebird.org/home>
- New York Wildlife Action Plan, available at https://extapps.dec.ny.gov/docs/wildlife_pdf/swapfinaldraft2015.pdf

- NYSERDA 2017. New York State Offshore Wind Master Plan, November 2017, available at <https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-in-NewYork-State-Overview/NYS-Offshore-Wind-Master-Plan>
- Studies funded by BOEM on baseline offshore and near-shore avian studies:
 - Williams, K.A, I.J. Stenhouse, E.E. Connelly, and S.M. Johnson. 2015. Mid-Atlantic Wildlife Studies: Distribution and Abundance of Wildlife along the Eastern Seaboard 2012-2014. Biodiversity Research Institute. Portland, Maine. Science Communications. Series BRI 2015-19. 32 pp.
- Carbon Trust ORJIP One Bird Collision Avoidance Study co-funded by Equinor - Skov, H., Heinanen, S. Norman, T., Ward, R.M., Mendez-Roldan, S & Ellis, I. 2018. ORJIP Bird Collision and Avoidance Study. Final Report- April 2018. The Carbon Trust. United Kingdom. 247 pp., available at https://www.carbontrust.com/media/675793/orjip-bird-collision-avoidance-study_april2018.pdf
- ESRI. 2023. Audubon Important Bird Areas. Available at <https://hub.arcgis.com/maps/c885ff1a954d4f9a87c5babc18dd3f5b/explore>. Accessed December 7, 2023.
- Empire Wind relied on the following existing information for its baseline characterization of bats:
 - Equinor funded acoustic surveys within the Lease Area.
 - Tetra Tech (2019). 2018 Bat Study Survey Report: Equinor Wind Offshore Wind Project ICS-A 0512. Prepared for Equinor Wind US, LLC.
 - Mid-Atlantic Baseline Surveys within the Mid-Atlantic Wind Energy Areas- high-definition video aerial surveys and visual boat based surveys of wildlife, including bats.
 - Hatch, S. K., E. E. Connelly, T. J. Divoll, I. J. Stenhouse, and K. A. Williams (2013). Offshore observations of eastern red bats (*Lasiurus borealis*) in the Mid-Atlantic United States using multiple survey methods. PLoS ONE 8:e83803.
 - University of Maryland Center for Environmental Science Acoustic Surveys along the Mid-Atlantic coast from Massachusetts to North Carolina - acoustic bat detectors deployed aboard multiple ships.
 - Sjollema, A. L., J. E. Gates, R. H. Hilderbrand, and J. Sherwell (2014). Offshore activity of bats along the Mid-Atlantic Coast. Northeastern Naturalist 21:154–163.
 - Rhode Island Acoustic Studies along the Atlantic Coast of Southern New England – acoustic bat detectors deployed at multiple locations within the Rhode Island National Wildlife Refuge Complex
 - Smith, A. D., and S. R. McWilliams (2016). Bat activity during autumn relates to atmospheric conditions: Implications for coastal wind energy development. Journal of Mammalogy 97:1565–1577.
 - Carl Herzog, NYSDEC, email communication November 18, 2019 – Northern long-eared bat maternity roosts and hibernacula reported on Long Island.

- Dowling, Z., P. R. Sievert, E. Baldwin, L. Johnson, S. von Oettingen, and J. Reichard (2017). Flight Activity and Offshore Movements of Nano-Tagged Bats on Martha's Vineyard, MA.
- NYSDEC. 2015a. List of Endangered, Threatened and Special Concern Fish & Wildlife Species of New York State. New York State Department of Environmental Conservation. Available at <http://www.dec.ny.gov/animals/7494.html>.
- NYSDEC. 2015b. New York State Wildlife Action Plan ("SWAP") Species of Greatest Conservation Need, available at <http://www.dec.ny.gov/animals/7179.html>
- NYSERDA 2017. New York State Offshore Wind Master Plan, November 2017, available at <https://www.nyseda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-in-NewYork-State-Overview/NYS-Offshore-Wind-Master-Plan>

5.1.2 Data collected

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

- Empire Wind conducted digital aerial avian surveys within the Empire Wind Project area. Detailed methods and findings can be found in COP Appendix P.
 - Status: Complete
- Empire Wind installed a passive bat detector onboard geophysical research vessel to detect bats while the vessel was engaged in other survey activity in the Lease Area in May through December 2018. Detailed methods and findings can be found in COP Appendix R.
 - Status: Complete
- Surveys for ESA-listed bat species at the South Brooklyn Marine Terminal in Brooklyn, New York.
 - Status: Active
- Empire Wind has and will continue to share the results of the monitoring with the relevant regulatory authorities and stakeholders.
 - Status: Active

5.2 Species at risk

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

- The Biodiversity Research Institute ("BRI") conducted an avian and bat risk assessment for onshore and offshore Project components using quantitative and semi-quantitative methods to assess exposure and vulnerability risk of coastal and marine birds and bats. Detailed methods and findings can be found in COP Appendix Q and Appendix S. Based on the assessment, species and taxa groups of greatest concern include:
 - For coastal birds, migratory falcons and songbirds, which may have some risk of exposure to the offshore Project Area, as uncertainty exists about the behavior of falcons around and potentially attraction to offshore wind platforms and understanding of songbird migration is limited. However, mortalities of songbirds and falcons at offshore wind projects have generally not been documented and thus population level impacts are unlikely.

- For marine birds, terns, and loons, as terns may have moderate exposure to the offshore Project Area, particularly during spring, and moderate vulnerability to collision with turbines, though terns are expected to fly below the Rotor Swept Zone. Loons may exhibit avoidance behavior but are expected to have low exposure to the Lease Area and any displacement is unlikely to affect population trends because of the relatively small size of the Lease Area in relation to available foraging habitat.
- ESA-listed avian species, such as the Rufa Red Knot (*Calidris canutus*), Piping Plover (*Charadrius melodus*), and Roseate Tern (*Sterna dougallii*), due to their depleted or declining population numbers. However, these species are only expected to fly through the Lease Area during migration in limited numbers and their likelihood of occurrence is low.
- For bats, tree-roosting species such as eastern red bats (*Lasiurus borealis*), hoary bats (*Lasiurus cinereus*), and silver-haired bats (*Lasionycteris noctivigans*), which may pass through the Lease Area during spring and fall migration and have been documented in the Lease Area.
- ESA-listed northern long-eared bat (*Myotis septentrionalis*) and a species proposed for ESA-listing, tricolored bat (*Perimyotis subflavus*), due to due to their depleted or declining population numbers. However, neither species is expected in the Lease Area given minimal acoustic detections in the offshore environment and that any movement offshore would likely occur near the mainland, and so exposure is likely to be minimal. Acoustic surveys on land have documented no northern long-eared bats. Empire Wind is implementing conservation measures to ensure no effects to potential tricolored bats.
- The Final EIS for Empire Wind further describes the bird and bat species that may be affected by the Project but indicates that impacts to birds will be minimal and negligible, respectively.

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 to birds and bats and proposed mitigation measures are provided in Table 5-1.

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Collision risk to marine birds and bats	<ul style="list-style-type: none"> ● Lighting technology will be used in the offshore Project Area that minimizes attraction- and disorientation-related impacts to birds and bats to the extent practicable, such as shielding of lighting at each wind turbine generator (“WTG”) and Offshore Substation to minimize upward illumination, where safe while maintaining human safety and compliance with Federal Aviation 		X	X	X

Table 5-1 Potential Impacts to birds and bats and Proposed Mitigation Measures

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>Administration (“FAA”), USCG, BOEM and other regulations. Lighting reduction measures will also be implemented onshore such as downward projecting lights, lights triggered by motion sensors, and limiting artificial light to the extent practicable, where safe.</p> <ul style="list-style-type: none"> • Install an ADLS, which will activate the FAA hazard lighting only when aircraft is in the vicinity of the wind facility to reduce visual impacts at night. • Empire Wind will install anti-perching devices on offshore, above-water Project-related structures, where feasible from a health and safety perspective. Monitoring will be conducted to assess effectiveness of the perching deterrents and locations and types of deterrents may be modified accordingly. • Review current technology and methods for minimizing collision risk of ESA-listed birds, and implementing those methods deemed reasonable and prudent. • Empire Wind will document and report to the appropriate federal agencies any dead or injured birds found on vessels and structures during construction, operations, and decommissioning. Empire Wind will also report the occurrence of any dead or injured ESA-listed bird as soon as practicable. • Empire Wind will provide appropriate compensatory mitigation as needed to offset projected levels of take of listed birds from WTG collision. 				
Habitat impacts, including breeding and nesting areas	<ul style="list-style-type: none"> • Site and construct onshore components in previously disturbed areas, existing roadways, and/or rights-of-way to the extent practicable. • Adhere to time of year restrictions as necessary in sensitive onshore bird habitats, where feasible and required, unless otherwise determined acceptable by the applicable agencies. • Develop and enforce an Oil Spill Response Plan (“OSRP”). • For both birds and bats, temporarily disturbed areas will be revegetated with appropriate native species, as appropriate. 		X	X	X
Additional	<ul style="list-style-type: none"> • Develop an adaptive, long-term monitoring program 	X	X	X	X

Table 5-1 Potential Impacts to birds and bats and Proposed Mitigation Measures					
Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
proposed mitigations	to address specific questions related to ESA-listed and non ESA-listed bird and bat species, and when possible, to contribute to the understanding of long-term Project-specific impacts and larger scale efforts to understand cumulative impacts.				
*Phase: 1: Survey/Design; 2: Construction; 3: Operation; 4: Decommission					

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.

5.4.1 Pre/Post monitoring to assess and quantify changes

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

- Consistent with requirements in the Final EIS, Empire Wind has committed to an adaptive, long-term monitoring approach that uses statistically sound methods to assess potential impacts to environmental resources. In consultation with stakeholders, including regulatory agencies, Empire Wind has developed the Empire Wind Offshore Wind Projects: Proposed Bird and Bat Monitoring Framework (“Framework”), which has been approved by BOEM, and will be developed into a formal, detailed Avian and Bat Post-Construction Monitoring Plan (“ABPCMP”).
- Equinor will support pre- and post-construction digital aerial surveys across the Lease Area to understand avoidance behavior of birds exposed to the Project and whether densities vary across the Lease Area. To determine which survey configurations are most effective at statistically modeling displacement, a simulation analysis was conducted to assess auk, gannet, and loon distributions and their displacement after construction in the Empire Wind Lease Area. Once surveys are completed, changes in the spatial distribution or overall abundance of animals in the Lease Area before compared to after construction activities will be investigated using spatially explicit density modeling methods.
- Empire Wind will continue to consult with BOEM, USFWS, other relevant regulatory agencies, outside experts, and other stakeholders to determine the need for adjustments to its approach and/or additional periods of monitoring based on an ongoing assessment of results.

5.4.2 Address data gaps

Describe how data gaps will be addressed.

- Empire Wind will implement an adaptive, long-term monitoring program to address data gaps related to ESA-listed and non ESA-listed bird and bat species.
- A detailed monitoring plan, the ABPCMP, will be developed based on the BOEM-approved Framework through ongoing discussion with stakeholders and regulators and will be coordinated with regional research efforts.
- Questions to be addressed in the monitoring program include:

- What ESA-listed and non ESA-listed bird and bat species are present in the Lease Area?
- What time of year are marine birds and bats present in the Lease Area?
- What time of year are birds migrating offshore and how is migratory activity related to weather?
- How does bird and bat activity relate to temperature and wind speed?
- What dead or injured species are found incidentally?
- To address these questions, Empire Wind will:
 - Install bat acoustic detectors at multiple turbines across the Lease Area and acoustically monitor for bats at night once operations at Empire Wind begin.
 - Install bird acoustic detectors at offshore substations and acoustically monitor for migrating birds once operations begin.
 - Install Motus stations at multiple turbines following current USFWS Offshore Motus Guidance and support Motus tagging efforts to track ESA-listed species around the Lease Area once operations begin.
 - Document dead or injured birds and bats around the Lease Area during all phases of the Project.
- Empire will submit annual monitoring reports to BOEM, BSEE and other relevant agencies that include all data, analyses, and summaries regarding ESA-listed and non-ESA-listed birds and bats.

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.

- Following the submission of an annual monitoring report, Empire Wind will meet with BOEM and USFWS 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 BOEM or USFWS determines that revisions to the ABPCMP are necessary, Empire Wind may modify the ABPCMP accordingly.
- Empire will also conduct an annual review of current technology and methods for minimizing collision risk of ESA-listed birds and will implement those methods deemed reasonable and prudent.
- Empire will provide appropriate compensatory mitigation as needed to offset projected levels of take of listed birds from WTG collision.

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.

- Public data sources are suitable for characterizing benthic habitat and fisheries resources in the Project Area, including:
 - The evaluation of NYSERDA’s Master Plan Fish and Fisheries Study (2017; Appendix J).
 - NOAA National Centers for Coastal Ocean Science and BOEM Comprehensive Seafloor Substrate Mapping and Model Validation in the Atlantic (2019).
 - Estuarine Living Marine Resource database (NOAA 2000) provide descriptions of spatial and temporal distributions of species (by life stage) in Hudson River/Raritan Bay and the Great South Bay, however, the database is not updated regularly.
 - Use of commercial and recreational fisheries effort data as a proxy for fish species.
- The Empire Wind COP provides a detailed review of available baseline data.

6.1.2 Data being collected

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

- NOAA National Centers for Coastal Ocean Science and BOEM Comprehensive Seafloor Substrate Mapping and Model Validation in the Atlantic research/survey collected sediment grab samples at 400 locations in the Lease Area, as well as bathymetric data and opportunistic fisheries data.
 - Status: Complete
- Empire Wind commissioned benthic sampling in 2018 by Gardline Environmental covering the entire Lease Area and building on previous comprehensive benthic surveys carried out by NOAA's National Center for Coastal Ocean Science (“NOS”). These Empire Wind surveys were conducted at a total of 67 sample stations, and included grab samples, drop down digital video and stills imagery. Grab samples were analyzed for sediment grain size distribution and macro faunal analysis. This report has been made publicly available for download from the Empire Wind website.
 - Status: Complete
- Benthic sampling was conducted in 2019 by Inspire Environmental covering proposed potential export cable routes for the Lease Area. Sampling included Sediment Profile Imaging and Plan View imaging at 157 sample stations, with 15 reference stations and sediment grab samples for

sediment grain size analysis and macrofaunal analysis for verification. This report has been made publicly available for download from the Empire Wind website.

- Status: Complete
- Geophysical, benthic habitat (through geophysical interpretation), and geotechnical surveys were conducted from March 2018 to November 2018 across the entire Lease Area and export cable corridors, with additional geophysical and geotechnical surveys carried out in 2019 to fill in data gaps and cover areas from landfall to the 65 ft (20 m) depth contour.
 - Status: Complete
- With the site specific and existing benthic data, and the existing fisheries data, there is sufficient data for the purpose of the COP impact assessments, spatial planning and/or mitigation. However, Empire Wind will consult with the E-TWG and relevant federal agencies and stakeholders on requirements for further surveys for targeted benthic and fisheries monitoring and research.

6.2 Species at risk

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

- Empire Wind notes that fish and invertebrate species of interest in the lease area fall into three groups based on regulatory status: (1) species managed under the MSA; (2) species listed under the ESA; and (3) non-game fish and invertebrate species that are considered important prey (or shelter, in the case of biogenic habitats) for fish and wildlife.
- In addition, the role of the benthic habitat as a fisheries resource is fundamental to the identification of EFH, as reflected in the emphasis on EFH in BOEM's benthic survey guidance (BOEM 2019). EFH has been designated in the Lease Area for various life stages of more than two dozen nonmigratory managed species, including finfish, sharks and rays, and invertebrates.
- Designated EFH for three (3) coastal migratory pelagic and seventeen (17) highly migratory managed fish species also occurs in the Lease Area.
- Three federally-listed endangered fish may occur in the Lease Area:
 - Atlantic salmon (*Salmo salar*);
 - Atlantic sturgeon (*Acipenser oxyrinchus*); and
 - shortnose sturgeon (*Acipenser brevirostrum*).
- NYSDEC lists a number of other fish species as endangered, most if not all, are associated with freshwater habitat which will be evaluated, as applicable to the export cable route.
- Full details of species at risk, likely impact, and proposed mitigation have been described in the COP in consultation with the relevant stakeholders, including in the presentation and updates of the EMP to the E-TWG.

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 to fish, invertebrates, and their habitats and proposed mitigation measures are provided in Table 6-1.

Table 6-1 Potential Impacts to Fish, Invertebrates, and Their Habitats and Proposed Mitigation Measures					
Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Micro-siting conflicts with habitats and fishery resources	<ul style="list-style-type: none"> • Empire 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. • Empire Wind will prepare and implement micrositing plans designed to avoid, to the extent possible, siting structures (wind turbines, offshore substations, and submarine cables) in areas of sensitive habitat, where feasible; • Empire Wind will consider the timing of construction activities; working with the fishing industry and fisheries agencies on sensitive spawning and fishing periods to actively avoid or reduce interaction with receptors, where feasible. 	X			
Temporary, alteration of the seabed and localized increases in noise and turbidity	<ul style="list-style-type: none"> • Empire Wind will seek to use quiet foundation solutions or foundation installation technology solutions that reduce acoustic stress, where technically and commercially feasible. • Empire Wind shall seek to use noise attenuation technologies to reduce the sound from pile driving of foundations. • Most construction vessels will maintain position using dynamic positioning, limiting the use of anchors and jack-up features, where feasible. Where anchors or jack-up features are required, Empire Wind will develop and implement an Anchoring Plan to ensure any anchors or jack-up features would be placed within the previously cleared and/or disturbed areas around the foundations and along the cable routes; • Empire Wind will develop and implement a Boulder Identification and Relocation Plan designed to avoid or minimize impacts to sensitive benthic habitats; • Empire Wind will consider the use of HDD at landfall to minimize physical disturbance of coastal habitats. Empire Wind would implement appropriate 	X	X	X	X

Table 6-1 Potential Impacts to Fish, Invertebrates, and Their Habitats and Proposed Mitigation Measures

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>measures during HDD activities at landfalls to minimize potential release of HDD fluid. To minimize an inadvertent fluid return, an HDD Contingency Plan would be developed and implemented;</p> <ul style="list-style-type: none"> • Empire Wind will consider the use of appropriate measures and timing during cable installation activities to minimize sediment resuspension and dispersal in areas of known historically contaminated sediments; and • Empire Wind will seek to use commercially available and technically feasible noise reducing technologies, in accordance with associated authorizations. 				

Table 6-1 Potential Impacts to Fish, Invertebrates, and Their Habitats and Proposed Mitigation Measures

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Long-term changes to seabed and habitat	<ul style="list-style-type: none"> • Empire Wind will, to the extent possible, avoid sensitive benthic habitats. • Empire Wind will implement mitigation and avoidance measures to protect water quality, such as spill prevention. Specifically, Empire Wind will use appropriate measures for vessel operation and will develop and implement an OSRP, which will include measures to prevent, detect, and contain accidental release of oil and other hazardous materials. Project personnel will be trained in accordance with relevant laws, regulations, and Project policies, as described in the OSRP; • During construction, operations, and maintenance, Empire Wind will utilize sensitivelighting schemes to minimize exposure of light, as practicable; • Most construction vessels will maintain position using dynamic positioning, limiting the use of anchors and jack-up features, where feasible. Any anchors or jack-up features would be placed within the previously cleared and/or disturbed area around the foundations; • Empire Wind will consider the use of HDD at the landfall to minimize physical disturbance of coastal habitats. Empire Wind would implement appropriate measures during HDD activities at landfalls to minimize potential release of HDD fluid. To minimize an inadvertent fluid return, an HDD Contingency Plan would be developed and implemented. 	X	X	X	X
EMF Impacts	<ul style="list-style-type: none"> • Empire Wind will use proper shielding to reduce EMF impacts; • Empire Wind will conduct EMF modeling and assessments to identify potential mitigation requirements; • Electrical cables will be armored and sufficiently buried where feasible to reduce EMF effects; and • As noted above, Empire Wind will conduct both onshore and offshore EMF assessments for the COP. 		X	X	

Table 6-1 Potential Impacts to Fish, Invertebrates, and Their Habitats and Proposed Mitigation Measures

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Cable burial	<ul style="list-style-type: none"> • Empire Wind shall bury export and interarray cables to an appropriate minimal depth to reduce exposure risk. If depth cannot be reached, Empire Wind will add protective materials over the cable; • Sufficient burial of inter-array and export cables to facilitate continued seabed penetrating fishing activity; • Dissemination of information to fishers on cable locations including inclusion on navigational charts; • Intention to bury inter-array and export cables based on Cable Burial Risk Assessment; • Development of a Cable Installation Plan, detailing how cable installation will be managed; • Where plows, jets, grapnel runs, or other similar methods are used to install submarine cables, Empire Wind will conduct post-construction surveys to determine the height and width of any created berms, and if there are bathymetric changes in berm height greater than 1 meter above grade Empire Wind will develop and implement a Berm Remediation Plan to restore created berms to match adjacent natural bathymetric contours as technically and/ or economically practical or feasible; and • Empire Wind shall conduct routine surveys or inspections of sub-sea cables during operation, and shall conduct a survey or inspection to ensure and correct for cable exposure following hurricane or other major events causing disturbance to the seabed. 		X	X	
Turbine Scour Protection	<ul style="list-style-type: none"> • Empire Wind shall seek collaboration with state and federal regulatory authorities and key stakeholders to assess the feasibility and use of ecological enhancements for turbine scour protection. 	X			

Table 6-1 Potential Impacts to Fish, Invertebrates, and Their Habitats and Proposed Mitigation Measures					
Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Additional proposed mitigations	<ul style="list-style-type: none"> • Empire Wind will develop and implement a number of measures to mitigate potential impacts on commercial fisheries and for-hire and recreational fisheries as described in Condition 6 of BOEM’s draft Record of Decision. Additional information is available on the Empire Wind website at https://www.empirewind.com/environment-and-sustainability/mariners-and-fisheries/; • Empire Wind will install scour protection, as needed; • Empire Wind will develop and implement a monitoring program, including a Fisheries and Benthic Monitoring Plan, to address specific questions, to include identifying key species of interest, and when possible, to contribute to the understanding of long-term Project-specific impacts and larger scale efforts to understand cumulative impacts; and • Empire Wind will develop and implement a Protected Species Monitoring Plan that will include mitigation measures for pile driving noise and vessel strike avoidance. 	X	X	X	X
*Phase: 1: Survey/Design; 2: Construction; 3: Operation; 4: Decommission					

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.

- Ideally, specific questions and focal taxa shall 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.
- Outside expertise will, if practicable, be consulted during study design and data analysis processes.

- Empire Wind will seek to collaborate with other regulatory agencies and stakeholder groups to identify research needs and opportunities.
- Additionally:
 - Empire Wind understands that from the outset, any research and monitoring to assess changes and impacts should be statistically robust. However, for some biological monitoring, this level of robustness to adequately detect change as a direct result of an offshore wind farm is not always possible as many outside factors can influence these variations with much greater significance than the factors that can be attributed to causes from offshore wind energy developments (*e.g.*, seawater temperature, nutrient levels, etc.).
 - As such, Empire Wind is open to monitoring that explores other approaches to detect and quantify change, where further monitoring is appropriate, for example behavioral responses. Empire Wind will work with the regulatory agencies, E-TWG, F-TWG, ROSA, and relevant stakeholders to identify research and monitoring needs and agree on methodology.

6.4.2 Addressing data gaps

Describe how data gaps will be addressed.

- Empire Wind will seek to work with stakeholders, including regulatory agencies, to identify data gaps to be addressed through surveys or permitting applications.
- Additionally:
 - Empire Wind will conduct further research and monitoring where data and knowledge gaps remain that present uncertainties over potential significant adverse impacts attributable to the effects of offshore wind farm development.
 - Empire Wind is open to discussing further monitoring and research to fill data gaps as appropriate through regulatory agencies, E-TWG, F-TWG, ROSA, and relevant stakeholders.

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.

- As necessary, Empire Wind shall explore this further in consultation with the E-TWG, F-TWG, ROSA, and regulatory agencies and relevant stakeholders.
- Additionally:
 - Empire Wind has yet to finalize a process for alternative protocols, but is open to exploring this further in consultation with the E-TWG, regulatory agencies and relevant stakeholders.

7 Considerations for Subsea and Overland Cables

7.1 Mitigation strategies for subsea and overland cables

This section should describe any additional environmental mitigation strategies for proposed subsea and overland cable routes that support the offshore wind project.

- Proposed subsea and overland cable routes are described in the Empire Wind COP, along with the full list of reference materials and mitigation measures. These are summarized below.
- Baseline terrestrial vegetation and wildlife condition studies were conducted using the following resources:
 - 2019 National Land Cover Dataset: Land cover conterminous United States (USGS 2019); and
 - 2020 Half-Foot 4 and Long Island Zone New York City Aerial Ortho-Photography (NYSDEC 2021)
 - Environmental Resource Mapper used to check for the presence of Rare Plants and Animals and Significant Natural Communities
 - New York Nature Explorer digital database (NYSDEC 2021a)
 - USFWS National Wetlands Inventory (USFWS 2021)
 - NYSDEC Regulatory Freshwater Wetlands, Queens and Bronx Counties, Tidal Wetlands, and Water Quality Classifications reports
- The onshore component of the Empire Wind Project Area is located in a highly developed area with few areas of natural vegetation cover.
- Five federal and state-listed wildlife species (northern long-eared bat, Piping Plover, Red knot, and Roseate Terns) and one flowering plant, seabach amaranth (*Amaranthus pumilus*) were identified as potentially occurring within the Brooklyn, New York Project Area. The three federally-listed birds are considered shorebird species that require natural stretches of beaches and other coastal, marine, and estuarine habitats and the roseate tern nests almost exclusively on islands to avoid higher predation rates on the mainland. The seabach amaranth occurs on wide sandy beaches above the high tide line and adjacent to foredune areas. Northern long-eared bats are found primarily known to occur in forested areas and has not been found during acoustic surveys on site. The tricolored bat is proposed federally endangered, and the decision listing is anticipated by March 1, 2024. Empire Wind is working with USFWS to implement conservation measures to avoid any effects to potential tricolored bats.
- Empire Wind onshore facilities have been sited in a manner that avoids natural habitat – approximately 96% of the onshore portions of the Project Area consist of impervious surfaces, maintained lawn, and disturbed open space.
- Impacts to the shoreline and intertidal zones at the landfall locations may be avoided or minimized by using trenchless installation methods to connect the marine cable to the onshore substation facilities.
- Onshore substation facility locations, onshore export and interconnection cable routes, and POIs are situated within an intensely developed landscape of commercial/industrial buildings, roads,

and maintained lawns which further discourages the use of this area by bird species sensitive to human disturbance.

- During construction, Empire Wind will commit to the following avoidance, minimization, and mitigation measures to mitigate impacts: •
 - Limiting lighting associated with construction vehicles and work zones to the extent practicable, to reduce the attraction of insect prey for wildlife species such as bats and insectivorous birds;
 - The siting of onshore components in previously disturbed areas, existing roadways, and/or rights-of-way to the extent practicable;
 - The implementation of soil erosion and sediment control plans, which will be provided for agency review and approval, as applicable, for each onshore component
 - The implementation of an Inadvertent Return Plan, which will be provided for agency review and approval, as applicable
 - The management of accidental spills or releases of oils or other hazardous wastes through a SPCC plan, which will be provided for agency review and approval, as applicable;
 - During construction, access will be restricted to existing paved roads and approved access routes to avoid impacts to naturally vegetated areas and wildlife resources;
 - The implementation of an invasive species control plan, which will be provided for agency review and approval, as applicable, to avoid the spread of invasive species and replant with native vegetation only; and
 - Landscaping and restoration work will be completed with appropriate native species, per a Landscape Restoration Plan or other appropriate plan, and in compliance with an invasive species control plan to prevent the introduction of invasive plant species, which will be provided for agency review and approval, as applicable.
- In addition, during construction, Empire Wind will consider the following avoidance, minimization, and mitigation measures to mitigate impacts
 - A trenchless method may be used for installation of the export cable landfalls to avoid surficial disturbances and impacts to coastal resources including the intertidal zone, freshwater and tidal wetlands, naturally vegetated areas and wildlife resources;
 - Although not anticipated within the Project Area due to the highly developed nature of the onshore area and absence of suitable habitat, evaluation of seasonal restrictions will be conducted should sensitive species be detected prior to vegetation clearing or other construction related activities, to mitigate potential impacts to breeding individuals; and
 - Consideration of staggering silt fencing or other erosion control devices in sensitive areas to facilitate the passage of biota, if deemed effective. The strategy will be implemented on a site specific basis and finalized during the permitting process. As the Project design is still preliminary, detailed mitigation strategies will be developed as part of the final design and conform to the requirements of state and federal permitting respective to wetlands and waterbody resources.

- During operations, Empire Wind will commit to the following avoidance, minimization, and mitigation measures to mitigate impacts:
 - Protective measures will be installed around Project-components to restrict access to wetlands, naturally vegetated areas, and wildlife resources during operation and maintenance activities;
 - Revegetation monitoring will be conducted consistent with a Landscaping Restoration Plan and Invasive Species Control Plan, which will be provided for agency review and approval,
 - Mitigation monitoring, as required and defined during the regulatory process for any areas identified as mitigation sites because of long-term unavoidable impacts to freshwater and tidal wetlands, naturally vegetated areas, and wildlife resources; and •
 - The implementation of lighting reduction measures such as downward projecting lights, lights triggered by motion sensors, and limiting artificial light to the extent practicable, where safe.
- Avoidance, minimization, and mitigation measures proposed to be implemented during conceptual decommissioning are expected to be similar to those experienced during construction and operations. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

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.

- Empire Wind will support collaborative research on potential mitigation strategies and best management practices, with other developers, agencies, and stakeholders.
- Additionally:
 - Empire Wind will continue to monitor new and novel approaches to mitigation in the offshore wind industry both in the US and from existing offshore wind farms owned by Empire Wind's affiliates and developments elsewhere in the world, including the forums and networks in which Empire Wind's affiliates participate.

8.2 Process for updating the EMP

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

- Updates to the EMP are intended to reflect the results of iterative exchanges with members of the E-TWG, F-TWG, and relevant stakeholders.
- Additionally:
 - Empire Wind will continuously evaluate and evolve this EMP so that all the components of the EMP are complete and sufficient.
 - Empire 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.
 - Currently Empire Wind is working with the E-TWG to establish a process for updating the Empire Wind EMP, where formal updates will likely occur after major Project milestones (e.g., a Project Notice of Intent).

9 Project Decommissioning

9.1 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).

- Empire Wind's waste handling processes during decommissioning will focus on re-use or recycling, with disposal as the last option.
- Empire Wind will collaborate with regulatory authorities and key environmental stakeholder groups better understand the effects and potential impacts associated with decommissioning.
- Additionally:
 - Empire Wind does not expect impacts from decommissioning to exceed impacts resulting from the maximum design scenarios associated with construction.
 - As monitoring during operations provides a better understanding of the spatial and temporal presence of marine mammals, sea turtles, birds, bats, and fish habitats within the Lease Area, mitigation measures can be more tailored and effective at further reducing the likelihood and level of impacts.
 - Empire Wind will collaborate on further research into the effects and potential impacts associated with decommissioning, including coordination with the E-TWG and F-TWG, using the experiences in Europe to help inform that process as well as experiences from decommissioning of oil and gas installations and other offshore wind developments on the eastern seaboard of the United States.
 - Empire Wind will continue to investigate potential evolving technologies and processes for implementing the mitigation hierarchy related to waste, through incorporation of circularity principles and life cycle assessment work that is being conducted within the broader organization and externally.

9.2 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

- Empire Wind will decommission the Project in accordance with all necessary laws and regulations and generate a detailed Project-specific decommissioning plan.
- Empire Wind will seek input on the detailed Project-specific decommissioning plan from regulatory agencies, fisheries and marine stakeholders, and local communities.
- Empire Wind will use "lessons learned" from the construction and operations activities and apply them when appropriate to the decommissioning plan.
- Additionally:

- Empire Wind will continuously evaluate and improve this EMP so that all the components of the EMP are complete and sufficient, including the decommissioning plan.
- Empire Wind expects that additional guidance and information will become available throughout the planning and regulatory process and will continue to consider its relevance to the EMP at the appropriate intervals.