

Appendix A: Environmental & Fisheries Protection and Mitigation Measures – Studies and Data Collected

Atlantic Shores Project 1
June 30, 2023

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1 Introduction

Atlantic Shores has prepared an appendix to accompany its report to the New Jersey Board of Public Utilities (BPU) regarding the environmental and fisheries protection and mitigation measures it has enacted in the previous year. Atlantic Shores is playing an important part in expanding the scientific data and knowledge of the New Jersey coast and offshore environment where it intends to develop Atlantic Shores Offshore Wind Project 1. In its proposal to the BPU and in its Construction and Operations Plan (COP) Atlantic Shores has committed to minimizing or avoiding impacting the environment and fisheries located within the Bureau of Ocean Energy Management (BOEM) Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS)-A 0499 (Lease Area). To minimize or avoid environmental impacts Atlantic Shores has engaged with residents and public officials, environmental non-governmental organizations [eNGOs], commercial and recreational boaters, and Federal, Tribal, State, and local governmental agencies to understand what needs to be studied and the best management practices (BMPs) that should be employed. Starting in 2020, Atlantic Shores has partnered with organizations to study various aspects of the environment and areas of concern. These studies include tracking migration patterns of red knots, surveys of bat populations within the Lease Area, ongoing surfclam studies, geophysical and geotechnical surveys of essential fish habitats (EFH), and the deployment of buoys to collect real-time meteorological and oceanographic data. This appendix describes these ongoing and completed studies and where the data from these studies can be found.

2 Boat-based radar monitoring for bats

Description: Atlantic Shores conducted opportunistic pre-construction boat based acoustic bat surveys throughout the Lease Area on survey vessels in 2020 and 2021. The survey plan was developed in consultation with the Bureau of Ocean Energy Management (BOEM), U.S. Fish and Wildlife Service (USFWS), and New Jersey Department of Environmental Protection (NJDEP). Normandeau Associates, Inc. managed the surveys in 2020, and the Biodiversity Research Institute (BRI) managed the surveys in 2021. BRI analyzed the calls recorded in both years.

Type of Data Collected: A single SM4Bat acoustic detector was deployed to record bat echolocation calls in full spectrum to identify bat species in the Lease Area. The detector was deployed for 65 nights in 2020 from 16 August–18 November; the detector was deployed for 115 nights in 2021, from 30 June–01 November.

Conclusions: Data from both years showed that the eastern red bat, silver-haired bat, hoary bat, big brown bat, and *Myotis* species were detected. No federally listed northern long-eared bats or Indiana bats were detected. Bats were detected throughout the Lease Area with no clear spatial trends. Bats were detected from July to October, with spikes of detections in late August and early September. The last detection of the year was on November 1st in 2020, and October 24th in 2021. Wind and temperature were found to influence bat activity. The mean wind speed at which bats were detected was 10.3 mph (4.6 m/s), ranging from 1–30 mph (0.5–12.5 m/s), but varied by species. The mean temperature at which bats were detected was 74.6° F (23.7° C), ranging from 58.3–83.6° F (14.6–28.7° C); however, the temperature readings may have been influenced by heat generated by the survey vessel itself.

Link to Publicly Accessible Data: [Appendix II-F4: Bat Monitoring Report](#)

3 Offshore Buoy-based Monitoring of Tagged Birds and Bats

Description: Atlantic Shores is working with USFWS to experimentally deploy antenna on buoys in the Lease Area for the Motus Wildlife Tracking System (MWTs). Atlantic Shores has worked with Pam Loring of the USFWS to deploy MOTUS receivers on two buoys in the Lease area. These receivers are designed to detect signals from tagged birds and bats that travel near the receivers in order to better understand what species might be present in our lease area. Only birds and bats which have been tagged and travel within the detection range of the receivers are recorded. Buoys MBA1_WS201 (ID# 8502) and MBA4_WS200 (ID# 8505) were deployed on 10/7/2021 and 9/30/2021 respectively and are both currently active. To date, no tagged species have been picked up by these two MOTUS receivers. Atlantic Shores will continue to monitor any data collected by these two MOTUS receivers. The data collected is available in the below link. The link shows all active receiver deployments as part of the Atlantic Offshore Wind Pilot program. The first three receiver deployments are in cooperation with other developers. Buoys MBA1_WS201 (ID# 8502) and MBA4_WS200 (ID# 8505) are solely owned by Atlantic Shores.

Type of Data Collected: The collected data includes the tag ID, the species of bird, the date and time of the detection. Location data is based on the deployed location of the antenna.

Link to Publicly Accessible Data: [Active receiver deployments - Atlantic Offshore Wind Pilot \(#390\) - Motus](#) (MBA1, MBA4).

4 Revised Essential Fish Habitat (EFH) Assessment Atlantic Shores Offshore Wind

Description: A Preliminary EFH report was submitted as Appendix II-J of the Atlantic Shores Offshore Wind COP in March of 2021. Since the submittal of the Atlantic Shores COP, the following changes, updates, and recommendations have been made:

- Identification of two offshore wind energy generation projects within the southern portion of Lease Area OCS-A-0499 (Project 1 and Project 2);
- Minor adjustments to the Atlantic Landfall and to a portion of the Atlantic Export Cable Corridor (ECC) and Monmouth ECC;
- Completion of benthic habitat mapping;
- Updated EFH mapping from NOAA Fisheries as of March 2021; and
- Comments from the BOEM requesting additional information.

Type of Data Collected: Atlantic Shores conducted high resolution geophysical (HRG) and geotechnical surveys from 2019 to 2021 in the Offshore Project Area. Studies also included benthic grab samples, sediment profile imaging (SPI).

Conclusions: The maximum total seabed disturbance in the WTA (temporary and permanent) is 5.61 square miles (14.5 square kilometers) which represents approximately 3.5% of the 160 square miles (413 square kilometers) WTA area. The maximum total seabed disturbance in the ECCs (temporary and permanent), excluding the portion of the ECCs located in the WTA, is 3.47 square miles (8.99 square kilometers), which represents approximately 7.2% of the total ECC area.

Link to Publicly Accessible Data: Atlantic Shores' Preliminary Essential Fish Habitat Assessment can be found here: <https://www.boem.gov/renewable-energy/state-activities/appendix-ii-j-preliminary-efh-assesment>. A revised Essential Fish Habitat Assessment will be released alongside BOEM's DEIS which is set to be released in December 2022.

5 Tracking Movements of Red Knots in the U.S. Atlantic Using Satellite Telemetry, 2020–2021

Description: Atlantic Shores developed a project to track the migratory movements of red knots (*Calidris canutus rufa*) during their southward migration through the US, and the northward migration from Brazil. During this migration red knots are known to have stopover locations along the New Jersey coast. Atlantic Shores collaborated with Wildlife Restoration Partnerships (WRP), the USFWS, Biodiversity Research Institute (BRI), Normandeau Associates, and NJ Audubon to develop research objectives, tag the red knots, and develop a report. With the use of new GPS Argos satellite tracking technology, building on previous tracking studies, this project documented red knot movements, including departure timing, migratory pathways, and flight altitudes during migration. This information is important to refine risk assessments to red knots from exposure to offshore Wind Energy Areas (WEAs) and will inform of collision risk posed by offshore wind turbines

Type of Data Collected: Red knots were captured at known stopover locations along the Atlantic coast of New Jersey in July of 2020 and 2021 using cannon nets, following protocols detailed in the British Trust for Ornithology Cannon Netting Manual. All work was conducted under specific United States Geological Survey (USGS) Bird Banding Lab permits with authorization to capture and affix satellite tags on red knots (permit available upon request). Morphometric and movement data was collected from all tagged individuals. Movement data was analyzed using ArcGIS (v.10) and R (v.3.6.1) to meet the following outcomes: 1) map movement patterns and altitudes of migratory flights of red knots in U.S. Atlantic Region; 2) summarize meteorological conditions (wind speed, wind direction, visibility, and precipitation) and timing (time of day, day of year) of offshore flights in the Atlantic OCS; 3) estimate exposure of red knots to all offshore wind lease areas in the U.S. Atlantic OCS.

Conclusions: The data collected indicates that tracking can garner extremely useful information on avian species of conservation concern and provides a solid foundation on which to build further research. A final complete report with further analysis, discussions and recommendations were submitted in the Fall of 2022.

Link to Publicly Accessible Data: [Appendix II-F3: Red Knot Satellite Tagging Study Memorandum](#)

6 Surf clam Study with Rutgers University

Description: Atlantic Shores is conducting a study with Rutgers University to assess the interactive effects of wind farms and future ocean conditions on the surf clam industry. This study will support a better understanding of how the effects of climate change are influencing the distribution and abundance of surf clams within the Lease Area and the greater Mid-Atlantic Bight. Atlantic Shores is funding a multi-phase modeling study that will evaluate the economics of the Atlantic surf clam fishery in response to current and future wind farm activity over the approximate 30-year Projects' life span.

Link to Publicly Accessible Date: Rutgers released a short memo in March 2023 detailing initial surfclam study results and the full study results and report anticipated in late Summer 2023.

The short memo is attached to the submission of this report.

7 Ocean and Air Monitoring Studies

Description: Atlantic Shores has partnered with Rutgers University to deploy two ocean buoys near the Lease Area, that are gathering meteorological ocean and air observations. Data collected will contribute to the ongoing research, monitoring, modeling, and analysis efforts of U.S. governmental and academic institutions in the Mid-Atlantic region, and advance knowledge of the Mid-Atlantic Cold Pool (MACP), an important oceanographic feature off the coast of New Jersey. The MACP is an important oceanographic feature off the coast of New Jersey characterized by cold temperatures at the sea floor with warmer temperatures at the sea surface. The scientific, environmental, and fishing significance of the MACP requires information at the atmosphere-ocean boundary and at the ocean floor, which is being collected by the buoys deployed by Atlantic Shores. The buoys are equipped with extra sensors that will collect data so that Rutgers University can study the MACP and monitor the climatological and oceanographic trends associated with climate change and their impacts on marine habitats.

Though the planned operational period for these buoys expired in 2023, Atlantic Shores recognized the value of ongoing data collection to our stakeholders and the scientific community. As such, the decision was made to redeploy one of the buoys to continue to collect real time measurements and provide a platform for tagged species monitoring via MOTUS and Vemco receivers.

Type of Data Collected: The data collected at each buoy includes:

- wind speed and direction
- air temperature
- water temperature
- wave height and direction
- humidity
- air pressure

Link to Publicly Accessible Data: Atlantic Shores has two buoys, Atlantic Shores-1 and Atlantic Shores-4, currently deployed and the data collected can be found on our website: [Mariners Information | Atlantic Shores Offshore Wind \(atlanticshoreswind.com\)](https://www.atlanticshoreswind.com/mariners-information). Detailed historical datasets can be found here: [Atlantic Shores Offshore Wind, ASOW-1. ASOW-4.](#)

8 New Jersey Artificial Reef Deployment

Atlantic Shores continues to work with Stockton University regarding artificial reef deployment or restoration along the New Jersey coast. One of the goals of the deployment is to continue to support recreational fisheries and recreationalists. It is also currently being assessed as a potential net positive impact (NPI) opportunity for Atlantic Shores.

Reef deployment would be tracked and followed up with further study to analyze impacts. The Artificial Reef Project is progressing with ambition for material deployment in early 2024.

Appendix B: Identification & Implementation of Best Management Practices (BMPs)

Atlantic Shores Project 1

April 11, 2022

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Appendix B: Best Management Practices

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1 Introduction

In response to the New Jersey Board of Public Utilities' (NJBPU) second offshore wind solicitation, Atlantic Shores Offshore Wind, LLC (Atlantic Shores) developed a proposal for a 1,509.6MW Project ("Project C" in the proposal) which was granted an Offshore Renewable Energy Credit (OREC) by the NJBPU on June 30, 2021. The proposal included an Environmental Protection Plan and Fisheries Protection Plan, each of which included Best Management Practices (BMPs). Since our Project award, Atlantic Shores continues to make substantial progress towards implementing the BMPs presented in our proposal. This appendix provides an overview of the status of these BMPs and Atlantic Shores' approach to identifying and incorporating additional emerging BMPs.

2 Best Management Practices

Atlantic Shores recognizes that there are potential Project-related effects on the biological resources found in the Lease Area. To minimize or avoid these effects, Atlantic Shores has identified BMPs to be implemented throughout the Project lifecycle, from design and construction to operation and eventual decommissioning. These BMPs were compiled through extensive research and consultation with various industry groups, research and monitoring organizations, government agencies, and other relevant groups. Atlantic Shores also reviewed recent approval conditions for other relevant projects and activities. In addition, Atlantic Shores continues to refine and augment the BMPs through consistent involvement in the larger offshore wind community, such as the Responsible Offshore Science Alliance (ROSA), and the Regional Wildlife Science Collaborative for Offshore Wind (RWSC).

Atlantic Shores has engaged New Jersey stakeholders extensively (including hundreds of meetings with residents and public officials, environmental non-governmental organizations [eNGOs], commercial and recreational boaters, and Federal, Tribal, State, and local governmental agencies) to understand and address their concerns, as well as to discuss opportunities for collaboration. Based on these discussions, Atlantic Shores adopted a range of BMPs such as optimized Project layout, lighting controls and navigational aid technologies.

Atlantic Shores regularly shares non-commercial information and site and environmental data with Project stakeholders through public presentations, targeted meetings, our website, or upon request. Atlantic Shores has also leveraged relationships with governmental and non-governmental data services/information portals to share Project information and to collaboratively build data infrastructure management systems to accommodate the large datasets collected during various Project phases. Such relationships include:

- NOAA (National Oceanic and Atmospheric Administration)-affiliated Resource Centers (e.g., Center for Environmental Information, Northeast and Mid-Atlantic Fisheries Management Councils, Northeast Cooperative Science Center)
- National Marine Fish Service (NMFS)
- Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS)
- Responsible Offshore Development Alliance (RODA)
- Responsible Offshore Science Alliance (ROSA)
- BOEM and NOAA scientists who helped design and build a data-sharing platform specific for offshore wind decision-making

2.1 Identification and Adoption of Emerging BMPs

To ensure our planned BMPs remain current and comprehensive, Atlantic Shores maintains ongoing engagement with industry groups, research and monitoring organizations, government agencies, and other relevant groups where emerging BMPs can be identified and shared.

Specifically, since June 30, 2022, Atlantic Shores has:

- Continued collaborating with Rutgers University and Stockton University. Some highlights include:
 - The continued development of a research study with Rutgers University titled, “Future Ocean, Surf clam Fishing, and Windfarm Development” to assess the interactive effects of wind farms and future ocean conditions on the surf clam industry. Short memo on initial results published March 2023.
 - Atlantic Shores continues to support research by Stockton University on the ecological succession of submerged structures, which will inform how well offshore wind submerged infrastructure benefits the local ecosystem. This includes progressing an artificial reef deployment project to begin in 2024.
- Continued and expanded engagement in local and regional offshore wind community. Highlights include:
 - Ongoing collaboration with NJDEP and other New Jersey offshore wind developers on New Jersey’s Research and Monitoring Initiative (RMI). This includes quarterly updates to Atlantic Shores.
 - Participation in the Regional Wildlife Science Collaborative for Offshore Wind (RWSC). RWSC’s goal is to work across federal, state, non-governmental organizations, and developers to scientific research priorities on regional and ecosystem-wide scales, establishing and maintaining data and standards to support science priorities and monitoring at the project.
 - Information of RWSC’s actions can be found here: <https://neoceanplanning.org/rwse/>.
- Continued to proactively engage with Federal and State agencies to present project details and updates, collaboratively identify resource issues of concern, design scientifically rigorous studies that meet all regulatory review requirements and identify appropriate mitigation strategies.
 - Atlantic Shores meets regularly with key agencies, such as the Bureau of Ocean Energy Management (BOEM), the US Coast Guard, the Environmental Protection Agency (EPA), the US Army Core of Engineers (USACE) and New Jersey Department of Environmental Protection (DEP), and have collaborated on research activities with other agencies, such as the US Fish and Wildlife Service).
 - These engagements and collaborations provide opportunities for the identification of emerging BMPs to further minimize and avoid impacts to important resources.
- Continued to review recent approval conditions for other relevant projects and activities. Atlantic Shores reviews these documents to understand emerging industry practices and how regulators are addressing these large infrastructure projects These documents include:
 - Ocean Wind 1 Final Environmental Impact Statement (FEIS), the Ocean Wind 1 New Jersey Department of Environmental Protection (DEP) state permit approval, Ocean Wind 1’s Coastal Zone Consistency determination,
 - South Coast Wind’s Draft Environmental Impact statement (DEIS), and
 - Revolution Wind’s draft Outer Continental Shelf (OCS) air permit.
- Also, Atlantic Shores continues to follow the construction of the Vineyard Wind 1 project and the South Fork Wind projects in the New England wind energy area.

2.2 Environmental Protection BMPs

Atlantic Shores has identified comprehensive BMPs to avoid, minimize, and mitigate our Project's effects to the environment. The BMPs are presented by relevant resource. A BMP may appear in multiple sections as it may apply to more than one resource.

2.3 Avian and Bat

Atlantic Shores is committed to following BMPs to support the mitigation of potential effects to avian and bat populations. These measures are consistent with guidance from the USFWS, BOEM, Federal Aviation Administration (FAA), and the USCG.¹ Atlantic Shores has already taken precautionary steps and commitments to avoid, mitigate and monitor the Project’s effects on New Jersey’s avian and bat populations during construction, operation, and decommissioning. Additional avoidance and mitigation measures and tools will be evaluated further as the Project progresses through development and permitting and in coordination with Federal and State jurisdictional agencies and other stakeholders (i.e., eNGOs).

Atlantic Shores is implementing its Avian Survey Plan which covers pre-and post-construction analyses on impacts to birds (and bats) and incorporates post-construction monitoring following BOEM and USFWS-approved survey guidelines. Atlantic Shores specifically designed its avian surveys to facilitate a before-after-control-impact (BACI) analysis based on post-construction monitoring. The post-construction monitoring plan will be developed in cooperation with BOEM, NJDEP, and USFWS and will build on lessons learned in the pre-construction surveys. Table 1 presents key best management practices Atlantic Shores has committed to relating to birds and bats.

Table 1: Bird and Bat BMPs

ID	Best Management Practice	Status
BB-01	Ongoing consultation and research partnership with NJDEP and USFWS.	Ongoing discussions with NJDEP on use of funds dedicated to research initiatives and the regional monitoring of wildlife and fisheries related to the introduction of offshore wind projects as required by the Board Order.
BB-02	Monitoring birds through digital aerial surveys	Digital aerial surveys were completed October 2020 - May 2021. Further details on these surveys are included in the COP Appendix II-F2 Avian Appendix.
BB-03	Satellite telemetry study of red knot	Red knot satellite telemetry studies (fieldwork) completed in 2020 and 2021. Report is in progress and expected to be available in mid-2022 and mid-2023.
BB-04	Lighting controls to minimize bird attraction, including: <ul style="list-style-type: none"> • Lowest effective flash rate will be used on obstruction lighting, with synchronized flashing lights to the extent practicable. • Use of red lighting over white lighting when allowed by Federal regulations. • Use of low-intensity strobe lights by preference over high intensity steady lights. 	Planned for inclusion in WTG design.

¹ USFWS, 2012. US Fish and Wildlife Service Land-Based Wind Energy Guidelines [online]. Available from: https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf. Orr, T., S. Herz, and D. Oakley. 2013. Evaluation of Lighting Schemes for Offshore Wind Facilities and Impacts to Local Environments. US Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA. OCS Study BOEM 2013-0116. [429] pp. BOEM. 2016. Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP). Available online at: <https://www.boem.gov/COP-Guidelines/>. Patterson, J.W. 2012. Evaluation of New Obstruction Lighting Techniques to Reduce Avian Fatalities. US Department of Transportation – Federal Aviation Administration. <http://www.tc.faa.gov/its/worldpac/techrpt/tctn12-9.pdf>.

ID	Best Management Practice	Status
	<ul style="list-style-type: none"> To the extent practical, the Project will use shielding and/or downward angling of construction and maintenance lights and will minimize the amount of lighting needed during construction and maintenance. Use of Aircraft Detection Lighting System if authorized by the FAA 	
BB-05	Construction activities onshore will occur outside of known breeding and migration periods for birds and bats.	Planned during project construction.
BB-06	To decrease exposure of birds and bats to possible oil spills Atlantic Shores will follow Federal and State measures for handling toxic substances to minimize danger to water and wildlife resources from spills. Facility operators will maintain Hazardous Materials Spill Kits on site and train personnel in the use of these.	Planned during project construction.
BB-07	Offshore structures will be designed to minimize areas for perching and roosting (e.g., rounded rails and anti-perching devices where feasible).	Planned for inclusion in WTG design.
BB-08	Atlantic Shores will avoid tree clearing as much as practicable, as trees provide migratory stopover and breeding habitat for birds and bats. If clearing of trees is unavoidable, Atlantic Shores will conduct these activities outside of known breeding and migration periods.	Planned during project construction.
BB-09	Atlantic Shores will implement installation techniques such as underground horizontal directional drilling (HDD) to avoid disturbance to sensitive avian habitats, such as coastal shorelines, forests, and wetlands.	Planned during project construction.
BB-10	Sensitive foraging and roosting habitat such as, coastal wetlands and waterbodies, dune and coastal barrier beach locations, active shellfish beds, and other sensitive features, have been delineated and avoided.	Habitats have been identified and delineated and avoidance is included in project design.
BB-11	Atlantic Shores will maximize use of previously disturbed habitats (e.g., existing roads and rights-of-way) to site onshore infrastructure.	Ongoing onshore routing work prioritizes use of previously disturbed habitats when practicable and will continue to do so as the project progresses through design and construction. Atlantic Shores has instructed its subcontractors to be aware of this BMP as the final export cable route is developed in advance of state permit submittal.
BB-12	The siting of onshore facilities including the onshore transmission system will avoid protected areas (e.g., parks, wildlife refuges, critical habitat, important bird areas) to the greatest extent practicable.	Ongoing onshore facilities avoids protected areas to the greatest extent practicable and will continue to do so as project progresses through design and construction.

2.4 Marine Mammals and Sea Turtles

Atlantic Shores is committed to avoiding and minimizing project-related impacts to marine mammals and sea turtles during all phases of the Project. Atlantic Shores is developing a Marine Mammal and Sea Turtle Monitoring Plan in conjunction with Federal, State and eNGO stakeholders that will allow us to track the presence of marine mammal and sea turtle species in our Lease Area over the lifespan of our Project. In addition, Atlantic Shores will continue implementing a comprehensive program of BMPs to minimize and avoid Project impacts, while exploring new, innovative minimization/avoidance approaches.

Atlantic Shores has been conducting marine operations offshore since 2019, and over this time Atlantic Shores has developed, in cooperation with both NOAA and BOEM, marine mammal and sea turtle mitigation and monitoring procedures that employ a combination of proven BMPs and evaluation of innovative technologies such as passive acoustic monitoring, night vision devices, and infrared viewing technologies. As Atlantic Shores advances our Project towards the construction and operations phases, Atlantic Shores will continue implementing these proven strategies. Atlantic Shores has also partnered with leading researchers, such as JASCO Applied Sciences (marine acoustics), LGL (marine acoustics), RPS (protected species specialists), and APEM (aerial digital observations), jurisdictional agencies and eNGOs to evaluate additional innovative technologies and methods to improve the monitoring of the marine wildlife within our Project Area and to further inform regional efforts to understand cumulative impacts to these species. Table 2 presents BMPs Atlantic Shores has committed to relating to marine mammals and sea turtles.

Atlantic Shores is currently investigating other innovative technologies to further minimize impacts to marine mammal and sea turtles including:

- Near Real-Time Monitoring - Various acoustic technologies (e.g., passive underwater acoustic monitors, cable hydrophones) provide advantages for real-time monitoring of marine mammal vocalizations indicating species presence in an area.
- Sound Attenuation Devices – Various technologies are commercially available for application during project construction, particularly foundation installation by pile driving. Devices like bubble curtains, sleeves and hydro-dampeners reduce the generation and propagation of sound from the source. Alternative pile driving installation methods like vibratory piling and blue piling allow for pile installation without impact driving and the high intensity sounds it creates.
- Autonomous Underwater Vehicles (AUV) – AUV technologies allow for remotely controlled data collection of the underwater environment without divers or intrusive methods to detect marine life and changing environmental conditions during certain project activities (e.g., construction).
- Unmanned Aerial Systems (UAV) – This effort will build on earlier trials conducted by RPS, AUV Flight Services and Advanced Aircraft Company, for which Federal regulatory agency approval was obtained. Atlantic Shores will conduct a field trial during an offshore wind survey using drone technology to monitor for protected species. The UAV would be mounted with a high definition stabilized infrared camera system specifically designed for small, unmanned vehicles. A trial would be configured whereby a protected species observer (PSO) team monitors high-definition drone camera footage in real time on shore, while a PSO team simultaneously monitor visually from a selected platform.

Table 2: Marine Mammal and Sea Turtle BMPs

ID	Best Management Practice	Status
MMST-01	Conducting state-of-the-art underwater acoustic modeling and marine animal behavior exposure modeling.	Hydroacoustic modeling has been performed and is presented in COP Appendix II-L Hydroacoustic Modeling Report. Modeling and analysis will be updated as appropriate throughout project cycle.
MMST-02	Conducting aerial digital surveys to document wildlife usage of the Project Area.	Digital aerial surveys were completed October 2020 - May 2021.
MMST-03	Implementing BOEM and NOAA-approved mitigation measures during pre-construction surveys to avoid vessel strikes and noise impacts.	Ongoing survey activities are implementing these mitigation measures in accordance with Atlantic Shores' current IHA issued by NMFS.
MMST-04	Implementing a suite of wildlife monitoring and construction mitigation measures to limit exposures of marine wildlife.	Planned during project construction.
MMST-05	Environmental stewardship and compliance across project activities, personnel, vessels, and equipment to avoid accidental and incidental waste discharges.	Planned during project construction, operation, and decommissioning.
MMST-06	Developing and implementing a Marine Mammal and Sea Turtle Monitoring Plan.	Atlantic Shores is developing a Marine Mammal and Sea Turtle Monitoring Plan with planned completion prior to construction.
MMST-07	Daytime and nighttime visual monitoring by NOAA Fisheries-approved PSOs to both greatly decrease the risk of accidental vessel strikes and alert the active marine survey and/or construction team to the presence of protected species.	Planned during project construction in accordance with NOAA requirements.
MMST-08	Establishment and monitoring of marine mammal and sea turtle protection zones to create sufficient opportunity to modify or halt project activities potentially harmful to protected species (e.g., pile driving, operation of various marine survey equipment).	Planned during project construction in accordance with NOAA requirements.
MMST-09	Vessel Strike avoidance procedures to reduce the potential risk of Project-related vessel collisions with protected marine life.	Planned during project construction in accordance with NOAA requirements.
MMST-10	Adhere to applicable NOAA-established Seasonal Management Area and Dynamic Management Area speed restrictions, which are currently 10 knots or less for vessels 65 feet or greater during time periods with high densities of species of concern.	Planned during project construction in accordance with NOAA requirements.
MMST-11	Boat-based and/or aerial observations will be implemented for large Exclusions Zones and Monitoring Zones.	Planned during project construction in accordance with NOAA requirements.
MMST-12	During nighttime activities and/or periods of inclement weather use of night vision devices such as night vision binoculars and/or infrared cameras will be implemented.	Ongoing survey activities are implementing these mitigation measures in accordance with Atlantic Shores' current Incidental Harassment Authorization (IHA) issued by National Marine Fisheries Service.

ID	Best Management Practice	Status
		These measures are also planned during project construction in accordance with NOAA requirements.
MMST-13	Soft starts shall be considered for activities such as impact pile driving. Standard soft-start procedures are a “ramp-up” procedure whereby the sound source level is increased gradually before full use of power.	Planned during project construction in accordance with NOAA requirements.

2.5 Seabed Conditions

Atlantic Shores is taking active measures to site Project facilities and to select techniques and tools that avoid or minimize the disturbance of the seabed. As the Project progresses through development and permitting, Atlantic Shores will continue assessing additional measures to eliminate and monitor potential seafloor effects in coordination with Federal and State jurisdictional agencies and other stakeholders. Table 3 includes BMPs Atlantic Shores has committed to relating to seabed conditions.

Table 3: Seabed Conditions BMPs

ID	Best Management Practice	Status
SC-01	Implementation of a comprehensive benthic habitat survey in consultation with BOEM and NOAA including seafloor sampling, imaging, and mapping.	Atlantic Shores has performed comprehensive mapping of benthic habitat within the project area. The results of these surveys are presented in Appendix II-G Benthic Reports and II-H Benthic Monitoring Plan in the COP.
SC-02	Modeling of sediment transport from cable installation.	Modelling has been completed and results can be found in COP Appendix II-J3 Sediment Dispersion Modelling Report.
SC-03	Achieving target burial of subsea cables through proper siting and installation methods.	Planned during project construction. A Cable Burial Risk Assessment has been conducted and included in the COP as Appendix II-A5a, A5b, and A5c.
SC-04	State-of-the-art modeling of EMF from operating cables.	This modeling has been completed and can be found in Appendix II-I EMF in the COP.
SC-05	Atlantic Shores will install scour protection, as necessary, around foundations.	Planned during project construction.
SC-06	Using anchor midline buoys on construction vessels to minimize disturbance to the seafloor and sediments.	Planned during project construction.
SC-07	Application of horizontal direction drilling (HDD) to avoid sensitive intertidal and wetlands during cable installation, if necessary.	Planned during project construction.
SC-08	Using dynamic positioning vessels and jet plow embedment to minimize sediment disturbance and alteration during cable-laying process.	Planned during project construction.
SC-09	Atlantic Shores will site Project infrastructure and conduct project activities in a manner that avoids disturbance to important habitats, such as seagrasses,	Planned as part of the project design.

ID	Best Management Practice	Status
	clam beds, reefs, and other biogenic communities, to the maximum extent possible.	
SC-10	Monitoring the pre-construction and post-construction conditions of the seabed to understand the seabed’s changing conditions in the Project Area and allow for future opportunities to apply mitigation measures.	Discussed in Appendix II-H Benthic Monitoring Plan in the COP.
SC-11	Atlantic Shores will conduct work with Federal and State jurisdictional agencies and other stakeholders to design post-construction environmental survey(s), as necessary, to monitor impacts of the Project and the effectiveness of any required seabed/habitat restoration/recovery activities.	Ongoing.

2.6 Water Resources

Project-related impacts to water quality, both onshore and offshore, will be avoided and minimized through siting of Project infrastructure, specialized construction techniques, and design considerations. Table 4 contains key best management practices Atlantic Shores has committed to relating to water resources.

Table 4: Water Resources BMPs

ID	Best Management Practice	Status
WR-01	Using anchor midline buoys on construction vessels to minimize disturbance to the seafloor and sediments.	Planned during project construction.
WR-02	Using dynamic positioning vessels and jet plow embedment to minimize sediment disturbance and alteration during cable-laying process.	Planned during project construction.
WR-03	Operations and maintenance of the Project will also be managed by a comprehensive Oil Spill Response Plan (OSRP).	A draft OSRP has been submitted to BOEM as Appendix I-D of the COP. Atlantic Shores is currently compiling a final OSRP.
WR-04	Application of HDD to avoid sensitive intertidal and wetlands during cable installation, if necessary.	Planned during project construction.
WR-05	Project specific soil erosion and sedimentation control plan (ES&CP) and stormwater pollution prevention plan.	Planned during project construction in accordance with state/local permits.
WR-06	Atlantic Shores will use HDD to avoid sensitive intertidal habitats at cable landfall locations. All HDD activities will be managed by a comprehensive frac-out plan to ensure the protection of marine and inland waters from an accidental release of drilling mud. Drilling mud will consist of non-hazardous material such as bentonite and all drilling mud will be collected and recycled.	Planned during project construction.

ID	Best Management Practice	Status
WR-07	Atlantic Shores will site Project infrastructure and conduct Project activities primarily in sediments that are favorable for such activities.	Planned as part of project design and construction.
WR-08	Onshore construction techniques will be selected to minimize soil erosion and the discharge of sediments into inland waters.	Planned as part of project design and construction.
WR-09	Upland construction will be conducted in accordance with a soil erosion and sedimentation control plan and stormwater pollution prevention plan.	Planned as part of project design and construction.

2.7 Terrestrial Wildlife

Atlantic Shores has committed to taking measures to mitigate potential Project-related impacts to terrestrial wildlife and their habitats. As the Project progresses through development and permitting, Atlantic Shores will continue its discussions with the USFWS and NJDEP to determine the need for any additional appropriate avoidance/mitigation measures for these areas. Table 5 contains key best management practices Atlantic Shores has committed to relating to terrestrial wildlife.

Table 5: Terrestrial Wildlife BMPs

ID	Best Management Practice	Status
WR-01	Siting onshore project facilities in previously disturbed areas along existing rights-of-way from wetlands and waterbodies to the greatest extent possible.	Planned as part of project design and construction.
WR-02	Installation of the Project’s electrical transmission underground and using alternative construction methods like HDD, when possible, to avoid direct impacts to wetlands and waterbodies.	Planned as part of project design and construction.
WR-03	Construction activities compliance with a Certified Erosion and Sediment Control Plan from the appropriate County Soil Conservation District and New Jersey DLUR-approved Stormwater Management Control Plan.	Planned during project construction in accordance with state/local permits.
WR-03	The Project will avoid removing trees 0.25 miles from any known hibernacula, or 150 feet around any known roost tree from 1 June to 31 July, to avoid most regulatory concerns regarding protected bats.	Planned during project construction.
WR-04	The Project will avoid wetlands, stream corridors and vernal pool habitats by using HDD under these environmentally sensitive habitats.	Planned during project construction.
WR-05	If it is determined through agency consultation that construction activities will occur in certain habitats during certain timeframes, then tree clearing, grading, and other noise-producing or significant ground disturbing activities may be avoided during certain	Planned during project construction.

ID	Best Management Practice	Status
	times of year to minimize disruption to the life stages or life cycles of various species.	

2.8 Fisheries Protection BMPs

Atlantic Shores has taken steps to develop a detailed understanding of the fisheries resources in the Project Area in order to properly assess the potential effects of our Project activities on New Jersey’s fisheries. Atlantic Shores has developed mitigation measures that are designed to avoid and minimize project related effects on these resources.

Atlantic Shores is taking proactive measures to site project facilities and to select techniques and tools that avoid impacts to important finfish, invertebrates, and benthic habitats. In addition to continuing our existing maritime operation programs to study important habitats, Atlantic Shores has identified key mitigation and monitoring strategies that will be implemented throughout all phases of the Projects (pre-construction, construction, operations, decommissioning). Table 6 contains key best management practices Atlantic Shores has committed to relating to marine fisheries.

Table 6: Fisheries Protection BMPs

ID	Best Management Practice	Status
MF-01	Atlantic Shores will site project infrastructure and conduct project activities to avoid or minimize disturbance to substrates (e.g., sand ridges) used by fish in various life stages (e.g., spawning, ambush cover, refugia, foraging, juveniles). Substrates to avoid include hard-bottom habitats, submerged aquatic vegetation, natural and artificial reefs and structurally diverse or complex habitats.	Ongoing as part of project design and construction.
MF-02	Atlantic Shores will use anchor midline buoys on anchored construction vessels to minimize disturbance of the seabed and benthic habitats.	Planned during project construction.
MF-03	Selecting construction techniques to avoid and minimize disturbances of the seafloor to decrease sediment suspension in the water column.	Planned during project construction.
MF-04	Atlantic Shores will use horizontal directional drilling (HDD) to avoid sensitive beach and surf zone habitats at cable landfall locations.	Planned during project construction.
MF-05	Atlantic Shores will use dynamic positioning vessels to the maximum extent possible and jet plow embedment to install the Project export and inter-array cables and minimize sediment disturbance and benthic habitat alteration during the cable-laying process.	Planned during project construction.
MF-06	Atlantic Shores will install scour protection, as necessary, around foundations.	Planned during project construction.

ID	Best Management Practice	Status
MF-07	Achieving target burial of subsea cables through proper siting and installation methods.	Planned during project construction.
MF-08	Atlantic Shores has identified and will continue to identify existing sensitive benthic habitats in the Project Area during the 2020-2021 seafloor sampling, imagery, and mapping surveys. The results of these surveys will support any required post-construction monitoring.	Ongoing. Atlantic Shores has performed comprehensive mapping of benthic habitat within the project area. The results of these surveys are presented in Appendix II-G Benthic Reports and II-H Benthic Monitoring Plan in the COP.
MF-09	Atlantic Shores will conduct environmental surveys to monitor impacts of our Projects and measure the effectiveness of any required restoration/recovery.	Planned post construction.
MF-10	Modeling of sediment transport from cable installation will guide installation methods.	Modelling has been completed and results can be found in COP Appendix II-J3 Sediment Dispersion Modelling Report.
MF-11	Soft starts will be implemented for activities such as impact pile driving. Standard soft-start procedures are a “ramp-up” procedure whereby the sound source level is increased gradually before full use of power.	Planned during project construction.
MF-12	Commercially available sound attenuation devices will be evaluated for application during project construction, particularly foundation installation by pile driving. Devices like bubble curtains, sleeves and hydro-dampeners reduce the generation and propagation of sound from the source. Alternative pile driving installation methods like vibratory piling and blue piling allow for pile installation without impact driving and the high intensity sounds it creates.	Planned during project construction. Atlantic Shores will continue to evaluate available technologies for potential use to further reduce impact.
MF-13	Monitoring the pre-construction and post-construction conditions of the seafloor to promote a deeper understanding of conditions in the Project Area and allow for future opportunities to apply mitigation measures.	Ongoing per Atlantic Shores’ Fisheries Monitoring Plan included as COP Appendix II-K.

2.9 Commercial and Recreational Fisheries

Atlantic Shores is committed to maintaining the sustainability of the fisheries in our Project Areas. Atlantic Shores has taken early, significant strides to create productive relationships with the fishing community to support our objective of responsibly delivering clean energy while doing what we can to support fishermen’s livelihoods. Leading with science is the foundation of our informed decisions and project planning. Data sharing is critical to building transparency with the fishermen and broader communities invested in healthy oceans and ecosystems. Atlantic Shores will leverage these relationships to continue to identify emerging BMPs to further minimize or avoid effects to fisheries. Table 7 contains key best management practices Atlantic Shores has committed to relating to commercial and recreational fisheries.

Table 7: Commercial and Recreational Fisheries BMPs

ID	Best Management Practice	Status
CRF-01	Siting of project infrastructure to avoid areas of concentrated fishing activity based on direct input from fishing industry representatives and current science about fishing areas and benthic habitats.	Ongoing as part of project design and construction.
CRF-02	Continuous communication and coordination with commercial fishing industry to promote open dialogue and cooperative management of issues.	Ongoing
CRF-03	Implementing Atlantic Shores Fisheries Communication Plan.	Planned during project construction and operations. The Fisheries Communication Plan is included as Appendix II-R of the COP.
CRF-04	Activating the FLO and FIR to coordinate with fishermen and respond to questions and concerns.	Ongoing
CRF-05	Regular communication with fishermen; advanced notification of fishermen and mariners of survey and construction schedules and locations, including construction vessel transits.	Ongoing
CRF-06	Regular consultations with Responsible Offshore Development Alliance (RODA), NOAA and BOEM to learn of any potential, emerging conflicts.	Ongoing
CRF-07	Atlantic Shores has specifically selected the orientation of the wind turbine rows to align with the predominant flow of vessel traffic (commercial fishing) within the Lease Area. Spacing between each wind turbine row (1 nm) and between wind turbines (0.6 nm) in a grid layout allows for multiple lines of transit.	Complete
CRF-08	Commitment to a target burial for subsea cables of at least 6 feet below the mudline to prevent interference between dredging activities and the subsea export cable.	Planned during construction. A Cable Burial Risk Assessment (CBRA) has been conducted and included in the COP as Appendix II-A5a, A5b, and A5c.
CRF-09	Focus on navigational safety as a priority issue during all project phases.	Ongoing.
CRF-10	Effective marking, lighting, and safety measures compliant with USCG and COLREGS regulations.	Planned during construction, operations, maintenance, and decommissioning.
CRF-11	Consulting with mariners and regulators on project safety zone delineation and maintenance.	Implemented in ongoing survey operations and planned during construction
CRF-12	Charting of project structures (partial and complete) for dissemination with mariners.	Implemented in ongoing survey operations and planned during construction and operations.
CRF-13	Identification and charting of safe transit routes to, around, and through the Project Area.	Atlantic Shores' proposed layout was selected to align with predominant vessel traffic. Further details can be found in the Navigational Safety Risk Assessment (NSRA) and included in the COP as Appendix II-S.

ID	Best Management Practice	Status
CRF-14	<p>Conducting a fair and accessible process for commercial fishermen to raise concerns and disputes regarding lost or damaged fishing gear due to project-related causes.</p>	<p>Atlantic Shores has implemented a Gear Loss Avoidance Program that includes a form and policy to cover gear loss or damage. The form can be found in the “For Mariners” section of our website. The program is ongoing with only 2 claims in 3 years of surveys. Refer to Appendix II-R Fisheries Communication Plan.</p>