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VINEYARD WIND

Draft Construction and Operations Plan

Volume III Text

Vineyard Wind Project

October 22, 2018

Submitted by
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700 Pleasant Street, Suite 510
New Bedford, Massachusetts 02740

Submitted to
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

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Epsilon ASSOCIATES INC.

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Public Archaeology Laboratory, Inc.
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Swanson Environmental Associates
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October 22, 2018

Section 2.0

Project Summary

2.0 PROJECT SUMMARY

Vineyard Wind, LLC (Vineyard Wind) proposes to construct, operate, and decommission an ~ 800 MW wind energy project consisting of up to 100 offshore wind turbine generators (WTGs) arranged in a grid-like pattern located in the Atlantic Ocean south of Martha's Vineyard. The Project also includes up to four electrical service platforms (ESPs), inter-array cables connecting the WTGs to the ESPs, inter-link cables between ESPs, and two offshore export cables. Each WTG will independently generate approximately 8 to 10 MW of electricity and will interconnect with the ESPs via the inter-array submarine cable system. The offshore export cable transmission system connects the ESPs to a Landfall Site in either Barnstable or Yarmouth. It is approximately 158 kilometers (98 miles) in length, assuming that two export cables are used. After the offshore export cables are brought to shore at one of two potential Landfall Sites, the physical connection between the offshore export cables and the onshore export cables will be made in an underground concrete vault(s). The onshore export cable route, located principally in established right-of-ways, will connect the underground vault at the Landfall Site to a new onshore substation located within the Independence Park commercial/industrial area in Barnstable. The Project will then connect to the New England transmission system at Eversource's Barnstable Switching Station or the West Barnstable Switching Station.

The Lease Area is within the Massachusetts Wind Energy Area identified by BOEM, following a public process and environmental review, as suitable for wind energy development. The proposed ~800 MW Project is located within the northern portion of the Lease Area, referred to as the Wind Development Area (WDA). The WDA is 306 km^2 (75,614 acres). At its nearest point, the Lease Area is just over 23 kilometers (14 miles) from the southeast corner of Martha's Vineyard and a similar distance to Nantucket (Figure 2.1-1 of Volume I).

The Project has significant environmental benefits. The electricity generated by the WTGs, which do not emit air pollutants, will displace electricity generated by higher-polluting fossil fuel-powered plants and significantly reduce emissions from the ISO New England power grid over the lifespan of the Project. Based on air emissions data for New England power generation facilities from EPA's Emissions & Generation Resource Integrated Database (eGRID), the Project is expected to reduce CO_2 emissions from the ISO NE system by approximately 1,630,000 tons per year (tpy). In addition, NO_x and SOx emissions across the New England grid are expected to be reduced by approximately 1,050 tpy and 860 tpy, respectively. Furthermore, the Project is likely to benefit marine mammals and other marine life. These benefits include reduction in greenhouse gasses that induce climate change which in turn potentially impacts species' ranges and access to prey as prey species' shift or decline, a particular concern for migratory species, such as some baleen whales which rely on high-latitude areas for feeding. In addition to these important environmental benefits, the Project is expected to bring significant employment and other economic benefits to the south coast of Massachusetts and the region. Finally, the Project should be an important foundational step in creating a thriving, utility scale, domestic offshore wind industry.

This section provides a summary of the Project; the complete Project Description is included in Section 3.0 of Volume I. Standard terms used to describe the Project are defined in Section 1.4 of Volume I.

2.1 Design Envelope/Phasing

The Project is being developed and permitted using an "Envelope" concept. The evolution of offshore wind technology and installation techniques often outpaces the speed of permitting processes. The Envelope concept allows for optimized projects once permitting is complete while ensuring a comprehensive review of the project by regulators and stakeholders, as BOEM recognized in its National Offshore Wind Strategy. The flexibility provided in the Envelope is important because it precludes the need for numerous permit modifications as infrastructure or construction techniques evolve after permits are granted but before construction commences. The parameters of the Envelope are presented in Table 2.1-1, with the maximum design scenario for environmental analysis. Construction of the ~800 MW Project will be continuous and is expected to start in late 2019.

Table 2.1-1 Vineyard Wind Project Envelope with Maximum Design Scenario

CAPACITY	Maximum	
Wind Farm Capacity	~800 megawatt ("MW")	
WIND TURBINE GENERATORS	**Smallest Turbine**	**Largest Turbine**
Turbine Size	8 MW	10 MW
Total Height[1]	191 meters ("m") (627 feet ["ft"])	212 m (696 ft)
Number of Positions (up to)[2]	106	
Number of WTGs (up to)	100	
WTG FOUNDATIONS		
Foundation Envelope	-100% monopiles or -Up to 10 jackets, remainder monopiles	
Foundation Type	Jackets (Pin Piles)	Monopiles
Number of Piles/Foundation	3-4	1

Table 2.1-1 Vineyard Wind Project Envelope with Maximum Design Scenario (Continued)

CAPACITY	Maximum	
FOUNDATIONS		
Maximum Area of Scour Protection at each Foundation	up to 1800 square meters ("m^2") (19,375 square feet ["ft^2"])	up to 2100 m^2 (22,600 ft^2)
Maximum Number of Foundations Installed per Day (24 hours)	1 (up to 4 pin piles)	2
ELECTRICAL SERVICE PLATFORMS		
ESP Type	400 MW Conventional ESP	800 MW Conventional ESP
Number of ESPs	**2**	1
ESP Foundations		
Foundation Types for Conventional ESP	Monopiles	Jackets
Number of Piles/Foundation	1	3-4
Maximum Area of Scour Protection at each Foundation	up to 2100 m^2 (22,600 ft^2)	up to 2500 m^2 (26,900 ft^2)
Maximum Height above Mean Low Water ("MLLW")	65.5 m (215 ft)	**66.5 m (218 ft)**
INTER-ARRAY CABLES		
Inter-array Cable Voltage	66 kilovolts ("kV")	
Maximum Length of Inter-array Cables	**275 kilometers ("km") (171 miles ["mi"])**	
EXPORT AND INTER-LINK CABLES		
Export and Inter-link Cable Voltage	220 kV	
Maximum Length of Inter-link Cable[3]	**10 km (6.2 mi)**	
Maximum Number of Export Cables	2	
Maximum Length of Offshore Export Cables(for two export cables)	**158 km (98 mi)**	

Notes:

Maximum Design Scenario indicated by double lined box and bold text.

1. Turbine output not necessarily proportionately linked to size, so smallest turbine size may not be an eight MW turbine.
2. Additional WTG positions are included to account for spare positions in the event of environmental or engineering challenges.

2.2 Construction and Installation

2.2.1 Offshore Activities and Facilities

The Project's offshore elements include the wind turbine generators (WTGs) and their foundations, the electric service platforms (ESPs) and their foundations, scour protection for all foundations, the inter-array cables, the inter-link cable that connects the ESPs, and the offshore export cables. The WTGs, the ESPs, the inter-array cables, the inter-link cable, and portions of the offshore export cables are located in federal waters. The balance of the export cable run is located in Massachusetts waters.

2.2.1.1 Wind Turbine Generators

The Project will install 8 MW to 10 MW WTGs. Although the Project is including 106 WTG positions in the Project Envelope, only up to 100 positions will be occupied by a WTG. The site layout for up to 106 turbine locations is shown on Figure 3.1-2 of Volume I.

The WTGs are arranged in a grid-like pattern. Spacing between WTGs will vary from approximately 1,400 m to over 1,850 m (0.76 to 1.0 nautical miles)1 with a one nautical mile wide corridor (1,850 m) running from northwest to southeast and a second one nautical mile wide corridor running from northeast to southwest within the grid design.

The WTGs consists of two main components, the rotor nacelle assembly (RNA) and the Tower. The nacelle houses the energy-generating components of the turbine, including the gear box, generator, controller, low- and high-speed shafts, and brake. A pitch and yaw system will allow the wind turbine to optimize its performance by positioning the direction of the rotor and the angle of the blades. The brake, pitch, and yaw systems may be controlled using hydraulics. The RNA is mounted on the steel tower which is mounted on a foundation and/or transition piece via a bolted connection. The WTGs will have three-bladed rotors manufactured from fiberglass and carbon, which are connected to a steel hub.

The WTGs will be no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in color to reduce their visibility against the horizon. In accordance with FAA requirements and/or BOEM guidelines, two synchronized Federal Aviation Administration (FAA) "L-864" aviation red flashing obstruction lights will be installed on each WTG nacelle. Depending upon commercial availability and regulatory approval, the Project will use either an Aircraft Detection Lighting System (ADLS) that is activated automatically by approaching aircraft or a system that automatically adjusts lighting intensity to accommodate visibility conditions to reduce potential impacts. A report on how often the ADLS system would be activated is included in Appendix III-N for informational purposes. If

[1] The listed dimensions describe the typical grid spacing. The minimum distance between nearest turbines is no less than 1.2 km (0.65 nm) and the maximum distance between nearest turbines is no more than 2.1 km (1.1 nm). The average spacing between turbines is 1.6 km (0.86 nm).

the use of ADLS is not feasible, reduced lighting for the interior will be reviewed and discussed with BOEM and the FAA. Marine navigation lighting will consist of two yellow flashing lights at each turbine and lights on the corners of ESPs approximately 20 - 23 m above MLLW. Other temporary lighting (e.g. helicopter hoist status lights) may be utilized for safety purposes when necessary. In accordance with International Association of Lighthouse Authorities (IALA) guidance, each WTG foundation will be painted with high visibility yellow paint from the water line to an approximate height of at least 15m (50 ft). Sound signals and AIS transponders are included in the Project design to enhance marine navigation safety.

The WTG parameters are provided in the table below and are shown on Figure 3.1-1 of Volume I.

Table 2.2-1 WTG Parameters

WTG Parameter	Envelope
Tip height	191-212 m (627-696 ft) MLLW*
Hub height	109-121 m (358-397 ft) MLLW
Rotor diameter	164-180 m (538-591 ft) MLLW
Platform level and expected Interface level towards foundations	19-23 m (62-75 feet) MLLW
Tip clearance	27-31 m (89-102 ft) MLLW

Note: MLLW is mean lower low water, which is the average height of the lowest tide recorded at a tide station each day during the recording period. Elevations relative to mean higher high water are approximately 1 m (3 ft) lower than those relative to MLLW.

The WTGs are expected to be amongst the most efficient renewable energy generators currently demonstrated for offshore use.

The WTGs will be installed with one or two jack-up or dynamic positioning (DP) vessel(s). The tower will first be erected followed by the nacelle and finally the hub, inclusive of the blades. Alternatively, the nacelle and hub could be installed in a single operation followed by the installation of individual blades. The WTG installation phase represents the most intense period of vessel traffic in the offshore site with wind turbine foundations, inter-array cables and wind turbines being installed in parallel; however, this is a relatively short time period compared to the life of the Project.

2.2.1.2 WTG Foundations

The WTG foundations will either be all monopiles or a combination of monopiles and jackets. Up to ten jackets are expected to be used in deeper water locations. Scour protection will be used to protect the foundations from scour development, which is the removal of the sediments near structures (such as the foundation) by hydrodynamic forces. Scour protection consists of the placement of stone or rock material that can withstand the increase seabed drag that is created by the presence of the foundation.

The monopile is a single, hollow cylinder fabricated from steel that is secured in the seabed. The diameter of the monopiles will range from 7.5 to 10.3 meters (25 to 34 feet) and will be driven into the seabed approximately 20 to 45 meters (66 to 148 feet) depending upon seabed conditions and water depths (Figure 3.1-3 of Volume I). Each monopile will typically be topped by a transition piece (Figures 3.1-3 and 3.1-4 of Volume I), although in some cases an extended monopile may be used (no transition piece; Figure 3.1-5 of Volume I). The transition piece provides a level surface for the WTG tower above it and contains secondary structures, such as tower flange for mounting the WTG, boat landing, internal and external platform, and various electrical equipment needed during installation and operation.

The Jacket design concept consists of 3-4 piles, a large lattice jacket structure and a transition piece (TP), see Figures 3.1-6 through 3.1-8 of Volume I. The jacket will also contain secondary structures, such as boat landings and cable tubes. The piles for the jacket foundation will range from 1.5 to 3 meters (5 to 10 feet) and will be driven into the seabed approximately 30 to 60 meters (98 to 197 feet), depending on seabed conditions and water depths.

The monopiles (or jackets) are expected to be installed by one or two heavy lift or jack-up vessel(s). Anchored vessels will not be used as primary construction and installation vessels within the WDA. Any anchoring that does occur within the WDA will occur within the Area of Potential Effect (APE) defined in Volume II-C. Pile driving will begin with a "soft-start" to ensure that the monopile remains vertical and allow marine life to move away before the pile driving intensity is increased. The intensity (hammer energy level) will be gradually increased based on the resistance that is experienced from the sediments. Typical pile driving for a monopile is expected to take less than approximately three hours to achieve the target penetration depth. It is anticipated that a maximum of two monopiles or one complete jacket could be driven into the seabed per day. No drilling of monopiles is anticipated, but it could be required if a large boulder or monopile refusal is encountered.

2.2.1.3 Electric Service Platforms (ESPs)

The ESP(s) will serve as the common interconnection point for the WTGs within the array. Each WTG will interconnect with the ESP via a 66kV submarine cable system. These cable systems will interconnect with circuit breakers and transformers located on the ESP to increase the voltage level and transmit wind-generated power through the offshore export cable systems to the final connection point to the New England Transmission System.

The Project may use one 800 MW conventional ESP or two 400 MW conventional ESPs. Like the WTGs, the ESPs will be secured to the seabed with either a monopile or jacket foundation and will also have scour protection. The foundations for the ESPs will be installed in the same manner as the WTG foundations. The ESP will have a maximum height above MLLW of approximately 65.5 meters to 66.5 meters (215 to 218 feet) depending upon the foundation used. The approximate size and design of topside components of conventional ESPs are depicted in Figures 3.1-10 through 3.1-13 of Volume I). If multiple ESPs are used, each ESP will be inter-linked with a inter-link cable the same 220 kV cable as used for the export cable. Figure 3.1-14 of Volume I provides representaive pictures of ESPs installed in Europe.

2.2.1.4 Inter-array Cables

The WTG's will be connected to the ESPs via 66kV inter-array cables. The expected cable type is a three-core alternating current ("AC") cable, which will also be the type of cable used for export cables, described in Section 2.2.1.5.

The inter-array cables will connect radial "strings" of 6 to 10 WTGs to the ESPs. The inter-array cable system will be designed and optimized for the Project during the final design and will consider cable design and capacity, ground conditions, Project operating conditions, installation conditions, and potential cultural resources. Therefore, the Envelope for the inter-array cables includes any potential layout within the WDA. One potential layout is provided as Figure 3.1-18 of Volume I, for illustrative purposes. As shown in Figure 3.1-18, the farthest WTG will have one outgoing connection and each subsequent WTG will have both an incoming and outgoing cable. The maximum anticipated length of the inter-array cables for an ~800 MW Project is approximately 275 km (170.8 miles). The inter-array cables are anticipated to be installed up to 1.5 to 2.5 meters (4.9 to 8.2 feet) below the seafloor, likely by jetting or jet plow embedment, after the cables are placed on the seafloor.

2.2.1.5 Offshore Export Cables

Two offshore export cables will connect the ESPs to the bulk power grid. Each offshore export cable, as well as the inter-link cables that connect the ESPs together, will be comprised of a three-core 220 kV AC cable for power transmission and one fiber optic cable for communication and temperature measurement, which serves to monitor the high-voltage system. The three-cores of the cable consist of three copper or alumimum conductors which will each be encapsulated by cross-linked polyethylene (XLPE) insulation and waterproof sheathing will prevent the infiltration of water.

Each of the export cables will be installed below the seafloor. In certain locations, sand waves are present, and since part of the sand waves may be mobile over time, the upper portions of the sand waves may need to be dredged so that the cable laying equipment can achieve the proper burial depth below the sand waves and into the stable sea bottom. Where required, dredging will occur within a 20 m (66 foot) wide dredged corridor by various techniques depending upon site conditions. Dredge volumes are dependent on the final route and cable installation method: a cable installation method that can achieve a burial depth of 2.5 m will require less dredging; a cable installation method that can achieve a burial depth of 1.5 m will require more dredging. The average dredge depth is 0.5 meters and may range up to 4.5 meters in localized areas. The maximum length of export cables (assuming two cables) is 158 kilometers (98 miles).

The majority of the export and inter-link cable is expected to be installed using simultaneous lay and bury via jet plowing or one of the other techniques listed in Section 4.2.3.3.2 of Volume I. However, other methods may be needed in areas of coarser or more consolidated sediment, rocky bottom, or other difficult conditions in order to ensure a proper burial depth. While anchored vessels are not expected to be the primary vessels used for cable installation, some anchored vessels may be needed along portions of the cable route. It is expected that there will be some areas where it will be difficult to achieve the proper burial depth. In those areas the cable will be protected by techniques such as placing rocks on top of the cable or placing prefabricated flexible concrete coverings on top of the cable (referred to as concrete mattresses).

There is one primary Offshore Export Cable Corridor ("OECC") with two route options through Muskeget Channel and two potential Landfall Sites (see Figure 3.1-15 of Volume I). The OECC will pass through Muskeget Channel, turn west, and will make landfall either at Covell's Beach parking lot in the Town of Barnstable or New Hampshire Avenue/Lewis Bay in the Town of Yarmouth.

2.2.2 Onshore Activities and Facilities

2.2.2.1 Landfall Site and Onshore Export Cable Route

The offshore export cable will make landfall at either New Hampshire Ave or Covell's Beach. The New Hampshire Avenue landing site is located inside Lewis Bay where a road dead-ends just west of Englewood Beach at a low concrete bulkhead. A paved parking area is located approximately 300 feet north of the dead-end where construction staging operations could occur. The Covell's Beach landing site is located on Craigville Beach Road near the paved parking lot entrance to a public beach that is owned and managed by the Town of Barnstable.

In both cases, the ocean to land transition could be made using Horizontal Directional Drilling (HDD). The HDD rig would be setup in a parking lot or other previously disturbed area; the drill would be advanced seaward. However, the Lewis Bay/New Hampshire Ave landing area may be suitable for a direct lay approach. This landing area is unique in that the shoreline area has been entirely altered with manmade structures (road, sea wall, riprap, etc.). Moreover, there is no eelgrass or other sensitive habitat in the shallow water immediately offshore from the end of New Hampshire Ave.

Upon making landfall, the transmission line would follow one of two potential routes to connect the underground vault at the Landfall Site to the new onshore substation (Figure 2.2-1 of Volume I). For both routes, the onshore cables will be located entirely underground, primarily beneath public road right-of-ways with some shorter stretches in existing electric or railroad ROWs. The underground onshore cable routes are approximately 9 to 10 km (5.4 to 6.0 miles) in length.

The physical connection between the offshore export cables and the onshore export cables at the Landfall Site will be made in an underground concrete vault(s). From the surface, the only visible components of the cable system are the manhole covers. Inside the vault(s), each three-core submarine cable will be separated and spliced into three separate single-core cables and placed within a single duct bank. The duct bank is constructed using heavy wall PVC pipes encased in concrete. The duct bank installation is done with conventional construction equipment (e.g., hydraulic excavator, loader, dump trucks, flatbed trucks to deliver PVC pipe, crew vehicles, cement delivery trucks, paving equipment). Once the duct bank is in place, the cables are pulled into place via underground splice vaults and associated manholes, which are placed every 457 to 607 m (1,500 to 2,000 ft) or more along the duct bank.

2.2.2.2 Onshore Substation

The onshore substation site will be constructed on the eastern portion of a previously developed site, adjacent to an existing substation, within the Independence Park commercial/industrial area in Barnstable. The buried duct bank will enter the substation site by way of an access road that provides access to the electric transmission corridor from Mary Dunn Road. The substation will house up to four 220 kV /115 kV "step-down" transformers, switchgear, and other necessary equipment. The Project will connect to the bulk power grid via available positions at Eversource's Barnstable Switching Station, located just to the north of the substation site, though Vineyard Wind is also including the option to connect at the West Barnstable Switching Station. If a connection is made at West Barnstable, the Project substation would include step-up transformers (220 kV to 345 kV).

2.2.2.3 Port Facilities

Vineyard Wind has signed a letter of intent to the use the New Bedford Marine Commerce Terminal facility to support Project construction; the terminal is owned by the Massachusetts Clean Energy Center. The 26-acre New Bedford facility, located on the City's extensive industrial waterfront, was purposely built to support offshore wind energy projects. The terminal is just upstream of the Army Corps of Engineers hurricane barrier and has ready access to interstate highways.

The New Bedford facility is expected to be used to offload shipments of components, prepare them for installation, and then load components onto jack-up barges or other suitable vessels for delivery to the lease area for installation[2]. Some component fabrication and fitup may take place in New Bedford or other nearby ports as well.

Given the scale of the Project and the possibility that one or more other offshore wind projects may also use portions of the 26-acre New Bedford facility in parallel with Vineyard Wind, it is possible that Vineyard Wind may stage certain activities from other Massachusetts, Rhode Island, Connecticut, or Canadian ports. These possible ports are listed in Table 3.2-1 of Volume I.

2.3 Operations and Maintenance

2.3.1 Offshore Activities and Facilities

The WTGs are designed to operate without attendance by any operators. Continuous monitoring is conducted using a supervisory control and data acquisition (SCADA) system from a remote location. Examples of parameters that are monitored include temperature limits, vibration limits, current limits, voltage, smoke detectors, etc. The WTG also includes self-protection systems that will be activated if the WTG is operated outside its specifications or the SCADA system fails. These self-protection systems may curtail or halt production or disconnect from the grid.

Weather conditions will also be monitored. The forecasts will cover key parameters covering both meteorological (wind, temperature, visibility, warnings (e.g. lightning), as well as oceanographic parameters (wave conditions). In addition, it is likely that a small weather station (wind, temperature sensors) will be installed on the ESP, as such operations personnel will have an indication of real time conditions offshore which can be used to support the planning and execution of work.

Routine inspection and maintenance activities will be performed for all offshore facilities and may include such things as multi-beam echosounder inspections, side scan sonar inspections, depth of burial inspections, and other geophysical surveys.

2.3.2 Onshore Activities and Facilities

In support of Project operations and the necessary maintenance activities, operations and maintenance facilities (O&M Facilities) will be developed that include offices, a control room, training space for technicians and engineers, shop space, and warehouse space for parts and tools. These functions will be co-located, if feasible.

[2] Monopiles may not be loaded onto vessels for transport but may instead be pulled by tugs while floating in the water.

The O&M Facilities will also include pier space for crew transport vessels (CTV) and other larger support vessels. CTVs are purposely built to support offshore wind energy projects; they are typically about 23 m (75 ft) in length and are set up to safely and quickly transport personnel, parts and equipment. It is expected that approximately 1-2 CTV trips will occur daily during the operation period.

The CTVs are typically used in conjunction with helicopters. Helicopters can be used when rough weather limits or precludes the use of CTVs as well as for fast response visual inspections and repair activities, as needed. The helicopter(s) used to support O&M operations would ideally be based at a general aviation airport in reasonable proximity to the O&M Facilities.

Vineyard Wind plans to locate the Project's O&M Facilities in Vineyard Haven on Martha's Vineyard. However, Vineyard Wind intends to use port facilities at both Vineyard Haven and the New Bedford Terminal to support O&M activities (see Table 3.2-2 of Volume I). Smaller vessels (e.g. CTVs or SOVs) used for O&M activities will likely be based out of Vineyard Haven. Larger vessels used for major repairs during O&M (e.g. jack-up vessels, heavy cargo vessels, etc.) would likely use the New Bedford Terminal. Improvements to Vineyard Haven may be needed to accommodate Vineyard Wind's needs, such as improvements to existing marine infrastructure (e.g., dock space for CTVs, access, etc.) and to structures (office and warehouse space). It is expected that any needed improvements would be coordinated with lessor.

2.4 Decommissioning

2.4.1 Offshore Activities and Facilities

As currently envisioned, the decommissioning process is essentially the reverse of the installation process. Decommissioning of the Project is broken down into the following steps:

- Retirement in place or removal of offshore cable system (e.g., 66 kV inter-array and 220 kV offshore export cables).
- Dismantling and removal of WTGs.
- Cutting and removal of monopile foundations (and/or jackets) and removal of scour protection.
- Removal of ESPs.
- Possible removal of onshore export cables.

The offshore export cables could be retired in place or removed, subject to discussions with the appropriate regulatory agencies on the preferred approach to minimize environmental impacts. If removal is required, the first step of the decommissioning process would involve disconnecting the inter-array 66 kV cables from the WTGs. Next, the inter-array cables would be extracted from their embedded position in the seabed. If protective mattresses or rocks were used to cover portions of the cables, they will be removed prior to recovering the cable.

Prior to dismantling the WTGs, they would be properly drained of all lubricating fluids, according to the established operations and maintenance procedures and the OSRP. Removed fluids would be brought to a port area for proper disposal and / or recycling. Next, the WTGs would be deconstructed (down to the transition piece) in a manner closely resembling the installation process. It is anticipated that almost all of the WTG will be recyclable, with the potential exception of fiberglass components.

After removing the WTGs, the steel transition pieces and foundation components would be decommissioned. Sediments inside the foundations may be removed and temporarily stored on a barge to allow access for cutting. The foundation and transition piece assembly is expected to be cut below the seabed using one or a combination of: underwater acetylene cutting torches, mechanical cutting, or a high-pressure water jet. The portion of the foundation below the cut will likely remain in place. The cut piece(s) would then be lifted out of the water and placed on a barge for transport to an appropriate port area for recycling. Sediments that were previously removed from the inner space of the foundation would be replaced after the foundation is removed. To minimize sediment disturbance and turbidity, a vacuum pump and diver or ROV-assisted hoses would likely be used.

Subject to consultation with the fishing community, appropriate marine fisheries agencies and BOEM approval of the decommissioning plan, the stone scour protection pads will be removed. The stone would likely be excavated with a clamshell dredge, placed on a barge, and returned to shore for reuse or disposal at an onshore location. The process of disassembling the ESPs and their foundations will closely resemble the process used to dismantle the WTGs and their foundations.

The decommissioning of the offshore facilities would require the involvement of an onshore recycling facility with the ability to handle the large quantities of steel and other materials from the Project. There are such facilities currently in operation in New England. Currently, the fiberglass in the rotor blades has no commercial scrap value. Consequently, it is anticipated that the fiberglass from the blades would be cut into manageable pieces and then disposed of at an approved onshore solid waste facility.

2.4.2 Onshore Activities and Facilities

Decommissioning of onshore facilities would be coordinated closely with the host town to ensure that decommissioning activities meet the host town's needs and have the fewest environmental impacts. Subject to those future discussions, it is envisioned that the onshore cables, the concrete encased duct bank itself, and vaults would be left in place for future reuse as would elements of the onshore substation and grid connections. If onshore cable removal is determined to be the preferred approach, removal of cables from the duct bank would be done using truck mounted winches, cable reels and cable reel transport trucks.