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USA

# VINEYARD WIND

## Draft Construction and Operations Plan

### Volume I

## Vineyard Wind Project

March 15, 2018

**Submitted by**

**Vineyard Wind LLC**  
700 Pleasant Street, Suite 510  
New Bedford, Massachusetts 02740

**Submitted to**

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

**Prepared by**

**Epsilon Associates, Inc.**  
3 Mill & Main Place, Suite 250  
Maynard, Massachusetts 01754

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*Submitted by:*

**VINEYARD WIND LLC**  
700 Pleasant Street, Suite 510  
New Bedford, MA 02740

*Prepared by:*

**EPSILON ASSOCIATES, INC.**  
3 Mill & Main Place, Suite 250  
Maynard, MA 01754

*In Association with:*

Biodiversity Research Institute  
C2Wind  
Capitol Air Space Group  
Clarendon Hill Consulting  
Ecology and Environment  
Foley Hoag  
Geo SubSea LLC

Gray & Pape  
Morgan, Lewis & Bockius LLP  
Public Archaeology Laboratory, Inc.  
RPS  
Saratoga Associates  
Swanson Environmental Associates  
Wood Thilsted Partners Ltd  
WSP

March 15, 2018

## Table of Contents

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# TABLE OF CONTENTS

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<b>1.0</b>	<b>PROJECT OVERVIEW</b>	<b>1-1</b>
1.1	Introduction	1-1
1.2	Massachusetts Offshore Wind Leasing Program	1-1
1.3	Company Overview	1-4
	1.3.1 Contact Information	1-5
	1.3.2 Designation of Operator	1-5
1.4	Standard Terminology	1-5
1.5	Construction and Operation Concept	1-7
	1.5.1 Objective	1-7
	1.5.2 Proposed Activities	1-10
	1.5.3 Tentative Schedule	1-11
	1.5.4 Plans for Phased Development	1-15
1.6	Guide to Location of Required Information for COP	1-15
1.7	Commercial Lease Stipulations and Compliance	1-22
1.8	Financial Assurance	1-24
1.9	Certified Verification Agent Nomination	1-24
1.10	Design Standards	1-25
<b>2.0</b>	<b>PROJECT LOCATION – LOCATION PLAT</b>	<b>2-1</b>
2.1	Vineyard Wind Lease Area (OCS-A 501)	2-1
2.2	Onshore Facilities	2-5
<b>3.0</b>	<b>PROJECT STRUCTURES AND FACILITIES - GENERAL STRUCTURAL AND PROJECT DESIGN, FABRICATION AND INSTALLATION</b>	<b>3-1</b>
3.1	Offshore Facilities	3-1
	3.1.1 Wind Turbine Generators	3-2
	3.1.1.1 Site Layout	3-5
	3.1.2 WTG Foundations	3-5
	3.1.2.1 Monopiles	3-5
	3.1.2.2 Jackets	3-11
	3.1.3 Scour Protection	3-11
	3.1.4 Electrical Service Platforms	3-16
	3.1.5 Export Cables and Inter-Link Cables	3-23
	3.1.5.1 Offshore Export Cable Corridors	3-23
	3.1.5.2 Export Cable Separation Distances	3-26
	3.1.5.3 Export Cable Design	3-26
	3.1.6 Inter-array Cables	3-29
3.2	Onshore Facilities	3-30
	3.2.1 Landfall Site	3-30
	3.2.2 Offshore to Onshore Transition	3-33
	3.2.3 Onshore Export Cable Routes	3-33
	3.2.4 Onshore Substation and Grid Connection	3-36
	3.2.5 Construction Facilities	3-36
	3.2.6 Operations & Maintenance Facilities	3-39
3.3	Fabrication	3-41

## TABLE OF CONTENTS (Continued)

---

<b>4.0</b>	<b>PROJECT ACTIVITIES</b>	<b>4-1</b>
4.1	Detailed Construction Schedule	4-1
4.2	Deployment and Construction	4-1
4.2.1	Deployment Overview	4-1
4.2.2	Health, Safety & Environmental Protection Features during Deployment and Installation	4-1
4.2.3	Construction Approach	4-12
4.2.3.1	Introduction	4-12
4.2.3.2	Scour Protection	4-13
4.2.3.3	Offshore Export Cables	4-13
4.2.3.3.1	Overview	4-13
4.2.3.3.2	Detailed Description of Cable Installation	4-16
4.2.3.4	Foundations (Monopile and Jacket)	4-21
4.2.3.5	Electrical Service Platforms	4-23
4.2.3.6	Inter-array Cables	4-24
4.2.3.7	Wind Turbine Generators	4-24
4.2.3.8	Landfall Site	4-25
4.2.3.9	Onshore 220 kV Underground Transmission	4-25
4.2.3.10	Onshore Substation	4-26
4.2.4	Vessels, Vehicles, and Aircraft	4-27
4.2.5	Waste Generation and Disposal	4-33
4.2.6	Chemical Products Used	4-34
4.3	Operations & Maintenance	4-39
4.3.1	Purpose and Objectives	4-39
4.3.1.1	Philosophy	4-39
4.3.1.2	Objectives	4-39
4.3.1.3	Development of Detailed Maintenance Plans and Processes	4-39
4.3.2	Normal Operating Procedures	4-40
4.3.2.1	Scheduled and Preventive Maintenance	4-40
4.3.2.2	Systems and Processes	4-44
4.3.2.3	Monitoring and Control	4-44
4.3.3	Non-routine Operating Procedures/Unscheduled Maintenance	4-46
4.3.4	Vessels, Vehicles, and Aircraft	4-47
4.4	Decommissioning & Site Clearance Procedures	4-48
4.4.1.	Decommissioning Plan Requirements	4-48
4.4.2.	Decommissioning Time Horizon	4-49
4.4.3	General Decommissioning Concept	4-49
4.4.4	Decommissioning Plan and Procedures	4-50
<b>5.0</b>	<b>REGULATORY FRAMEWORK</b>	<b>5-1</b>
<b>6.0</b>	<b>AGENCY CONTACTS AND STAKEHOLDER COORDINATION</b>	<b>6-1</b>
<b>7.0</b>	<b>REFERENCES AND INCORPORATION BY REFERENCE</b>	<b>7-1</b>

## LIST OF APPENDICES

---

Appendix I-A	Draft Oil Spill Response Plan
Appendix I-B	Draft Safety Management System
Appendix I-C	Statement of Qualifications for Certified Verification Agent (CVA) Services
Appendix I-D	CVA Scope of Work and Verification Plan
Appendix I-E	Hierarchy of Standards

## LIST OF FIGURES

---

Figure 1.1-1	RI and MA Lease Areas Overview	1-2
Figure 1.5-1	Construction Schedule (Continuous 800 MW)	1-12
Figure 1.5-2	Construction Schedule (800 MW with Five-year Gap)	1-13
Figure 1.5-3	Construction Schedule (400 MW Followed by 200 MW Increments)	1-14
Figure 2.1-1	Offshore Location Plat	2-2
Figure 2.2-1	Onshore Location Plat	2-6
Figure 3.1-1	WTG Dimensions	3-3
Figure 3.1-2a	Wind Development Area for COP Review	3-6
Figure 3.1-2b	Wind Development Area for COP Review	3-7
Figure 3.1-3	WTG Monopile Foundations	3-8
Figure 3.1-4	Photographs of Monopiles and Transition Pieces	3-9
Figure 3.1-5	WTG Extended Monopile Foundation	3-10
Figure 3.1-6	WTG Jacket Foundation	3-12
Figure 3.1-7	WTG Jacket Foundation 3D Rendering	3-13
Figure 3.1-8	Photographs of Jacket Foundations	3-14
Figure 3.1-9	Typical Scour Protection For Monopile Foundation	3-15
Figure 3.1-10	ESP Monopile Foundation	3-18
Figure 3.1-11	ESP Extended Monopile Foundation	3-19
Figure 3.1-12	ESP Jacket Foundation	3-20
Figure 3.1-13	ESP Jacket Foundation 3D Rendering	3-21
Figure 3.1-14	Photographs of Electrical Service Platforms	3-22
Figure 3.1-15a	Export Cable Corridors	3-24
Figure 3.1-15b	Export Cable Corridors	3-25
Figure 3.1-16	Export Cable Spacing	3-27
Figure 3.1-17	Typical Submarine Cable Cutaway	3-28
Figure 3.1-18a	Vineyard Wind Turbine Layout: Inter-array Cable Layout Example	3-31
Figure 3.1-18b	Vineyard Wind Turbine Layout: Inter-array Cable Layout Example	3-32
Figure 3.2-1	Onshore Cable Cutaway	3-34
Figure 3.2-2	Typical Duct Bank Cross Sections	3-35

## LIST OF FIGURES (CONTINUED)

---

Figure 3.2-3	New Bedford Marine Commerce Terminal	3-37
Figure 3.2-4	Crew Transfer Vessel (CTV) Examples	3-40
Figure 4.1-1a	Detailed Construction Schedule (400 MW)	4-2
Figure 4.1-1b	Detailed Construction Schedule (400 MW)	4-3
Figure 4.1-1c	Detailed Construction Schedule (400 MW)	4-4
Figure 4.1-1d	Detailed Construction Schedule (400 MW)	4-5
Figure 4.1-2a	Detailed Construction Schedule (800 MW)	4-6
Figure 4.1-2b	Detailed Construction Schedule (800 MW)	4-7
Figure 4.1-2c	Detailed Construction Schedule (800 MW)	4-8
Figure 4.1-2d	Detailed Construction Schedule (800 MW)	4-9
Figure 4.1-2e	Detailed Construction Schedule (800 MW)	4-10
Figure 4.2-1	Scour Protection Installation Vessels	4-14
Figure 4.2-2	National Grid Cable Crossing	4-17
Figure 4.2-3	Export Cable Corridors - Dredge Volumes (Maximum Design Scenario)	4-18
Figure 4.2-4	Foundation Installation Vessels	4-22
Figure 4.3-1	Representative Inspection and Maintenance Schedule	4-41

## LIST OF TABLES

---

Table 1.4-1	Standard Terminology Used to Describe Project Elements	1-5
Table 1.5-1	Vineyard Wind Project Envelope Parameters	1-9
Table 1.6-1	Construction and Operations Plan Requirements for Commercial Leases Pursuant to 30 CFR §585.105(a), 621 (a-g), 626(a) and (b), 627(a) and (b)	1-16
Table 1.7-1	Commercial Lease Stipulations and Compliance	1-22
Table 2.1-1	Coordinates for the WTGs and ESPs	2-1
Table 3.1-1	Vineyard Wind Project Envelope with Maximum Design Scenario	3-1
Table 3.1-2	Envelope of WTG Parameters	3-4
Table 3.1-3	Envelope of WTG Foundation Dimensions	3-16
Table 3.1-4	ESP Dimensions	3-17
Table 3.2-1	Possible Ports Used During Construction	3-38
Table 3.3-1	Summary of Fabrication for the Project	3-41
Table 4.2-1	Vessels Used For Construction and Routine Operations	4-28
Table 4.2-2	List of Wastes Expected to be Produced During all Project Phases	4-34
Table 4.2-3	List of Potential Chemical Products Used	4-35
Table 4.3-1	O&M Activities and Equipment Types	4-43
Table 4.3-2	Annual Vessel Use during O&M	4-47
Table 5-1	Required Environmental Permits for the Project	5-1
Table 6-1	Consultations with Agencies, Tribes, and Municipalities	6-1

## LIST OF ACRONYMS

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AC	Alternating current
AR	Avangrid Renewables
BOEM	Bureau of Ocean Energy Management
Call	Call for Information and Nominations
CBP	County Business Patterns
CCC	Cape Cod Commission
CBA	Community Benefit Agreement
CFR	Code of Federal Regulations
CIP	Copenhagen Infrastructure Partners
CO <sub>2</sub>	Carbon Dioxide
COP	Construction and Operations Plan
CSV	Construction support vessel
CTV	Crew Transfer Vessel
CVA	Certified Verification Agent
cy	Cubic yard
DP	Dynamically positioned
DPW	Department of Public Works
EA	Environmental Assessment
ECC	Export Cable Corridor
EEA	Executive Office of Energy and Environmental Affairs
eGRID	Environmental Protection Agency's Emissions & Generation Resource Integrated Database
ENF	Environmental Notification Form
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ESP	Electrical service platform
FAA	Federal Aviation Administration
FDR	Facilities Design Report
FIR	Fabrication and Installation Report
FONSI	Finding of No Significant Impact
ft	feet
gal	gallons
G.L.	General Law
HDD	Horizontal directional drilling
HSE	Health, Safety and Environment
HVAC	Heating Ventilation and Air Condition
IEC	International Electrotechnical Commission
IHA	Incidental Harassment Agreement
IMCA	International Marine Contractors Association
IMO	International Maritime Organization
kj	kilojoules
km <sup>2</sup>	Square kilometers
kV	kilovolt



## LIST OF ACRONYMS (CONTINUED)

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L	liters
LOA	Letter of Authorization
m	meters
MA	Massachusetts
MA CZM	Massachusetts Coastal Zone Management
MA DEP	Massachusetts Department of Environmental Protection
MA DMF	Massachusetts Division of Marine Fisheries
MA EFSB	Massachusetts Energy Facility Siting Board
MA WEA	Massachusetts Wind Energy Area
MassCEC	Massachusetts Clean Energy Center
MEPA	Massachusetts Environmental Policy Act
MLLW	Mean Lower Low Water
mm <sup>2</sup>	Square millimeters
MP	monopile
MSD	Marine sanitization device
MW	megawatt
nm	Nautical miles
NMFS	National Marine Fisheries Service
NO <sub>x</sub>	Nitrogen Oxide
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance Facilities
OCS	outer continental shelf
OECC	Offshore Export Cable Corridor(s)
OEM	Original Equipment Manufacturers
OSRP	Oil Spill Response Plan
RFI	Request for Interest
RI	Rhode Island
RNA	Rotor Nacelle Assembly
ROTV	Remotely operated towed vehicle
ROV	Remotely operated vehicle
ROW	Right-of-way
RSD	ripple scour depressions
SAP	Site Assessment Plan
SCADA	supervisory control and data acquisition
SMS	Safety Management System
SO <sub>2</sub>	Sulfur dioxides
SOV	Service Operations Vessel
TBD	To be determined
TBF	To be filed
THPO	Tribal Historic Preservation Officer
TP	Transition piece
tpy	Tons per year
TSHD	Trailing suction hopper dredge

## LIST OF ACRONYMS (CONTINUED)

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US	United States
USCG	United States Coast Guard
USFWS	United States Fish & Wildlife Service
Utility ROW	Utility Right of Way
WDA	Wind Development Area
WEA	Wind Energy Area
WTG	wind turbine generator

## 1.0 Project Overview

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## 1.0 PROJECT OVERVIEW

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### 1.1 Introduction

Vineyard Wind, LLC (“Vineyard Wind”) is proposing an ~800 megawatt (“MW”) wind energy project within Bureau of Ocean Energy Management (“BOEM”) Lease Area OCS-A 0501, consisting of offshore Wind Turbine Generators (“WTGs”) (each placed on a foundation support structure), Electrical Service Platforms (“ESPs”), an onshore substation, offshore and onshore cabling, and onshore operations & maintenance facilities (these facilities will hereafter be referred to as the “Project”). The location of the Lease Area is depicted on Figure 1.1-1. As is described later in this document, the ~800 MW Project will be located in the northern portion of the over 675 square kilometers (“km<sup>2</sup>”) (166,886 acre) Lease Area (referred to as the “Wind Development Area” or “WDA”).

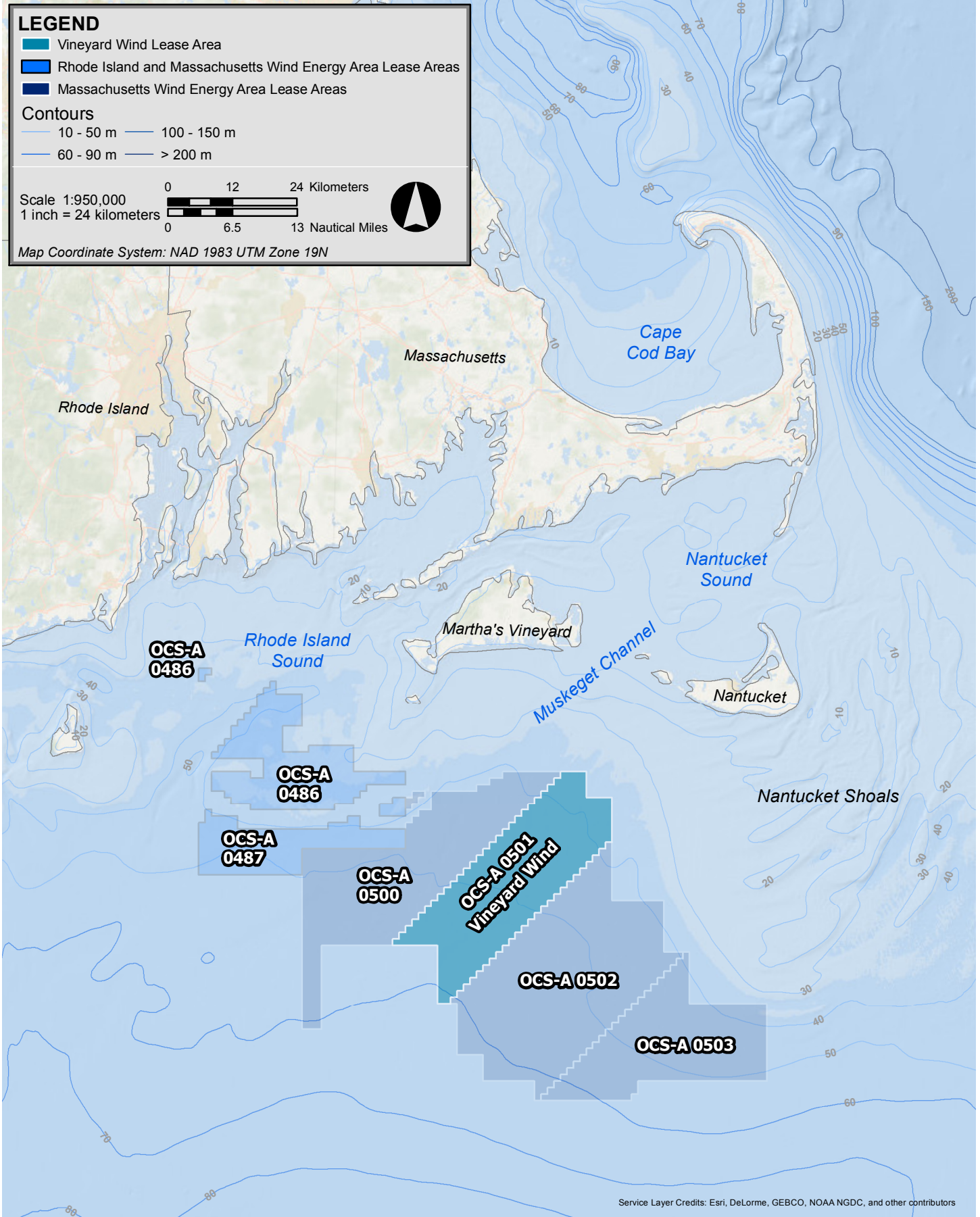
### 1.2 Massachusetts Offshore Wind Leasing Program

BOEM has evaluated areas along the Atlantic coast with respect to their potential suitability for offshore wind development via a public stakeholder and desktop screening<sup>1</sup> process, which began in 2009. The location of the Massachusetts offshore wind lease areas, including the Vineyard Wind Lease Area, was determined through a process that involved significant public input over a period of approximately six years. The process began with the formation of a Massachusetts-BOEM task force, composed of representatives from many federal, state, tribal, and local government agencies, as well as public stakeholder meetings. As a result of this initial planning and consultation, BOEM published a Request for Interest (“RFI”) on December 29, 2010 for a preliminary Massachusetts (“MA”) Wind Energy Area (“WEA”) of approximately 7,628 km<sup>2</sup> (1,884,920 acres), referred to as the “RFI area.” This RFI requested expressions of commercial interest from potential wind energy developers, as well as any information from the public relevant to determining the suitability of the RFI area for offshore wind development. After the initial round of responses to the RFI, BOEM announced a second public comment period, which closed on April 18, 2011. A total of 10 companies, including Vineyard Wind/Vineyard Power, responded to the RFI and 260 public comments were received.

After careful consideration of the public comments, as well as input from the Massachusetts-BOEM task force, BOEM extensively modified the RFI area to address stakeholder concerns. For example, BOEM decided to exclude certain areas identified as important habitats that could be adversely affected if ultimately used for offshore wind energy development. BOEM also excluded an area of high sea duck concentration, as well as an area of high fisheries value so as to reduce potential conflict with commercial and recreational fishing activities. The

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<sup>1</sup> Conducted by the Department of Energy's National Renewable Energy Laboratory.



### Vineyard Wind Project



**Figure 1.1-1**  
RI and MA Lease Areas Overview

distance from the WEA to the nearest shore was also extended, in order to further reduce any possible viewshed impacts. These extensive revisions resulted in the revised MA WEA being reduced in size, as compared to the preliminary RFI area, by approximately 40%.

On February 6, 2012, BOEM published a “Call for Information and Nominations” (“Call”) for areas within the revised MA WEA (the “Call Area”). The Call for Information and Nominations requested the submission of a nomination for a lease by those interested in potentially obtaining a commercial lease for the “Call Area” and also allowed interested and affected parties to provide comments about site conditions, resources, or uses within the “Call Area.” That same month, BOEM also published a Notice of Intent to prepare an Environmental Assessment (“EA”) for the “Call Area.” The EA was made available for public review on November 12, 2012. Among other issues, the EA considered potential impacts to the endangered North Atlantic Right Whales (*Eubalaena glacialis*) and potential effects on viewsheds. Comments on the EA were considered and the revised EA for the WEA was issued on June 4, 2014. As a result of the analysis presented in the revised EA, BOEM issued a “Finding of No Significant Impact” (also known as a “FONSI”), which concluded that reasonably foreseeable environmental effects associated with the commercial wind lease issuance and related activities would not significantly impact the environment.

On June 17, 2014, BOEM and Massachusetts announced that 3002 km<sup>2</sup> (742,000 acres) comprising the MA WEA would be made available for commercial wind energy leasing. On January 29, 2015, BOEM held a competitive lease sale, conducted as an auction, for the lease areas within BOEM’s MA WEA. While the lease areas were to be awarded to the highest cash bid, prior to the auction, BOEM awarded Vineyard Wind<sup>2</sup> a discount to the bid amounts it would have to pay, in recognition of the Community Benefits Agreement (“CBA”) Vineyard Wind had entered into with the local, community-based non-profit cooperative, Vineyard Power. Vineyard Wind won Lease Area OCS-A 0501 (see Figure 1.1-1) in the auction.

Lease Area OCS-A 0501 is as good as any offshore wind site in the world. The Lease Area has high wind speeds, excellent seafloor conditions, moderate water depths, and reasonable proximity to multiple grid connection locations in an area of high electrical load and a need for new generation capacity. Since winning the lease, Vineyard Wind has worked to optimize the project design and efficiency, while accounting for stakeholder input. These efforts also support the preparation of the major federal (i.e., BOEM) and Massachusetts (e.g, Energy Facility Siting Board and Massachusetts Environmental Protection Act) application submittals, as well as the Project’s response to Massachusetts’ recent Request for Proposals for long-term Power Purchase Agreements.

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<sup>2</sup> At the time of the auction, Vineyard Wind, LLC was called Offshore MW, LLC.

### 1.3 Company Overview

Vineyard Wind is a New Bedford, MA based project company owned by Copenhagen Infrastructure Partners (“CIP”) and Avangrid Renewables (“AR”). Together, these owners bring a considerable depth of offshore wind energy knowledge and experience as well as strong financial backing. CIP makes long-term clean energy infrastructure investments on behalf of 21 institutional investors, including several large Scandinavian pension funds, and currently has over five billion euros (\$5.9 billion) under management.

Copenhagen Offshore Partners is a specialized team formed to develop and deliver offshore wind projects for institutional investors such as CIP<sup>3</sup>. The Copenhagen Offshore Partners team includes individuals who have had key roles on more than 15 offshore wind projects in Europe, dating back to 1995. Major projects undertaken to-date include Veja Mate, a 402 MW wind project in the German North Sea, and Beatrice, a 588 MW project under development in the Moray Firth portion of the North Sea. The 67 turbine Veja Mate project achieved its financial closing in 2015; commissioning was completed in May 2017, well ahead of schedule. The Beatrice project is currently under construction off the northeast coast of Scotland; commercial operation is scheduled for the second quarter of 2019.

Avangrid Renewables is a leader in the renewable energy industry in the United States (“US”) and is amongst the nation’s largest renewable energy operators. AR’s mission is to lead the transformation to a competitive, clean energy future. The company is headquartered in Portland Oregon, and has regional offices in Philadelphia, Chicago, and Austin. AR controls over 6,000 MW of operating generation, including thermal, wind, solar, and biomass projects. AR is a subsidiary of Avangrid,<sup>4</sup> which is 81.5% owned by Iberdrola, SA. Iberdrola has an asset base which includes 14,000 MW of renewable energy projects in 12 countries.

Within the Avangrid/Iberdrola family, Scottish Power is where the considerable offshore wind energy expertise is positioned. Scottish Power has completed several major offshore projects, including the 389 MW West of Duddon Sands project in the UK. Scottish Power teams are currently completing construction of three new offshore wind projects: the 350 MW Wikinger project, located in the German Baltic Sea; the 714 MW East Anglia One project, located in the UK North Sea; and the 496 MW St Brieuc project, located in the Atlantic Ocean off the French coast of Brittany.

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<sup>3</sup> Copenhagen Offshore Partners has a long-term exclusivity arrangement to CIP in North America. However, there is no ownership or governance relationship between the two companies.

<sup>4</sup> Avangrid Renewables is a subsidiary of Avangrid, a New York Stock exchange listed company (AGR). Other subsidiaries of Avangrid include Central Maine Power, United Illuminating in Connecticut, New York State Electric & Gas, and Rochester Gas and Electric.

Vineyard Wind’s New Bedford-based team includes scientists, engineers and managers with decades of local offshore wind energy expertise and a strong knowledge of the power grid, infrastructure, New England coastline, and ocean waters off Cape Cod and the Islands.

The Vineyard Wind team also includes Vineyard Power, a non-profit renewable energy cooperative based on Martha’s Vineyard, with which Vineyard Wind has entered into a CBA. This partnership has enabled significant input into the Project design process from members of the local community, such that the Project’s design addresses local concerns and enhances opportunities for local benefits. Vineyard Power staff and its board of directors have been working closely with the broader Vineyard Wind project team, and have lead responsibility for outreach to community stakeholders, including local towns, environmental interests, and commercial and recreational fisheries.

**1.3.1 Contact Information**

Rachel Pachter  
 Vice President for Permitting Affairs  
 700 Pleasant Street, Suite 510  
 New Bedford, MA, 02740  
 508-717-8964  
[rpachter@vineyardwind.com](mailto:rpachter@vineyardwind.com)

**1.3.2 Designation of Operator**

The operator of the Project will be Vineyard Wind.

**1.4 Standard Terminology**

The following table defines standard terms that are used to describe elements of the Vineyard Wind Project throughout this Construction and Operations Plan.

**Table 1.4-1 Standard Terminology Used to Describe Project Elements**

<b>Standard Term</b>	<b>Definition</b>
Construction staging areas	Areas to be used for unloading and loading equipment, final equipment assembly, etc.
Duct bank	The underground structure that houses the onshore export cable, which consists of PVC pipes encased in concrete.
Electrical Service Platform (“ESP”)	The offshore substations located in the WDA, which contain transformers and other electrical gear
Export cable	The entire physical transmission cable that transmits power generated by the WTGs to the onshore substation.
Export Cable Corridor (“ECC”)	The area identified for routing the entire length of onshore and offshore export cable.



**Table 1.4-1 Standard Terminology Used to Describe Project Elements (Continued)**

<b>Standard Term</b>	<b>Definition</b>
Fisheries Communication Plan	A comprehensive communications plan with the various port authorities, federal, state and local authorities, and other key stakeholders.
Foundations	Steel structures that support both ESPs and Wind Turbine Generators (“WTGs”) and are driven into the seabed.
Inter-array cables	Submarine transmission cables that connect groups of WTGs to the ESPs.
Inter-link cables	A submarine transmission cable that connects ESPs together.
Landfall Site	The shoreline landing site where the export cable transitions from offshore to onshore.
Lease Area	The entire area that Vineyard Wind purchased from BOEM, which includes more area than just the WDA.
MA or RI-MA Wind Energy Area	The areas designated in Massachusetts and Rhode Island (“RI”) by BOEM for wind energy development.
New Bedford Marine Commerce Terminal (“New Bedford Terminal”)	A 26-acre port facility in the Port of New Bedford, which Vineyard Wind intends to use as a construction staging area.
Offshore cable system	All offshore transmission cables (inter-array cable, inter-link cable, and offshore export cable).
Offshore export cable	The portion of the export cable that is located offshore below the seafloor.
Offshore Export Cable Corridor (“OECC”)	The area identified for routing the offshore export cable.
Offshore facilities	All offshore infrastructure (WTGs, ESPs, etc.).
Offshore Project Area	The offshore area where Project components are physically located.
Onshore export cable	The portion of the export cable that is located onshore underground.
Onshore Export Cable Route	The area along onshore portion of the export cable.
Onshore facilities	All onshore infrastructure (onshore substation, onshore export cables, etc.).
Onshore Project Area	The onshore area where Project components are physically located.
Onshore substation	The landside substation located in Barnstable County that contains transformers and other electrical gear.
Operations and Maintenance Facilities (“O&M Facilities”)	All buildings and infrastructure used to support operations and maintenance activities.
Project	All elements of the Vineyard Wind Project (both offshore and onshore).
Project Area	The combined onshore and offshore area where Project components are physically located.

**Table 1.4-1 Standard Terminology Used to Describe Project Elements (Continued)**

<b>Standard Term</b>	<b>Definition</b>
Project Region	The cities and towns surrounding the area where Project activities will occur.
Scour protection	Rock or other protection placed around the base of a foundation to prevent sediment erosion.
Splice vaults	Underground concrete "boxes" where segments of the onshore export cable are joined together.
Transition vault	A type of splice vault where the offshore cable is transitioned to the onshore cable.
Utility right-of-way ("utility ROW")	Previously disturbed corridors that contain existing electric transmission lines or other utilities.
Wind Development Area ("WDA")	The northeast portion of the Lease Area that will be developed initially for an ~800 MW project.
Wind Turbine Generators ("WTGs")	Offshore wind turbines that will each generate approximately eight to 10 MW of electricity each.

## 1.5 Construction and Operation Concept

### 1.5.1 Objective

Vineyard Wind plans to design, permit, construct and operate an ~800 MW offshore wind energy project in the northern half of BOEM Lease Area OCS-A 0501. The WTGs for this Project will be among the most efficient renewable energy generators currently demonstrated for offshore use. Based on detailed analysis of regional wind data, it is expected that the WTGs will be capable of operating with an annual capacity factor in excess of 45%; capacity factor refers to the ratio of the Project's annual power production to the nameplate production potential.

The Project will be new, privately financed, generation infrastructure that is ideally located to provide clean, renewable electric power to one of the densely populated areas along the Atlantic coast. Electricity generated by the WTGs is emission-free and will displace electricity generated by fossil fuel-powered plants, thereby significantly reducing emissions from the ISO New England ("NE") power grid over the lifespan of the Project. Based on air emissions data for New England power generation facilities, obtained from the Environmental Protection Agency's Emissions & Generation Resource Integrated Database (eGRID), the Project will reduce carbon dioxide ("CO<sub>2</sub>") emissions from the ISO NE power grid by approximately 1,680,000 tons per year ("tpy"). In addition, the Project is expected to reduce nitrogen oxide ("NO<sub>x</sub>") and sulfur dioxides ("SO<sub>2</sub>") emissions by approximately 1,030 tpy and 880 tpy, respectively (see Section 5.1 of Volume III).

Beyond these very important environmental advantages, the Project will bring significant employment and other economic benefits to the south coast of Massachusetts and the region (see Section 7.0 of Volume III) as well as energy diversity, and on-peak power production (i.e., hot summer afternoons). Lastly, the Vineyard Wind Project could be the second offshore wind project in the US and would be an important foundational step in creating a thriving, utility-scale, domestic offshore wind industry.

Finally, the Project is being developed and permitted using an “Envelope” concept. The Envelope concept allows Vineyard Wind to properly define and bracket Project characteristics for purposes of environmental review and permitting while maintaining a reasonable degree of flexibility with respect to the selection and purchase of key Project components, such as the WTGs, foundations, submarine cables, offshore substations, etc.<sup>5</sup> As the Project is bidding into competitive power procurement processes, this flexible approach is particularly important to ensure projects can take advantage of rapidly advancing technology and produce the most cost-effective results for Massachusetts ratepayers.

The Project design may be further refined during the permitting process in an effort minimize potential impacts within the envelope. The Project Envelope which is being used to develop this Construction and Operations Plan (“COP”) is provided as Table 1.5-1, below.

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<sup>5</sup> The evolution of offshore wind technology toward less expensive, safer, and more efficient concepts often outpaces the speed of permitting processes. As BOEM recognized in its National Offshore Wind Strategy, the envelope concept allows for optimized projects once permitting is complete while ensuring a comprehensive review of the project by regulators and stakeholders.

**Table 1.5-1 Vineyard Wind Project Envelope Parameters**

Layout and Project Size	Foundation	WTGs
<ul style="list-style-type: none"> <li>• ~800MW project</li> <li>• Up to 106 WTG positions</li> <li>• Construction may occur in ~200 MW, ~400 MW, and ~800 MW increments</li> <li>• Construction begins late 2019</li> <li>• The first ~400 MW could be constructed by the end of 2021</li> <li>• Construction of the remaining 400 MW may occur concurrently or after a gap of up to five years</li> </ul>	<ul style="list-style-type: none"> <li>• 800MW of monopiles or 400MW of piles and up to 400MW of jackets</li> <li>• Pile driving hammer</li> <li>• Scour protection on all positions</li> <li>• Installation with a jack-up vessel or vessel on dynamic positioning (DP) with feeder barges</li> </ul>	<ul style="list-style-type: none"> <li>• 8 – 10MW WTG</li> <li>• Rotor size of 164-180 m (538-591 ft)</li> <li>• Hub height of 109-121 m (358-397 ft)</li> <li>• Installation with a jack-up vessel or vessel on dynamic positioning (DP) with feeder barges</li> </ul>
Inter-array cables	Offshore Export Cables	Electrical Service Platform (ESP)
<ul style="list-style-type: none"> <li>• 66kV cables beneath the seafloor</li> <li>• Example layout identified, not finalized</li> <li>• Maximum total cable lengths indicated</li> <li>• Installation techniques include jet plow, mechanical plow &amp; mechanical trenching.</li> <li>• Installation with a vessel on dynamic positioning (DP)</li> <li>• Pre-lay grapnel run</li> </ul>	<ul style="list-style-type: none"> <li>• Up to three 220kV export cables beneath the seafloor</li> <li>• Two corridors identified with variants</li> <li>• Max total cable lengths indicated</li> <li>• Installation techniques include jet plow, mechanical plow &amp; mechanical trenching. Dredging in some locations to achieve burial depth</li> <li>• Installation with a vessel on dynamic positioning (DP) and some use of an anchored vessel</li> <li>• Use of mattresses or rock protection on areas of minimal cable burial</li> <li>• Pre-lay grapnel run</li> </ul>	<ul style="list-style-type: none"> <li>• Four light-weight ESPs or two conventional ESPs</li> <li>• Each ESP installed on one monopile or a single jacket foundation</li> <li>• Scour protection on all positions</li> <li>• Installation using foundation and turbine installation vessels or specialized crane vessel</li> </ul>

### 1.5.2 *Proposed Activities*

The key elements of the Project, as bounded by the Envelope (see Table 1.5-1), are as follows. A complete description of each component, including figures, is provided in Section 3.0:

- ◆ Wind Turbine Generators: The WTGs will range in size from eight to 10 MW. Up to 106 turbine locations are being permitted to allow for spare positions (in the event of environmental or engineering challenges) and added power generation to account for electrical losses along the transmission line. If a larger turbine is selected, fewer positions will be occupied.
- ◆ Monopile and Jacket Foundations: Foundations will be monopiles or jackets. A monopile is a long, steel tube that is driven into the seabed to support a WTG. The monopiles will typically be topped by a transition piece although in some cases an extended monopile may be used with no transition piece, subject to detailed design.

Jacket foundations may be used for up to half of the Project. Jacket foundations, if used, would typically be located in the deeper water portions of the Lease Area. The jacket foundation is a large lattice-type steel structure that includes either three or four piles (i.e., legs) connected with welded steel tubular cross bracing. The jacket structures also include a transition piece to connect the WTG to the foundation.

- ◆ Scour Protection: All WTG and ESP foundations will have scour protection. The scour protection is expected to be a layer of stone or rock laid around the foundation.
- ◆ Inter-array Cables: 66 kilovolt (“kV”) inter-array cables will connect radial “strings” of six to 10 WTGs to a shared offshore substation or ESP.
- ◆ Offshore Substations/Electrical Service Platforms: The ESPs will include step-up transformers (66 kV to 220 kV) and other electrical gear. The ESPs are expected to be located along the northwest edge of the WDA. Both conventional and light-weight ESPs are being considered and analyzed in this COP. Up to two conventional ESPs or two sets of two light-weight ESPs are under consideration.
- ◆ Offshore Cables: 220 kV offshore export cables will connect the offshore ESPs to the shore. Up to a total of three cables will be needed for an ~800 MW Project. An inter-link cable will connect the first and second 400 MWs within the Project Area. The inter-link is a 220 kV cable, which connects the ESPs and provides additional reliability in the event of an export cable issue. A range of Offshore Export Cable Corridors and installation techniques are under consideration and are further described in Section 3.1.5. While the offshore export cables will follow a common corridor, a reasonable distance will be maintained between each cable to facilitate installation as well as any future repairs that may be needed (see Section 3.1.5.2).

- ◆ Onshore Cables: 220 kV underground onshore export cables will be used to connect the Landfall Site to a 220 kV to 115 kV step down onshore substation and the subsequent interconnection to the bulk power grid. As with the offshore export cables, a range of underground onshore export cable routes are under consideration. Section 3.2 describes the Onshore Export Cable Routes and onshore substation.
- ◆ Installation: The Project Envelope also describes potential foundation and equipment installation approaches. As a general matter, WTG and ESP installation will be performed using jack-up vessels or dynamically positioned (“DP”) vessels, as well as necessary support vessels and barges. As described in Sections 4.2.3.3 and 4.2.3.6, cable laying will be accomplished primarily by jet plowing, mechanical plowing, or mechanical trenching. Vessel types under consideration for cable installation include DP, anchored, self-propelled, or barge. In accordance with standard industry practice, a pre-lay grapnel run will be made in all instances to locate and clear obstructions, such as abandoned fishing gear and other marine debris.

### **1.5.3 Tentative Schedule**

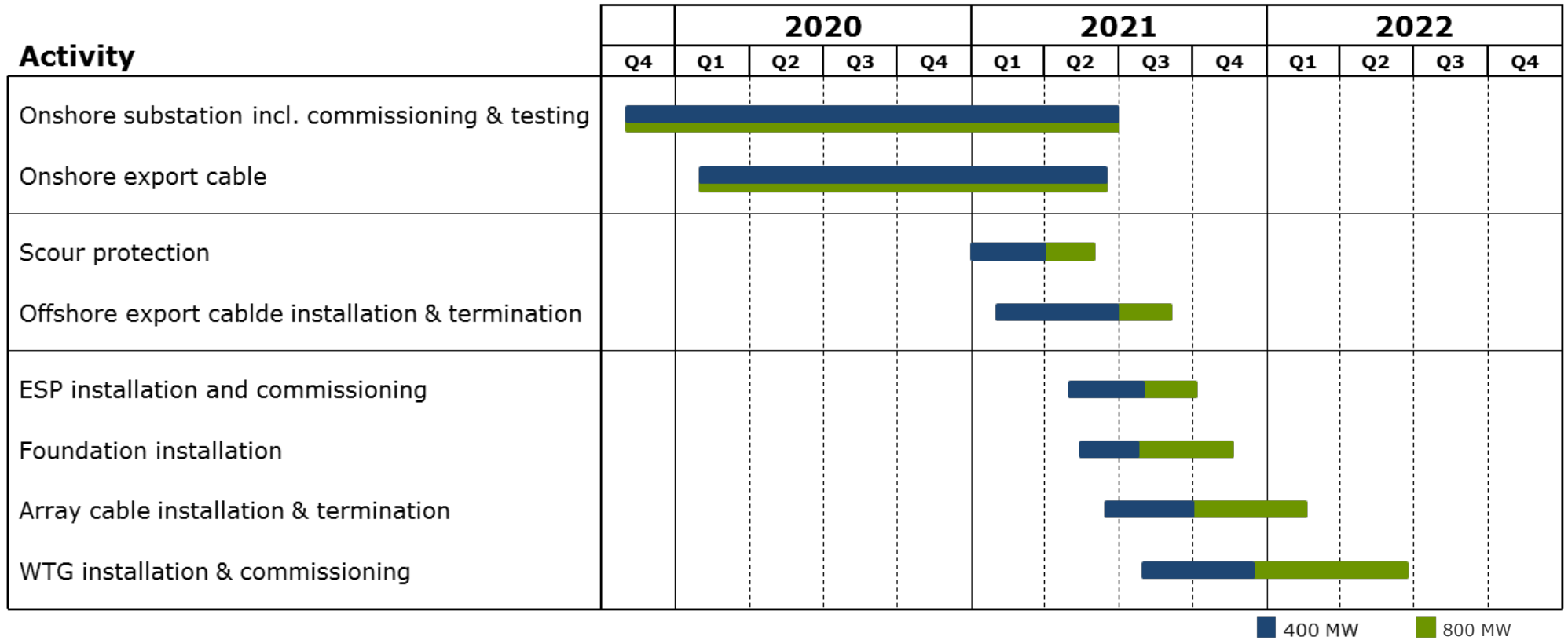
Federal and Massachusetts environmental reviews, and subsequent federal, state, regional and local permitting are expected to be a principal focus of Project activities during 2018 and a portion of 2019. Assuming the necessary permits are issued and the planned financial close is completed in late 2019, construction will begin in late 2019. . The Project may be constructed in stages consisting of ~400 MW and ~800 MW, with up to five years between increments. Construction of the first 400 MW of the Project could be completed by the end of 2021; construction of the remaining 400 MW may occur concurrently and, in this instance, could be completed by the end of 2022. Alternately, construction of the second 400 MW may occur after an up to five-year gap. Additionally, a smaller increment of ~200 MW could be constructed depending on offtake awards to Vineyard Wind. Representations of the Project’s construction schedule envelope are provided as Figures 1.5-1 through 1.5-3.

The Proponent anticipates that onshore construction will commence in late 2019 with work at the Landfall Site, onshore substation, and onshore duct bank. It is likely that some of the infrastructure for the 800 MW project (e.g., duct banks) will be built during construction of a 400 MW project. On Cape Cod, there are general summer limitations on construction activities, which the Proponent has built into the Project schedule for construction at the Landfall Site and along the onshore transmission route where the route follows public roadway layouts. Activities at the Landfall Site where transmission will transition from offshore to onshore will not be performed during the months of June through September unless authorized by the host town. Likewise, Vineyard Wind will not conduct activities along the onshore transmission route within public roadway layouts from Memorial Day through Labor Day unless authorized by the host town; such work could extend through June 15 subject to consent from the local Department of Public Works (DPW). The Company will consult with the towns regarding the construction

# High-level Construction Plan

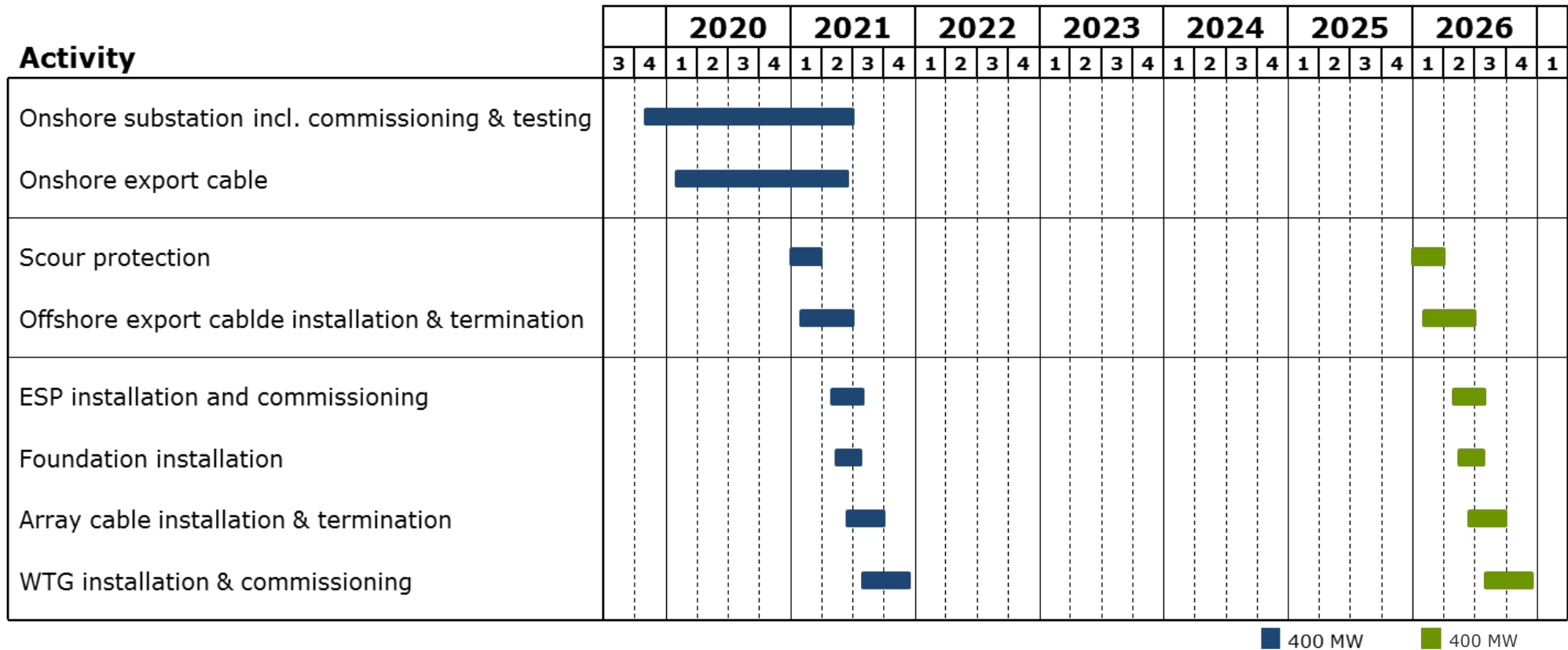
400 MW + 800 MW

1 ESP per 400 MW



# High Level Construction Plan

400 MW + 5 year gap + 400 MW  
2 ESPs



Vineyard Wind Project

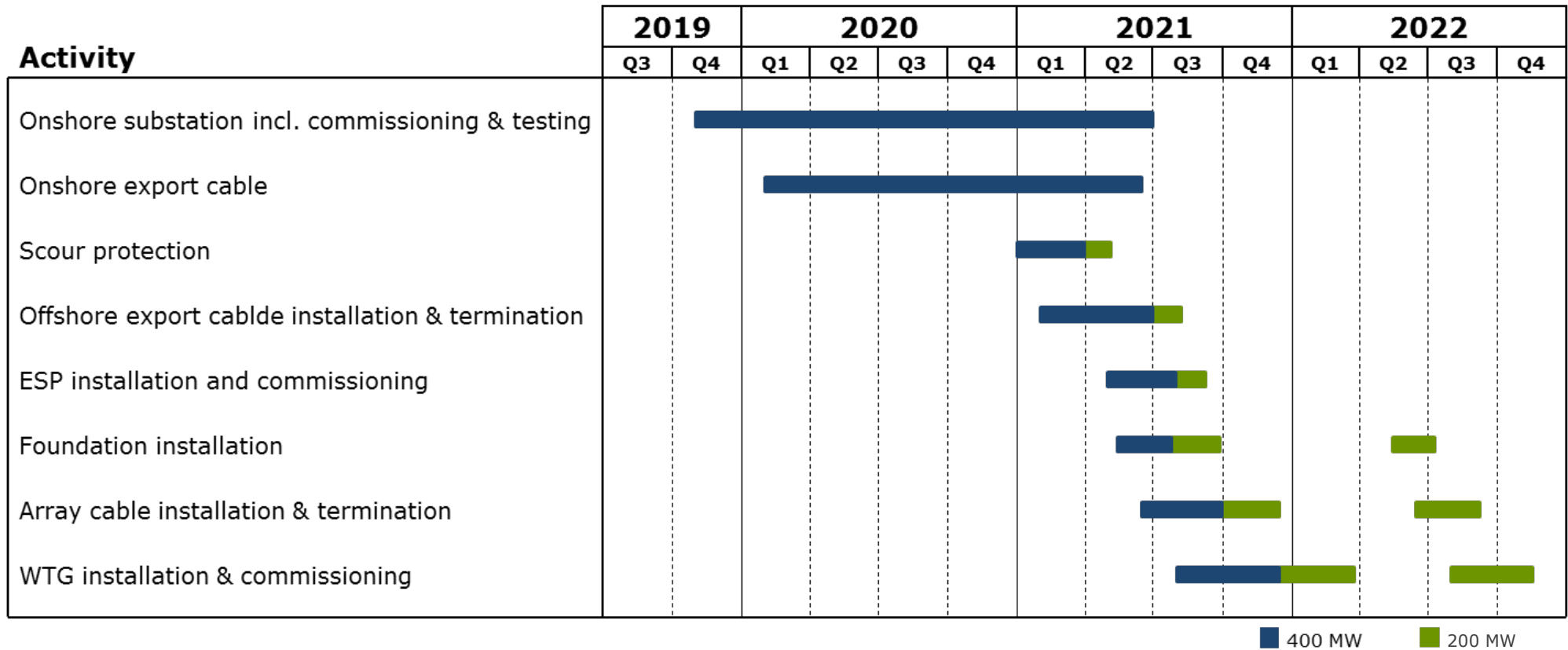


Figure 1.5-2  
Construction Schedule (800 MW with Five-year Gap)



# High Level Construction Plan

400 MW + 200MW + 200 MW  
2 ESPs



schedule. Typical construction hours will extend from 7:00 AM to 6:00 PM. Nighttime work will be performed only on an as-needed basis, such as when crossing a busy road. When needed, nighttime work/extended construction hours, including possible work on weekends, will be coordinated through each Town. These summer limitations on certain onshore construction activities are shown on the detailed construction schedules included as Figures 4.1-1 and 4.1-2.

Once an increment of the Project is completed and commissioned, it will have an operational life of up to 30 years. Throughout that time, the entire Project will be carefully monitored and maintained. Skilled technicians and engineers will be responsible for a rigorous preventative maintenance program and will be responsible for addressing any malfunctions that may occur, making repairs, and replacing components. A more detailed discussion of the Project's operations and maintenance is provided in Section 4.3. Decommissioning at the end of the Project's useful life is described in Section 4.4. Assuming a 30-year operational life, decommissioning of the Project would be slated to begin no earlier than 2052.

#### ***1.5.4 Plans for Phased Development***

Vineyard Wind is not proposing to develop its lease in phases at this time. As discussed above, however, the activities under this COP may proceed in stages.

### **1.6 Guide to Location of Required Information for COP**

The following table lists the BOEM regulations and where the corresponding information can be found in this COP.

**Table 1.6-1 Construction and Operations Plan Requirements for Commercial Leases Pursuant to 30 CFR §585.105(a), 621 (a-g), 626(a) and (b), 627(a) and (b)**

Requirement	Location in COP
<b>30 CFR §585.105(a)</b>	
1) Design your projects and conduct all activities in a manner that ensures safety and will not cause undue harm or damage to natural resources, including their physical, atmospheric, and biological components to the extent practicable; and take measures to prevent unauthorized discharge of pollutants including marine trash and debris into the offshore environment.	Section 3.1.1 of Volume I Section 4.2.2 of Volume I Section 4.3 of Volume I Appendix I-A Appendix I-B Appendix I-E Section 4 of Volume III Section 5 of Volume III Section 6 of Volume III Appendix III-A Appendix III-B Appendix III-C Appendix III-D Appendix III-F
<b>30 CFR §585.621(a-g)</b>	
a) The project will conform to all applicable laws, implementing regulations, lease provisions, and stipulations or conditions of the lease.	Section 1.6 (Table 1.6-1) of Volume I Section 1.7 (Table 1.7-1) of Volume I Section 1.10 of Volume I Section 3 of Volume I Section 4 of Volume I Section 5 (Table 5-1) of Volume I Appendix I-E
b) The project will be safe.	Section 3.1.1 of Volume I Section 4.2.2 of Volume I Section 4.3 of Volume I Appendix I-B
c) The project will not unreasonably interfere with other uses of the OCS, including those involved with National security or defense.	Section 7.5 of Volume III Section 7.6 of Volume III Section 7.9 of Volume III Appendix III-E Appendix III-I
d) The project will not cause undue harm or damage to natural resources; life (including human and wildlife); property; the marine, coastal, or human environment; or sites, structures, or objects of historical or archeological significance.	Section 4 of Volume III Section 5 of Volume III Section 6 of Volume III Section 7 of Volume III Appendix III-A Appendix III-B Appendix III-C Appendix III-D Appendix III-F Appendix III-G Appendix III-H.a Appendix III-H.b

**Table 1.6-1 Construction and Operations Plan Requirements for Commercial Leases Pursuant to 30 CFR §585.105(a), 621 (a-g), 626(a) and (b), 627(a) and (b) (Continued)**

<b>Requirement</b>	<b>Location in COP</b>
<b>30 CFR §585.621(a-g)</b>	
e) The project will use the best available and safest technology.	Section 1.5.1 of Volume I Section 4.2.2 of Volume I Appendix I-B Appendix I-D Appendix I-E
f) The project will use best management practices.	Section 4 (Table 4.1-2) of Volume III
g) The project will use properly trained personnel.	Section 4.2.2 of Volume I Section 4.3.1 of Volume I Section 4.3.2 of Volume I
<b>30 CFR §585.626(a)</b>	
<i>(1) Shallow Hazards</i>	
(i) Shallow Faults;	Section 3.2 (Table 3.2-1) of Volume II-A
(ii) Gas Seeps or shallow gas;	Section 3.2 (Table 3.2-1) of Volume II-A
(iii) Slump blocks or slump sediments;	Section 3.2 (Table 3.2-1) of Volume II-A
(iv) Hydrates; or	Section 3.2 (Table 3.2-1) of Volume II-A
(v) Ice Scour of seabed sediments	Section 3.2 (Table 3.2-1) of Volume II-A
<i>(2) Geological survey relevant to the design and siting of facility</i>	
(i) Seismic activity at your proposed site;	Section 4.1 (Table 4.1-1) of Volume II-A
(ii) Fault zones;	Section 4.1 (Table 4.1-1) of Volume II-A
(iii) The possibility and effects of seabed subsidence; and	Section 4.1 (Table 4.1-1) of Volume II-A
(iv) The extent and geometry of faulting attenuation effects of geological conditions near your site.	Section 4.1 (Table 4.1-1) of Volume II-A
<i>(3) Biological</i>	
(i) A description of the results of biological surveys used to determine the presence of live bottoms, hard bottoms, and topographic features, and surveys of other marine resources such as fish populations (including migratory populations), marine mammals, sea turtles, and sea birds.	Section 5 of Volume II-A Section 6 of Volume III
<i>(4) Geotechnical Survey</i>	
(i) The results of a testing program used to investigate the stratigraphic and engineering properties of the sediment that may affect the foundations or anchoring systems for your facility.	Section 2.1.2.2 of Volume II-A (summary) Appendix F of Volume II-A Appendix N of Volume II-B
(ii) The results of adequate in situ testing, boring, and sampling at each foundation location, to examine all important sediment and rock strata to determine its strength classification, deformation properties, and dynamic characteristics.	Section 2.1.2.2 of Volume II-A (summary) Appendix F of Volume II-A Appendix N of Volume II-B

**Table 1.6-1 Construction and Operations Plan Requirements for Commercial Leases Pursuant to 30 CFR §585.105(a), 621 (a-g), 626(a) and (b), 627(a) and (b) (Continued)**

<b>Requirement</b>	<b>Location in COP</b>
<b>30 CFR §585.626(a)</b>	
(iii) The results of a minimum of one deep boring (with soil sampling and testing) at each edge of the project area and within the project area as needed to determine the vertical and lateral variation in seabed conditions and to provide the relevant geotechnical data required for design.	Section 2.1.2.2 of Volume II-A (summary) Appendix F of Volume II-A Appendix N of Volume II-B
<i>(5) Archeological Resources</i>	
(i) A description of the historic and prehistoric archaeological resources, as required by the NHPA (16 U.S.C. 470 et. seq.), as amended.	Volume II-C (submarine) Section 7.3 of Volume III (terrestrial) Appendix III-G
<i>(6) Overall Site Investigation</i>	
(i) Scouring of the seabed;	Section 3.2 (Table 3.2-1 and Section 3.2.2) of Volume II-A Section 4.1 (Table 4.1-1) of Volume II-A
(ii) Hydraulic instability;	Section 4.1 (Table 4.1-1) of Volume II-A
(iii) The occurrence of sand waves;	Section 3.2 (Section 3.2-1) of Volume II-A Section 4.1 (Table 4.1-1) of Volume II-A
(iv) Instability of slopes at the facility location;	Section 3.2 (Table 3.2-1) of Volume II-A Section 4.1 (Table 4.1-1) of Volume II-A
(v) Liquefaction, or possible reduction of sediment strength due to increased pore pressures;	Section 4.1 (Table 4.1-1) of Volume II-A
(vi) Degradation of subsea permafrost layers;	Section 4.1 (Table 4.1-1) of Volume II-A
(vii) Cyclic loading;	Section 4.1 (Table 4.1-1 and Section 4.2.1) of Volume II-A
(viii) Lateral loading;	Section 4.1 (Table 4.1-1 and Section 4.1.2) of Volume II-A
(ix) Dynamic loading;	Section 4.1 (Table 4.1-1) of Volume II-A
(x) Settlements and displacements;	Section 4.1 (Table 4.1-1) of Volume II-A
(xi) Plastic deformation and formation collapse mechanisms; and	Section 4.1 (Table 4.1-1) of Volume II-A
(xii) Sediment reactions on the facility foundations or anchoring systems.	Section 4.1 (Table 4.1-1) of Volume II-A
<b>30 CFR §585.626(b)</b>	
(1) Contact information	Section 1.3.1 of Volume I
(2) Designation of operator, if applicable	Section 1.3.2 of Volume I
(3) The construction and operation concept	Section 1.5 of Volume I
(4) Commercial lease stipulations and compliance	Section 1.7 of Volume I
(5) A location plat	Section 2.1 (Figure 2.1-1) of Volume I Section 2.2 (Figure 2.2-1) of Volume I
(6) General structural and project design, fabrication, and installation	Section 1.9 of Volume I Section 3 of Volume I Appendix I-C Appendix I-D Section 2 of Volume III

**Table 1.6-1 Construction and Operations Plan Requirements for Commercial Leases Pursuant to 30 CFR §585.105(a), 621 (a-g), 626(a) and (b), 627(a) and (b) (Continued)**

Requirement	Location in COP
<b>30 CFR §585.626(b)</b>	
(7) All cables and pipelines, including cables on project easements	Section 2.1 (Figure 2.1-1) of Volume I Section 2.2 (Figure 2.2-1) of Volume I Section 3.1.5 of Volume I Section 3.1.6 of Volume I Section 3.2.1 of Volume I Section 3.2.2 of Volume I Section 3.2.3 of Volume I Section 3.3 of Volume I Section 4.2.3.3 of Volume I Section 4.2.3.5 of Volume I Section 4.2.3.6 of Volume I Section 4.2.3.8 of Volume I Section 4.2.3.9 of Volume I Section 4.3.2.1 of Volume I Section 4.4 of Volume I
(8) A description of the deployment activities	Section 4.2 of Volume I
(9) A list of solid and liquid wastes generated	Section 4.2.5 of Volume I
(10) A listing of chemical products used (if stored volume exceeds Environmental Protection Agency (EPA) Reportable Quantities)	Section 4.2.6 of Volume I
(11) A description of any vessels, vehicles, and aircraft you will use to support your activities	Section 3.2.6 of Volume I Section 4.2.3 of Volume I Section 4.2.4 of Volume I Section 4.4 of Volume I Section 5.1 of Volume III Section 7.9 of Volume III Appendix III-I Appendix III-J
(12i) A general description of the operating procedures and systems under normal conditions	Section 4.3.1 of Volume I Section 4.3.2 of Volume I Appendix I-B
(12ii) A general description of the operating procedures and systems in the case of accidents or emergencies, including those that are natural or manmade.	Section 4.3.3 of Volume I Appendix I-A Appendix I-B Section 8 of Volume III
(13) Decommissioning and site clearance procedures	Section 4.4 of Volume I
(14i) A listing of all Federal, State, and local authorizations, approvals, or permits that are required to conduct the proposed activities, including commercial operations	Section 5 (Table 5-1) of Volume I

**Table 1.6-1 Construction and Operations Plan Requirements for Commercial Leases Pursuant to 30 CFR §585.105(a), 621 (a-g), 626(a) and (b), 627(a) and (b) (Continued)**

Requirement	Location in COP
<b>30 CFR §585.626(b)</b>	
The U.S. Coast Guard, U.S. Army Corps of Engineers, and any other applicable authorizations, approvals, or permits, including any Federal, State or local authorizations pertaining to energy gathering, transmission or distribution (e.g., interconnection authorizations).	
(14ii) A listing of all Federal, State, and local authorizations, approvals, or permits that are required to conduct the proposed activities, including commercial operations  A statement indicating whether you have applied for or obtained such authorization, approval, or permit.	Section 5 (Table 5-1) of Volume I
(15) Your proposed measures for avoiding, minimizing, reducing, eliminating, and monitoring environmental impacts	Section 4 (Table 4-1) of Volume III Section 5 of Volume III Section 6 of Volume III Section 7 of Volume III Appendix III-A Appendix III-C Appendix III-D Appendix III-F
(16) Information you incorporate by reference	Section 7 of Volume I
(17) A list of agencies and persons with whom you have communicated, or with whom you will communicate, regarding potential impacts associated with your proposed activities	Section 6 (Table 6-1 and Table 6-2) of Volume I
(18) Reference	Section 7 of Volume I Section 9 of Volume III
(19) Financial assurance	Section 1.8 of Volume I
(20) CVA nominations for reports required in subpart G of this part	Section 1.9 of Volume I Appendix I-C Appendix I-D
(21) Construction schedule	Section 1.5.3 (Figures 1.5-1, 1.5-2, and 1.5-3) of Volume I Section 4.1 (Figures 4.1-1 and 4.1-2) of Volume I
(22) Air quality information	Section 5.1 of Volume III Appendix III-B
(23) Other information	Section 1.1 of Volume 1 Section 1.2 of Volume 1 Section 1.4 of Volume 1 Section 1.6 of Volume 1 Section 3 of Volume III Appendix III-G

**Table 1.6-1 Construction and Operations Plan Requirements for Commercial Leases Pursuant to 30 CFR §585.105(a), 621 (a-g), 626(a) and (b), 627(a) and (b) (Continued)**

<b>Requirement</b>	<b>Location in COP</b>
<b>30 CFR §585.627(a)</b>	
(1) Hazard information	Section 3 of Volume II-A Section 4 of Volume II-A Appendix III-A
(2) Water quality	Section 5.2 of Volume III Appendix III-A
(3)(i) Benthic Communities	Section 5 of Volume II-A Section 6.5 of Volume III Appendix III-D
(3)(ii) Marine Mammals	Section 6.7 of Volume III
(3)(iii) Sea turtles	Section 6.8 of Volume III
(3)(iv) Coastal and marine birds	Section 6.2 of Volume III Section 6.4 of Volume III Appendix III-C
(3)(v) Fish and shellfish	Section 6.5 of Volume III Section 6.6 of Volume III Appendix III-D Appendix III-F
(3)(vi) Plankton	Appendix III-F
(3)(vii) Seagrasses	Section 5.2.2 of Volume II-A Section 6.4 of Volume III Appendix III-F
(3)(viii) Plant life	Section 6.1 of Volume III Section 6.4 of Volume III
(4) Threatened or endangered species	Section 6 of Volume III
(5) Sensitive biological resources or habitats	Section 5.2 of Volume II-A (marine-benthic) Section 6 of Volume III Appendix III-D Appendix III-F
(6) Archaeological resources	Volume II-C (submarine) Section 7.3 of Volume III (terrestrial) Appendix III-G
(7) Social and economic resources	Section 7 of Volume III, Appendix III-E Appendix III-H.a Appendix III-H.b
(8) Coastal and marine uses	Section 7.6 of Volume III Section 7.8 of Volume III Section 7.9 of Volume III Appendix III-E Appendix III-I
(9) Consistency Certification	To be provided, if required
(10) Other resources, conditions, and activities	Section 5.1 of Volume III Section 5.3 of Volume III Section 6.3 of Volume III Section 7.9 of Volume III Appendix III-B Appendix III-J



**Table 1.6-1 Construction and Operations Plan Requirements for Commercial Leases Pursuant to 30 CFR §585.105(a), 621 (a-g), 626(a) and (b), 627(a) and (b) (Continued)**

<b>Requirement</b>	<b>Location in COP</b>
<b>30 CFR §585.627(b)</b>	
Consistency certification	To be provided, if required
<b>30 CFR §585.627(c)</b>	
Oil spill response plan	Appendix I-A
<b>30 CFR §585.627(d)</b>	
Safety management system	Appendix I-B

## 1.7 Commercial Lease Stipulations and Compliance

Table 1.7-1 demonstrates compliance with the stipulations in the Project’s lease.

**Table 1.7-1 Commercial Lease Stipulations and Compliance**

<b>Stipulation</b>	<b>Compliance</b>
<b>Section 4(a):</b> The lessee must make all rent payments to the Lessor in accordance with applicable regulations in 30 CFR Part 585, unless otherwise specified in Addendum “B”.	The Proponent has made and will continue to make all rent payments in accordance with applicable regulations, unless otherwise specified in Addendum “B”.
<b>Section 4(b):</b> The Lessee must make all operating fee payments to the Lessor in accordance with applicable regulations in 30 CFR Part 585, as specified in Addendum “B”.	The Proponent will make all operating fee payments in accordance with applicable regulations.
<b>Section 5:</b> The Lessee may conduct those activities described in Addendum “A” only in accordance with a SAP or COP approved by the Lessor. The Lessee may not deviate from an approved SAP or COP except as provided in applicable regulations in 30 CFR Part 585.	The Proponent will conduct activities as described in the COP.
<b>Section 7:</b> The Lessee must conduct, and agrees to conduct, all activities in the leased area in accordance with an approved SAP or COP, and with all applicable laws and regulations.	The Proponent will conduct all activities in the leased area in accordance with the COP and all applicable laws and regulations.
<b>Section 10:</b> The Lessee must provide and maintain at all times a surety bond(s) or other form(s) of financial assurance approved by the Lessor in the amount specified in Addendum “B”.	The Project will provide the necessary financial assurance s as described in Section 1.8 of Volume I.
<b>Section 13:</b> Unless otherwise authorized by the Lessor, pursuant to the applicable regulations in 30 CFR Part 585, the Lessee must remove or decommission all facilities, projects, cables, pipelines, and obstructions and clear the seafloor of all obstructions created by activities on the leased area, including any project easements within two years following lease termination, whether by expiration, cancellation, contraction, or relinquishment, in accordance with any approved SAP, COP, or approved Decommissioning Application, and applicable regulations in 30 CFR Part 585.	Preliminary decommissioning plans are described in Section 4.4 of Volume I. The decommissioning will be in accordance with the applicable regulations.

**Table 1.7-1 Commercial Lease Stipulations and Compliance (Continued)**

Stipulation	Compliance
<p><b>Section 14:</b> The Lessee must</p> <ul style="list-style-type: none"> <li>(a) Maintain all places of employment for activities authorized under this lease in compliance with occupational safety and health standards and, in addition, free from recognized hazards to employees of the Lessee or of any contractor or subcontractor operating under this lease;</li> <li>(b) Maintain all operations within the leased areas in compliance with regulations in 30 CFR Part 585 and orders from the Lessor and other Federal agencies with jurisdiction, intended to protect persons, property and the environment on the OCS; and</li> <li>(c) Provide any requested documents and records, which are pertinent to occupational or public health, safety, or environmental protection, and allow prompt access, at the site of any operation or activity conducted under this lease, to any inspector authorized by the Lessor or other Federal agency with jurisdiction.</li> </ul>	<ul style="list-style-type: none"> <li>(a) The Proponent will maintain all places of employment in compliance with applicable standards.</li> <li>(b) The Proponent will maintain all operations in the leased area in compliance with applicable regulations.</li> <li>(c) The Proponent will provide any requested documents and records.</li> </ul>
<p><b>Section 15:</b> The Lessee must comply with the Department of the Interior’s non-procurement debarment and suspension regulations set forth in 2 CFR Parts 180 and 1400 and must communicate the requirement to comply with these regulations to persons with whom it does business related to this lease by including this requirement in all relevant contracts and transactions.</p>	<p>The Project will comply with the applicable Department and suspension regulations.</p>
<p><b>Section 16:</b> During the performance of this lease, the Lessee must fully comply with paragraphs (1) through (7) of section 202 of Executive Order 11246, as amended (reprinted in 41 CFR 60-1.4(a)), and the implementing regulations, which are for the purpose of preventing employment discrimination against persons on the basis of race, color, religion, sex, or national origin.</p>	<p>The Project will fully comply with paragraphs (1) through (7) of section 202 of Executive Order 11246, as amended.</p>
<p><b>Addendum “B”, Section III (Payments):</b> Unless otherwise authorized by the Lessor in accordance with the applicable regulations in 30 CFR Part 585, the Lessee must make payments as described below.</p>	<p>The Proponent will make payments as stipulated in Addendum “B”, Section III.</p>

As described in Section 4.3.2 and Table 4.3-1, offshore and nearshore geophysical surveys will be conducted post-construction during the operations and maintenance phase of the Project to conduct activities such as, inspect cable depth of burial and conduct as-built cable surveys. In addition, it is anticipated that short ad-hoc geophysical or geotechnical surveys may be required during construction to verify site conditions. Geotechnical work would only be conducted in areas already cleared for archaeological/historical resources.

Any unanticipated discoveries of cultural resources will be reported and avoided during further onsite work, with review and recommendations by the qualified marine archaeologist.

All surveys will use Best Management Practices and industry standard equipment that has been approved for use previously for offshore renewable energy work on the OCS. Most of the surveys will entail use of geophysical systems 200 kHz or higher in frequency that do not require any special mitigation (multi-beam echosounder, side scan sonar, and magnetometer). Standard operating conditions (i.e., vessel strike avoidance, separation distances from protected species, necessary notifications, marine trash and debris prevention, etc.) for work on the OCS will be observed.

For surveys using sonar equipment less than 200 kHz in frequency (sub-bottom profilers) and any bottom disturbing investigations that have been previously cleared, in addition to the standard operating procedures identified above, the following mitigation measures will be employed to maintain a level of consistency with pre-COP offshore project activities.

- ◆ Notifications when appropriate: national security and military organizations, USCG communication, tribal correspondence.
- ◆ Vessel strike avoidance measures, including speed restrictions in Dynamic Management Areas and from November 1 through July 31.
- ◆ Protected Species Observer (“PSO”) monitoring: PSOs will accompany survey vessels and follow standard monitoring protocols, actively observing an established exclusion zone around each vessel.
- ◆ Shut down and soft start procedures.

## 1.8 Financial Assurance

The activities and facilities proposed in the COP will be covered by financial assurance in amounts and within time frames approved by BOEM.

## 1.9 Certified Verification Agent Nomination

BOEM regulations at 30 C.F.R. § 585.705 et seq. define the requirements for use of a Certified Verification Agent (“CVA”) for offshore wind projects subject to BOEM jurisdiction. The CVA role is a key component in maintaining safety and reducing environmental risk in offshore wind projects.

### *Nomination Statement*

Vineyard Wind nominates DNV GL as CVA for the Facility Design Report (“FDR”) and Fabrication and Installation Report (“FIR”) as required by 30 C.F.R. § 585.706(a). DNV GL is world-recognized as a leading certification and classification society, and has significant experience in the US offshore wind sector.

### *Qualification Statement*

The Statement of Qualifications for CVA Services is provided in Appendix I-C. The Statement addresses:

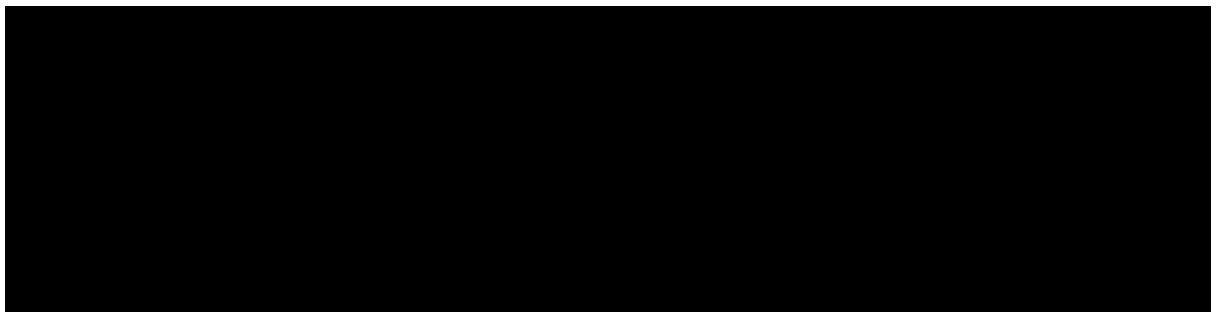
- ◆ Previous experience of the nominated CVA in third-party verification and BOEM procedures
- ◆ Technical capabilities of the CVA and staff members
- ◆ Size and type of organization
- ◆ Availability of technology
- ◆ Ability to perform
- ◆ Conflict of interest
- ◆ Professional Engineer supervision

### *Scope of Work and Verification Plan*

The CVA Scope of Work and Verification Plan is provided in Appendix I-D. This document defines the alignment of 30 C.F.R. § 585 with the International Electrotechnical Commission (“IEC”) Standard 61400-22, including issuance of IEC-compliant conformity statements and evaluation reports. IEC 61400-22 will be supplemented by DNVGL-SE-0073, Service Specification for Project Certification of Wind Farms. The scope specifies the level of work to be performed by the CVA at all phases of the verification, and identifies the high-level list of documents and subject matter that the CVA will review.

## **1.10 Design Standards**

BOEM’s COP Guidelines recognize that “[t]he BOEM’s renewable energy regulations are not prescriptive regarding the design standards that must be used for an offshore wind energy installation” (COP Guidelines Appendix C, Section I). Further, the Guidelines state that “[f]or offshore wind turbines, BOEM will accept a ‘design-basis’ approach whereby the applicant proposes which criteria and standards to apply, and then justifies why each particular criterion and standard is appropriate” (COP Guidelines Appendix C, Section I). Towards that end, Vineyard Wind has created a Hierarchy of Standards, provided in Appendix I-E, to inform the Project design and development process.



## 2.0 Project Location – Location Plat

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## 2.0 PROJECT LOCATION – LOCATION PLAT

### 2.1 Vineyard Wind Lease Area (OCS-A 501)

The over 675 square kilometers (“km<sup>2</sup>”) (166,886 acres) Lease Area is approximately 16 kilometers (“km”) (8.7 nautical miles [“nm”]) wide and 50 km (26 nm) long.<sup>6</sup> As shown on Figure 2.1-1, the long axis of the Vineyard Wind Lease Area is oriented northeast to southwest. At its nearest point, the Lease Area is just over 23 km (14 miles [“mi”]) from the southeast corner of Martha’s Vineyard and a similar distance to Nantucket.

Water depths in the Lease Area range from about 35-60 meters (“m”) (115-197 feet [“ft”]). As shown on Figure 2.1-1, water depths gradually increase as distance from land increases. Water depths in the northern half of the Lease Area generally range from approximately 35-49 m (115-161 ft). As noted above and discussed in subsequent sections, the Project would be located within the northern portion of the Lease Area, referred to as the Wind Development Area (“WDA”). The WDA is 306 km<sup>2</sup> (75,614 acres).

Coordinates for the Wind Turbine Generators (“WTGs”) and Electrical Service Platforms (“ESPs”) are provided in Table 2.1-1, below.

**Table 2.1-1 Coordinates for the WTGs and ESPs**

Name	Easting (m)	Northing (m)	Latitude	Longitude	Water Depth (m)
<b>WTGs</b>					
VYW01_R00_P01	379890	4555090	41° 08' 17.6589" N	70° 25' 52.0635" W	
VYW01_R00_P02	384690	4550290	41° 05' 44.5510" N	70° 22' 22.9830" W	
VYW01_R01_P01	378690	4555090	41° 08' 17.0163" N	70° 26' 43.5213" W	
VYW01_R01_P02	379890	4553890	41° 07' 38.7564" N	70° 25' 51.2180" W	
VYW01_R01_P03	383490	4550290	41° 05' 43.9349" N	70° 23' 14.4090" W	
VYW01_R01_P04	384690	4549090	41° 05' 5.6473" N	70° 22' 22.1730" W	
VYW01_R02_P01	377004	4554937	41° 08' 11.1427" N	70° 27' 55.7084" W	
VYW01_R02_P02	377966	4553975	41° 07' 40.4790" N	70° 27' 13.7691" W	
VYW01_R02_P03	378927	4553014	41° 07' 9.8426" N	70° 26' 31.8843" W	
VYW01_R02_P04	379889	4552052	41° 06' 39.1700" N	70° 25' 49.9666" W	
VYW01_R02_P05	382383	4549518	41° 05' 18.3331" N	70° 24' 1.3175" W	
VYW01_R02_P06	383536	4548353	41° 04' 41.1618" N	70° 23' 11.1173" W	
VYW01_R02_P07	384688	4547189	41° 04' 4.0160" N	70° 22' 20.9764" W	
VYW01_R03_P01	375802	4553735	41° 07' 31.5172" N	70° 28' 46.3742" W	
VYW01_R03_P02	377113	4552424	41° 06' 49.7348" N	70° 27' 49.2236" W	
VYW01_R03_P03	378424	4551113	41° 06' 7.9442" N	70° 26' 52.0932" W	
VYW01_R03_P04	379735	4549802	41° 05' 26.1453" N	70° 25' 54.9828" W	

<sup>6</sup> As shown on Figure 1.1-1, the perimeter of the Lease Area is irregular or “sawtoothed,” hence the overall area is less than that of a true 10 x 30 mi rectangle.

Table 2.1-1 Coordinates for the WTGs and ESPs (Continued)

Name	Easting (m)	Northing (m)	Latitude	Longitude	Water Depth (m)
<b>WTGs</b>					
VYW01_R03_P05	381202	4548335	41° 04' 39.3628" N	70° 24' 51.1006" W	
VYW01_R03_P06	382364	4547173	41° 04' 2.2994" N	70° 24' 0.5178" W	
VYW01_R03_P07	383527	4546010	41° 03' 25.1976" N	70° 23' 9.9073" W	
VYW01_R03_P08	384689	4544848	41° 02' 48.1213" N	70° 22' 19.3560" W	
VYW01_R04_P01	374600	4552533	41° 06' 51.8856" N	70° 29' 37.0230" W	
VYW01_R04_P02	375911	4551222	41° 06' 10.1102" N	70° 28' 39.8735" W	
VYW01_R04_P03	377222	4549911	41° 05' 28.3265" N	70° 27' 42.7441" W	
VYW01_R04_P04	378533	4548600	41° 04' 46.5345" N	70° 26' 45.6347" W	
VYW01_R04_P05	380000	4547133	41° 03' 59.7597" N	70° 25' 41.7536" W	
VYW01_R04_P06	381311	4545822	41° 03' 17.9502" N	70° 24' 44.6869" W	
VYW01_R04_P07	382623	4544510	41° 02' 36.1005" N	70° 23' 47.5967" W	
VYW01_R04_P08	383934	4543199	41° 01' 54.2744" N	70° 22' 50.5700" W	
VYW01_R05_P01	373398	4551331	41° 06' 12.2481" N	70° 30' 27.6549" W	
VYW01_R05_P02	374709	4550020	41° 05' 30.4796" N	70° 29' 30.5064" W	
VYW01_R05_P03	376020	4548709	41° 04' 48.7028" N	70° 28' 33.3781" W	
VYW01_R05_P04	377331	4547398	41° 04' 6.9177" N	70° 27' 36.2698" W	
VYW01_R05_P05	378798	4545931	41° 03' 20.1506" N	70° 26' 32.3898" W	
VYW01_R05_P06	380109	4544619	41° 02' 38.3155" N	70° 25' 35.3233" W	
VYW01_R05_P07	381420	4543308	41° 01' 56.5046" N	70° 24' 38.2776" W	
VYW01_R05_P08	382732	4541997	41° 01' 14.6859" N	70° 23' 41.2092" W	
VYW01_R06_P01	372196	4550129	41° 05' 32.6047" N	70° 31' 18.2699" W	
VYW01_R06_P02	373507	4548818	41° 04' 50.8430" N	70° 30' 21.1225" W	
VYW01_R06_P03	374818	4547507	41° 04' 9.0731" N	70° 29' 23.9952" W	
VYW01_R06_P04	376129	4546196	41° 03' 27.2949" N	70° 28' 26.8879" W	
VYW01_R06_P05	377596	4544729	41° 02' 40.5355" N	70° 27' 23.0091" W	
VYW01_R06_P06	378907	4543417	41° 01' 58.7073" N	70° 26' 25.9436" W	
VYW01_R06_P07	380218	4542106	41° 01' 16.9032" N	70° 25' 28.8989" W	
VYW01_R06_P08	381530	4540795	41° 00' 35.0915" N	70° 24' 31.8315" W	
VYW01_R07_P01	370994	4548927	41° 04' 52.9553" N	70° 32' 8.8680" W	
VYW01_R07_P02	372305	4547616	41° 04' 11.2005" N	70° 31' 11.7217" W	
VYW01_R07_P03	373615	4546305	41° 03' 29.4369" N	70° 30' 14.6382" W	
VYW01_R07_P04	374926	4544994	41° 02' 47.6655" N	70° 29' 17.5320" W	
VYW01_R07_P05	376394	4543527	41° 02' 0.9144" N	70° 28' 13.6115" W	
VYW01_R07_P06	377705	4542215	41° 01' 19.0931" N	70° 27' 16.5471" W	
VYW01_R07_P07	379016	4540904	41° 00' 37.2959" N	70° 26' 19.5034" W	
VYW01_R07_P08	380328	4539593	40° 59' 55.4910" N	70° 25' 22.4369" W	
VYW02_R01_P01	369528	4547461	41° 04' 4.5895" N	70° 33' 10.5563" W	
VYW02_R01_P02	370512	4546478	41° 03' 33.2890" N	70° 32' 27.6638" W	
VYW02_R01_P03	371495	4545495	41° 03' 1.9833" N	70° 31' 44.8253" W	

Table 2.1-1 Coordinates for the WTGs and ESPs (Continued)

Name	Easting (m)	Northing (m)	Latitude	Longitude	Water Depth (m)
<b>WTGs</b>					
VYW02_R01_P04	372478	4544512	41° 02' 30.6729" N	70° 31' 1.9981" W	
VYW02_R01_P05	373461	4543529	41° 01' 59.3579" N	70° 30' 19.1822" W	
VYW02_R01_P06	374929	4542061	41° 01' 12.5837" N	70° 29' 15.2624" W	
VYW02_R01_P07	375912	4541078	41° 00' 41.2570" N	70° 28' 32.4745" W	
VYW02_R01_P08	376896	4540094	41° 00' 9.8939" N	70° 27' 49.6544" W	
VYW02_R01_P09	377879	4539111	40° 59' 38.5579" N	70° 27' 6.8891" W	
VYW02_R01_P10	378863	4538127	40° 59' 7.1854" N	70° 26' 24.0915" W	
VYW02_R02_P01	368326	4546259	41° 03' 24.9269" N	70° 34' 1.1170" W	
VYW02_R02_P02	369310	4545276	41° 02' 53.6316" N	70° 33' 18.2252" W	
VYW02_R02_P03	370293	4544293	41° 02' 22.3310" N	70° 32' 35.3876" W	
VYW02_R02_P04	371276	4543310	41° 01' 51.0258" N	70° 31' 52.5612" W	
VYW02_R02_P05	372259	4542326	41° 01' 19.6835" N	70° 31' 9.7453" W	
VYW02_R02_P06	373726	4540859	41° 00' 32.9489" N	70° 30' 5.8702" W	
VYW02_R02_P07	374710	4539876	41° 00' 1.6279" N	70° 29' 23.0403" W	
VYW02_R02_P08	375693	4538892	40° 59' 30.2693" N	70° 28' 40.2638" W	
VYW02_R02_P09	376677	4537909	40° 58' 58.9391" N	70° 27' 57.4565" W	
VYW02_R02_P10	377660	4536925	40° 58' 27.5712" N	70° 27' 14.7024" W	
VYW02_R03_P01	367124	4545057	41° 02' 45.2583" N	70° 34' 51.6608" W	
VYW02_R03_P02	368108	4544074	41° 02' 13.9682" N	70° 34' 8.7698" W	
VYW02_R03_P03	369091	4543091	41° 01' 42.6728" N	70° 33' 25.9330" W	
VYW02_R03_P04	370074	4542108	41° 01' 11.3727" N	70° 32' 43.1074" W	
VYW02_R03_P05	371057	4541124	41° 00' 40.0356" N	70° 32' 0.2923" W	
VYW02_R03_P06	372524	4539657	40° 59' 53.3086" N	70° 30' 56.4184" W	
VYW02_R03_P07	373508	4538674	40° 59' 21.9928" N	70° 30' 13.5894" W	
VYW02_R03_P08	374491	4537690	40° 58' 50.6394" N	70° 29' 30.8136" W	
VYW02_R03_P09	375475	4536707	40° 58' 19.3143" N	70° 28' 48.0070" W	
VYW02_R03_P10	376458	4535723	40° 57' 47.9516" N	70° 28' 5.2538" W	
VYW02_R04_P01	365922	4543855	41° 02' 5.5839" N	70° 35' 42.1877" W	
VYW02_R04_P02	366905	4542872	41° 01' 34.2983" N	70° 34' 59.3404" W	
VYW02_R04_P03	367889	4541889	41° 01' 3.0086" N	70° 34' 16.4616" W	
VYW02_R04_P04	368872	4540906	41° 00' 31.7137" N	70° 33' 33.6368" W	
VYW02_R04_P05	369855	4539922	41° 00' 0.3817" N	70° 32' 50.8225" W	
VYW02_R04_P06	371322	4538455	40° 59' 13.6625" N	70° 31' 46.9498" W	
VYW02_R04_P07	372306	4537472	40° 58' 42.3518" N	70° 31' 4.1216" W	
VYW02_R04_P08	373289	4536488	40° 58' 11.0035" N	70° 30' 21.3466" W	
VYW02_R04_P09	374273	4535505	40° 57' 39.6836" N	70° 29' 38.5408" W	
VYW02_R04_P10	375256	4534521	40° 57' 8.3260" N	70° 28' 55.7883" W	
VYW02_R05_P01	364720	4542653	41° 01' 25.9035" N	70° 36' 32.6978" W	
VYW02_R05_P02	365703	4541670	41° 00' 54.6231" N	70° 35' 49.8513" W	



**Table 2.1-1 Coordinates for the WTGs and ESPs (Continued)**

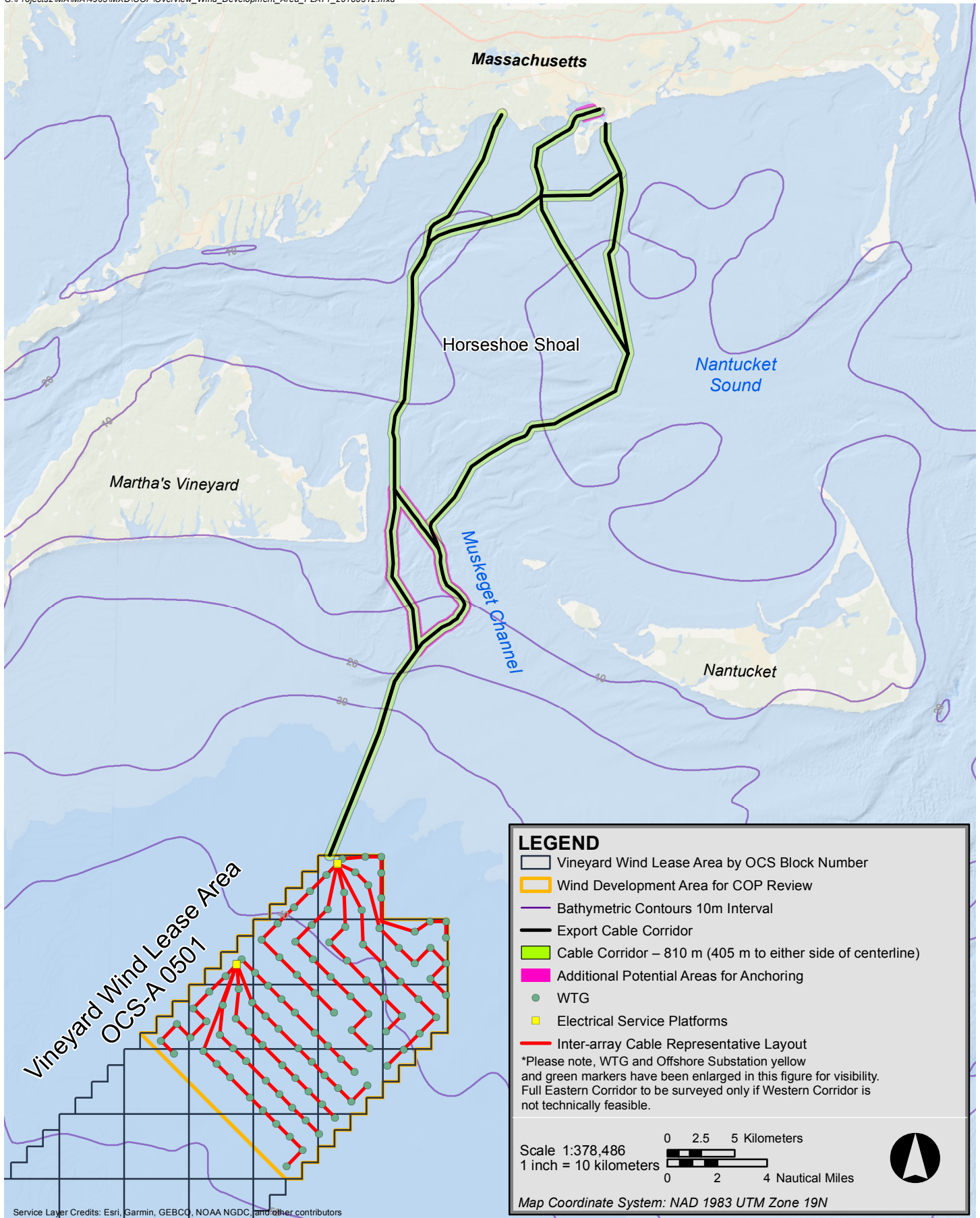
Name	Easting (m)	Northing (m)	Latitude	Longitude	Water Depth (m)
<b>WTGs</b>					
VYW02_R05_P03	366687	4540687	41° 00' 23.3386" N	70° 35' 6.9733" W	
VYW02_R05_P04	367670	4539703	40° 59' 52.0164" N	70° 34' 24.1486" W	
VYW02_R05_P05	368653	4538720	40° 59' 20.7219" N	70° 33' 41.3359" W	
VYW02_R05_P06	370120	4537253	40° 58' 34.0104" N	70° 32' 37.4645" W	
VYW02_R05_P07	371104	4536270	40° 58' 2.7049" N	70° 31' 54.6370" W	
VYW02_R05_P08	372087	4535286	40° 57' 31.3617" N	70° 31' 11.8628" W	
VYW02_R05_P09	373071	4534303	40° 57' 0.0469" N	70° 30' 29.0578" W	
VYW02_R05_P10	374054	4533319	40° 56' 28.6945" N	70° 29' 46.3061" W	
VYW02_R06_P01	363518	4541451	41° 00' 46.2172" N	70° 37' 23.1910" W	
VYW02_R06_P02	364501	4540468	41° 00' 14.9419" N	70° 36' 40.3454" W	
VYW02_R06_P10	372852	4532117	40° 55' 49.0570" N	70° 30' 36.8071" W	
<b>ESPs</b>					
OSS-I_01	376621	4554553	41° 07' 58.4773" N	70° 28' 11.8402" W	
OSS-I_02	376650	4554581	41° 07' 59.4088" N	70° 28' 10.6199" W	
OSS-II_01	369172	4547106	41° 03' 52.8918" N	70° 33' 25.5240" W	
OSS-II_02	369143	4547079	41° 03' 51.9694" N	70° 33' 26.7428" W	

**NOTES:**

1. Grid coordinates referenced to UTM Zone 19 north in meters, NAD83 datum.
2. Water depths may be interpolated where WTG and ESP locations have not been surveyed yet.
3. Water depths are referenced to Mean Lower Low Water.

## 2.2 Onshore Facilities

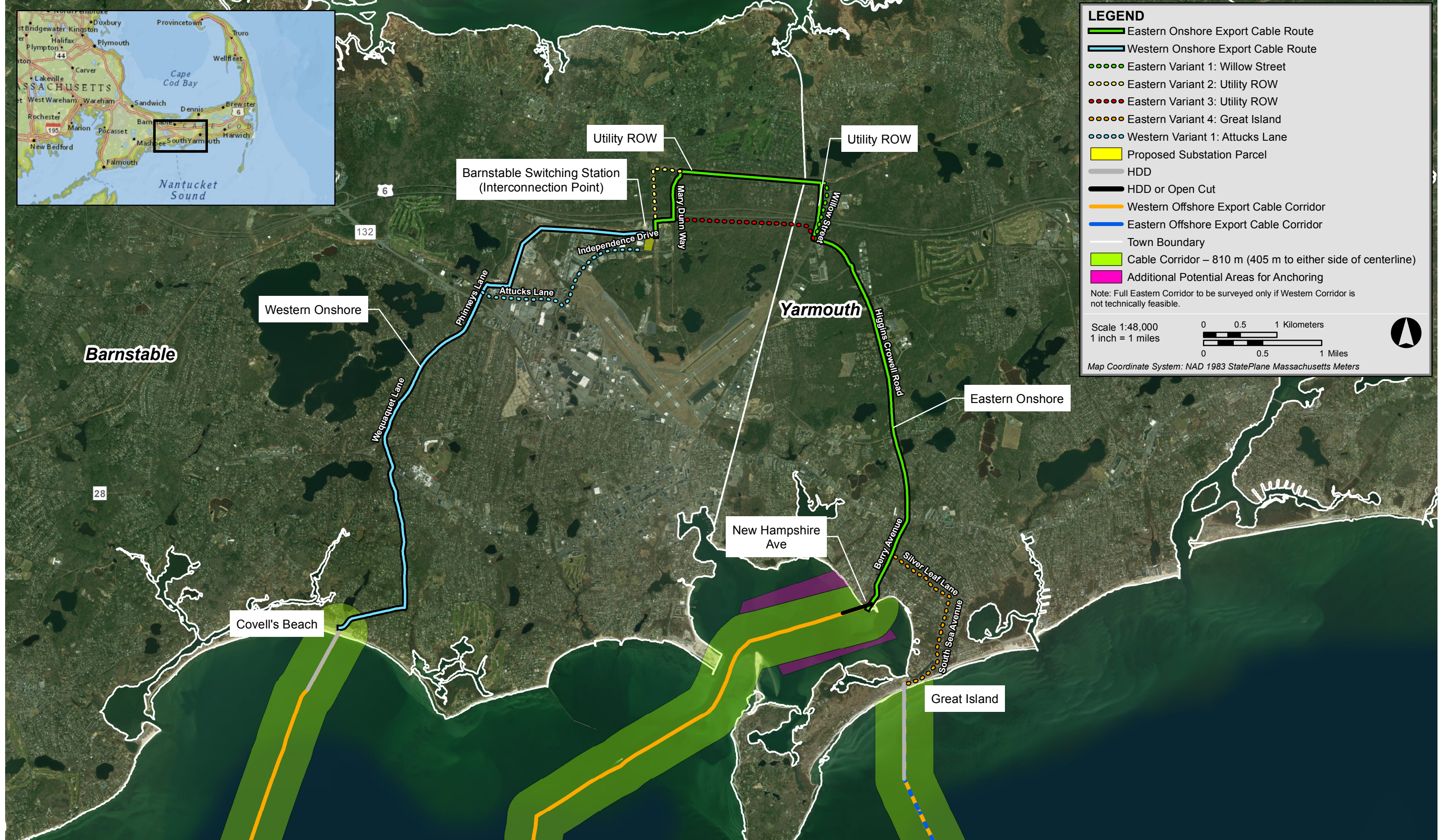
The Project’s onshore facilities will include the Landfall Site, the onshore export cable from the Landfall Site to the onshore substation, the onshore substation itself, and the connections from the onshore substation to the existing bulk power grid. The Project’s onshore components are shown on Figure 2.2-1.



**Vineyard Wind Project**



**Figure 2.1-1**  
Offshore Location Plat



### 3.0 Project Structures and Facilities – General Structural and Project Design, Fabrication and Installation

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### 3.0 PROJECT STRUCTURES AND FACILITIES - GENERAL STRUCTURAL AND PROJECT DESIGN, FABRICATION AND INSTALLATION

#### 3.1 Offshore 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.

Appropriate lightning protection will be installed on the electrical systems, including the WTGs and ESPs.

Table 3.1-1 lists the Project Envelope and highlights the maximum number of structures or maximum dimensions (referred to as the “maximum design scenario”).

**Table 3.1-1 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 <sup>1</sup>	187 meters (“m”) (614 feet [“ft”])	212 m (696 ft)
Number of Positions (up to) <sup>2</sup>	~ 8 MW WTGs	~ 10 MW WTGs
	106	88
FOUNDATIONS		
Foundation Envelope	Combination of at least 400 MW monopiles and up to 400 MW jackets: -100% monopiles or -Up to 50% jackets, remainder monopiles	
Foundation Type	Jackets (Pin Piles)	Monopiles
Number of Piles/Foundation	3-4	1
Maximum Area of Scour Protection at each Foundation	up to 1800 square meters (“m <sup>2</sup> ”) (19,375 square feet [“ft <sup>2</sup> ”])	up to 2100 m <sup>2</sup> (22,600 ft <sup>2</sup> )
Maximum Number of Foundations Installed per Day (24 hours)	2 (up to 8 pin piles)	2
ELECTRICAL SERVICE PLATFORMS		
ESP Type	Light-weight ESP	Conventional ESP
Number of ESPs	4	2
Foundation Types for Conventional or Light-weight ESP	Monopiles	Jackets

**Table 3.1-1 Vineyard Wind Project Envelope with Maximum Design Scenario Highlighted (Continued)**

CAPACITY	Maximum	
Number of Piles/Foundation	1	3-4
Maximum Area of Scour Protection at each Foundation	up to 2100 m <sup>2</sup> (22,600 ft <sup>2</sup> )	up to 2500 m <sup>2</sup> (26,900 ft <sup>2</sup> )
Maximum Height above Mean Low Low Water (“MLLW”)	65.5 m (215 ft)	<b>66.5 m (218 ft)</b>
INTER-ARRAY CABLES		
Inter-array Cable Voltage	66 kilovolts (“kV”)	
Maximum Length of Inter-array Cables	<b>275 kilometers (“km”) (171 miles [“mi”])</b>	
EXPORT AND INTER-LINK CABLES		
Export and Inter-link Cable Voltage	220 kV	
Maximum Length of Inter-link Cable <sup>3</sup>	<b>15 km (9.3 mi)</b>	
Maximum Number of Export Cables	3	
Maximum Length of Export Cables (for three export cables)	<b>227 km (141 mi)</b>	

Notes:

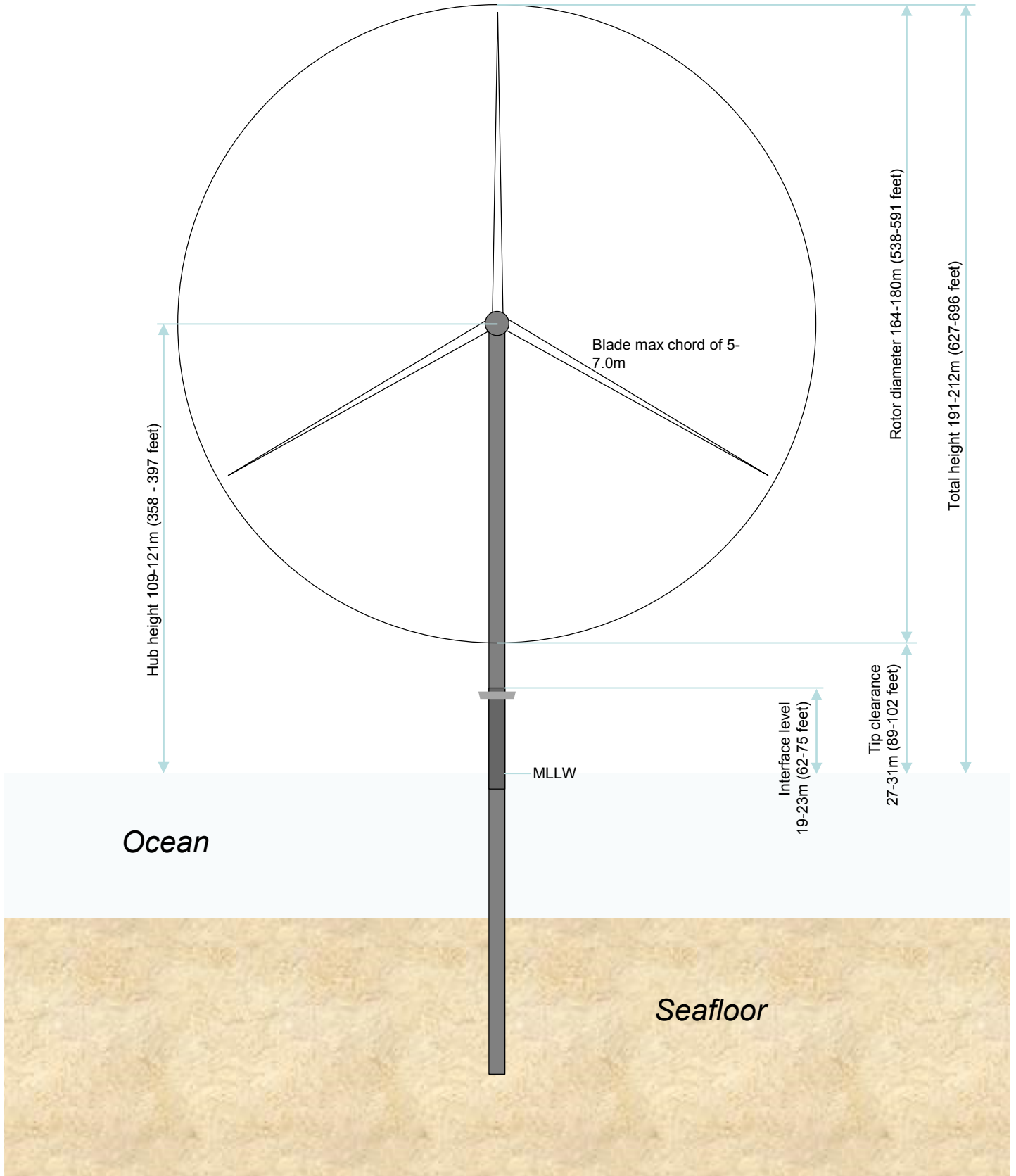
**Maximum Design Scenario indicated by double lined box and bold text.**

1. Turbine output not necessarily proportionately linked to size, so smallest turbine size may not be an eight MW turbine.
2. Additional positions included account for spare positions as well as added capacity to account for electrical losses.

### **3.1.1 Wind Turbine Generators**

The Project will utilize WTGs specially designed for offshore use (see Figure 3.1-1). The WTGs consists of two main components: the Rotor Nacelle Assembly (“RNA”) and the tower. The WTGs will have a three-bladed rotor with a rotor diameter as listed in Table 3.1-1 below. The nacelle houses the power generating components of the turbine, including the gear box, generator, transformer, converter and other auxiliary systems. 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 tower, which is mounted on a foundation and/or transition piece via a bolted connection; the foundation is further described in Section 3.1.2. The tower is typically constructed in two or three sections for offshore wind projects. Both the nacelle and the tower are steel structures coated to protect against corrosion.

For service purposes, the WTGs will have cranes in the nacelle and on the external working platform (which is mounted on the foundation and/or transition piece), that are able to lift spare parts to their proper location in accordance with operations and maintenance procedures. The WTGs will also include access ways for personnel inside the tower. An elevator will serve as the main access route. The elevator will be designed



to carry personnel, tools, small equipment, and small spare parts. Ladders will serve as a secondary access route. All access routes will be designed to ensure and will comply with all relevant standards and regulations.

**Table 3.1-2 Envelope of WTG Parameters**

<b>WTG Parameter</b>	<b>Envelope</b>
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: Elevations relative to MHHW are approximately 1 m (3 ft) lower than those relative to MLLW.

The WTGs will have maximum rotor tip height of 212 m (696 ft) above Mean Lower Low Water (“MLLW”) and will include a nighttime wind turbine obstruction lighting system in compliance with Federal Aviation Administration (“FAA”) and/or BOEM requirements. The obstruction lighting system will consist of two synchronized FAA “L-864” aviation red flashing obstruction lights placed on the nacelle of each WTG. If approved by BOEM and the FAA, 30 flashes per minute will be utilized for air navigation lighting.

Vineyard Wind is working to reduce the lighting to lessen the potential impacts of nighttime light on migratory birds and to address aesthetic concerns. The Project expects to use either an Aircraft Detection Lighting System (ADLS) that is activated automatically by approaching aircraft or a system that automatically adjusts lighting intensity in response to visibility conditions. The use of either of these systems is subject to commercial availability by turbine manufacturers, and approval by BOEM and the FAA, if applicable. If the use of ADLS is not feasible, reduced lighting for the interior will be reviewed and discussed with BOEM and the FAA. Turbines will be no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in color to reduce their visibility from against the horizon. Aviation concerns are further discussed in Section 7.9 of Volume III.

Marine navigation lighting will consist of two yellow flashing lights at each turbine and lights on the corners of ESPs. Yellow lights will be visible at five nautical miles (“nm”) and/or two nm in accordance with consultation with the US Coast Guard (“USCG”). Lighting on the turbines will be located on top of the work platform design level at a height of 20-23 m (66-75 ft) above MLLW. Lighting on top of the substations will be placed at a similar height above MLLW.

Daytime marking schemes will follow International Association of Lighthouse Authorities guidance, which involves marking each structure in the Project area with high visibility yellow paint. Alphanumeric identification panels of black lettering on bright yellow background will identify each WTG. Each turbine will also be clearly identified on National Oceanic and Atmospheric Administration charts. The high visibility yellow paint



shall begin at the waterline (at all tidal conditions) and cover the WTG foundation to a height of at least 15 m (50 ft) above the waterline. Fog horns and radar reflectors are included in the Project design to enhance marine navigation safety. Further information on marine navigation, including figures showing the marking and lighting, can be found in the Navigation Risk Assessment (see Appendix III-I).

### **3.1.1.1 Site Layout**

As described in Section 1.5, the Project is being permitted using an Envelope concept. If eight MW turbines are used, up to 106 WTGs will be installed; if 10 MW turbines are used, up to 88 WTGs will be installed. The site layout for up to 106 turbines is shown on Figure 3.1-2. The WTGs are laid out in a grid-like pattern with spacing of 0.76-1.0 nm between turbines. In consultation with local fishermen and the USCG, corridors in a northwest/southeast and northeast/southwest direction have been maintained.

### **3.1.2 WTG Foundations**

The foundations supporting the WTGs will include one of the following two concepts:

- ◆ Monopiles and transition piece (“TP”) (or extended monopile); and
- ◆ Jackets

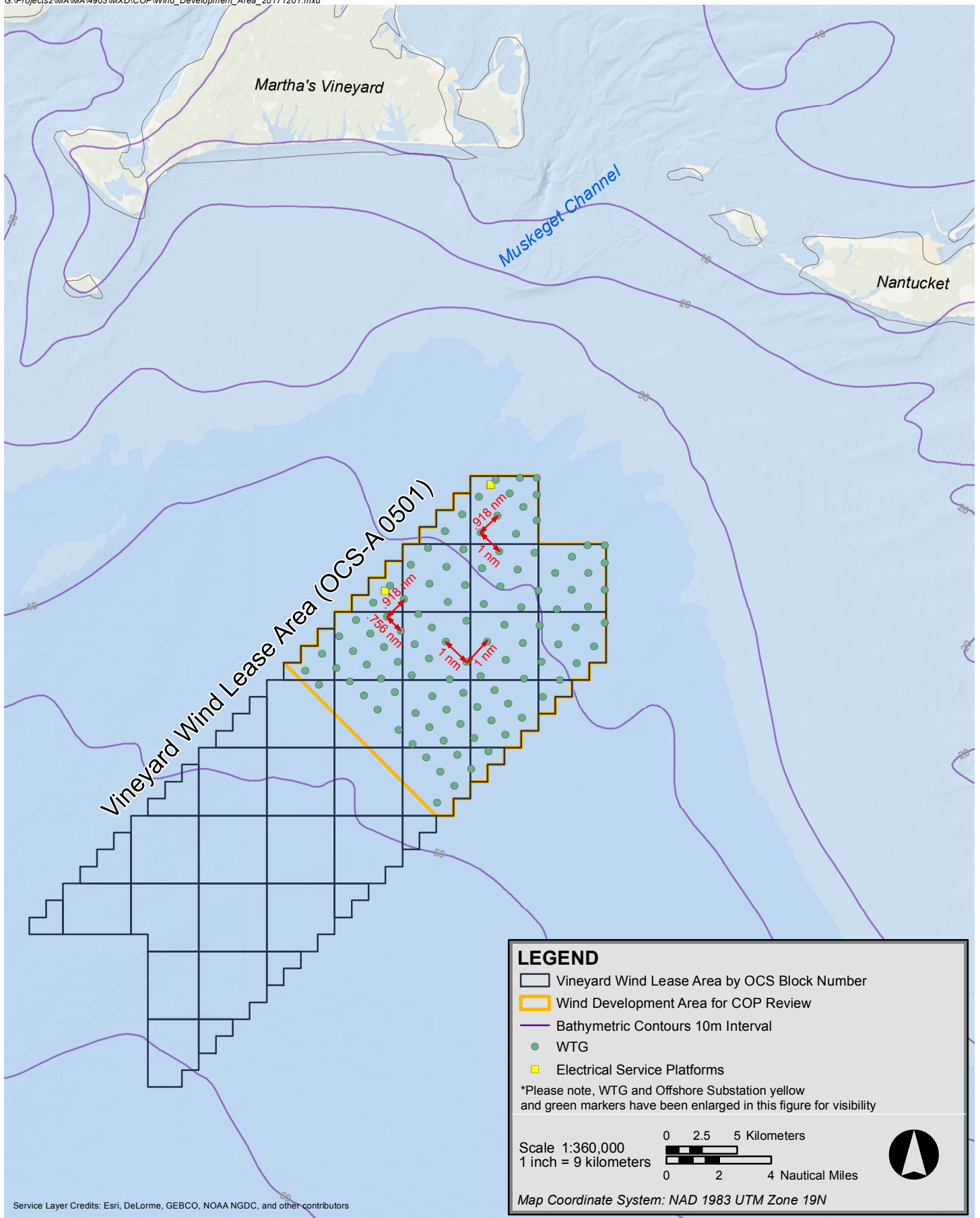
As described in Section 1.5, both concepts are contained in the Project Envelope, which includes monopiles for ~800 MW of WTGs or monopiles for ~400 MW and jackets for up to ~400 MW (or some number in between). Jackets are expected to be used in deeper water locations.

#### **3.1.2.1 Monopiles**

A monopile is a single, hollow cylinder fabricated from steel that is secured in the seabed. Monopile dimensions are shown on Figure 3.1-3 and are included in Table 3.1-3, below. Monopiles are a proven concept that has been used successfully at many offshore wind farms. They currently account for more than 80% of the installed foundations in Europe, with more than 3,350 units installed (Wind Europe, 2017).

A TP is typically installed between the monopile and WTG tower (see Figures 3.1-3 and 3.1-4). The TP features a connecting flange enabling the WTG tower section to be bolted/mounted on top of the TP; it also 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 (see Figure 3.1-3). In a variation of the concept, the monopile is extended to include the TP (this is referred to as an “extended monopile”; see Figure 3.1-5). In this case, secondary structures are attached after installation of the pile.

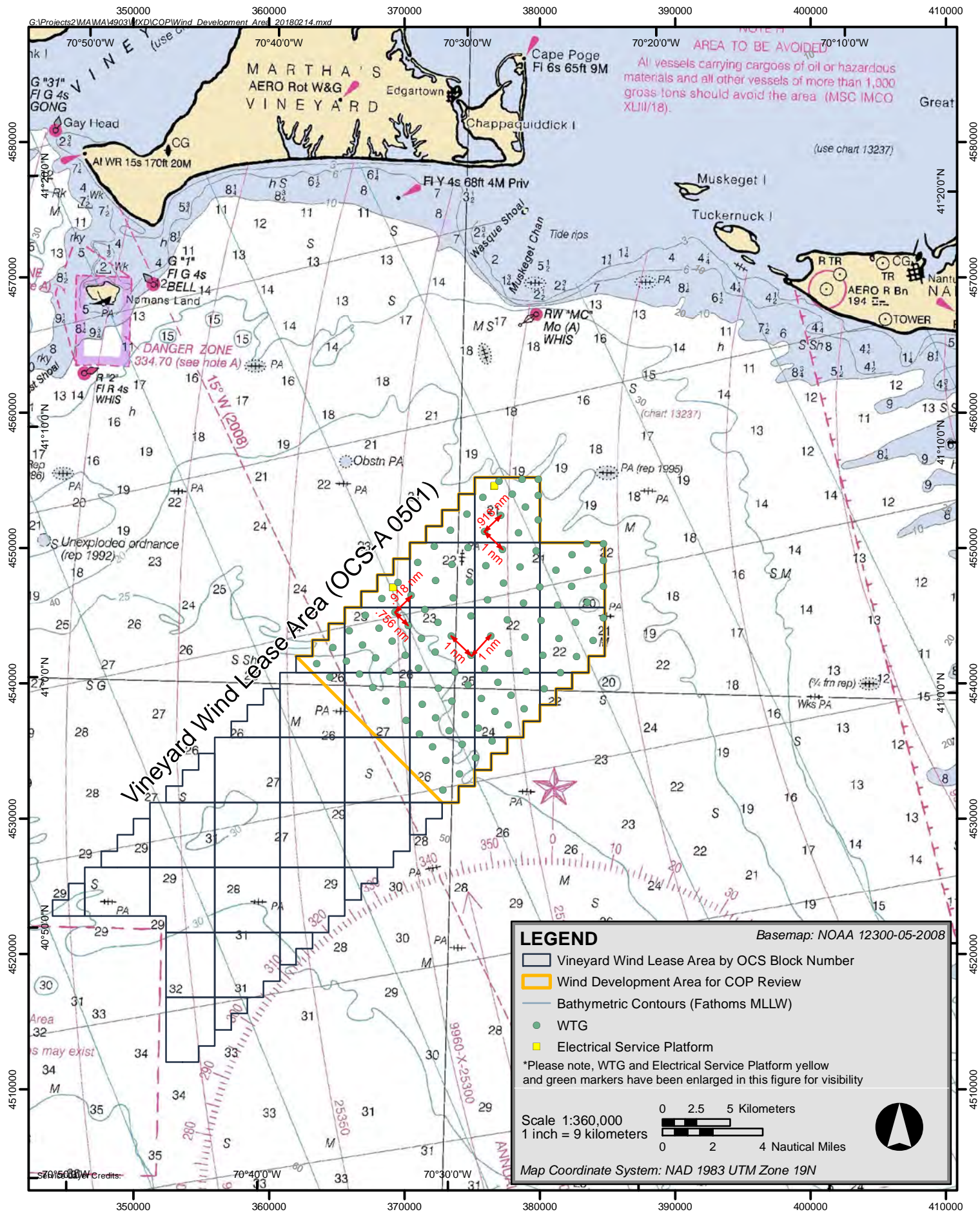
The monopile foundations for the Project will be equipped with a corrosion protection system designed in accordance with relevant standards. The monopiles will likely require the use of an anode cage to ensure sufficient corrosion protection closer to the seabed. An anode cage is a steel structure that has anodes attached to it.



## Vineyard Wind Project



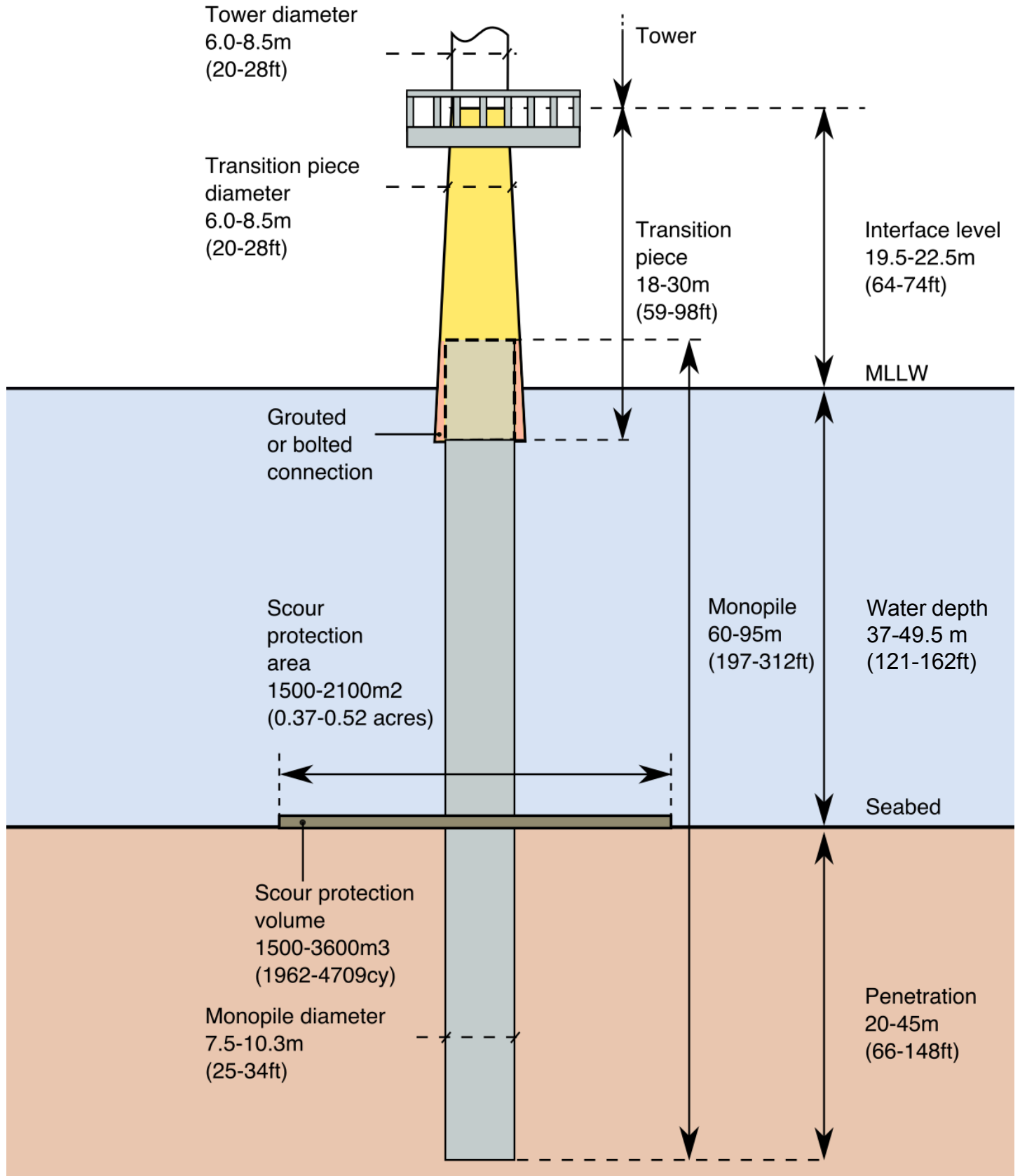
**Figure 3.1-2a**  
Wind Development Area for COP Review

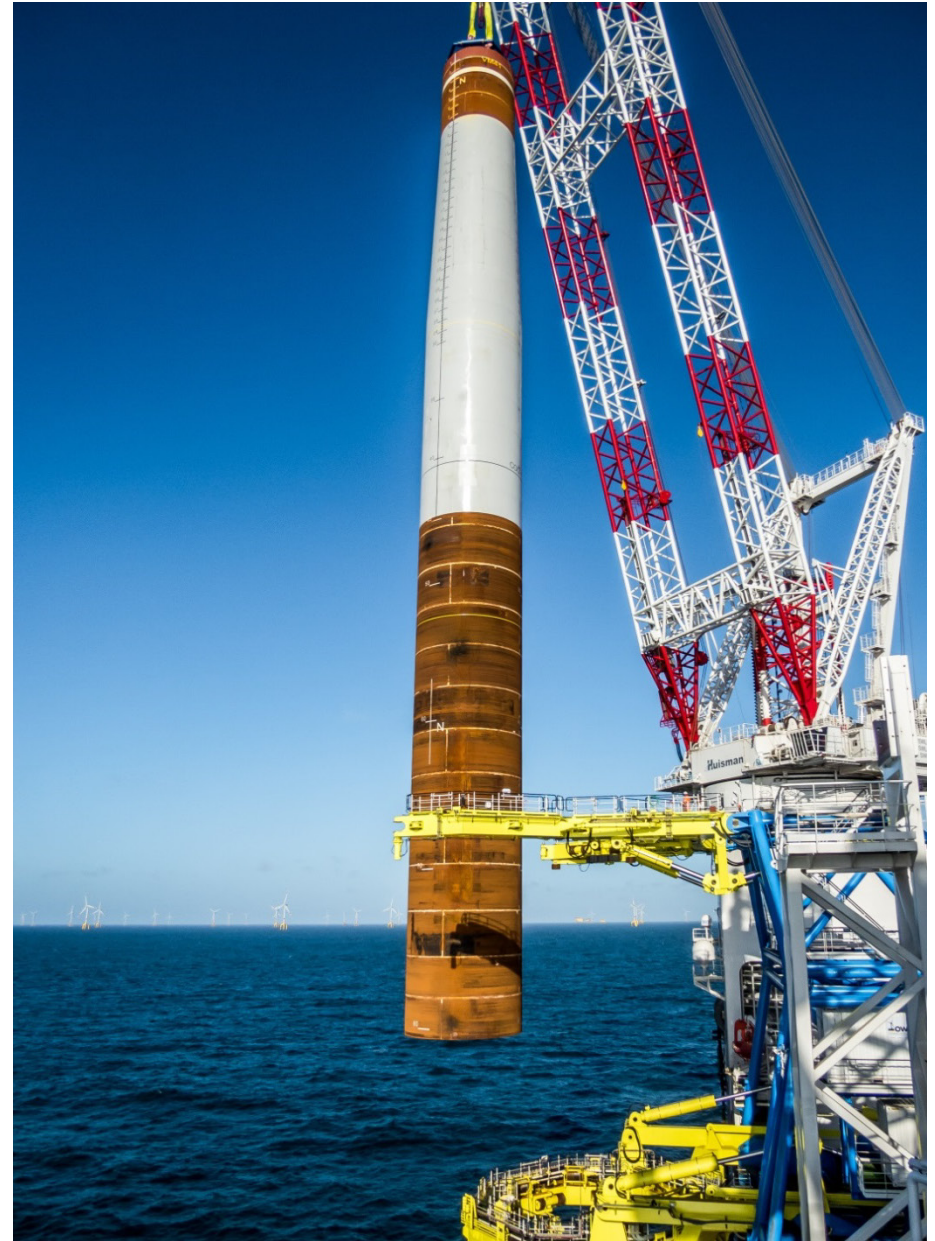


Vineyard Wind Project



Figure 3.1-2b  
 Wind Development Area for COP Review

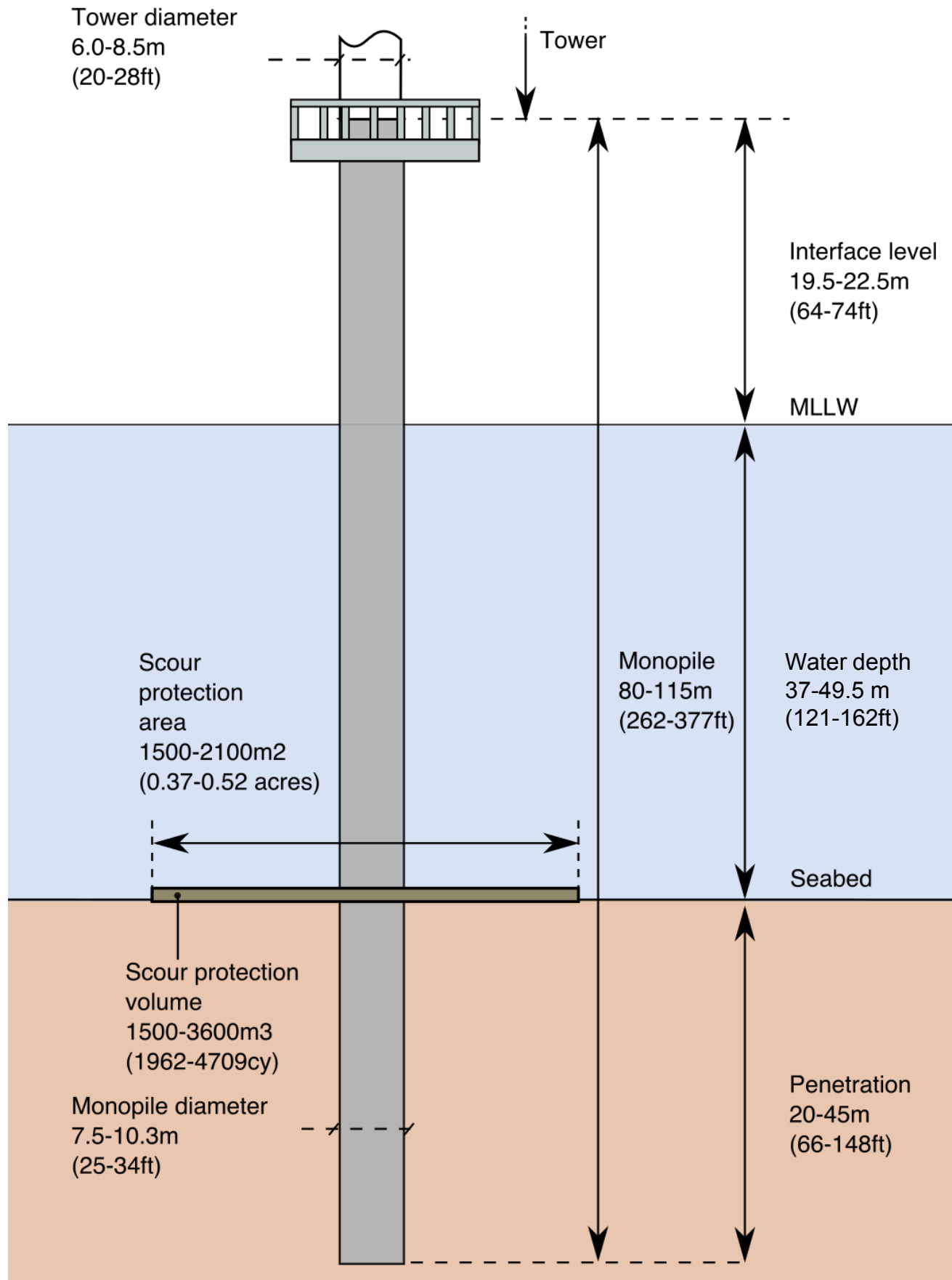




Vineyard Wind Project



**Figure 3.1-4**  
*Photographs of Monopiles and Transition Pieces*



### 3.1.2.2 Jackets

The jacket design concept consists of three to four piles, a large lattice jacket structure and a TP (see Figures 3.1-6 through 3.1-8). The jacket structure is supported/secured by pre-installed driven piles (one per leg). Alternatively, the jacket is secured to the sea floor via slender piles which are driven through “sleeves” or guides mounted to the base of each leg of the jacket structure.

The jacket will also contain secondary structures, such as boat landings and cable tubes. Jackets account for 12% of the number of foundations installed in 2016 in Europe, which brings their total market share to 6.6% (Wind Europe, 2017). Jackets are also widely used for other offshore applications, including in the oil and gas sectors. Further, as described for the monopiles (see Section 3.1.2.1, above), the jacket will be equipped with a corrosion protection system design in accordance with relevant standards.

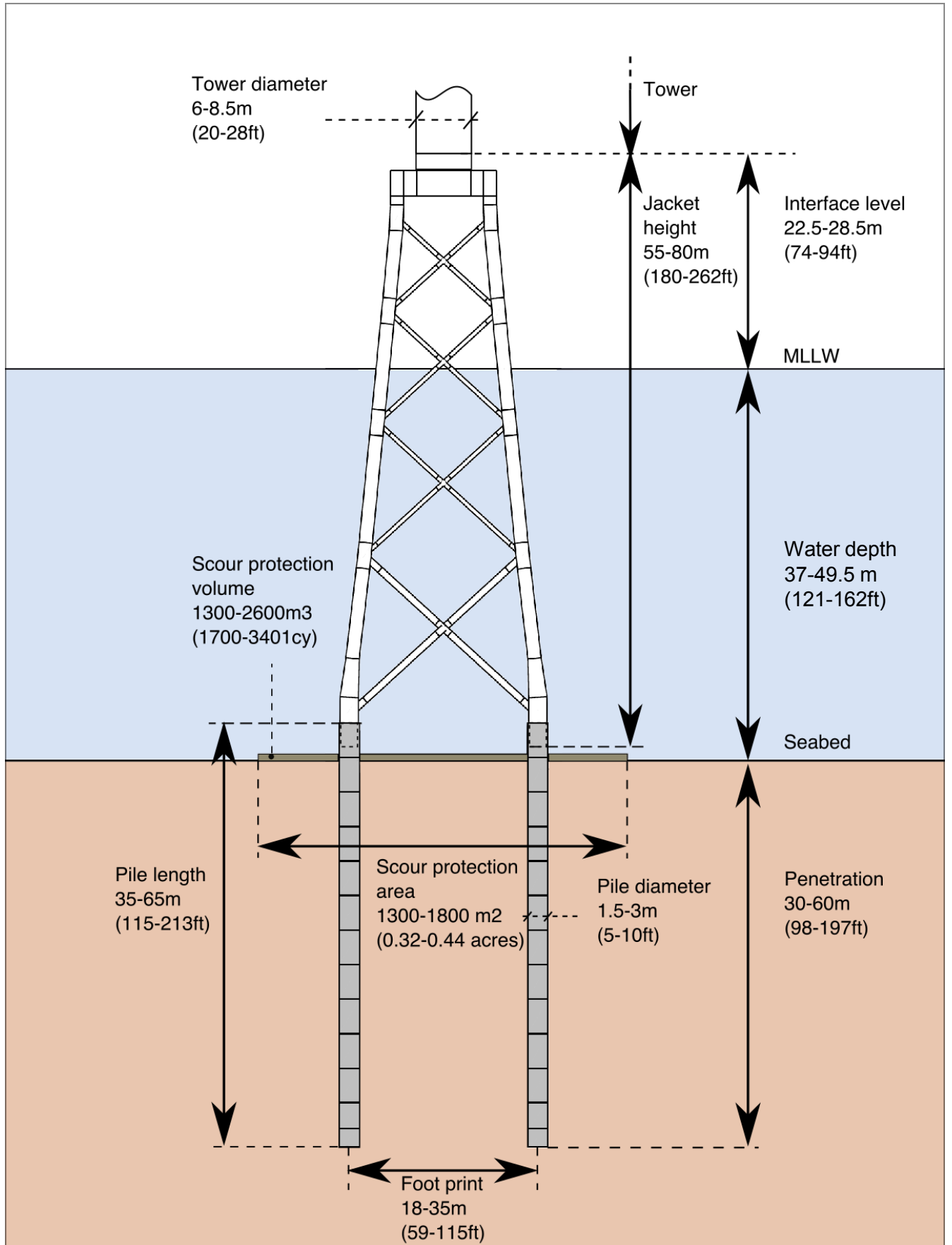
The jacket is fixed to the piles and a TP is fitted to obtain the turbine loads and transfer them to the jacket structure. The TP will contain secondary structures, such as tower flange for mounting the WTG, internal and external platforms, and various types of electrical equipment needed during installation and operation.

### 3.1.3 Scour Protection

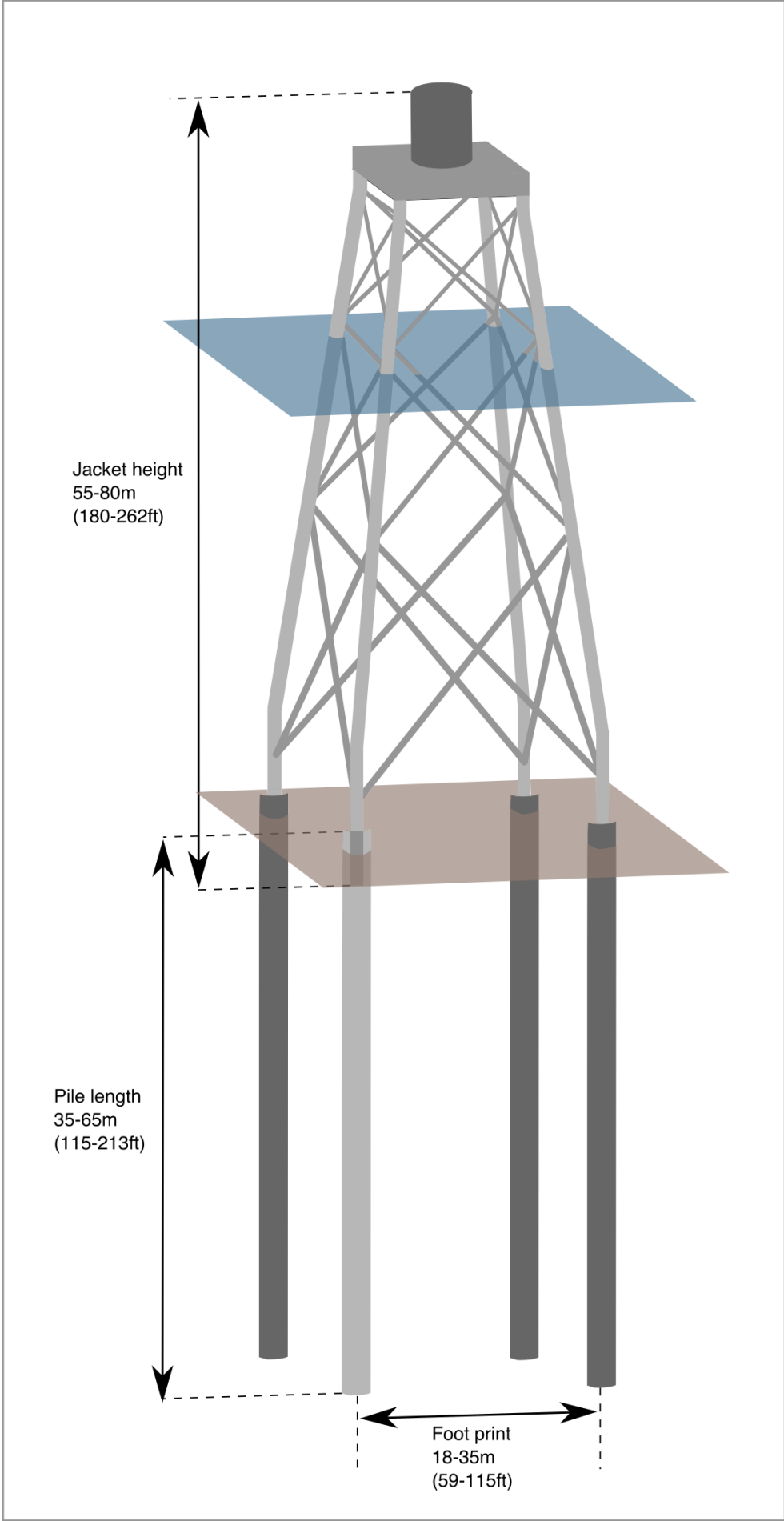
Scour protection is included to protect the foundation from scour development, which is the removal of the sediments near structures by hydrodynamic forces. Scour protection consists of the placement of stone or rock material around the foundation so that it can withstand the increased seabed drag created by the presence of the foundation. One of the benefits of scour protection is that it allows foundation penetration to be minimized, as the design does not have to account for significant scour development.

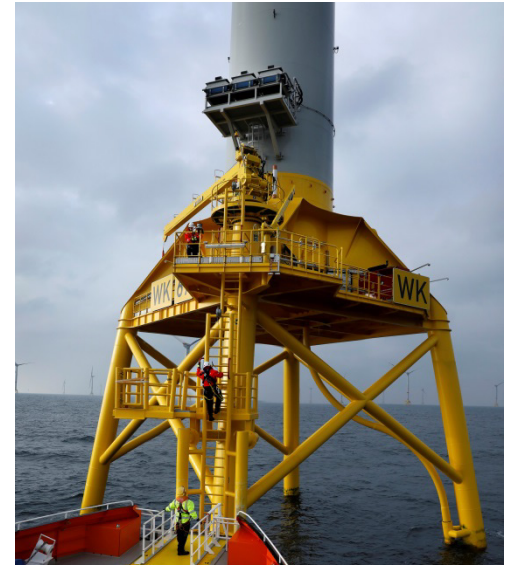
As shown on Figure 3.1-9, the scour protection will be one to two meters high (3-6 ft), with stone or rock sizes of approximately 10-30 centimeters (4-12 inches).

Table 3.1-3, below, shows the Project Envelope for the two foundation concepts and associated scour protection.

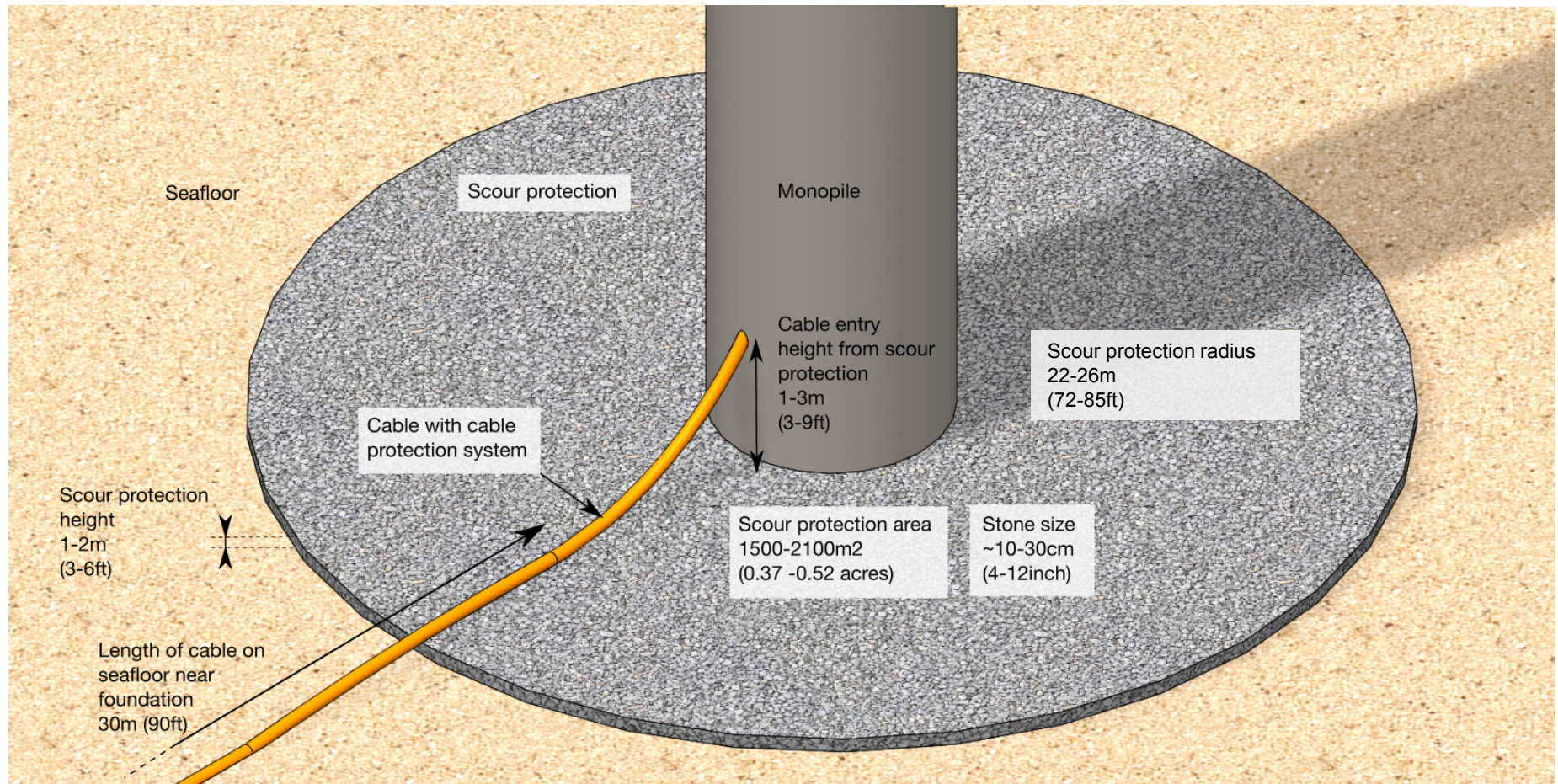








Vineyard Wind Project



**Table 3.1-3 Envelope of WTG Foundation Dimensions**

Concept	Monopile		Jackets
	Monopile	Extended Monopile	Piles (3-4 piles)
Length	60-95m (197-312 ft)	80-115 m (262-377 ft)	35-65 m (115-213 ft)
Diameter (maximum)	7.5-10.3 m (25-34 ft)	7.5-10.3 m (25-34 ft)	1.5-3.0 m (5-10 ft)
Penetration	20-45 m (66-148 ft)	20-45 m (66-148 ft)	30-60 m (98-197 feet)
Bottom Pile Wall Thickness	70-100 millimeters ("mm") (2.8-3.9 inches)	70-100 mm (2.8-3.9 inches)	40-55 mm (1.6-2.2 inches)
	Transition Piece	Transition Piece	Jacket Structure (including Transition Piece)
Length	18*-30 m (59-98 ft)	(N/A)	55-80 m (180-262 ft)
Diameter	6.0-8.5 m (20-28 ft)	(N/A)	18-35 m (59-115 ft)
Interface elevation	19-23 m MLLW (62-75 ft MLLW)	(N/A)	22.5-28.5** m MLLW (74-94 ft MLLW)
	Scour Protection	Scour Protection	Scour Protection
Scour protection volume	1,500-3,600 m <sup>3</sup> /mT (1,962-4,709 cubic yards ["cy"])	1,500-3,600 m <sup>3</sup> /mT (1,962 – 4,709 cy)	1,300-2,600 m <sup>3</sup> /mT (1,700-3,401 cy)
Scour protection area	1,500-2,100 m <sup>2</sup> (0.37 -0.52 acres)	1,500-2,100 m <sup>2</sup> (0.37 -0.52 acres)	1,300-1,800 m <sup>2</sup> (0.32-0.44 acres)

\* Length to account for the possibility of a bolted connection.

\*\* Interface elevation is set up to account for the possibility of an interface placed above the tower access door.

### **3.1.4 Electrical Service Platforms**

Every 400 MW installed is expected to require either one conventional ESP (with two transformers) or two light-weight ESPs (with one transformer on each) that are bridged together at a single location. For the ~800 MW Project, there will be two conventional ESPs or four light-weight ESPs (two sets of two light-weight ESPs bridged together). The potential locations for the ESPs are shown on Figure 3.1-2. Similar to the WTG foundations, two options are considered for the ESP foundations: monopile or jacket (Figures 3.1-10 through 3.1-13).

The ESPs will serve as the common interconnection point for the WTGs within the array. Each WTG will interconnect with an ESP via a 66 kV submarine cable system. These cable systems will interconnect with circuit breakers and transformers (66 kV to 220 kV)

located on the ESPs to increase the voltage level and transmit electricity through the offshore cable system to the final connection point to the bulk power grid. Additional information about the offshore cable systems is included in Sections 3.1.5 and 3.1.6.

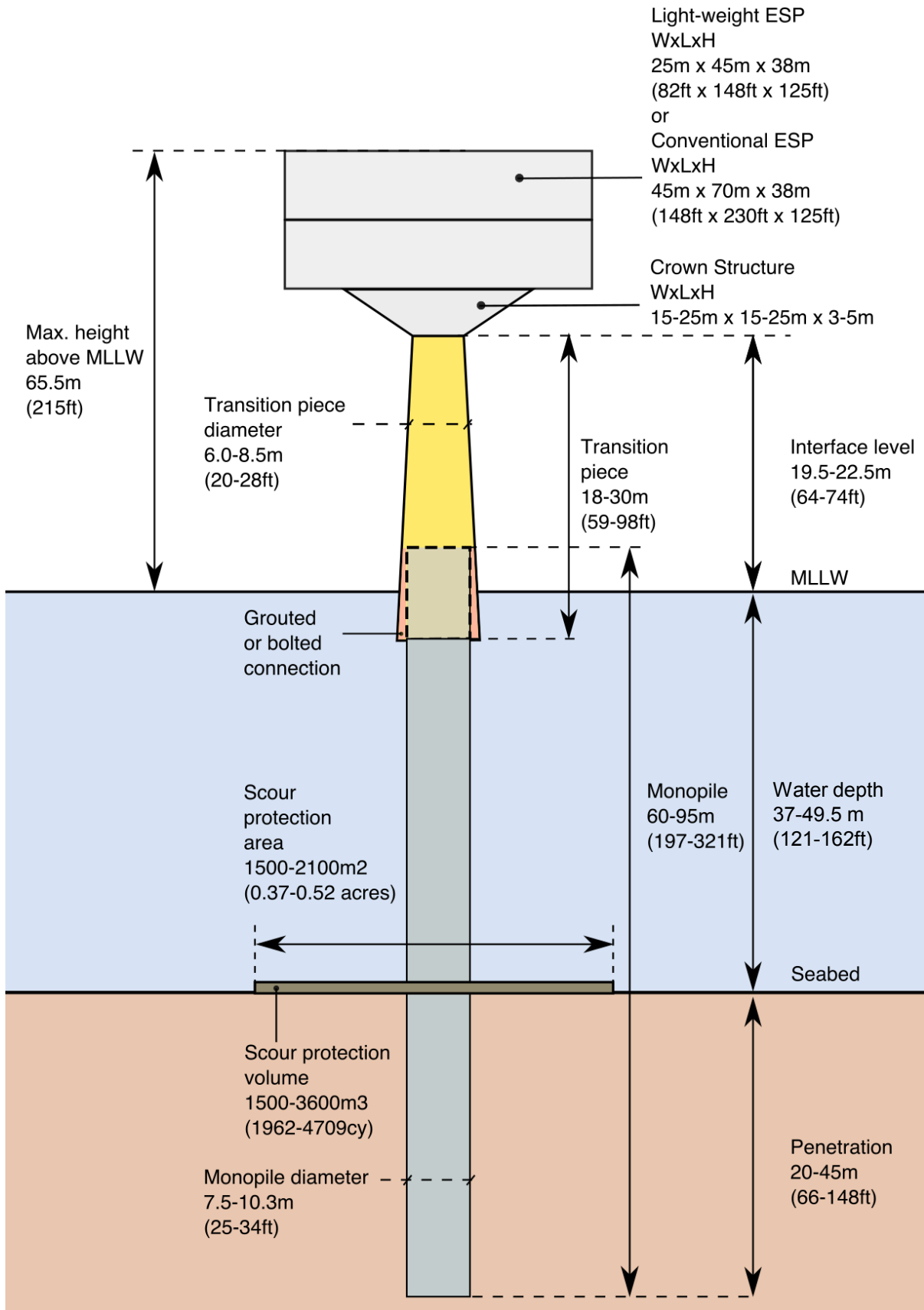
Additional equipment on the ESPs is subject to final design but is anticipated to include the following: 220 kV AC switchgear for connection to the onshore substation, switchgear for connection with the wind turbines, transformer oil spill tanks, shunt reactors, auxiliary systems, cooling systems, fire pumps, seawater utility pumps for systems such as fresh water and cooling, fire detection and firefighting equipment, cranes (as required), rescue and evacuation facilities and equipment (such as life rafts or boats, lifejackets), supervisory control and data acquisition (“SCADA”) equipment, and communications and navigation systems.

An HVAC system may be installed in the ESPs to protect the equipment and personnel from extreme temperatures. In addition, an emergency generator and/or battery may also be installed on the ESPs to provide emergency power.

Figures 3.1-10 through 3.1-13 provide illustrative dimensions for both a light-weight and a conventional ESP on a standard monopile/transition piece foundation, an extended monopile foundation, and a jacket foundation (2D and 3D versions), respectively. Photographs of ESPs can be found in Figure 3.1-14. ESPs may also include a helipad for maintenance work and are anticipated to include at least one boat landing. Project Envelope dimensions for the ESPs are shown in Table 3.1-4 below.

**Table 3.1-4 ESP Dimensions**

Foundation Concept	Monopile		Jackets
	Monopile	Extended Monopile	Piles (3-4 piles)
Length	60-95m (197-312 ft)	80-115 m (262-377 ft)	35-80 m (115-262 ft)
Diameter (maximum)	7.5-10.3 m (25-34 ft)	7.5-10.3 m (25-34 ft)	1.5-3.0 m (5-10 ft)
Penetration	20-45 m (66-148 ft)	20-45 m (66-148 ft)	30-75 m (98-246 feet)
Bottom Pile Wall Thickness	70-100 mm (2.8-3.9 inches)	70-100 mm (2.8-3.9 inches)	60-80 mm (2.4-3.1 inches)
	Transition Piece	Transition Piece	Jacket Structure (including Transition Piece)
Length	18*-30 m (59-98 ft)	(N/A)	55-65 m (180-213 ft)
Diameter	6.0-8.5 m (20-28 ft)	(N/A)	18-45 m (59-148 ft)
Interface elevation	19.5-22.5 m MLLW (64-74 ft MLLW)	(N/A)	22.5-28.5** m MLLW (74-94 ft MLLW)

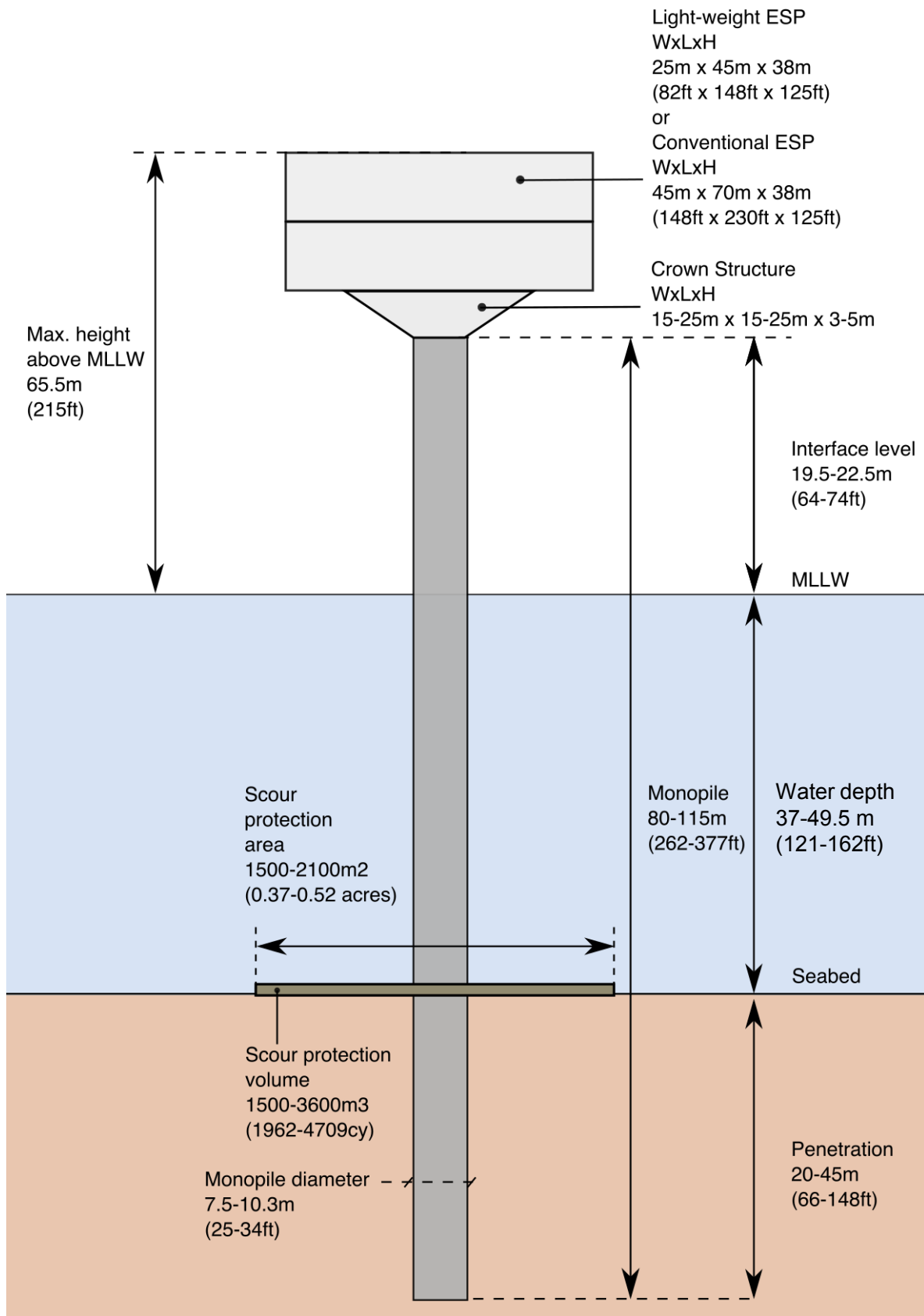


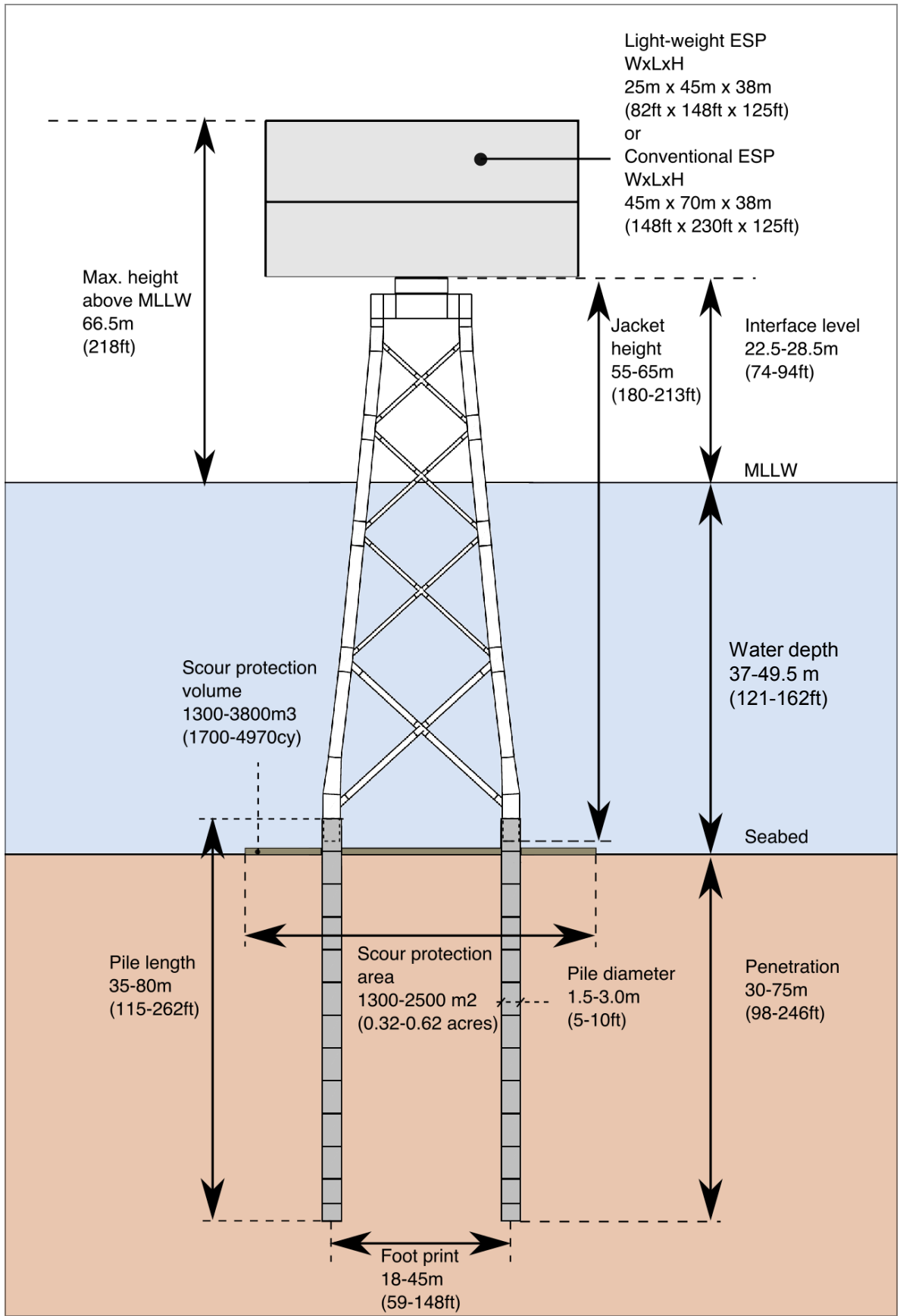
Vineyard Wind Project



Figure 3.1-10

ESP Monopile Foundation



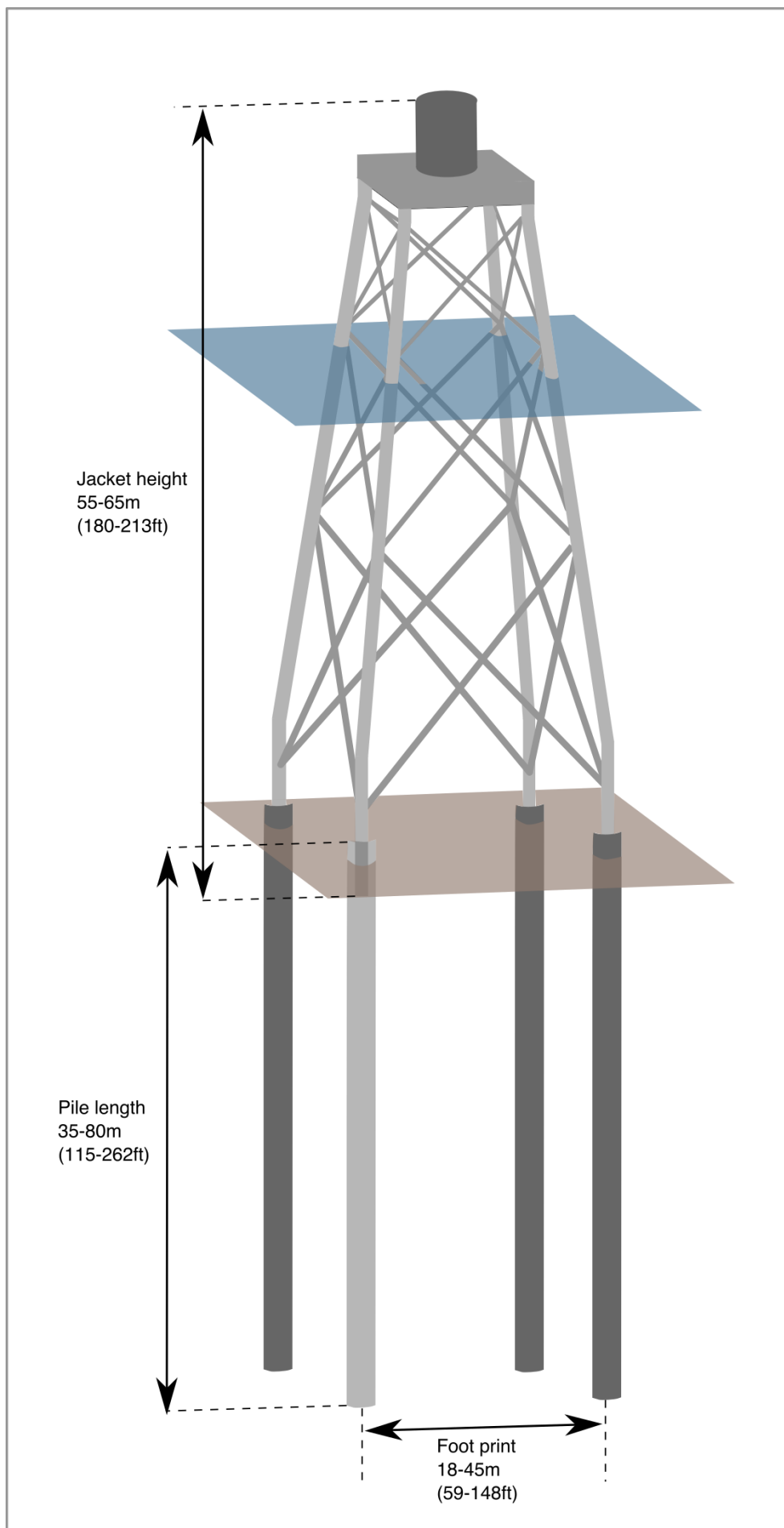


Vineyard Wind Project



Figure 3.1-12  
ESP Jacket Foundation







Vineyard Wind Project

**Table 3.1-4 ESP Dimensions (Continued)**

Foundation Concept	Monopile		Jackets
	Monopile	Extended Monopile	Piles (3-4 piles)
	Scour Protection	Scour Protection	Scour Protection
Scour protection volume	1,500-3,600 m <sup>3</sup> (1,962-4,709 cy)	1,500-3,600 m <sup>3</sup> (1,962 – 4,709 cy)	1,300-3,800 m <sup>3</sup> (1,700-4,970 cy)
Scour protection area	1,500-2,100 m <sup>2</sup> (0.37 -0.52 acres)	1,500-2,100 m <sup>2</sup> (0.37 -0.52 acres)	1,300-2,500 m <sup>2</sup> (0.32-0.62 acres)
	Crown Structure	Crown Structure	
Dimension (WxLxH)	15-25m x 15-25m x 3-5m (49-82 ft x 49-82 ft x 10-16.4 ft)	15-25m x 15-25m x 3-5m (49-82 ft x 49-82 ft x 10-16.4 ft)	(N/A)
Topside Component	Light-weight ESP		Conventional ESP
Dimensions (WxLxH)***	25m x 45m x 38m (82ft x 148ft x 125ft)		45m x70m x 38m (148ft x 230ft x 125ft)
Complete ESP	Monopile /Extended Monopile (Light-weight or Conventional)		Jackets (Light-weight or Conventional)
Max Height above MLLW	65.5 m MLLW (215 ft MLLW)		66.5 m MLLW (218 ft MLLW)

\* Length to account for the possibility of a bolted connection.

\*\* Interface elevation is setup to account for the possibility of an interface placed above the tower access door.

\*\*\*Dimensions include possible helideck but do not include antennae.

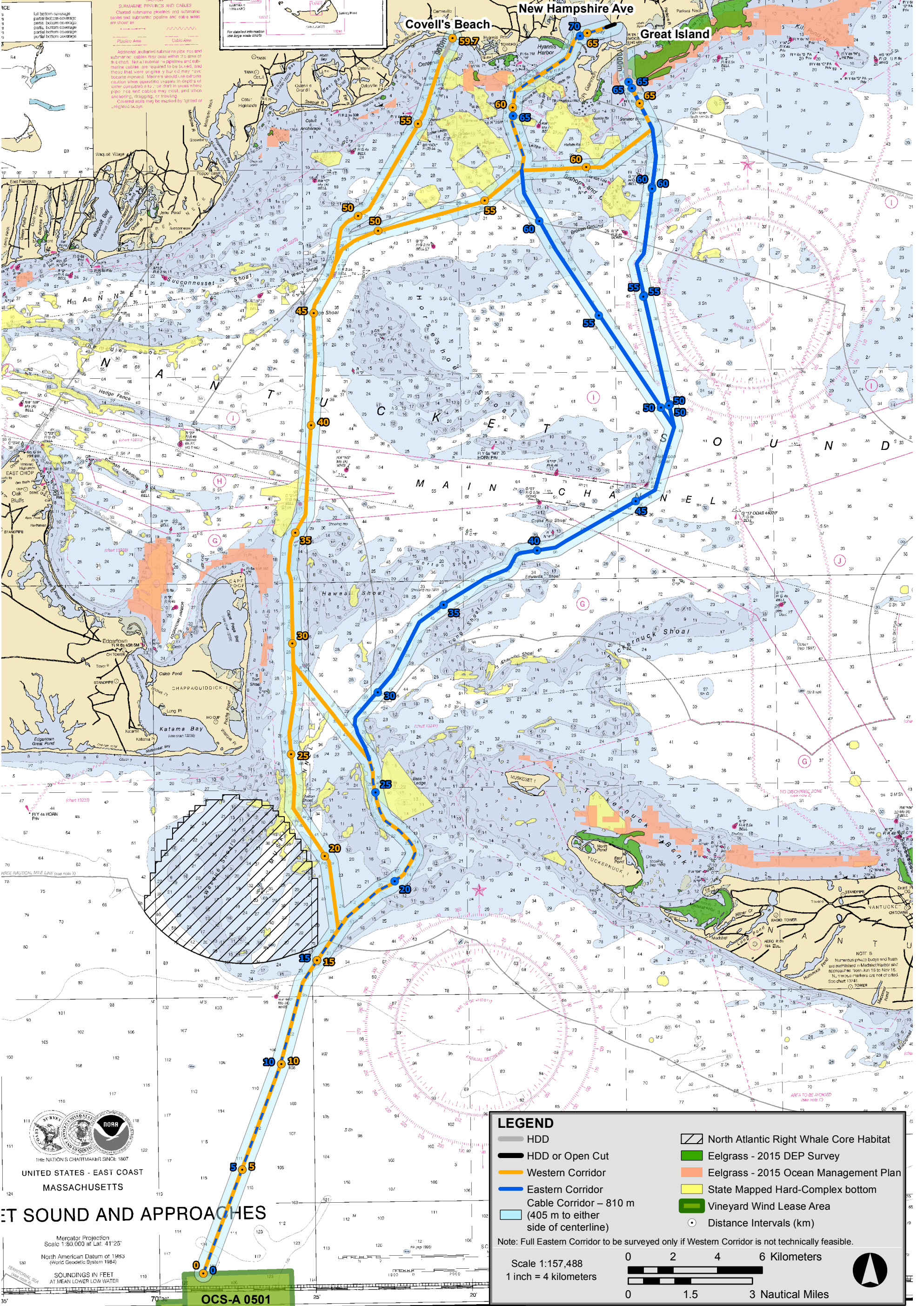
### **3.1.5 Export Cables and Inter-Link Cables**

#### **3.1.5.1 Offshore Export Cable Corridors**

The wind farm will connect to the onshore electrical grid via up to three offshore export cables that will travel north from the Offshore Project Area and make landfall onshore. Utilizing the Envelope concept for this part of the Project, two primary Offshore Export Cable Corridors (“OECC”) are under consideration: the Western Corridor and the Eastern Corridor (see Figure 3.1-15). Likewise, three potential Landfall Sites are under consideration: Covell’s Beach in Barnstable, New Hampshire Avenue in Yarmouth, and Great Island in Yarmouth (see Figure 3.1-15).

Each OECC is summarized below:

- ◆ The Western Corridor will pass through Muskeget Channel, turn west, and will make landfall at Covell’s Beach, New Hampshire Avenue, or Great Island.
- ◆ The Eastern Corridor will pass through Muskeget Channel, turn east, and then make landfall at either New Hampshire Avenue or Great Island.



**CAUTION**  
**SUBMARINE PIPES AND CABLES**  
 Charted submarine pipelines and submarine cables and submarine pipelines and cables are shown on this chart. Not all submarine pipelines and submarine cables are required to be located, and those that are required to be located may not be shown. Marine should use all available information when operating in depth of water less than 100 m (330 ft) in areas where pipelines and cables may exist, and when underway, dragging, or mooring.  
 Covered areas may be marked by lighted or unlighted buoys.

**LEGEND**

- HDD
- HDD or Open Cut
- Western Corridor
- Eastern Corridor
- Cable Corridor – 810 m (405 m to either side of centerline)
- North Atlantic Right Whale Core Habitat
- Eelgrass - 2015 DEP Survey
- Eelgrass - 2015 Ocean Management Plan
- State Mapped Hard-Complex bottom
- Vineyard Wind Lease Area
- Distance Intervals (km)

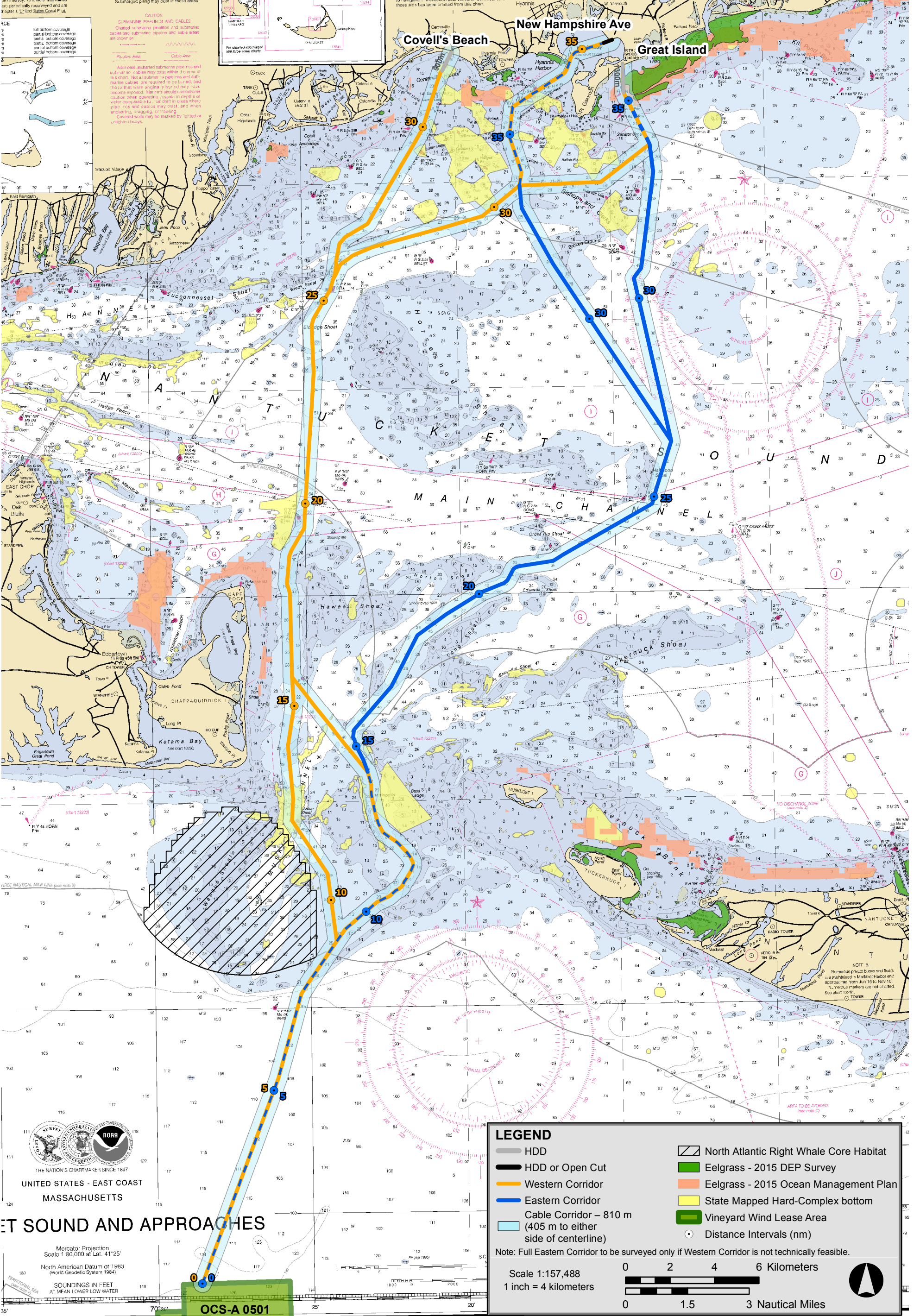
Note: Full Eastern Corridor to be surveyed only if Western Corridor is not technically feasible.

Scale 1:157,488  
 1 inch = 4 kilometers

0 2 4 6 Kilometers  
 0 1.5 3 Nautical Miles

**ET SOUND AND APPROACHES**

Mercator Projection  
 Scale 1:80,000 at Lat. 41°25'  
 North American Datum of 1983 (NAD 83)  
 SOUNDINGS IN FEET  
 AT MEAN LOWER LOW WATER



The maximum length per cable is just over 75 km (47 mi), which gives a total maximum length of export cables, assuming three cables, of 227 km (141 mi).

### 3.1.5.2 Export Cable Separation Distances

Separation between offshore export cables will be maintained to allow room for repairs, if needed. The following cable separation distances are proposed for the up to three offshore export cables (see Figure 3.1-16):

- ◆ A separation distance of up to 100 m (328 ft) between the first two cables (referred to as cables 1 and 2).
- ◆ A separation distance of up to 500 m (1,640 ft) between cable 2 and the third cable (referred to as cable 3).
- ◆ A buffer distance of approximately 105 m (344 ft) on the outer edges of cables 1 and 3.

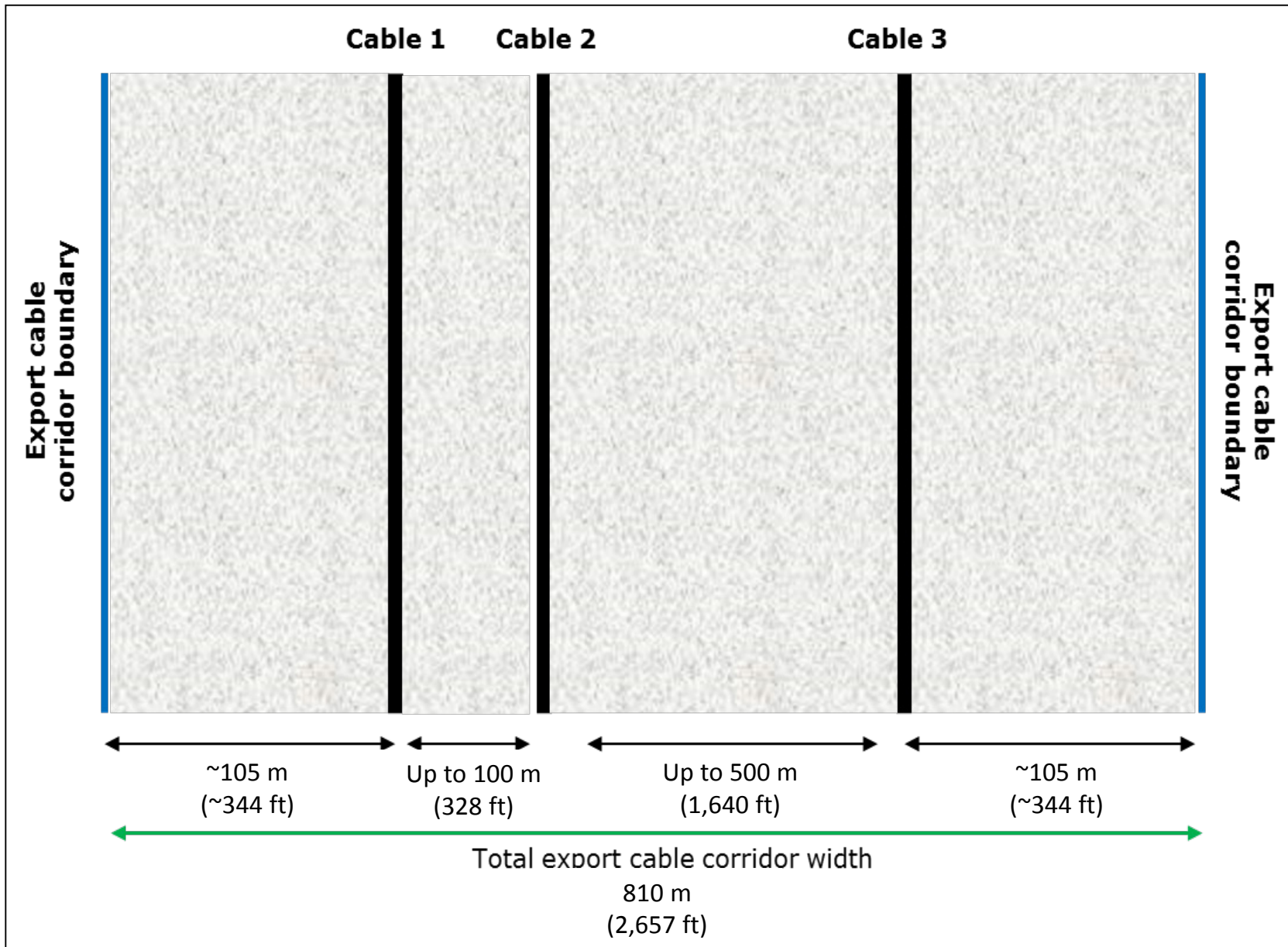
This gives a total corridor width of 810 m (2,657 ft). In some areas where more maneuverability may be required during construction, a corridor width of 1,000 m (3,280 ft) is planned, which gives a buffer distance of 200 m (656 ft) on the outer edges of cables 1 and 3. For sections where the cable crosses sensitive habitat areas or where a narrower corridor is needed for other reasons (e.g. where shoreline constrictions do not allow access), the recommended cable spacing may be decreased. Figure 3.1-15 shows the OECCs.

### 3.1.5.3 Export Cable Design

#### *Cable Design*

Each offshore export cable will be comprised of a three-core 220 kV alternating current (“AC”) cable for power transmission and one fiber optic cable for communication, temperature measurement, and protection of the high-voltage system (see Figure 3.1-17). The offshore export cables will be buried beneath the seafloor at a target depth of 1.5- 2.5 m (5-8 ft) (see Section 4.2.3.3 for a description of cable installation techniques). The three copper or aluminum conductors will each be encapsulated by cross-linked polyethylene insulation. Waterproof sheathing will prevent the infiltration of water.

As already noted, up to three offshore export cables may be used for the Project. Additionally, each ESP will be inter-linked via cables with up to two other ESPs using the same 220 kV cable. All designs would provide sufficient redundancy, thus improving reliability, and would also ensure sufficient transmission capacity under conditions where full wind speeds are sustained for a long period of time.



Note: A 810 m wide corridor is planned. However, the corridor may be up to 1,000 m wide in areas where more maneuverability is required during construction. In addition, the corridor width may be decreased where the cable crosses sensitive habitat areas or where shoreline constrictions do not allow access.



**Design:**

- |                               |                     |                      |
|-------------------------------|---------------------|----------------------|
| 1 Conductor (Al or Cu)        | 5 Swellable tape    | 9 Filler profiles    |
| 2 Inner semi-conducting layer | 6 Lead sheath       | 10 Bedding (PP)      |
| 3 XLPE insulation             | 7 PE oversheath     | 11 Armouring         |
| 4 Outer semi-conducting layer | 8 Fibre optic cable | 12 Outer sheath (PP) |



### ***Cable Protection System***

All offshore export and inter-array cables will be protected through the use of protection conduits put in place at the approach to the foundations and ESPs (see Figure 3.1-9). This protection consists of different components of composite material that protect the cables from fatigue loads and mechanical loads as they approach and enter the structures (for a distance of approximately 30 m outside the foundation). The cable protection system will be mounted around the cable on board the installation vessel and secured to the cable with a pull-in head.

In addition, in the event sufficient burial depths cannot be achieved or the cables need to cross other infrastructure (e.g., existing cables, pipes, etc.), alternative cable protection methods will be used. These alternative methods are:

- ◆ Rock placement, which involves laying rocks on top of the cable to provide protection.
- ◆ Concrete mattresses, which are prefabricated flexible concrete coverings that are laid on top of the cable. Alternately, the mattresses may be filled with grout and/or sand (referred to as grout/sand bags); this method is generally applied on smaller scale applications than concrete mattresses.
- ◆ Uraduct, half-shell or similar, which effectively is a protective shell that comes in two halves and is fixed around the cable to provide mechanical protection. Uraduct is generally used for short spans, at crossings or near offshore structures, where there is a high risk from falling objects. Uraduct does not provide protection from damage due to fishing trawls or anchor drags.

Vineyard Wind estimates that up to 10% of the total length of the offshore export cable system could require one of these alternative protection measures. The estimated length and area of offshore cables potentially requiring protection is presented in Table 6.5-4 of Volume III.

#### ***3.1.6 Inter-array Cables***

As already noted, the WTGs will be connected to the ESPs via 66 kV inter-array cables. These inter-array cables will be buried beneath the seafloor at a target depth of 1.5- 2.5 m (5-8 ft) (see Section 4.2.3.6 for a description of inter-array cable installation). The expected cable type is the same three-core 220 kV AC cable offshore to be used for the export cables, as described above in Section 3.1.5.3. The maximum outer diameter of these cables is anticipated to be 155 mm (6.1 inches). As they transmit different amounts of power, three different cross sections are envisaged for the cable: the likely cross sections are 240, 500, and 630 square millimeters (“mm<sup>2</sup>”), however, a maximum size of 800 mm<sup>2</sup> may be considered to account for updates in technology.

The inter-array cables will connect radial “strings” of six to 10 WTGs to the ESPs. The design and optimization of the inter-array cable system will occur during final design of the Project, and will consider cable design and capacity, ground conditions, wind farm

operating conditions, and installation conditions. This means Vineyard Wind is permitting an Envelope approach for the inter-array cables that will include any potential layout within the WDA.

One potential inter-array cable layout is provided on Figure 3.1-18 for illustrative purposes. As shown in here, 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 (171 mi).

As explained above in Section 3.1.5.3, all export and inter-array cables will be protected through the use of protection conduits at the approach to the foundations and ESPs. Additionally, for cases where the cables cannot be buried to a sufficient depth, the same protection methods described in Section 3.1.5.3 will be used. Vineyard Wind estimates that up to 10% of the total length of the inter-array cable could require one of these alternative protection measures.

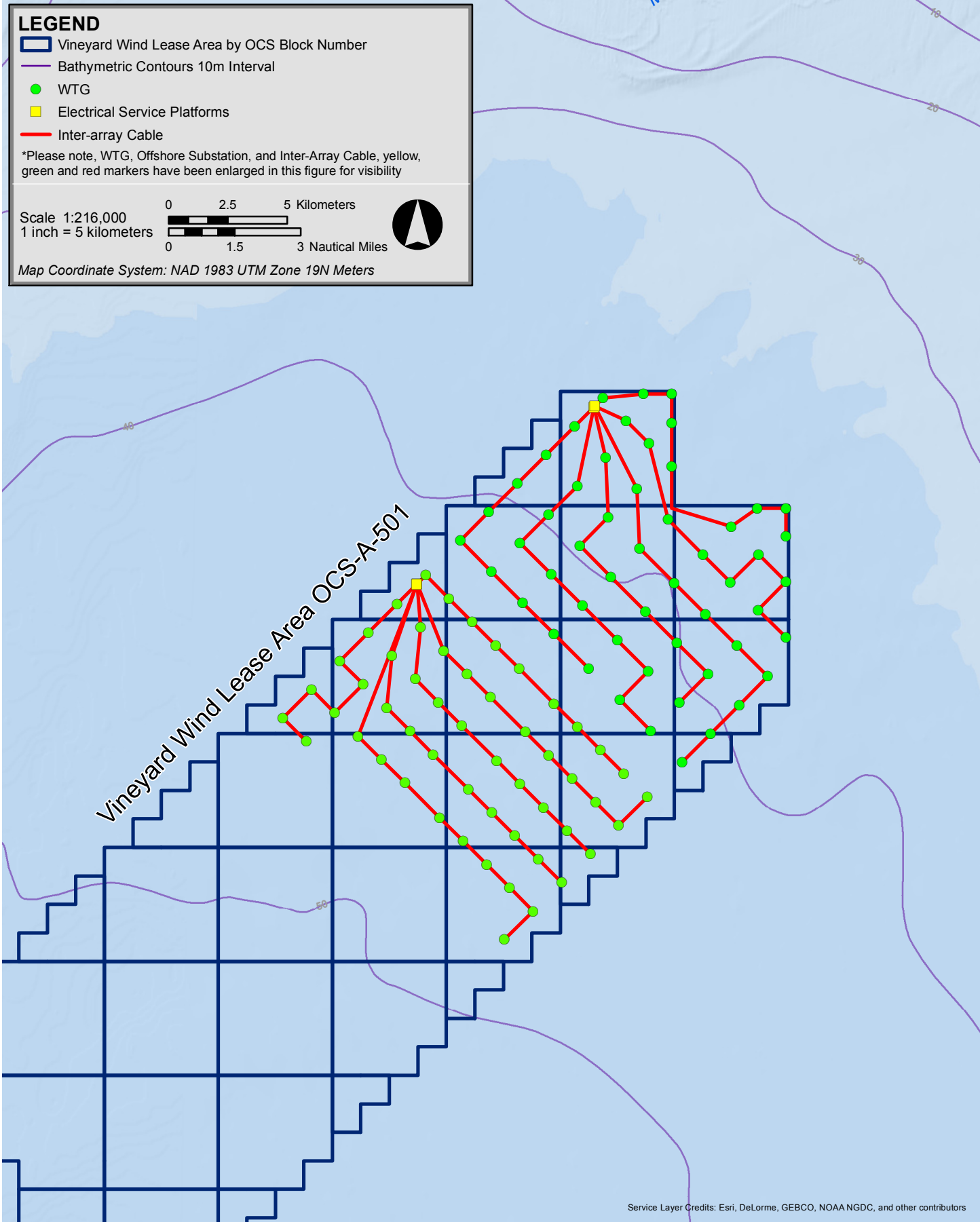
## 3.2 Onshore Facilities

The Project's onshore facilities include the Landfall Site, the onshore export cable from the Landfall Site to the onshore substation, the onshore substation itself, and the connections from the substation to the existing bulk power grid.

### 3.2.1 *Landfall Site*

A thorough evaluation of potential Landfall Sites resulted in the identification of three options that are included in the Project Envelope (see Figure 3.1-15); however, ultimately, a single Landfall Site will be used for all cables. Each of the three potential Landfall Sites is considered a good candidate for cable landing given their superior egress and favorable inland routing to the Barnstable Switching Station via public roads and existing utility right-of-way ("ROW"):

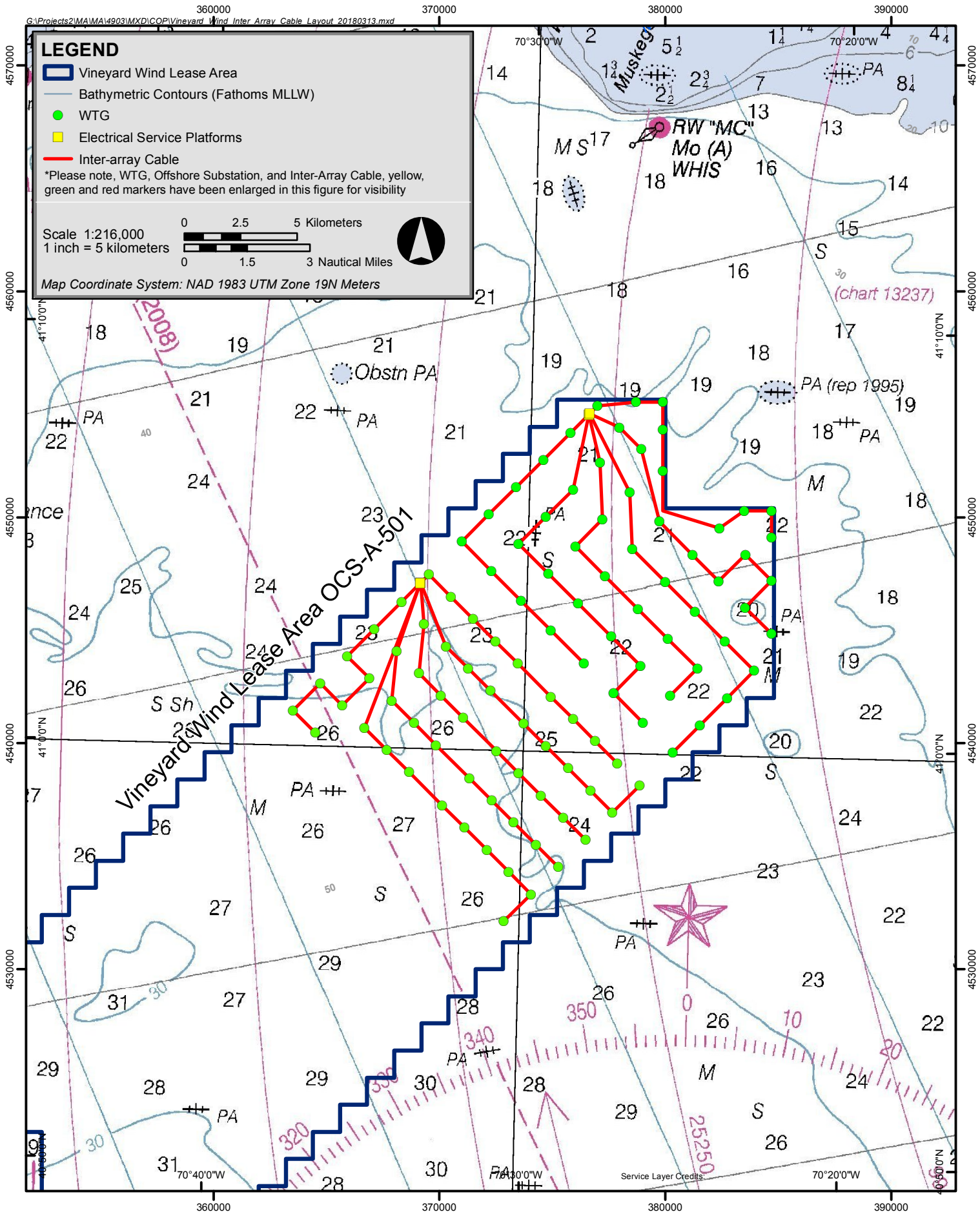
- ◆ Covell's Beach in Barnstable: The Covell's Beach Landfall Site is located on Craigville Beach Road near the paved parking lot entrance to a public beach that is owned and managed by the Town of Barnstable. This Landfall Site is considered advantageous for its relatively protected location within the Centerville Harbor bight.
- ◆ New Hampshire Avenue in Yarmouth: The New Hampshire Avenue Landfall 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 92 m (300 ft) north of the dead-end where construction staging operations could occur.
- ◆ Great Island in Yarmouth: The Great Island cable Landfall Site is located on private property on the Great Island barrier beach that separates Lewis Bay from Nantucket Sound. The use of this Landfall Site would avoid the need to route offshore export cables through the entrance to Lewis Bay.



### Vineyard Wind Project



**Figure 3.1-18a**  
Vineyard Wind Turbine Layout: Inter-array Cable Layout Example



Vineyard Wind Project



Figure 3.1-18b  
Vineyard Wind Turbine Layout: Inter-array Cable Layout Example

As the offshore export cables near the shoreline, horizontal directional drilling will be used to bring the cables beneath the nearshore area, the tidal zone, the beach and adjoining coastal areas, to one of the three Landfall Sites identified above. Alternately, the direct bury method is also under consideration for the New Hampshire Avenue Landfall Site. Construction methods for each Landfall Site are further discussed in Section 4.2.3.8.

### **3.2.2 Offshore to Onshore Transition**

After the offshore export cables are brought to shore at one of the Landfall Sites, the physical connection between the offshore export cables and the onshore export cables will be made in one or more underground concrete transition vaults. From the surface, the only visible components of the cable system will be the manhole covers.

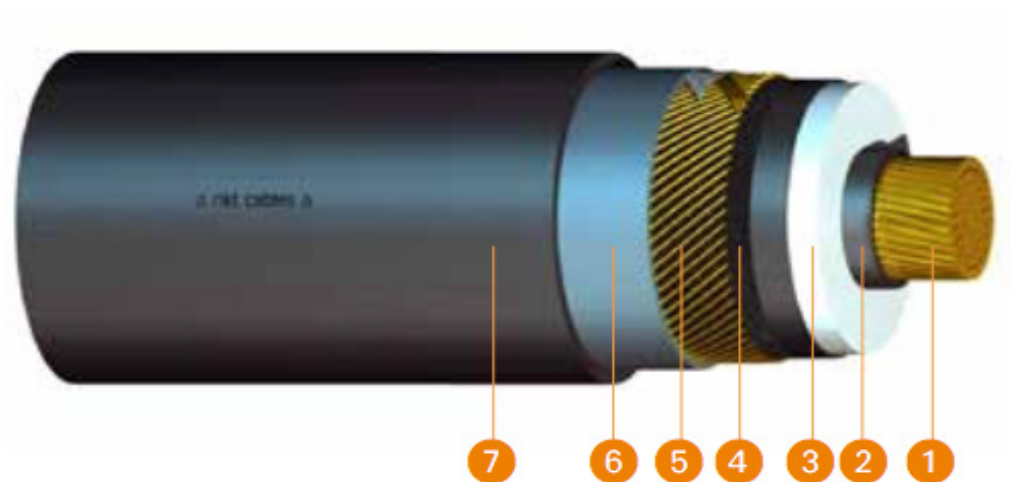
Inside the vaults, each three-core submarine cable will be separated and spliced into three separate single-core cables. A manufacturer's cutaway of the landside cable is provided as Figure 3.2-1; three of these cables make up a single 220 kV AC circuit. The onshore export cables will be placed within a single duct bank, which is installed underground for the entire length of the Onshore Export Cable Route (discussed below in Section 3.2.3). The duct bank is constructed using heavy wall PVC pipes encased in concrete.

The layout of conduits within the duct bank, and hence the duct bank dimensions, will vary somewhat along the Onshore Export Cable Route (see Figure 3.2-2). For most of the route, these conduits will be arrayed three conduits wide by four conduits deep, with the total duct bank measuring 1.2 m (four feet) wide and 1.5 m (five feet) deep; in other parts of the route, the array will be six conduits wide by two conduits deep, with the total duct bank measuring 2.1 m (seven feet) wide and 0.8 m (2.5 feet) deep. The top of the duct bank typically has a minimum of 0.9 m (three feet) of cover comprised of properly compacted sand topped by pavement.

Once the duct bank is in place, the cables (one cable per sleeve) are pulled into place via underground splice vaults and associated manholes, which are placed every 457-607 m (1,500-2,000 ft) or more along the duct bank. The splice vaults are typically two-piece (top and bottom) pre-formed concrete "boxes" with holes at both ends to connect with the PVC piping and admit the cables.

### **3.2.3 Onshore Export Cable Routes**

The Onshore Export Cable Route will provide a connection from the underground vault at the Landfall Site to the new onshore substation. The Project Envelope includes two main Onshore Export Cable Routes: one from the Covell's Beach Landfall Site to the onshore substation (the Western Onshore Export Cable Route) and a second from either the New Hampshire Avenue or Great Island Landfall Sites to the onshore substation (the Eastern Onshore Export Cable Route). The proposed Onshore Export Cable Routes will allow the onshore export cables to be located entirely underground, primarily beneath public road layouts with some shorter stretches in existing electric or railroad ROWs. The underground Onshore Export Cable Routes are on the order of 9-10 km (5.4-6 mi) in length. Each potential route is shown on Figure 2.2-1.



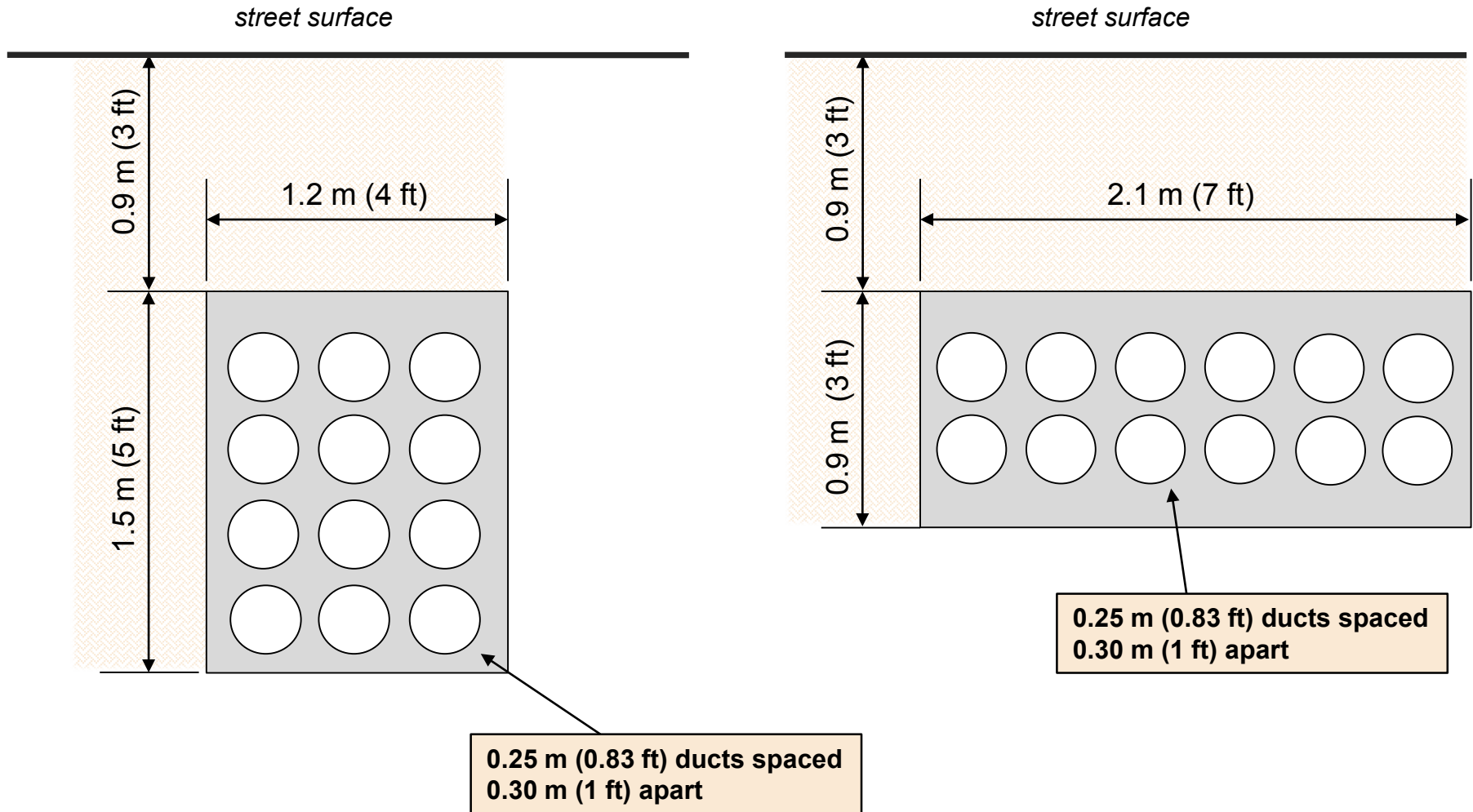
### Design:

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- |                               |                          |
|-------------------------------|--------------------------|
| 1 Conductor (Al or Cu)        | 5 Wire screen (Al or Cu) |
| 2 Inner semi-conducting layer | 6 Lead sheath            |
| 3 XLPE insulation             | 7 PE oversheath          |
| 4 Outer semi-conducting layer |                          |

### 3x4 layout

### 6x2 layout



Trench width at top = ~ 3 m (10 ft)

Trench width at top = ~ 3.4 m (11 ft)

### **3.2.4 Onshore Substation and Grid Connection**

As previously noted, the Project includes the construction of a new onshore substation. The Project's onshore substation site is located on the eastern portion of a previously developed site adjacent to an existing substation within the Independence Park commercial/industrial area in Barnstable. It consists of approximately 0.03 km<sup>2</sup> (6.3 acres) of mostly wooded land, but the site also includes previously developed parking areas and a small building formerly associated with a larger structure on the adjacent parcel.

The onshore substation site is bordered to the north by the Barnstable Switching Station, to the west by the former Cape Cod Times building, to the south by Independence Drive, and to the east by an electric transmission corridor (see Figure 2.2-1). The buried duct bank will enter the Project onshore substation site by way of an access road that provides access to the electric transmission corridor from Mary Dunn Road. The Project connection into the bulk power grid will likely be made via available positions at Eversource's Barnstable Switching Station, located just to the north of the onshore substation site, though Vineyard Wind is also including the option to connect at the West Barnstable Switching Station.

The Project's substation will house up to four 220 kV /115 kV "stepdown" transformers,<sup>7</sup> switchgear, and other necessary equipment. A battery may also be installed at the onshore substation to store power.

### **3.2.5 Construction Facilities**

Vineyard Wind has signed a letter of intent to use the New Bedford Marine Commerce Terminal ("New Bedford Terminal"), owned by the Massachusetts Clean Energy Center ("MassCEC"), to support Project construction. The 26-acre New Bedford Terminal is located on the City's extensive industrial waterfront and was purpose 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. An aerial photo of the New Bedford Terminal and the surrounding marine industrial area is provided as Figure 3.2-3.

Vineyard Wind plans to use the New Bedford Terminal 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.<sup>8</sup> Some component fabrication and fitup may also take place at New Bedford Terminal.

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<sup>7</sup> If a connection is made at West Barnstable, the Project onshore substation would include step-up transformers (220 kV to 345 kV).

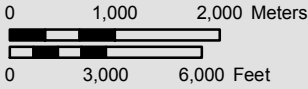
<sup>8</sup> Monopiles may not be loaded onto vessels for transport but may instead be pulled by tugs while floating in the water.



### LEGEND

New Bedford Marine Commerce Terminal

Scale 1:72,000  
1 inch = 6,000 feet



Map Coordinate System: NAD 1983 StatePlane Massachusetts Meters

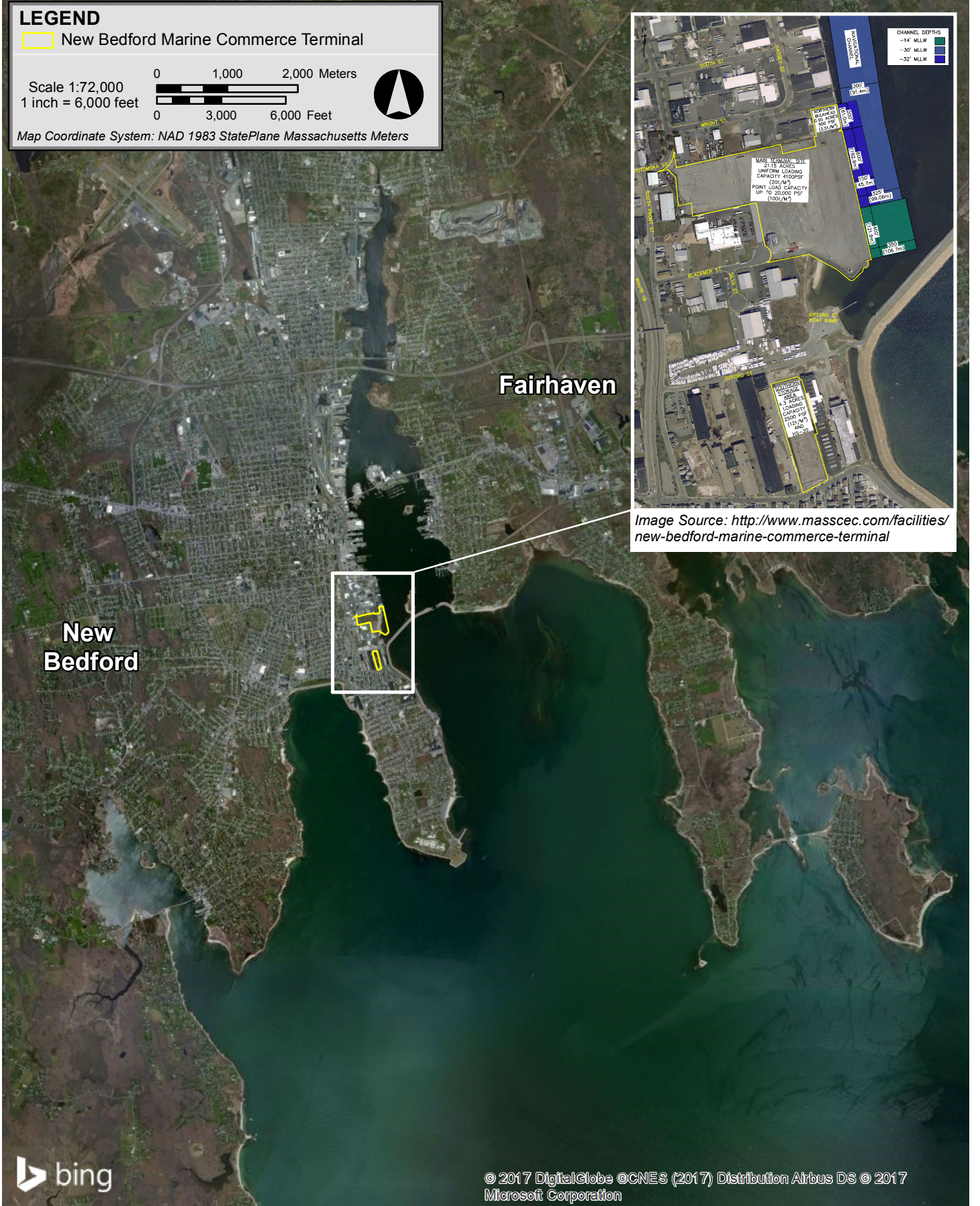
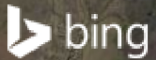


Image Source: <http://www.masscec.com/facilities/new-bedford-marine-commerce-terminal>



## Vineyard Wind Project



Figure 3.2-3

New Bedford Marine Commerce Terminal



**Table 3.2-1 Possible Ports Used During Construction (Continued)**

Port	Types of Improvements That May Be Required (To Be Completed by Port Owner/Operator Prior to Use by Vineyard Wind)
<b>Massachusetts Ports</b>	
Montaup	Land and quay structure improvements; potential removal of some existing onshore infrastructure; and maintenance dredging if used.
<b>Rhode Island Ports</b>	
Providence	Minor land and quay structure improvements and minor dredging.
Quonset Point	Minor land and quay structure improvements and minor dredging.
<b>Connecticut Ports</b>	
New London	Land and onshore infrastructure improvements.
Bridgeport	Onshore infrastructure improvements; local quay reinforcement; and dredging.

Additionally, the MassCEC recently finalized a study that identified and characterized other Massachusetts port facilities which could be used to support offshore wind energy construction projects. Vineyard Wind is committed to continuing to work cooperatively with the MassCEC and will work to integrate the results of this study into construction planning efforts.

**3.2.6 Operations & Maintenance Facilities**

Once the first increment of the Vineyard Wind project is installed, tested, and commissioned, the Project will enter an up to 30-year operating phase. In support of project operations and the necessary maintenance activities, Vineyard Wind will develop Operations and Maintenance Facilities (O&M Facilities) that will include management and administrative team offices, a control room, office and training space for technicians and engineers, shop space, and warehouse space for parts and tools. These functions will be co-located, if feasible.

The O&M Facilities will also include pier space for Crew Transport Vessels (“CTV”) and other larger support vessels. CTVs are purpose built to support offshore wind energy projects; they are typically about 23 m (75 ft) in length and set up to safely and quickly transport personnel, parts, and equipment (see Figure 3.2-4 for a photo of a representative CTV).

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 operations and maintenance activities would ideally be based at a general aviation airport in reasonable proximity to the O&M Facilities.



Vineyard Wind Project



**Figure 3.2-4**  
Crew Transfer Vessel (CTV) Examples

Larger support vessels are typically a Service Operations Vessel (“SOV”). These larger vessels have onboard crew and maintenance team quarters, shop facilities, a large open deck, appropriate lifting and winch capacity, and, in some instances, a helipad. These vessels are typically 80-90 m (~ 260-300 ft) in length. SOVs are usually diesel electric powered with dynamic positioning.

Vineyard Wind is in the early stages of evaluating possible locations for O&M Facilities; possible locations include existing working harbors in Martha’s Vineyard or New Bedford. Improvements to the finally selected site 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 Vineyard Wind would lease the site and any needed improvements would be coordinated with the lessor.

### 3.3 Fabrication

Project components will be fabricated by skilled manufacturers in the US, Europe, or elsewhere. Fabrication for the Project is summarized in Table 3.3-1 below.

**Table 3.3-1 Summary of Fabrication for the Project**

<b>Project Component</b>	<b>Description</b>
Monopiles	A large diameter steel pile built up by cylindrical steel cans joined by circumferential welds.
Transition Pieces	A structure made of various steel structures welded together, with a platform that is mounted onto the end of the monopile to provide a stable platform for the wind turbine.
Jackets and Transition Pieces	A large lattice type structure joined by x-bracing of cylindrical steel joined by welding.
Tower	Steel component placed on top of the transition piece. It consists of sections which are bolted together with flange joints.
Nacelle	The top section of the tower. The nacelle is made of fiberglass covering the structural part made of steel.
Hub	Steel component that supports the three blade bearings and transfers the forces from the blades to the generator.
Blades	Blades are composed of carbon and fiberglass.
220 kV Cables	Copper or aluminum triple-core cables.
66 kV Cables	Copper or aluminum core cables.
ESP Foundations	See monopiles and jackets above.
ESP Topside Structure	Upper part of the ESP including the transformers and other electrical equipment.

## 4.0 Project Activities

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## 4.0 PROJECT ACTIVITIES

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### 4.1 Detailed Construction Schedule

An overview of the construction and commissioning schedule is provided in Section 1.4.3, specifically Figures 1.5-1 through 1.5-3. Representative schedules have been provided for a 400 MW and an 800 MW Project as Figures 4.1-1 and 4.1-2. These schedules represent the use of two export cables and a conventional ESP. If there is a gap between construction cycles of two 400 MW projects, the schedule presented as Figure 4.1-1 will simply be repeated, with the exception that some of the onshore infrastructure (e.g., duct banks) may have already been constructed.

### 4.2 Deployment and Construction

#### 4.2.1 *Deployment Overview*

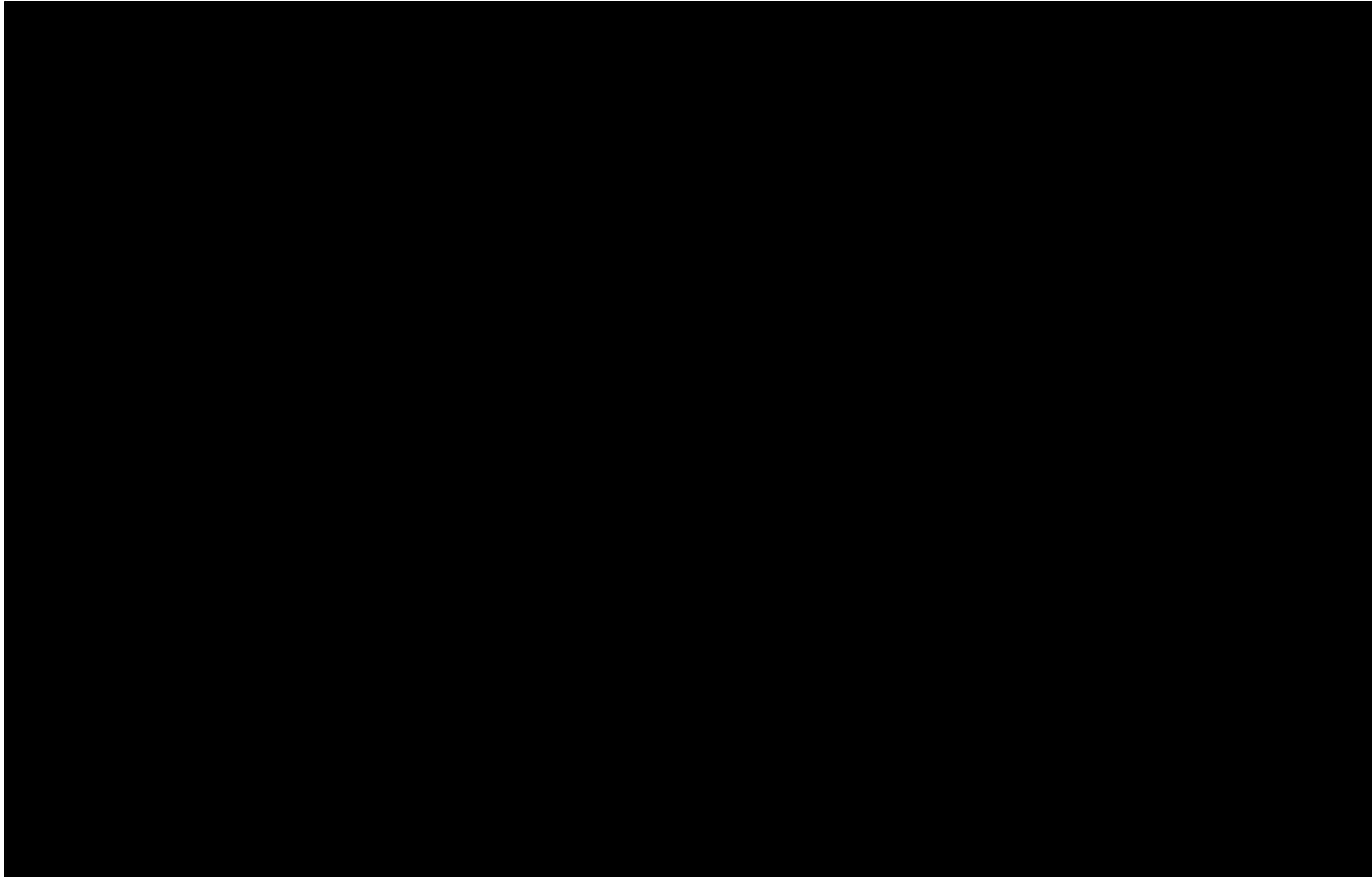
Deployment of the necessary vessels and construction equipment will be sequenced based on the construction schedule provided in Section 4.1. The installation sequence and construction methodology are generally described in Section 1.5. A more detailed discussion is provided in Section 4.2.3.

#### 4.2.2 *Health, Safety & Environmental Protection Features during Deployment and Installation*

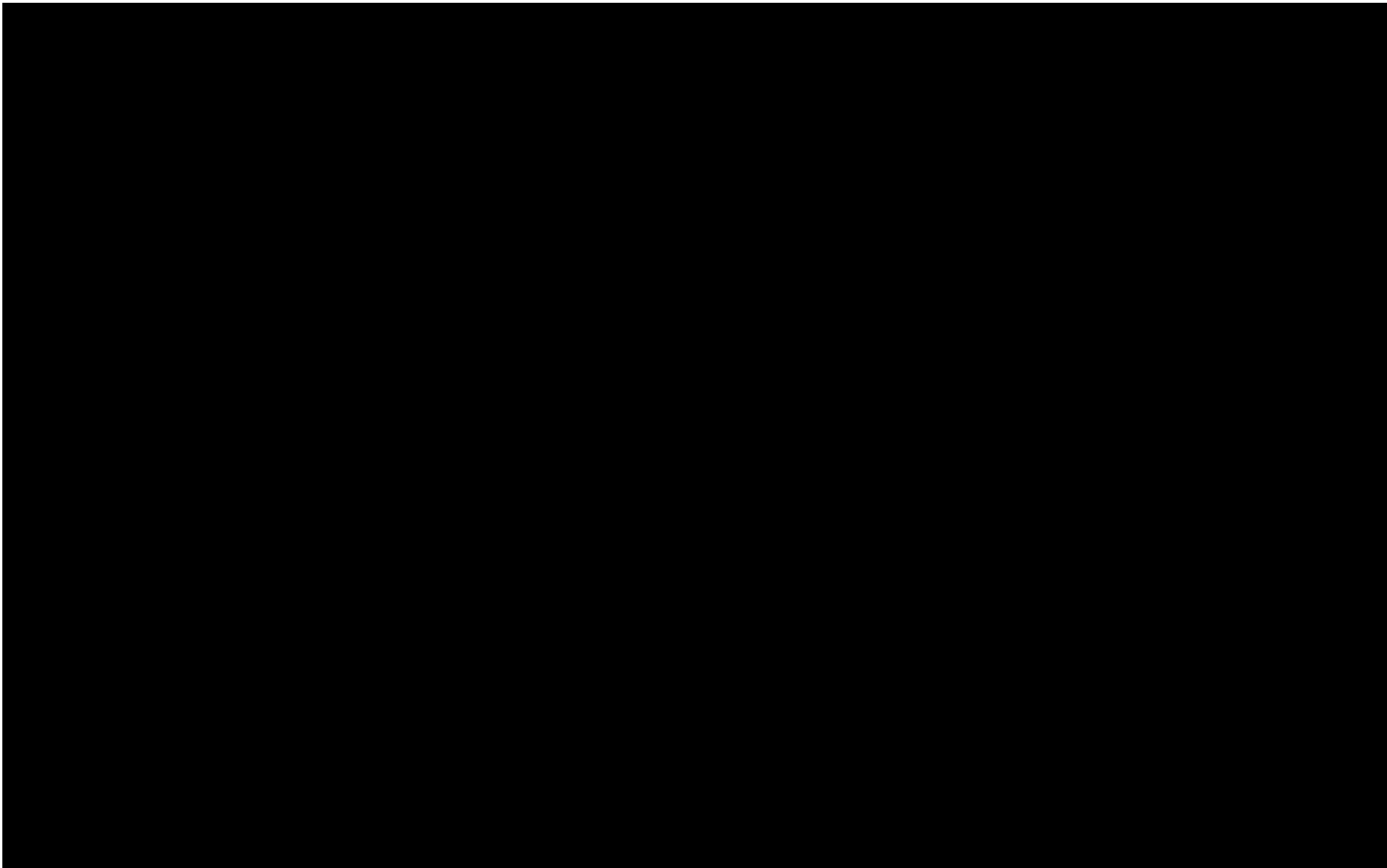
Vineyard Wind is firmly committed to Project safety and full compliance with applicable health, safety, and environmental protection regulations and codes. This commitment extends to all phases of the Project, commencing with deployment, into the construction/installation phases and through the O&M phase.

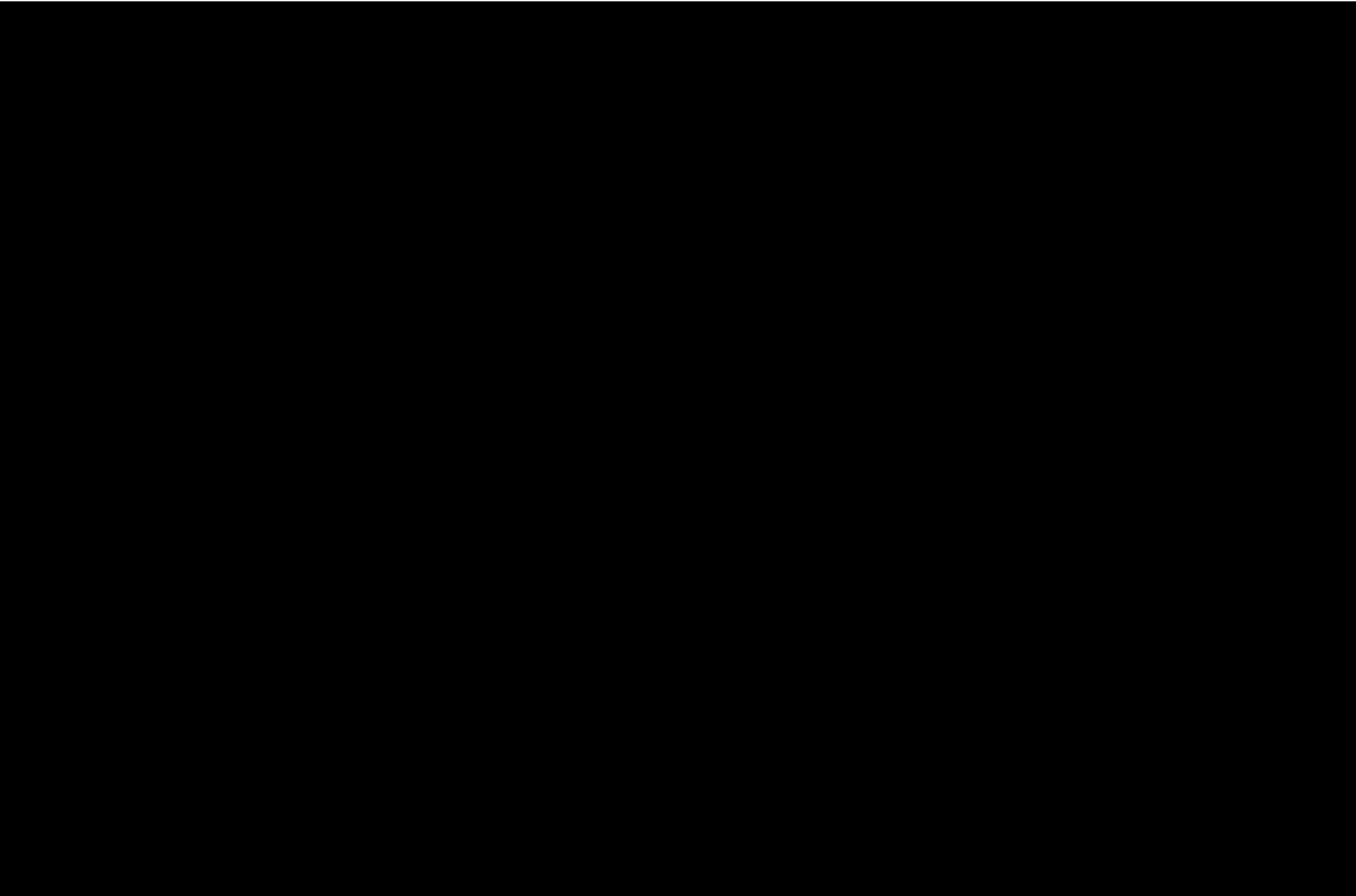
The challenges of large-scale construction in a marine environment require that health, safety and environmental protection are rigorously and continually assessed at every stage of the Project. Members of the Vineyard Wind team have many years of experience with safely constructing such projects in the North Sea, the Baltic Sea and other challenging environments. This experience will be applied to the planning, design, procurement and execution of the Vineyard Wind Project.

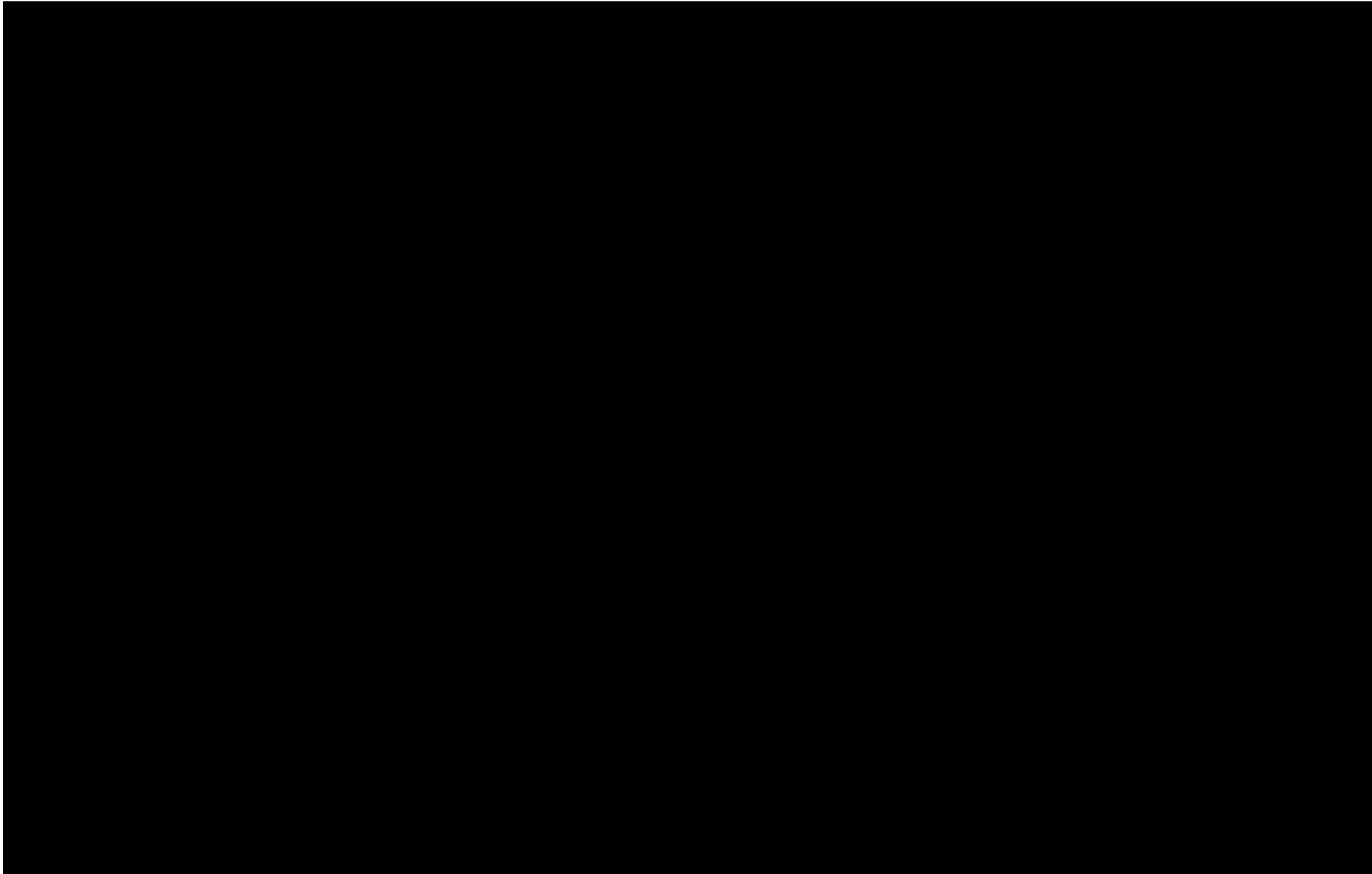
For the deployment and installation, Vineyard Wind's Safety Management System (SMS) (Appendix I-B) and related Environmental Management System will be utilized. All equipment suppliers and construction firms will be evaluated per the contractor qualification requirements stipulated in the Project's SMS to ensure compliance with regulatory and Project requirements. The evaluation includes a comprehensive gap analysis review of the equipment supplier and/or construction firm's SMS and Environmental Management System to satisfy Vineyard Wind that work can be performed in compliance with the project's SMS.

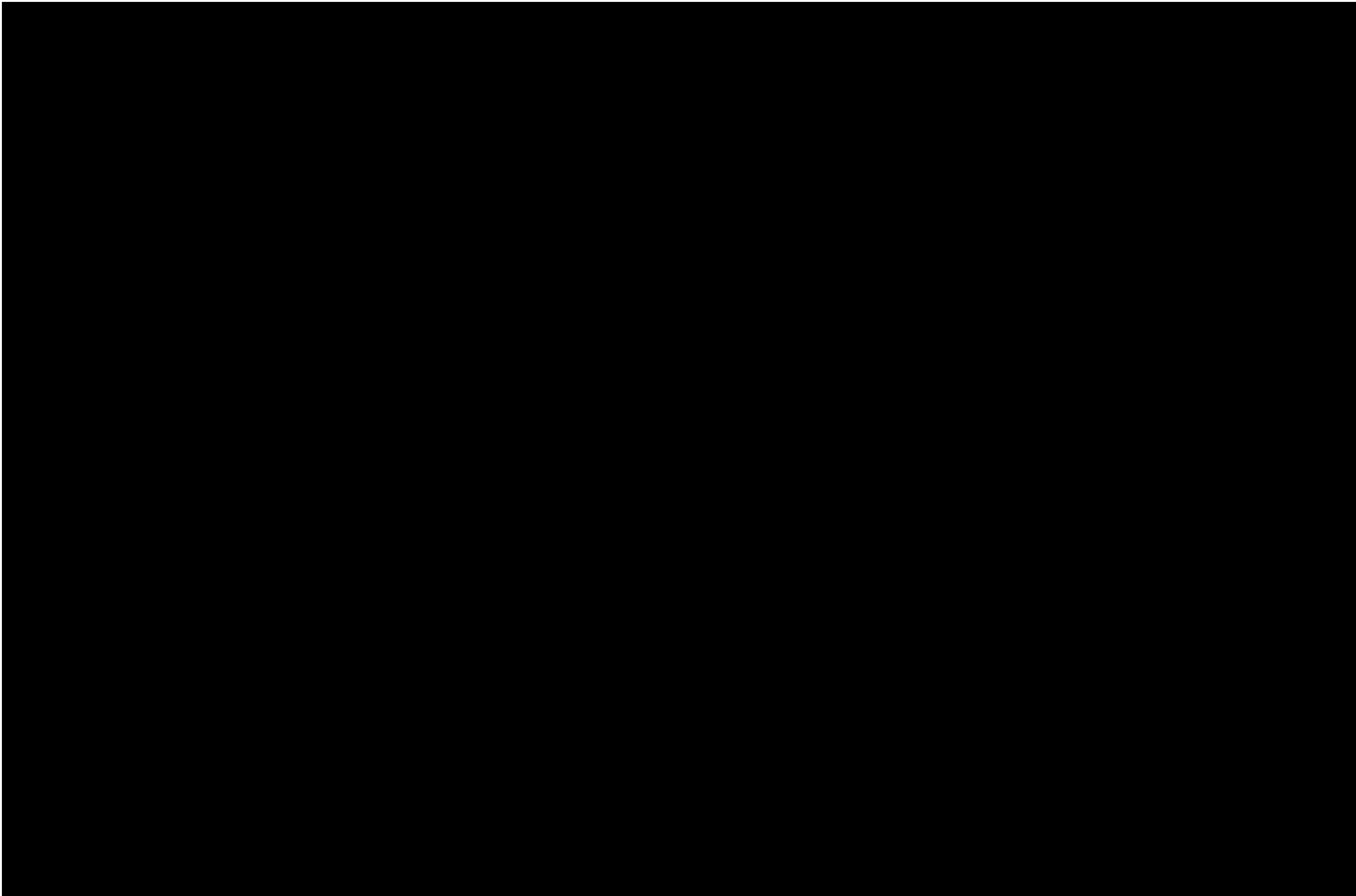


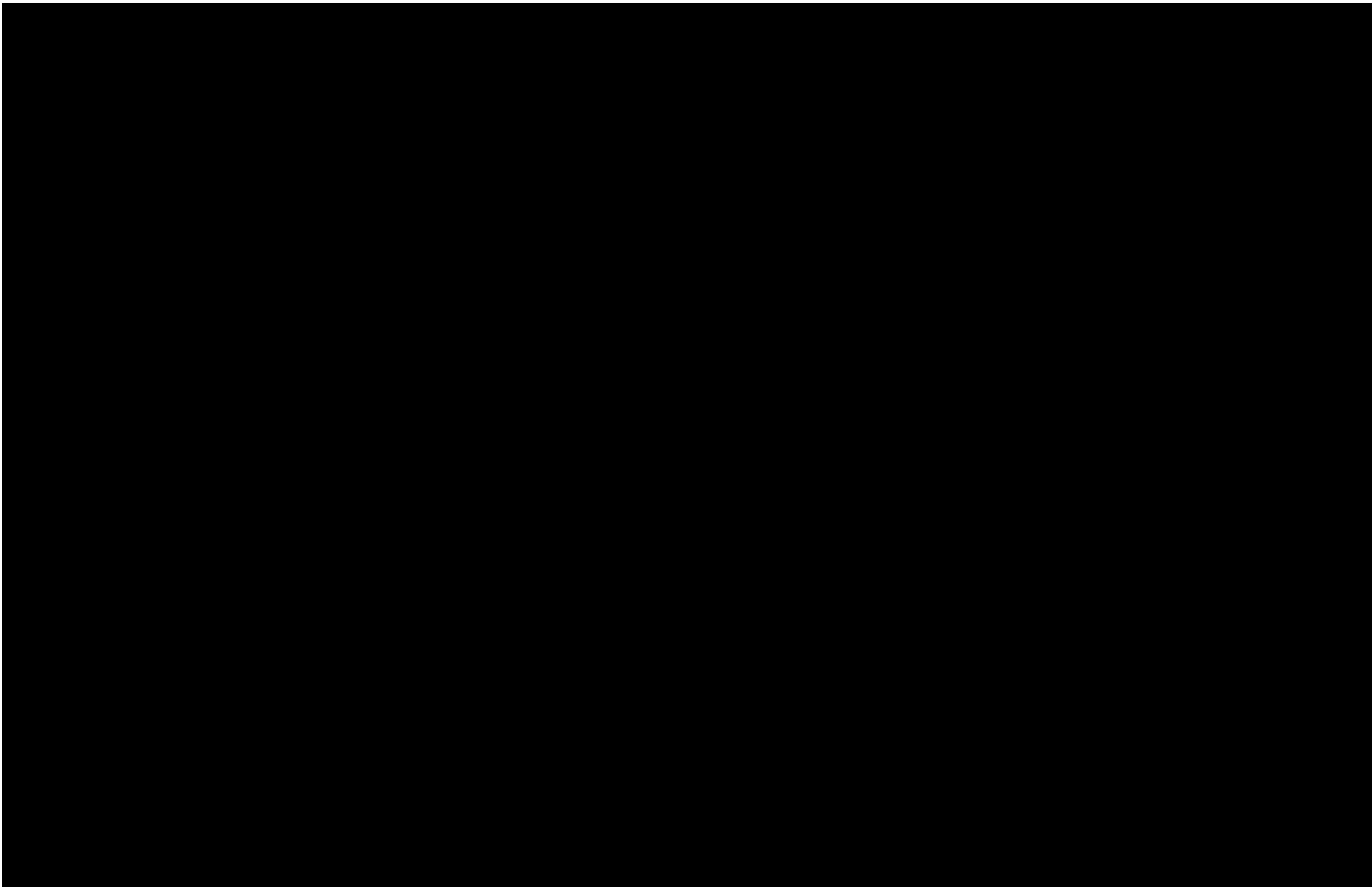


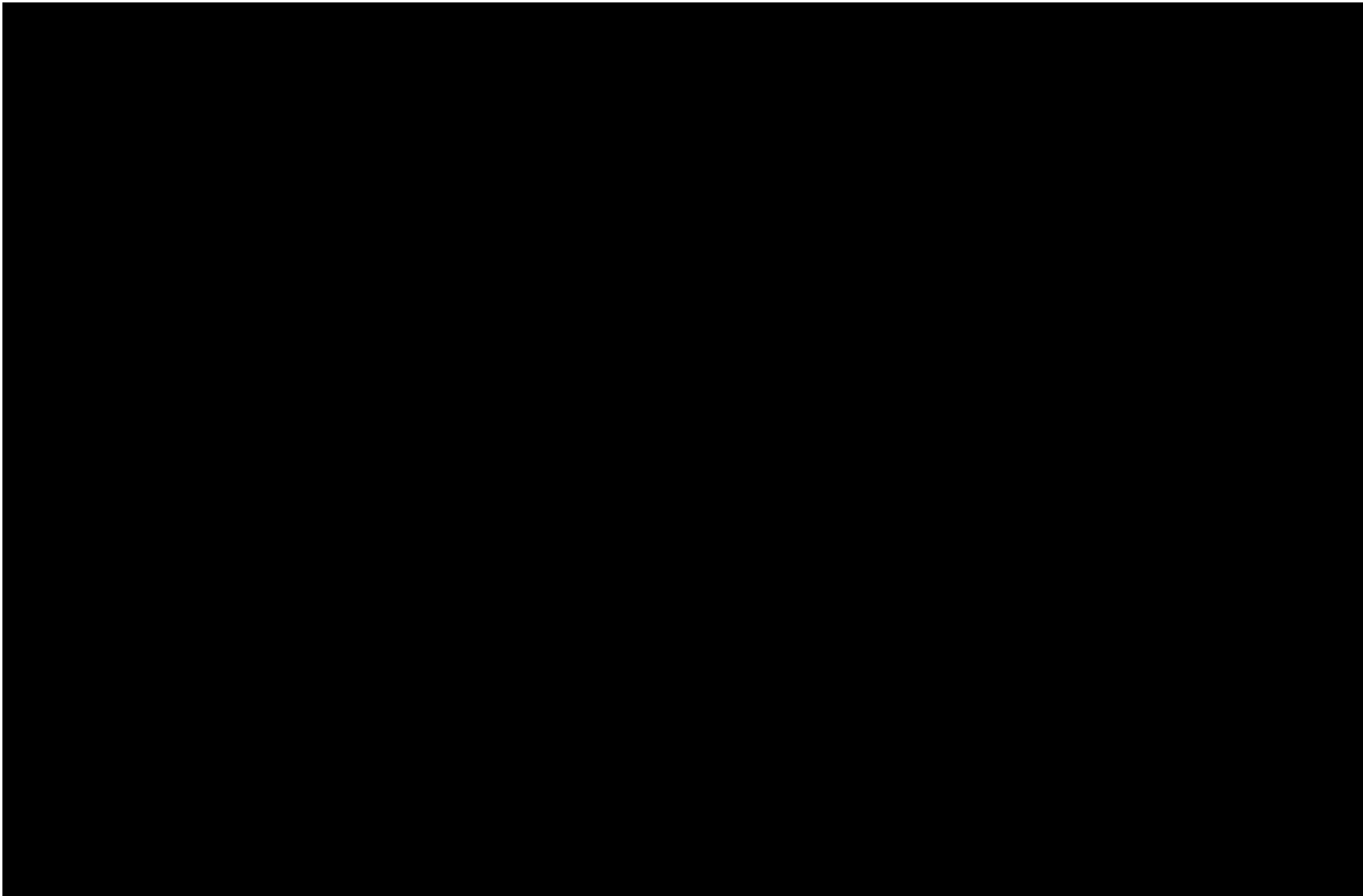


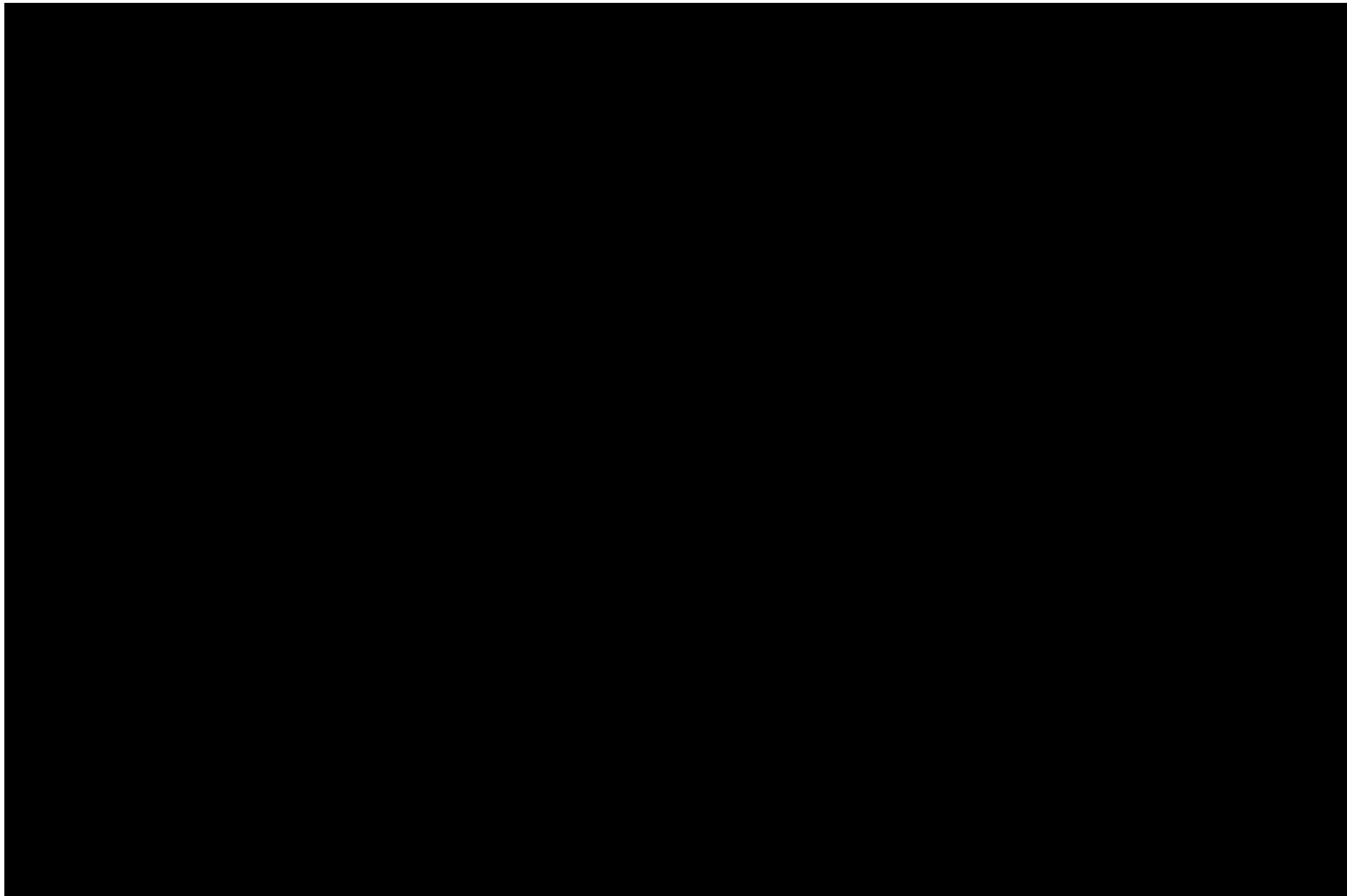


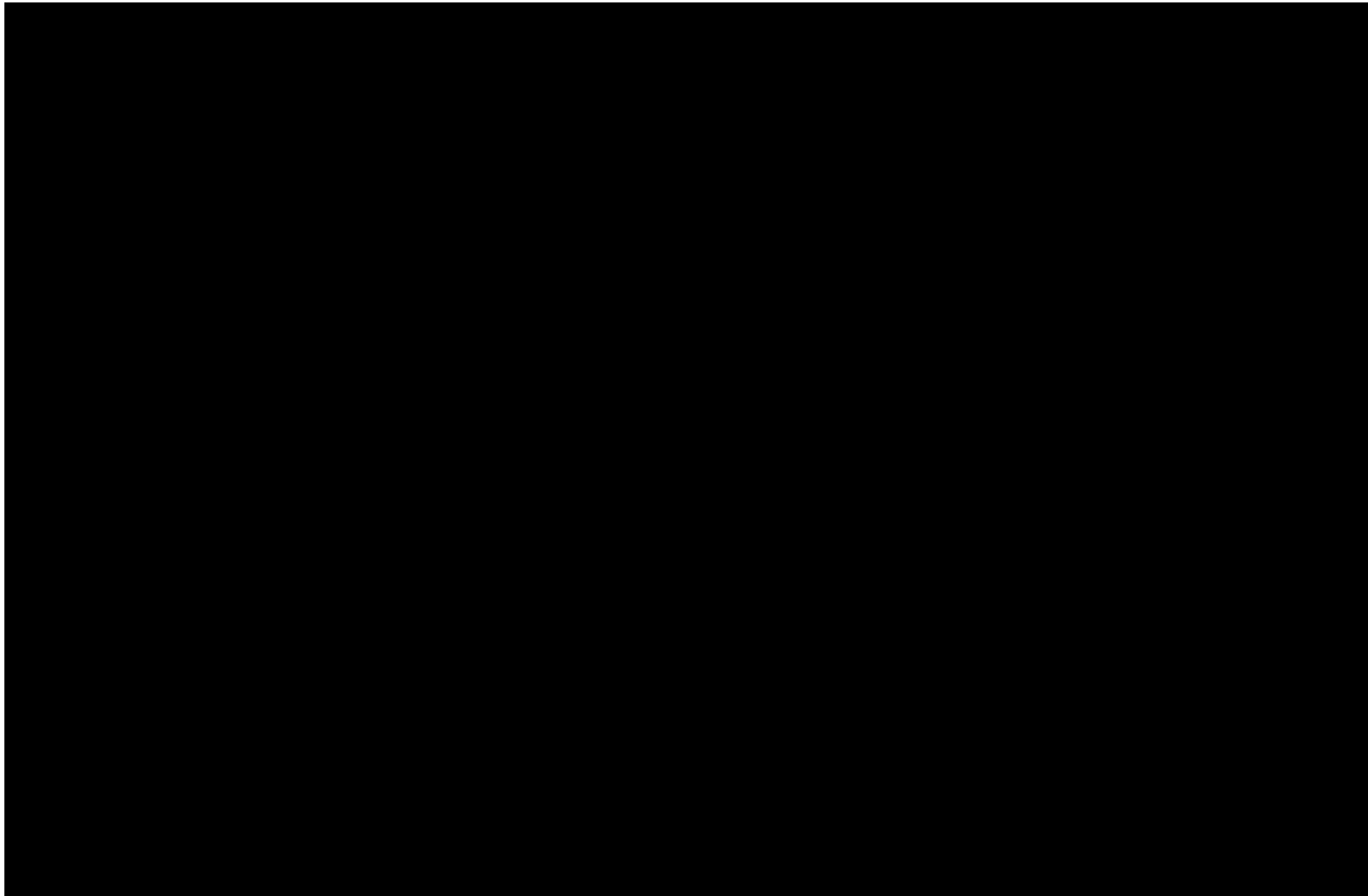














A Project specific SMS that includes the site-specific health, safety and environmental policies and procedure requirements will be developed. The Safety Management System will contain the minimum requirements for working on-site, which all parties will have to adhere to. The SMS will include, but not be limited to the following:

- ◆ The Project's HSE policy
- ◆ Requirements for preparing safe systems of work
- ◆ Training requirements and requirements for personal protective equipment
- ◆ Vessel requirements
- ◆ Requirements to carry out HSE inspections of own works
- ◆ Reporting to authorities and to the Project
- ◆ Hazardous work identified on the Project

Before starting any work on-site, all contractors and construction firms will need to attend a pre-job meeting for a final check that safe systems of work are in compliance with the Project's SMS and that all health and safety requirements are understood. This will also be inspected regularly by the Vineyard Wind EH&S representatives on-site. Furthermore:

Before any vessels are contracted, they will undergo a vessel inspection to make sure that they are compliant (e.g., IMCA audit). This also includes a check of their Safety Management System and Environmental Management System. Any findings of deficiency or non-compliance will be rectified before work begins. Vessels will also be checked to ensure it is 'fit for purpose' for the work they are expected to carry out.

Vessel owners and construction firms will receive a package of the relevant site information in order for them to carry out their work safely. This can include site layout, geotechnical data, and environmental data such as water depths, wind climate, wave climate (including wind wave misalignment and wind speed-wave height correlation), tidal elevation and currents, extreme sea state and extreme wave height, severe sea state and severe wave height, normal sea state, wave breaking, additional parameters, ice, seismic conditions, ship impact, and wave run up.

Safe systems of work such as risk assessments, method statements, lifting plans, towing arrangements, permit to work system (e.g., lifting operations, confined space working) will be in place before work begins. The safe systems of work will be based on regulatory HSE requirements, Project requirements and best practice. During the planning phase for the Project, HSE workshops will be held where planned procedures are tested for interfaces and unsafe practices.

The safe systems of work will be reviewed and approved by Vineyard Wind and the Marine Warranty Surveyor. During the execution of work, Vineyard Wind representatives will regularly check that the work is carried out according to the safe systems of work.

The information in the safe systems of work will be communicated to employees working on-site through toolbox talks. These toolbox talks will be regularly reviewed and attended by Vineyard Wind representatives.

Management and handling of hazardous substances used on the Project will be reviewed ensure compliance with regulatory requirements. This includes checking that appropriate containers, labeling and equipment are used. Where possible, a hazardous substance will be substituted with a more environmentally-friendly alternative.

Vineyard Wind will implement a system for reporting safety observations and near misses. All construction firms will be encouraged to report any observations and share their experiences with Vineyard Wind to avoid reoccurring unsafe acts.

A marine coordination center will be established to control vessel movements throughout the Offshore Project Area. Expected daily vessel movements, crew transfer vessel manifests, and no-go zones on-site will be handled by the marine coordinator. In addition, daily coordination meetings will be held by Vineyard Wind to coordinate between construction operations and avoid unnecessary simultaneous operations at the staging terminals and including routes to the Offshore Project Area.

The Marine Coordinator will implement communication protocols with external vessels at the harbor and offshore, during project construction. The Marine Coordinator will use tools such as radio communications and guard vessels to address vessels entering construction zones. The Marine Coordinator will also work in advance of, and during Project construction, to coordinate activities within and near the harbor(s) with non-Project vessels. Communication protocols will be developed as part of the Project's SMS.

Before construction and installation activities begin, an Oil Spill Response Plan ("OSRP"), Emergency Response Plan ("ERP"), and Safety Management System will be completed (see Appendices I-A and I-B) and issued to the vessels and construction firms. The OSRP and ERP will provide a method/process for communication protocol, coordination, containment, removal and mitigation of foreseen incidents that may occur on the Project. These plans will minimize confusion and indecision, prevent extensive damage to the Project or injury to personnel, and minimize exposure to personnel within or outside of the Project.

In the event of an actual spill or incident, it will be the vessels and construction firms plans that will be used to contain and/or stop an incident in compliance with the requirements of the projects OSRP. As such, these plans will be checked and reviewed by Vineyard Wind to make sure that they are in accordance with regulatory and Project requirements and that a drill plan is in place. In addition, routine training and exercises regarding the content of the OSRP and ERP will be carried out regularly to prepare personnel to respond to emergencies, should they occur.

### **4.2.3**            *Construction Approach*

#### **4.2.3.1**        **Introduction**

The discussion of construction and installation approaches is organized by offshore and onshore elements of the Project. The discussion of offshore elements follows the overall plan of installation set forth in the construction schedule, beginning with scour protection and proceeding through installation of offshore export cables, foundations, Electrical

Service Platforms (“ESPs”), inter-array cables, and Wind Turbine Generators (“WTGs”). As shown on Figures 1.5-1 through 1.5-3, 4.1-1, and 4.1-2, there is considerable overlap in the installation periods for each of these Project elements.

#### **4.2.3.2 Scour Protection**

As described in Section 3.1.3, a circular pad of stones or rocks will be placed on the seabed at each foundation location (WTG and ESP) prior to the installation of the foundations. Stone and rock are the most widely used scour protection in the offshore wind industry. Scour protection dimensions are presented above in Table 3.1-3.

The scour protection installation is done in a multi-step process:

1. A pre-construction survey of the bottom bathymetry is conducted.
2. The scour protection material is transported to the site.
3. The scour protection material is placed prior to installation of foundations.
4. A post-lay seabed survey of bottom bathymetry is conducted; additional material is added if needed to provide the necessary coverage and thickness.
5. If needed, in limited locations, additional scour protection material may be placed locally to protect the portions of the export or inter-array cables.

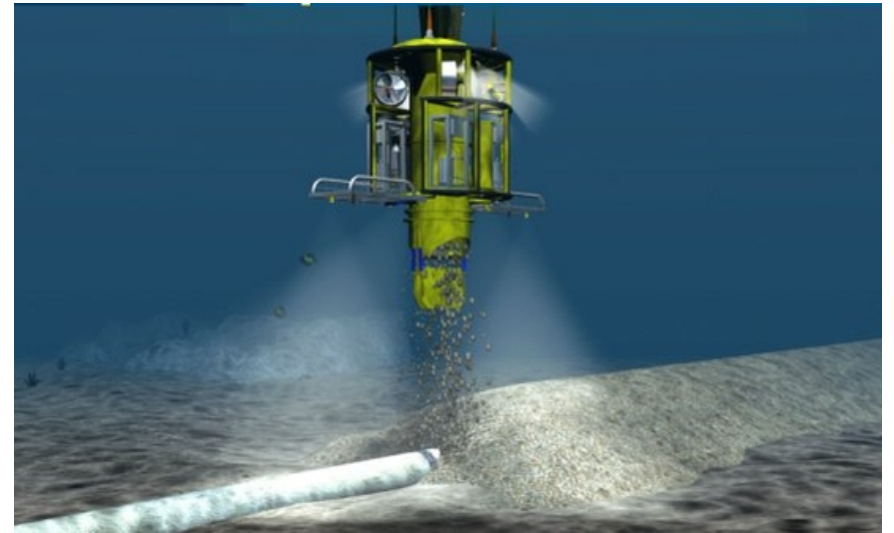
Several techniques for placing scour protection exist, including fall pipes, side dumping, and placement using a crane/bucket. The fall pipe method, in which a pipe extends from the vessel to the seafloor in the vicinity of the intended foundation location, is the most precise technique and will be used wherever possible. The fall pipe technique may include a remotely operated vehicle (“ROV”) guided lower end. The installation vessel will move along a predetermined pattern to ensure even distribution of the stone and/or rock material. Figure 4.2-1 provides illustrations of typical scour protection vessels.

#### **4.2.3.3 Offshore Export Cables**

##### 4.2.3.3.1 Overview

The offshore export cables will transmit power from the ESP to the cable Landfall Site. The offshore export cables will likely be transported directly to the Offshore Export Cable Corridor in a cable laying vessel or on a barge and installed by the vessel upon arrival. Vessel types under consideration for cable installation are presented in Table 4.2.3.

In accordance with normal industry practice, a pre-lay grapnel run will be performed in all instances to locate and clear obstructions, such as abandoned fishing gear and other marine debris. Additionally, some dredging may be required prior to cable laying due to the presence of sand waves. The upper portions of sand waves may be removed via mechanical or hydraulic means in order to achieve the proper burial depth below the stable sea bottom. Following the pre-lay grapnel run and any required dredging, offshore



Note: Figures of scour protection placement are for illustrative purposes only. As described in Section 4.2.3.2 of Volume I, scour protection will be placed prior to foundation installation.

export cable laying is expected to be performed primarily via simultaneous lay and burial using jet plowing.<sup>10</sup> However, depending on bottom conditions, water depth, and contractor preferences, other methods may be used in certain areas to ensure proper burial depth.

The offshore export cables can either be installed from the shore towards the Wind Development Area (“WDA”) or in the opposite direction. The installation will likely require at least one joint (splice) due to the overall distance of the route (70 kilometers [“km”] or 38 nautical miles [“nm”]). At the ESP, the cable will be pulled in. The cable entry protection system is not yet defined, but the entry system will be installed in the interface between the ESP and offshore export cable.

One cable crossing is planned over an existing National Grid power cable from the south shore of Cape Cod to Nantucket (see Figure 4.2-2). The specifics of this crossing will be developed with National Grid as Project planning continues. At this stage of the Project, it is anticipated that the cable crossing may include the following steps:

- ◆ The existing National Grid power cable will be carefully surveyed and inspected using an ROV, diver, or similar. Any survey will be defined, planned, executed, evaluated and documented according to the rules and regulations set forth by National Grid with agreement by Vineyard Wind.
- ◆ Any existing debris surrounding the crossing points will be carefully removed. The plan and procedures for this work will be agreed upon with National Grid.
- ◆ Depending on the depth of the National Grid cable and National Grid’s requirements, there may be a concrete mattress or other means of protection placed between the National Grid cable and Vineyard Wind’s proposed cables. Alternately, if there is sufficient vertical distance between National Grid’s cable and Vineyard Wind’s proposed cables and it is acceptable to National Grid, there may be no manmade physical barrier between the cables.
- ◆ The new export cables will be protected with either additional concrete mattresses, controlled rock placement, or a similar physical barrier. Cable protection measures will be designed to protect the export cables against mechanical impact from above and respect the vertical distance and physical barrier (if any) to the National Grid power cable. The design of the crossing structure will be defined, planned, executed, evaluated and documented according to the rules and regulations set forth by National Grid, and in order to minimize the risk of fouling or snagging of fishing equipment.
- ◆ If necessary, scour protection consisting of additional rocks and/or fond mattresses will be carefully placed on and around the crossings.

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<sup>10</sup> As described in Section 4.2.3.6, the inter-array cables are expected to be installed using a pre-lay/jet plowing approach.

- ◆ Final as-built surveys of the completed crossings will be undertaken. The surveys will be documented according to the rules and regulations set forth by and agreed upon with National Grid. As-built positions will be provided to NOAA for charting purposes.

#### 4.2.3.3.2 Detailed Description of Cable Installation

##### ***Pre-lay Grapnel Run***

The pre-lay grapnel run will consist of a vessel towing equipment that will hook and recover obstructions such as fishing gear, ropes, and wires from the seafloor.

##### ***Dredging***

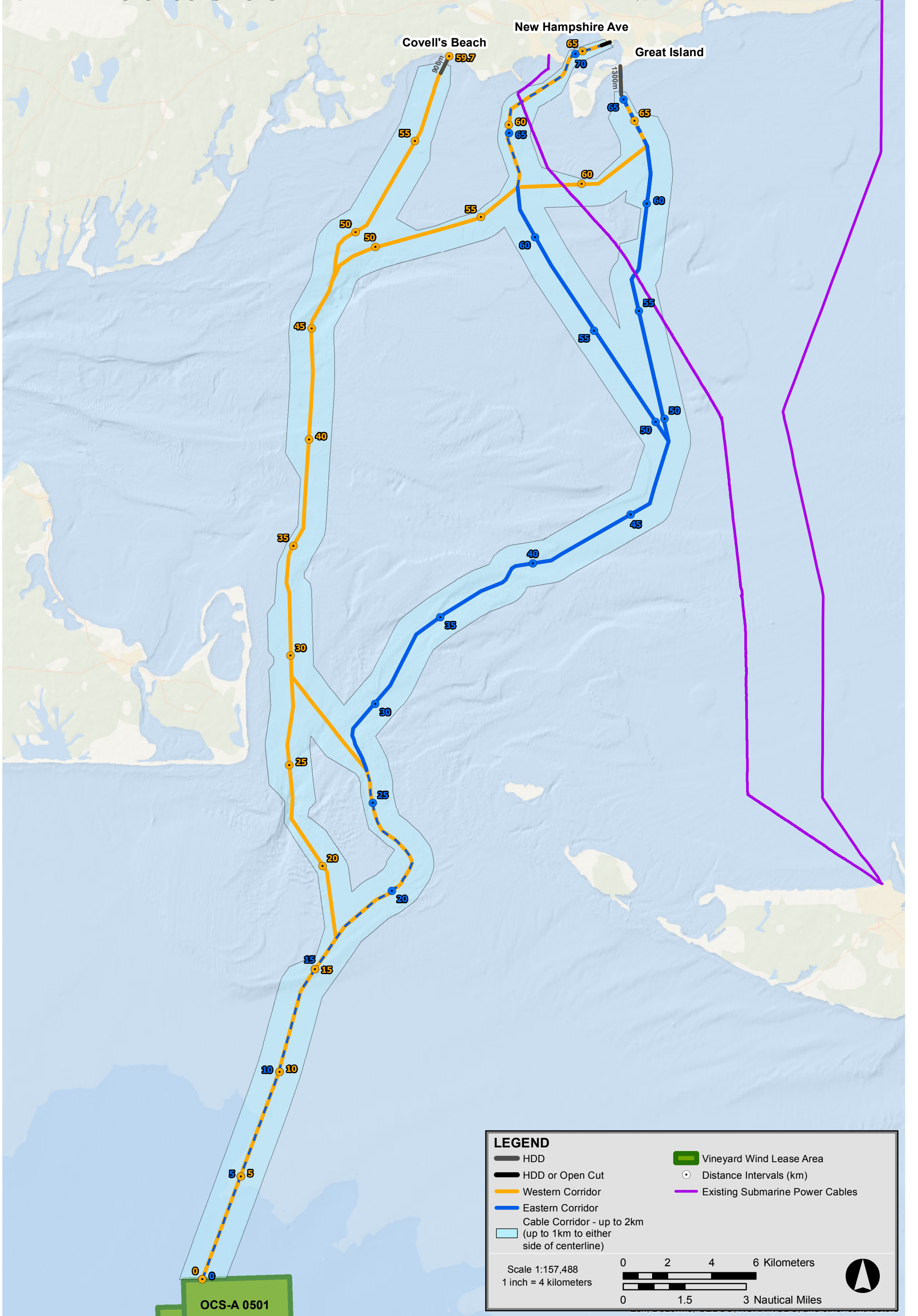
As described in Volume II, marine surveys completed in the summer of 2017 confirmed that portions of the Offshore Export Cable Corridor (“OECC”) contain sand waves. Portions of the sand waves may be mobile over time; therefore, the upper portions of the sand waves may need to be removed so that the cable laying equipment can achieve the proper burial depth below the sand waves and into the stable sea bottom.

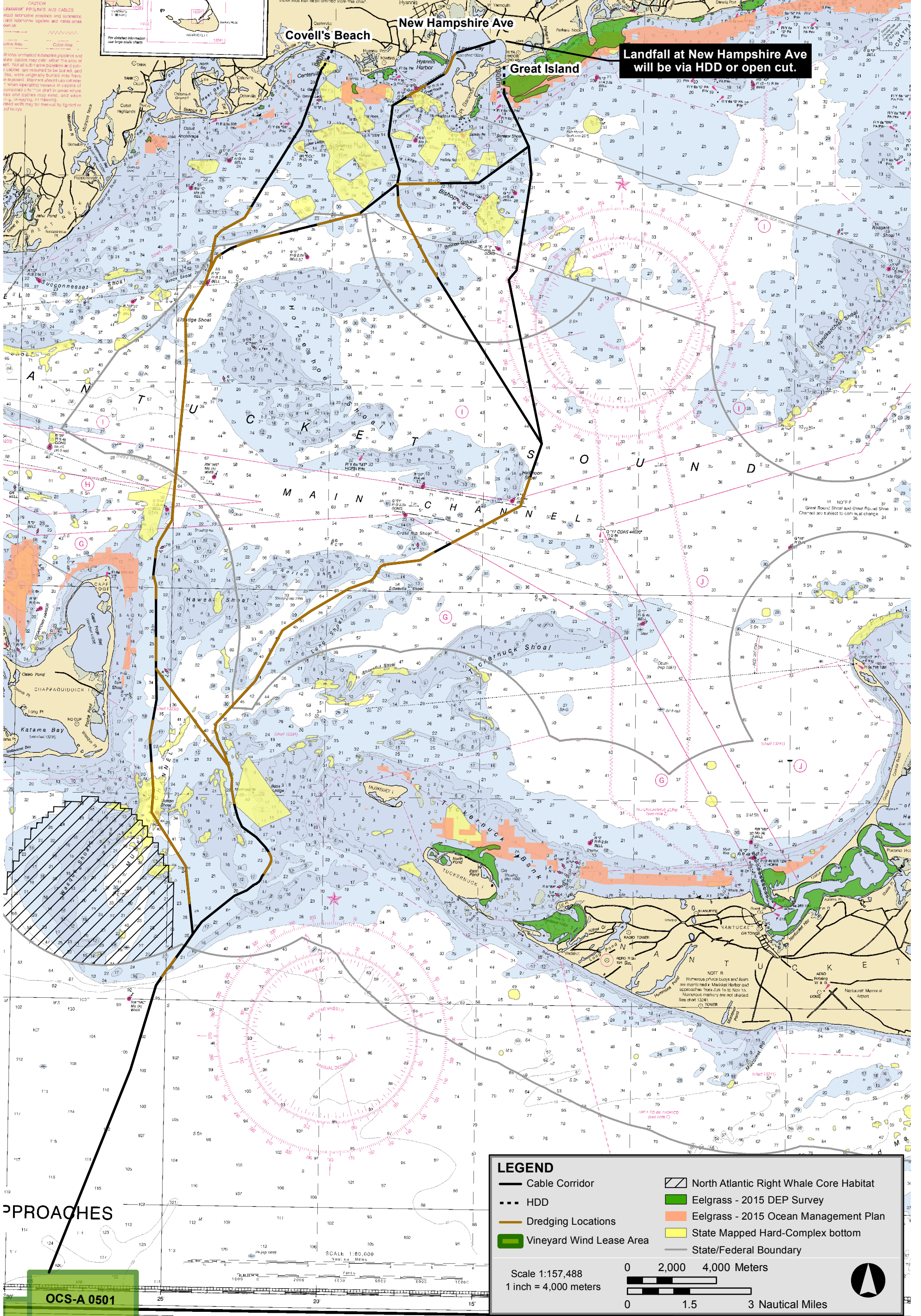
For each of the three export cables, a 20 meter (“m”) (66 feet [“ft”]) wide corridor will be dredged. This corridor includes the narrower two meter (6.6 ft) wide corridor for cable installation. For three cables, total dredging may impact up to 328,698 square meters (“m<sup>2</sup>”) (3,538,072 square feet [“ft<sup>2</sup>”])<sup>11</sup> and may include up to 192,948 cubic meters (252,366 cubic yards) of dredged material. The dredge volumes are dependent on the final route and cable installation method. Figure 4.2-3 provides the maximum extent of dredging. The average dredge depth is 0.5 m (1.6 ft) and may range up to 4.5 m (14.7 ft) in localized areas.

Dredging could be accomplished by several techniques. European offshore wind projects have typically used a trailing suction hopper dredge (“TSHD”). Dredges of this type are also commonly used in the US for channel maintenance, beach nourishment projects, and other uses. For this Project, a TSHD would be used to remove a 20 m (65.6 ft) wide section of a sand wave (for each of the up to three cables) that is deep enough to allow subsequent installation of the cable using one of the techniques described below. Should a TSHD be used, the sand removed could be discharged from the vessel in a direction that would allow the prevailing currents to naturally refill the cut after installation of the cable. Compared to other methods of sediment disposal, the proposed side-casting would limit the generation of suspended sediments.

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<sup>11</sup> Impacts will occur from the cable installation’s two meter (6.6 ft) wide corridor and dredging’s 20 m [66 ft] wide corridor. To avoid double-counting impacts, dredge areas are calculated outside of the two meter (6.6 ft) cable installation corridor.







A second dredging technique involves multiple passes of a mechanical plow to open the necessary cut in the sand wave. The feasibility of this technique will be a function of the final route, the configuration and number of sand waves, and the expected volume of material that needs to be moved.

Conventional bucket dredging may also be utilized to ensure proper cable burial depth. As with the TSHD, dredged sediments would be side-cast to allow for natural infilling of the trench after cable installation and to limit the generation of suspended sediments during disposal. It is anticipated that a bucket dredge could work in the required water depths; however, the open water environment may yield significant equipment downtime.

### ***Cable Installation***

The majority of the export and inter-link cable is expected to be installed using simultaneous lay and bury via jet plowing. Likewise, the majority of the inter-array cable is expected to be installed via jet plowing after the cable has been placed on the seafloor. 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. The three most common methods are described below under “Typical Techniques,” additional techniques that may be used more rarely are described below under “Additional Possible Techniques.”

The target burial depth for inter-array and export cables is 1.5- 2.5 m (5-8 ft). As noted in Sections 3.1.5.3 and 3.1.6, approximately 10% of the inter-array, inter-link, and export cable may not achieve the proper burial depth and will require cable protection.

### ***Typical Techniques***

- ◆ Jet plowing (jet trenching): This tool may be based from a seabed tractor or a sled deployed from a vessel. This tool typically has one or two arms, or booms, which extend into the seabed and discharge pressurized seawater as the tool moves along the cable route (either simultaneously as the cable is laid on the seafloor or after the cable has been laid), fluidizing the sediment and allowing the cable to sink by its own weight to the appropriate depth or to be placed at depth by the tool. Sediment naturally settles out of suspension thereby backfilling the narrow trench.
- ◆ Mechanical plowing: A mechanical plow is deployed from a vessel and uses a cutting edge(s) and moldboard to mechanically push through the seabed while feeding the cable into the trench created by the plow. This narrow trench infills itself behind the tool, either by collapse of the trench walls and/or by natural infill, usually over a relatively short period of time.
- ◆ Mechanical trenching: Mechanical trenching (chain or wheel cutter) is typically only used only in the more resistant sediments. A rotating chain or wheel with cutting teeth or blades removes the sediment. The cable is laid into the trench

behind the trencher and the trench collapses naturally to cover the cable, or, if required, another tool can be used to push the sediment over the cable to fill the trench.

### *Additional Possible Techniques*

- ◆ Shallow-water cable installation tractor: This system uses one of the techniques described above, but is deployed from a tractor that operates in shallow water where vessels cannot efficiently operate. The cable is first laid on the seabed, and then a tractor drives over or alongside the cable while operating an appropriate burial tool to complete installation. The tractor is controlled and powered from a self-elevating platform that holds equipment and operators above the waterline.
- ◆ Pre-trenching: A “V”-shaped trench is excavated by a plow or similar device, and the sediment is placed next to the trench. The cable is then laid in the trench. Separately or simultaneously to laying the cable, the sediment is returned to the trench and covers the cable.
- ◆ Boulder clearance: In areas of the route where large boulders could be encountered, boulder clearance may be employed prior to cable installation. Boulder clearance leaves the route clear of large boulders, facilitating installation and better ensuring proper burial. Boulder clearance is accomplished either by means of a grab that lifts individual boulders clear of the route, or using a plow-like tool which is moved along the route to push boulders to the side of the area where cable is to be installed.
- ◆ Precision installation: In situations where a large tool is not able to operate, or in situations where a specialized installation tool cannot complete installation, a diver or remotely-operated vehicle (“ROV”) may be used to complete installation. The diver or ROV may use small jets or other small tools to complete installation.

### *Anchor Usage During Cable Installation*

Anchors are not expected to be used for the majority of offshore export cable installation.<sup>12</sup> However, anchoring may be used along portions of the offshore export cable, where needed. The anchoring is expected to take place within the OECC shown in Figure 2.1-1. Additional width for the anchoring may be required in more challenging installation locations, such as Muskeget Channel and Lewis Bay. The additional area is also shown on Figure 2.1-1. If used, anchored vessels will avoid sensitive seafloor habitats to the greatest extent possible.

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<sup>12</sup> Within the WDA, anchored vessels will not be used as primary construction and installation vessels. Any anchoring that does take place within the WDA will occur within the Area of Potential Effect as described in Volume II-C.

### *Cable Splicing*

Due to the length of the OECC (70 km or 38 nm) and the shallow nearshore installation techniques, the offshore export cables will likely require at least one joint (splice). Upon reaching the joint location, a cable will be retrieved from the seabed and brought inside the cable laying vessel or other specialized vessel. Inside a controlled environment (i.e., a jointing room) aboard the vessel, the two ends of the cable will be spliced together. Once cable splicing is completed, the offshore export cable is lowered to the seafloor. Depending on the design of the cable and joint, the splicing process may take several days, in part, because the jointing process must be performed during good weather.

#### **4.2.3.4 Foundations (Monopile and Jacket)**

##### *Monopile Foundations*

After fabrication, the monopile foundation components (monopile, transition piece, and any secondary items) will be transported to a marshalling port (see Section 3.2.5) or directly to the offshore site.

The installation concept and method of bringing components to the WDA will be based on supply chain availability and final contracting. The monopiles (or jackets) are expected to be installed by a single heavy lift or jack-up vessel. The main installation vessel will likely remain at the WDA during the installation phase and tugs and/or feeder barges will transport a continuous supply of foundations from the port to the WDA. If a Jones Act compliant vessel is available, the foundation components could be picked up directly in the marshalling port.

At the WDA, using a crane, the installation vessel will upend the monopile, place it in the gripper frame, and then lower the monopile to the seabed. The gripper frame stabilizes the monopile's vertical alignment before and during piling. Once the monopile is lowered to the seabed, the crane hook is released and the hydraulic hammer is picked up and placed on top of the monopile. Figure 4.2-4 shows a vessel lowering a monopile and typical jack-up installation vessels.

The pile driving will then commence, beginning with a soft-start. This will ensure that the monopile remains vertical while also allowing any motile marine life to leave the area before the pile driving intensity is increased. The intensity (i.e., hammer energy level) will be gradually increased based on the resistance that is experienced from the sediments. The expected hammer size for monopiles is up to 4,000 kilojoules ("kJ"); energy use, however, is anticipated to be far less than 4,000 kJ.

The typical pile driving operation is expected to take less than approximately three hours to achieve the target penetration depth. It is anticipated that a maximum of two piles can be driven into the seabed per day. No drilling is anticipated, but it could be required if a large boulder is encountered. Similarly, use of a vibratory hammer is not anticipated, but could be used if deemed appropriate by the installation contractor.



Vineyard Wind Project

After installation of the monopile, the transition piece will be picked up and placed on the monopile. The connection between the monopile and the transition piece will be either grouted or bolted. If the time between the installation of the monopile and transition piece is longer than a few days, the amount of marine growth must be assessed and marine growth may need to be removed prior to installing the transition piece.

### ***Jacket Foundation Installation***

After fabrication, the jackets and pin piles will be transported to a marshalling port (see Section 3.2.5) or directly to the Offshore Project Area. The installation concept and method of bringing components to the WDA will be the same as for the monopile.

The jacket, including transition piece and pin piles, will be transported to the Offshore Project Area on feeder barges/vessels. The jacket will be lifted off the feeder vessel and lowered to the seabed with the correct orientation. Next, the pin piles will be lifted and driven through the pile sleeves to the engineered depth. The maximum anticipated hammer size for jacket foundations is 3,000 kJ; energy use, however, is anticipated to be far less than the hammer size. Once all piles are driven to the target depth, they will be fixed in the pile sleeves, most likely by the use of grouting. It is also possible that piles may be driven prior to lowering the jacket by using a frame to orient the piles.

The pile driving will then commence, beginning with a soft-start, as described above for the monopiles. It is anticipated that a maximum of two complete jackets can be installed per day. No drilling is anticipated, but it could be required if a large boulder is encountered. Similarly, use of a vibratory hammer is not anticipated, but could be used if deemed appropriate by the installation contractor.

#### **4.2.3.5 Electrical Service Platforms**

Each ESP is comprised of two primary components: the topside with the electrical components and the foundation substructure. Either a monopile or jacket will be used for the foundation. Seabed preparation may be required prior to foundation installation. This could include the removal of large obstructions at seabed to avoid excessive seabed gradients. The ESP foundation installation concept is similar to the foundation for the wind turbines: a monopile is driven vertically into the sea bed with a transition piece or similar connection structure mounted on the pile to provide a stable platform to support the weight of the ESP topside.

If a jacket is chosen as foundation for the ESP, the jacket will be lifted off the vessel and lowered to reach the seabed in the right location and with the correct orientation. Next, the pin piles will be lifted and driven through the pile sleeves to the engineered depth. Once all piles are driven to the target depth, they will be fixed in the pile sleeves by use of grouting. It is also possible that piles may be driven prior to jacket installation.

The ESP - either conventional or light-weight – can be transported directly to the Offshore Project Area. Alternatively, it could be transported to a harbor (see Section 3.2.5) and moved offshore on a barge. The installation of the topside is anticipated to be carried out by the same vessel that installs the foundations. The vessel will position itself next to the

foundation. The ESP topside will arrive on the feeder vessel or barge and the installation vessel crane will lift the topside and place it on the foundation. The ESP topside and the foundation will be connected either using bolted connections, welding, or a combination of bolts and welding. Figure 3.1-14 shows construction work being performed on an ESP. After the ESP mechanical installation is complete, the 66 kilovolt (“kV”) inter-array cables and the 220 kV offshore export cables will be pulled into place and terminated at the ESP. These cables will be routed through J-tubes, or similar means, located on the surface of the foundation/substructure or can be routed through the inside of the foundation/substructure.

#### **4.2.3.6 Inter-array Cables**

The 66 kV inter-array cables will be used to connect “strings” of six to 10 WTGs to the offshore ESP (see Figure 3.1-16). Each inter-array cable begins at a WTG and terminates at the next WTG on the string. The inter-array cable installation follows scour protection and foundation installation, and normally precedes WTG installation at a given WTG location.

The inter-array cables could be transported in a cable laying vessel and directly installed at site upon arrival, or they could be stored onshore then be transferred to a cable laying vessel. For the inter-array cables, the expected installation method is to lay the cable section on the seafloor and then subsequently bury the cable using a jet plow (this is referred to as “post-lay burial”). The jet plow technique is described above in Section 4.2.3.3.

At either end, the inter-array cable crosses the scour protection pad and is brought into a J-tube (see Figure 3.1-9) or similar connection, for subsequent linking to the WTG. Cable pull-in will be conducted at each foundation location and followed by cable termination works. As described in Section 3.1.6, cable protection measures may be required for sections of the inter-array cables where burial was not possible and for the transition from seabed to WTG foundation.

#### **4.2.3.7 Wind Turbine Generators**

WTG installation involves feeder barges transporting components from the port to the installation vessel. This installation vessel may be a jack-up or a dynamic positioning (“DP”) vessel. The tower will first be erected followed by the nacelle and finally the hub, inclusive of the blades. Alternatively, the nacelle and hub will be installed in a single operation followed by the installation of individual blades. In case the tower consists of more than one section, the sections will be joined with a bolted connection.

Commencement of the WTG installation phase represents the most intense period of vessel traffic in the Offshore Project Area, with wind turbine foundations, array cables, and wind turbines being installed in parallel.

WTG installation will be followed by the commissioning period where the WTGs will be prepared for operation and energized. Wind turbine commissioning involves conducting the necessary tests of the electrical infrastructure and WTGs ahead of passing the WTG to

the operations and maintenance teams for the duration of its service life. The WTG commissioning and testing phase will be conducted in parallel with the WTG installation phase.

#### **4.2.3.8 Landfall Site**

As described in Section 3.2.1, the Project has identified three possible Landfall Sites: Covell's Beach parking lot in the Town of Barnstable; New Hampshire Ave/Lewis Bay in the Town of Yarmouth; and a location on Great Island in the Town of Yarmouth. In all three cases, the ocean to land transition can be made by use of horizontal directional drilling ("HDD"). The HDD rig would be setup in a parking lot or other previously disturbed area, and the drill would be advanced seaward. The length of the drill or bore would depend on the width of the dune and beach area, any nearshore sensitive resources, such as eelgrass, as well as bathymetry and geologic conditions. Three bores would be needed, one for each offshore cable. At the offshore end of each bore site, a temporary cofferdam or other method (e.g., gravity cell) may be used to facilitate cable pull-in. Once the bores are completed, each offshore cable is pulled through a bore to an underground concrete vault. In the vault, the three core submarine cable is separated and jointed to the single core onshore export cable (three single core cables per circuit).

The Lewis Bay/New Hampshire Ave landing area may be suitable for a direct lay approach in lieu of the HDD installation contemplated for the other two Landfall Sites. The New Hampshire Ave 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. Use of a direct lay approach, as opposed to the more equipment intensive and time-consuming HDD, would also minimize any temporary disturbances to the nearby neighbors. It should be noted that the surrounding area is comprised of seasonal homes and cottages, hence offseason work would minimize the neighborhood disturbance under either approach (see Section 1.5.3 for a more detailed discussion of the seasonal limitations on the construction schedule).

#### **4.2.3.9 Onshore 220 kV Underground Transmission**

As described in Section 3.2.2 and 3.2.3, 220 kV underground transmission cabling will be used to connect the landfall site to a 220 kV to 115 kV step down substation and the subsequent interconnection to the 115 kV Barnstable Switching Station.

The construction of the duct bank includes the following steps:

- ◆ Survey and mark splice vault locations; survey and mark duct bank location.
- ◆ Set up erosion and siltation controls, including silt sacks or similar protection for existing storm drains.
- ◆ Set up traffic management measures, in coordination with local police and public works officials.

- ◆ Open roads and install duct bank.
- ◆ Repave roads as agreed with local town.
- ◆ Clean up work area, remove erosion controls.

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, and paving equipment).

Once the duct bank is in place, the 220 kV cables (one cable per sleeve) will be pulled into place from underground vaults along the cable route. This work is done using a cable reel transport vehicle, a pulling rig and the necessary crew and support vehicles. Installation of the in-road underground cabling will typically be performed during the off-season, where feasible, to minimize traffic disruption.

#### **4.2.3.10 Onshore Substation**

As described in Section 3.2.4, the Project's onshore substation is planned for a 0.03 km<sup>2</sup> (6.3-acre) leased site directly to the south of the existing Eversource 115 kV Barnstable Switching Station. The Barnstable Switching Station is located just south of Route 6, in a largely commercial/industrial area north of the Hyannis Airport.

Construction of the onshore substation will include the following steps:

- ◆ Install perimeter construction fencing, a security gate, and erosion controls.
- ◆ Prepare the site for construction.
- ◆ Construct transformer foundations, containment sumps, and spread footings for other equipment.
- ◆ Deliver and place major equipment using appropriate heavy-load vehicles and equipment.
- ◆ Deliver and place other electrical equipment and a prefabricated control house.
- ◆ Complete buswork, bring the 220 kV transmission into the site, and bring the 115 kV cabling to the adjacent Barnstable Switching Station.
- ◆ Complete cabling, control wiring, and installation of protection systems.
- ◆ Test and commission the onshore substation.

Construction and commissioning of the onshore substation is scheduled to take approximately 18 months.



#### **4.2.4 Vessels, Vehicles, and Aircraft**

Construction of the Project will require the use of an array of vessels. A much more limited number of vessels will be used to support routine operations and maintenance activities. Helicopters may be used to supplement crew transport and for Project support during both construction and operations.

Construction of the onshore export cable and onshore substation will require a number of different vehicles. These will primarily be vehicles used for conventional civil construction as well as conventional utility cable pulling equipment. Specialized heavy haul vehicles will be required to transport the substation transformers and other large, heavy components.

Different aspects of the construction will require a specific suite of vessels. For each major element of construction (scour protection, foundation installation, WTG installation, cable laying, etc.), the expected types have been provided in Table 4.2-1. Table 4.2-1 is organized by major construction element and includes the basic data on anticipated vessel type and use. All specifications are subject to change. Vessel data, for example, is highly speculative at this stage of the Project. Vessel details are anticipated to be further refined in the Fabrication and Installation Report ("FIR"). Due to variable availability and limitations associated with the Jones Act, vessels may even be changed out just prior to or during construction.

For the construction of an 800 megawatt ("MW") project, the average number of vessels on-site during construction is anticipated to be approximately 23, with a maximum of up to approximately 50 vessels.

Table 4.2-1 Vessels Used For Construction and Routine Operations

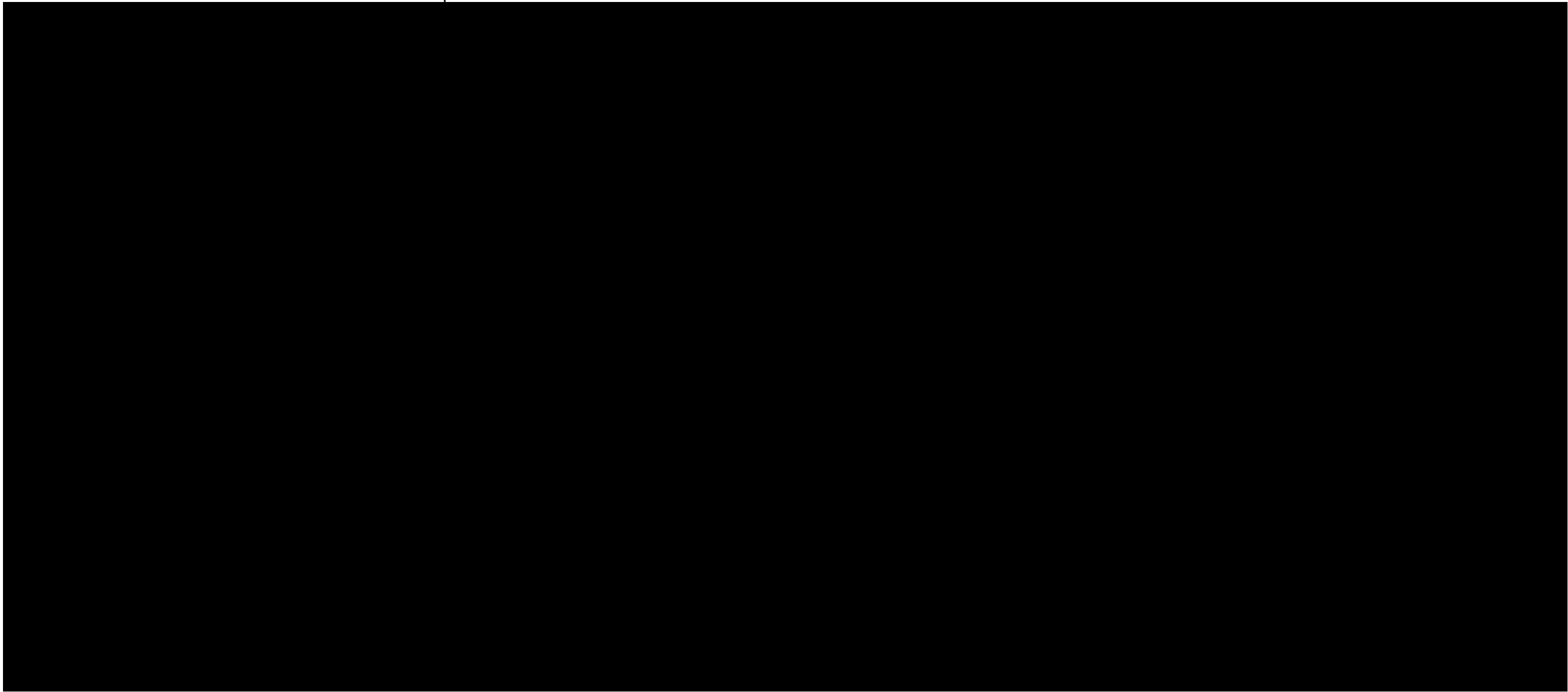


Table 4.2-1 Vessels Used For Construction and Routine Operations (Continued)

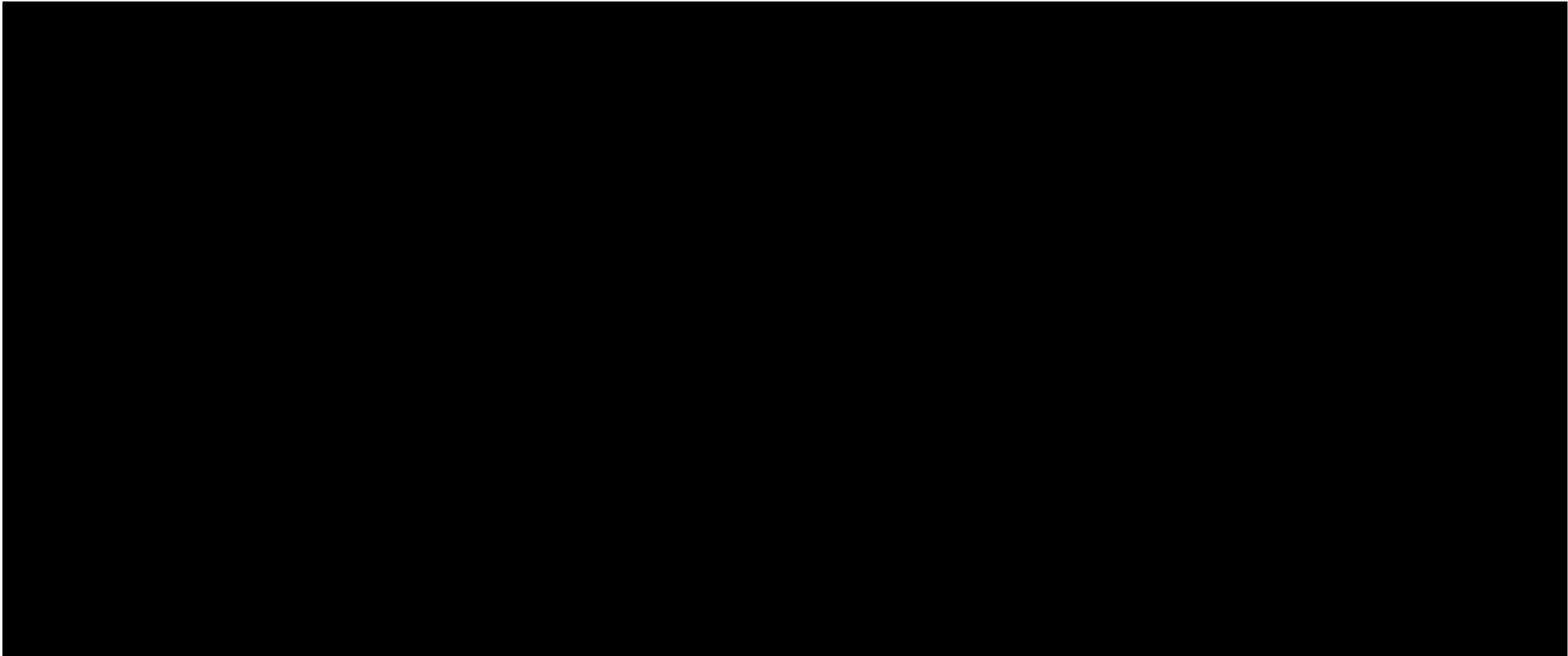


Table 4.2-1 Vessels Used For Construction and Routine Operations (Continued)

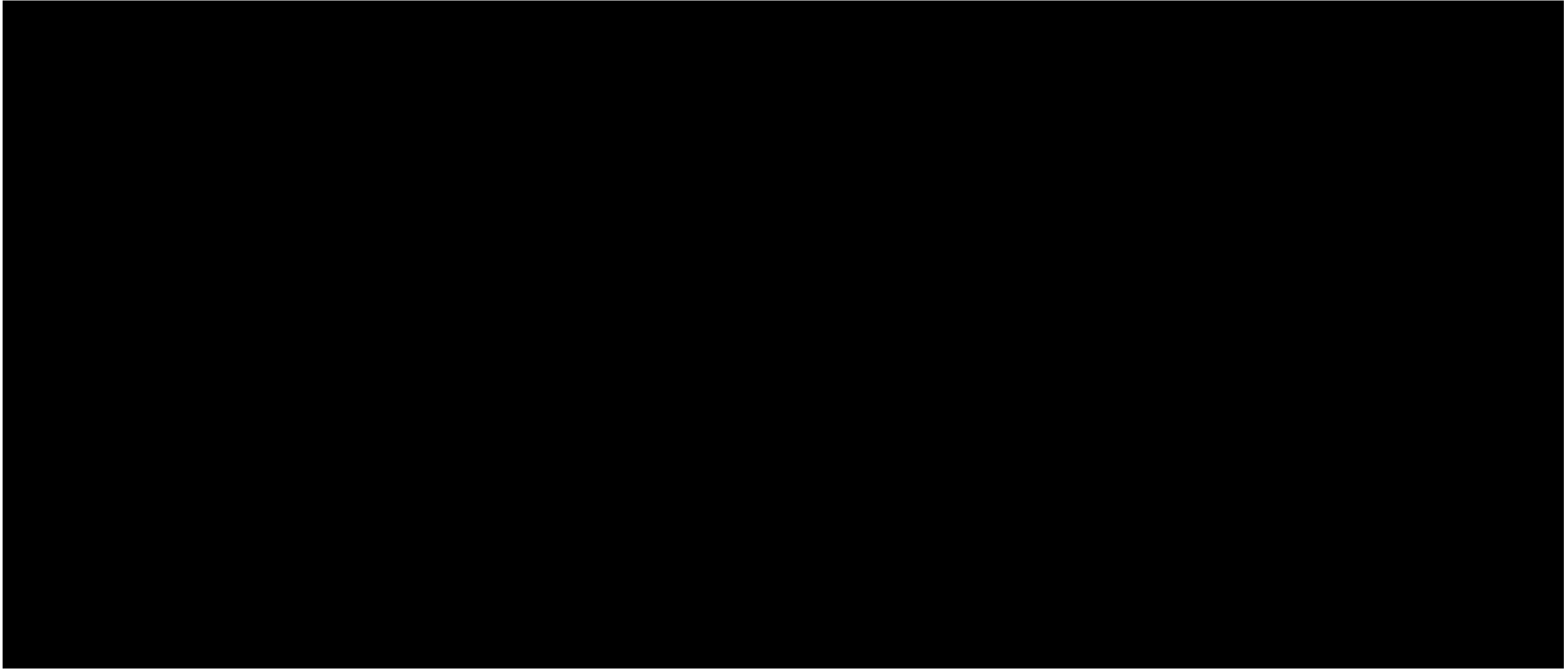


Table 4.2-1 Vessels Used For Construction and Routine Operations (Continued)


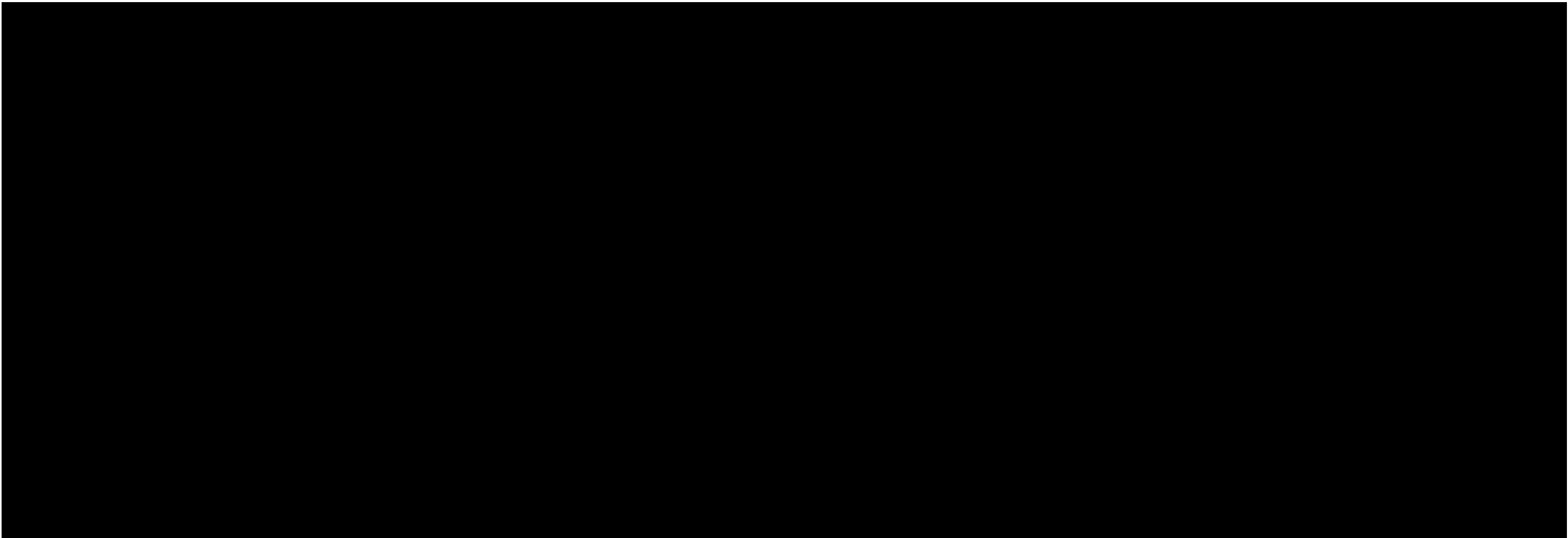


Table 4.2-1 Vessels Used For Construction and Routine Operations (Continued)

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With respect to construction of the onshore substation and underground onshore export cables, a complement of conventional construction equipment and vehicles will be used. Portions of the onshore substation site will be cleared and graded using conventional land clearing equipment. Construction of the onshore substation itself will begin with excavation/foundation placement, again using standard equipment (e.g., hydraulic excavators, backhoes, form trucks, concrete delivery trucks and support vehicles). The balance of the work includes delivering and setting the major components (transformers, breakers, etc.), erection of the bus system, and all of the necessary cabling/insulator installation. This element of the onshore substation work involves special over-the-road delivery trucks for the heavy/oversize components, normal delivery vehicles for other materials and parts, a large crane to set the transformers, rough terrain cranes, a variety of mobile lifts, and support vehicles.

Construction and installation of the underground onshore export cable system involves one complement of equipment for construction of the duct bank (excavators, dump trucks, delivery trucks, front end loader, concrete delivery trucks, crew vehicles, etc.), and a second complement of vehicles to support the cable pulling and splicing (cable reel trucks, winch, crew vehicles, etc.).

With respect to all construction activities, but particularly in relation to scour protection and cable installation, additional geophysical work will likely be conducted to ensure adequate understanding of seabed conditions, particularly in areas of seabed change. Geophysical equipment may also be utilized to ensure proper installation of project components such as scour protection. Geophysical instruments may include, but are not limited to, side scan sonar, bathymetry, magnetometers, and sub-bottom profilers.

#### **4.2.5 Waste Generation and Disposal**

Construction and commissioning of the Project will generate some quantity of solid wastes and some small quantity of liquid wastes. The solid waste will primarily consist of short lengths of cable trimmings as well as material and equipment packaging or protective wrappings. Nearly all of these materials will be collected for subsequent recycling. Similarly, small lots of leftover paints and finishes will be properly removed for reuse, recycling or proper disposal. The Project does not expect to need a National Pollutant Discharge Elimination System ("NPDES") permit for offshore construction and commissioning activities. However, a NPDES construction general permit will be required for elements of the onshore construction, since it involves disturbance of more than one acre of land area.

The vessels supporting the offshore construction and future operations and maintenance will be equipped with appropriate sanitary systems. Table 4.2-2 below describes potential wastes to be produced by the Project.

**Table 4.2-2 List of Wastes Expected to be Produced During all Project Phases**

Type of waste and composition	Approximate total amount discharged	Maximum Discharge Rate	Means of storage or discharge method
Sewerage from vessel	95-114 L/person/day (25-30 gal/person/day)	N/A	Tanks / Sewage Treatment Plant
Domestic water	114-151 L/person/day (30-40 gal/person/day)	N/A	Tanks or discharged overboard after treatment
Drilling cuttings, mud, or borehole treatment chemicals, if used	Dependent on final selection of HDD technique	N/A	N/A
Uncontaminated bilge water	Volume subject to vessel type	Rate subject to vessel size and equipment	Tanks or discharged overboard after treatment
Deck drainage and sumps	Volume subject to vessel type	Rate subject to vessel size and equipment	Discharged overboard after treatment
Uncontaminated ballast water	Volume subject to vessel type	Rate subject to vessel size and equipment	Discharged overboard
Uncontaminated fresh or seawater used for vessel air conditioning	N/A	N/A	Discharged overboard
Solid trash or debris	As generated	As generated	Onshore landfill (location to be determined ["TBD"])
Chemicals, solvents, oils, greases	Volume subject to vessel type	Rate subject to vessel size and equipment	Incineration or onshore landfill (location TBD)

1. Final discharge volumes and rates will be provided in the FIR following execution of contract with the construction contractor and the assignment of a Marine Coordinator.

#### **4.2.6 Chemical Products Used**

As planning and design proceeds, a detailed chemical and waste management plan will be developed and provided to BOEM. This plan will describe how each waste stream will be handled and stored, together with plans for proper disposal, recovery, recycling, or reuse. Examples of potential chemical products to be used are provided in Table 4.2-3 below.



**Table 4.2-3 List of Potential Chemical Products Used**

Chemical Type	Product Description	Source/Location	Approximate Volume (Liter [L] or Kilogram [kg])	Method of Bringing Onsite	Number of Transfers	Treatment, Discharge or Disposal Options
Transformer Oil (WTG and ESP)	Bio-degradable oil or highly refined mineral oil	Main 220/66kV Transformers, 220kV shunt reactors, 66kV aux. transformers & 66kV grounding reactor	6000 L per WTG  466,400 L on ESPs <sup>13</sup>	To be included at time of WTG and ESP installation During the O&M phase vessels will be transferring the oil to the offshore positions, either in cans/containers that can be hoisted to the foundation platform or in tanks/containers from which it can be pumped via a hose from the vessel	Not anticipated; only changed if needed	To be brought designated O&M port and disposed according to regulations and guidelines
Lubrication Oil (ESP)	Lubricant Oil	Crane  Emergency generator	Crane: To be defined during detailed design  Emergency generator: 55 L	During the O&M phase vessels will be transferring the oil to the offshore positions, either in cans/containers that can be hoisted to the foundation platform or in tanks/containers from which it can be pumped via a hose from the vessel	Expected every 5-8 years	To be brought designated O&M port and disposed according to regulations and guidelines
General Oil (WTG and ESP)	Different kinds of oil	WTGs: Hydraulics, gear box, yaw gears, transformers, etc. Might also be used for passive damper located in tower ESPs: Hydraulic oil for crane	8000 L per WTG  3000 L to be replaced as part of scheduled maintenance  1320 L on ESPs	To be included at time of WTG and ESP installation  During the O&M phase vessels will be transferring the oil to the offshore positions, either in cans/containers that can be hoisted to the foundation platform or in tanks/containers from which it can be pumped via a hose from the vessel	Expected every 5-8 years	To be brought designated O&M port and disposed according to regulations and guidelines

<sup>13</sup> For ESPs, quantities of chemicals are given for two conventional ESPs or four light-weight ESPs, with the exception of grout, which is given per position.

**Table 4.2-3 List of Potential Chemical Products Used (Continued)**

<b>Chemical Type</b>	<b>Product Description</b>	<b>Source/Location</b>	<b>Approximate Volume (Liter [L] or Kilogram [kg])</b>	<b>Method of Bringing Onsite</b>	<b>Number of Transfers</b>	<b>Treatment, Discharge or Disposal Options</b>
Grease (WTG)	Refill of grease for main bearing, yaw bearing, blade bearing	Bearings including yaw bearing and blade bearing	40 L per WTG	To be included at time of WTG installation  During O&M vessels will be transferring cans to site	Expected every year	To be brought designated O&M port and disposed according to regulations and guidelines
Diesel Fuel (WTG and ESP)	Fuel for the emergency diesel generator (if any)	Diesel storage tank	3000 L per WTG  21,560 L on ESPs	To be included at time of WTG and ESP installation  Potentially via hose from vessel or container placed at TP	Only as required	To be brought designated O&M port and disposed according to regulations and guidelines
Fire extinguishing Agents (WTG and ESP)	Inert gas extinguishing system (e.g., NOVEC, nitrogen, or similar)	Various rooms	To be defined during detailed design	To be included at time of WTG and ESP installation	Not anticipated; only changed if needed	To be brought designated O&M port and disposed according to regulations and guidelines
Fire extinguishing Agents (WTG and ESP)	Manual extinguishers: powder, CO <sub>2</sub> , foam	Various locations	WTG: To be defined during detailed design  11,000 L foam on ESPs	To be included at time of WTG and ESP installation	Depends on fabrication	To be brought designated O&M port and disposed according to regulations and guidelines

**Table 4.2-3 List of Potential Chemical Products Used (Continued)**

<b>Chemical Type</b>	<b>Product Description</b>	<b>Source/Location</b>	<b>Approximate Volume (Liter [L] or Kilogram [kg])</b>	<b>Method of Bringing Onsite</b>	<b>Number of Transfers</b>	<b>Treatment, Discharge or Disposal Options</b>
Fire extinguishing Agents (WTG and ESP)	Other types (if any)	Various locations	To be defined during detailed design	To be included at time of WTG and ESP installation	Not anticipated; only changed if needed	To be brought designated O&M port and disposed according to regulations and guidelines
Sulphur Hexafluoride ("SF6") (WTG and ESP)	SF6	WTG GIS switch gears  ESP GIS switch gears	~ 13kg per WTG  ~ 4,120 kg on ESPs	To be included at time of WTG and ESP installation	Not replaced	To be brought designated O&M port and disposed according to regulations and guidelines
Paint & Coating (WTG and ESP)	Corrosion protection of steel structure paints & varnishes	Steel structure, various locations	To be defined during detailed design	To be included at time of WTG and ESP installation; additional paint only needed for repairs	Only for repairs	To be brought designated O&M port and disposed according to regulations and guidelines
Coolants or refrigerants (such as water or glycol) (WTG and ESP)	Air handling unit, HVAC system	Heating, Ventilation, and Air Conditioning (HVAC) unit, Air Handling Unit	1600 L per WTG  Approx. 700 L to be replaced as part of scheduled maintenance  176 L on ESPs	To be included at time of WTG and ESP installation	Expected every 5-8 years	To be brought designated O&M port and disposed according to regulations and guidelines

**Table 4.2-3 List of Potential Chemical Products Used (Continued)**

<b>Chemical Type</b>	<b>Product Description</b>	<b>Source/Location</b>	<b>Approximate Volume (Liter [L] or Kilogram [kg])</b>	<b>Method of Bringing Onsite</b>	<b>Number of Transfers</b>	<b>Treatment, Discharge or Disposal Options</b>
Grout (WTG and ESP)	Grout	Grout for connection between monopile and transition piece	20,000 L per WTG and ESP position	To be included at time of WTG and ESP installation	Not anticipated; only changed if needed	To be brought designated O&M port and disposed according to regulations and guidelines

## 4.3 Operations & Maintenance

### 4.3.1 *Purpose and Objectives*

#### 4.3.1.1 Philosophy

The operations and maintenance (“O&M”) philosophy for the Project will be based on the following principles:

- ◆ *Health, Safety and Environment (“HSE”) First Principles* – putting the health and safety of our people and the environment at the forefront of all our operations and maintenance activities.
- ◆ *Continuous Improvement* – ensuring that we regularly review our procedures and performance, identify lessons learned and implement improvements.
- ◆ *Maximize Plant Reliability and Availability* – ensuring that we diligently design and select robust reliable wind farm components and that we implement a maintenance regime in which preventive (i.e., scheduled) maintenance is such that it reduces or eliminates the requirements for corrective (i.e., unscheduled) maintenance. In this regard, the aim is to deliver a reliable Project with high production.
- ◆ *Knowledge Transfer* – ensuring that, wherever possible, Vineyard Wind learns from other offshore projects (especially within the portfolios of the respective shareholders), wider business experience, experienced partners and contractors and the wider industry to develop our skills in order to achieve our O&M objectives.

#### 4.3.1.2 Objectives

Vineyard Wind’s primary O&M objective is to operate a safe and efficient Project. This objective shall be achieved through detailed planning, the use of well-thought-out procedures, the use of experienced and well-trained staff and contractors, and a strong focus on preventive maintenance, data analysis in order to predict/prevent corrective maintenance, and continuous review and improvement.

#### 4.3.1.3 Development of Detailed Maintenance Plans and Processes

Vineyard Wind will develop Project-specific operations and maintenance plans and processes for the wind energy installation. These plans will reflect the installed components. The starting point for all maintenance plans and processes will be the recommendations and instructions set out in the Original Equipment Manufacturers (“OEM”) manuals.

Specific maintenance schedules, which set forth the frequency with which maintenance is to be carried out, will be developed for the scheduled maintenance of each primary component (WTG, ESP, onshore substation, etc.). In addition, a scheduled maintenance checklist and or

summary method statements for each scheduled task will be developed. These checklists and or summary method statements may be developed by Vineyard Wind and/or their contractors (e.g., WTG OEM).

The final strategy for execution of maintenance works will be largely dependent on the contracting strategy implemented for the maintenance works at the various stages of the Project's life cycle. However, the following principles will be central to the execution of the maintenance:

- ◆ Ensuring that experienced operations personnel and/or contractors participate in all phases of the maintenance.
- ◆ Ensuring the spare parts and consumables strategy is sufficiently robust and managed such that spares' availability is high allowing for quick repair times in the event of a failure.
- ◆ Ensuring that robust maintenance plans and procedures for maintenance are in place, and continually reviewed and updated.
- ◆ Ensuring that the organization is structured to efficiently execute the maintenance strategy and that this structure is such that knowledge transfer and continuous improvement are built in to the process.
- ◆ Planning and executing maintenance proactively to reduce or eliminate the need for corrective interventions.

### **4.3.2        *Normal Operating Procedures***

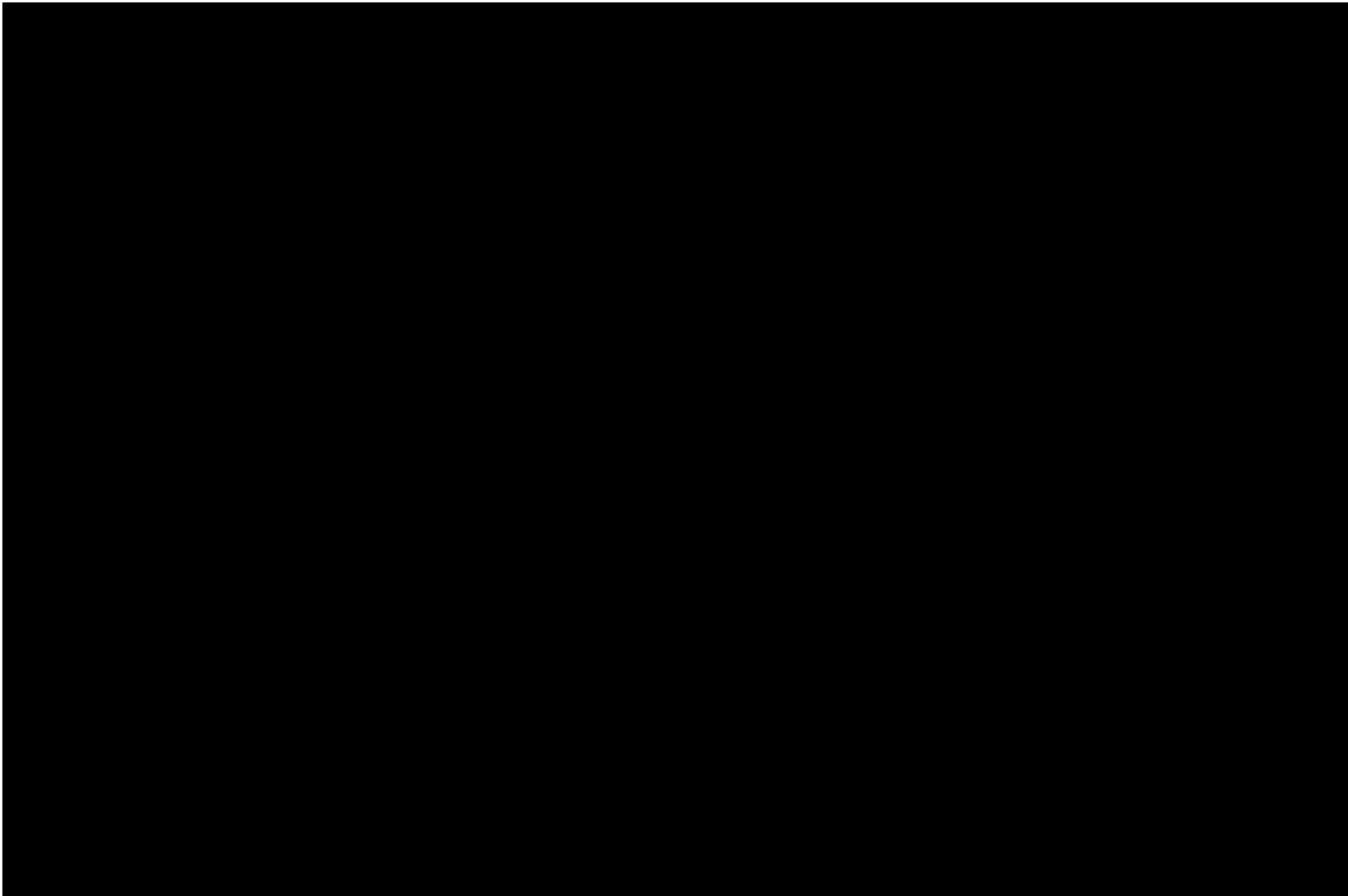
#### **4.3.2.1      *Scheduled and Preventive Maintenance***

Vineyard Wind will ensure the offshore wind farm maintenance strategy aligns with best industry practice. This preventive maintenance strategy will be regularly reviewed to ensure maintenance objectives are met and continuously improved. Ultimately, the objective of preventive maintenance is to reduce or eliminate the need for corrective maintenance and contribute to the objective of maintaining good reliability and high availability.

The preventive maintenance plans will be derived from a combination of the experience of the Vineyard Wind shareholders (i.e., CIP and Avangrid) and the maintenance schedules and manuals provided by the OEM's. In addition to the physical preventive maintenance, proactive inspections will be undertaken on a routine basis to ensure the plant remains in a safe condition to enable maintenance activities to be carried out.

#### ***Scheduled Inspection and Maintenance Activities***

Scheduled inspection and maintenance activities shall generally include the following tasks. A representative inspection and maintenance schedule is provided as Figure 4.3-1.



## WTG

- ◆ Inspections of components/equipment and proactive replacement of components due to wear and tear (e.g., brake system, pitch system, bolt tightening, and blades).
- ◆ Statutory inspections of high-voltage equipment, lifting equipment, safety equipment, hook-on points, etc.

## Foundations

- ◆ Inspection of external platform, including ladder and boat landing structure, and inspection of internal platform (corrosion measurement, etc.).
- ◆ Statutory inspections of lifting equipment, safety equipment, hook-on points, etc.
- ◆ Inspection of scour protection and monitoring of performance.

## ESP

- ◆ Inspection and service of high-voltage equipment (e.g., main transfer, switchgears, and earthing systems) and auxiliary systems (fire protection system, communication system, heating and ventilation system, etc.)
- ◆ Statutory inspections of lifting equipment, safety equipment, hook-on points, etc.

## Onshore Substation

- ◆ Inspection and service of high-voltage equipment (e.g., main transformer, switchgears, and earthing systems) and auxiliary systems (fire protection system, communication system, heating and ventilation system, etc.)
- ◆ Statutory inspections of lifting equipment, safety equipment, hook-on points, etc.

## Inter-array Cables, Inter-link Cables, Offshore Export Cables, Landfall Site(s) and Onshore Export Cables

- ◆ Bathymetric and other surveys and monitoring cable exposure and/or depth of burial.

## *Equipment*

Geophysical work will likely be conducted to ensure adequate understanding of seabed conditions, particularly in areas of seabed change, and to monitor project components such as cables and scour protection. Geophysical instruments may include, but are not limited to, side scan sonar, bathymetry, magnetometers, and sub-bottom profilers.

Equipment to be used for the inspection and O&M activities includes the following types listed in Table 4.3-1.



**Table 4.3-1 O&M Activities and Equipment Types**

Activity Type	Equipment
<p><u>Marine inspections and surveys:</u></p> <ul style="list-style-type: none"> <li>• Offshore and nearshore multi-beam echosounder inspections</li> <li>• Offshore and nearshore side scan sonar inspections</li> <li>• Offshore and nearshore magnetometer inspections</li> <li>• Offshore and nearshore depth of burial inspections</li> <li>• Other geophysical surveys</li> <li>• Geotechnical surveys</li> </ul>	<p>ROV or remotely-operated towed vessel (“ROTV”) deployed from a survey vessel.</p> <p>For geotechnical surveys, sampling instrumentation deployed from a survey vessel with geotechnical spread.</p> <p>Cable toner survey.</p>
Cathodic protection inspection and repair	ROV deployed from a survey vessel or divers
Hot work (welding) and ancillary equipment (including subsea)	Crew deployed to the WTG or divers deployed from diving vessel for subsea arc welding
Removal of marine growth and guano	Using a brush to break down the marine growth (where required) followed by high-pressure jet wash (sea water only). Technicians or deck hands will be deployed from crew transport vessels (“CTVs”) or similar vessel.
External surface preparation and external protective coating repair	Technicians and equipment deployed from CTVs or similar vessel. Surface preparation to break down existing surface coating and any associated rust via blaster.
<p>Grouted connections</p> <ul style="list-style-type: none"> <li>• Intrusive core samples</li> <li>• Re-grouting</li> </ul>	<p><u>Intrusive core samples:</u> ROV deployed from a survey vessel or divers</p> <p><u>Re-grouting:</u> Injected via one of several redundant grouting injection tubes from the TP</p>
External component replacement or repair	Varies according to component in question, could be a crew mobilized to site in CTV, diving spread, construction support vessel (CSV), or jack-up barge.

In addition to the equipment listed in Table 4.3-1, major repairs to Project components could utilize construction-type vessels, including cable-laying vessels.

#### 4.3.2.2 Systems and Processes

Vineyard Wind will develop a number of Project-specific O&M procedures; indicatively, these will cover at least the following topics:

- ◆ General Operations
- ◆ Preventive Maintenance
- ◆ Corrective Maintenance
- ◆ Urgent Response Protocol
- ◆ Local Operations
- ◆ Back up Control Room
- ◆ Planning and Monitoring of Works
- ◆ Work Control
- ◆ Warehouse Management
- ◆ Design Modifications
- ◆ Marine Coordination
- ◆ Warranty and Insurance management and claims
- ◆ Maintenance of control room systems
- ◆ Permit to work

Vineyard Wind will have a dedicated permit-to-work process in place covering all offshore and onshore works. This permit-to-work system is primarily designed to ensure that maintenance activities are properly planned, risks assessed, and work is carried out by properly trained and qualified individuals. In addition, the permit-to-work system seeks to avoid the execution of multiple works which, if executed at the same time, could result in safety conflict.

#### 4.3.2.3 Monitoring and Control

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.

While the final SCADA architecture is not finalized at this time, it is likely that the several SCADA systems will be utilized, for example:

- ◆ WTG SCADA
- ◆ ESP SCADA
- ◆ Onshore Substation SCADA
- ◆ Other SCADA's

### ***Monitoring of WTG***

Vineyard Wind and the selected turbine manufacturer shall be responsible for the 24/7 operation and monitoring of the WTGs. This shall be executed by utilizing both the Vineyard Wind O&M Facilities and the 24/7 control center of the shareholder companies (for example, Iberdrola/Avangrid has a US-based 24/7 renewables control center capable of providing support).

### ***Monitoring of Weather and Sea***

Vineyard Wind will appoint a competent contractor to provide regular weather forecasts. This forecast shall cover key parameters, including meteorological parameters, such as wind, temperature, visibility, and warnings (e.g., lightning), and oceanographic parameters, such as wave conditions. In addition, it is likely that a small weather station, with wind and temperature sensors, will be installed on the ESPs to provide operations personnel an indication of real-time conditions offshore to support the planning and execution of work.

### ***Communications***

A dedicated communications system will be implemented for the Project; this system will primarily be designed to facilitate voice communications within the wind farm. The communications system will be designed to provide coverage within WTGs and the ESP.

In addition to this dedicated system, normal marine and aviation communications channels would be utilized for the respective logistics options (e.g., marine VHF for ships).

Standard emergency channels will also be available.

Emergency protocols will be in place for both the installation and O&M phase and will be developed as part of the SMS. The emergency protocols will include steps for external stakeholders such as the USCG and fishermen to alert Vineyard Wind of concerns related to the project 24/7. Vineyard Wind will review draft emergency protocols with the USCG, fishermen, and other stakeholders, as relevant, prior to finalizing the SMS.

### **4.3.3 Non-routine Operating Procedures/Unscheduled Maintenance**

Subject to sufficiently implementing preventive maintenance, corrective maintenance should be minimized. Analysis and interrogation of SCADA data and, in particular, condition monitoring systems are essential to potentially identify equipment failures in advance.

The key aims of corrective maintenance will be to:

- ◆ Minimize downtime of the Project;
- ◆ Minimize cost incurred during intervention and revenue loss; and
- ◆ Determine the root cause in order to limit potential repetition of failure event.

Corrective maintenance will, however, be required. By its nature, corrective maintenance is difficult to accurately predict. As such, being adequately prepared for corrective maintenance is key. Key preparations in order to affect corrective maintenance center on the following items:

#### ***Spare Part Availability***

It is envisioned that a stock of recommended spare parts will be purchased along with the major components (e.g., WTGs, ESPs, onshore substation, cables, etc.). This stock would be based on OEM recommendations; however, it is likely that Vineyard Wind may request additional items based on its own experience.

Thereafter, Vineyard Wind, together with its contractors and service providers, will constantly monitor the use of spare parts in order to maintain recommended stock levels and, where applicable, increase stock levels and or purchase additional parts as deemed necessary.

Smaller spare parts and consumables will be stored at the Vineyard Wind O&M Facility, while larger spare parts are likely to be stored at either the OEM facilities or other storage facilities, as required.

#### ***Workforce Availability***

Given the fact that the Massachusetts economy includes significant marine industries and a strong engineering and technology component, an ample workforce is expected to be available. In addition, the rest of the US has a significant renewable energy and offshore oil and gas sector, the skills for which are readily transferable to the offshore wind industry.

While initially some Project works may have to be supported from the European or global supply chain, the local supply chain and workforce are expected to develop quickly. For addition discussion of workforce implications of the Project, see Sections 7.1.2.1.1 and 7.1.2.2.1 of Volume III.

***Site Accessibility (i.e., weather conditions)***

It is possible that a significant number of issues will be able to be addressed remotely (i.e., a remote reset), and it is envisioned that such remote repairs will be the most common form of corrective repair.

Corrective events which require a physical intervention offshore, will utilize the extensive metocean information described in Volume II to ensure safe and effective maintenance work.

The worst case scenario, with respect to corrective maintenance, is to have a major component failure (i.e., gearbox, blades, transformer). In this event, a potentially significant period of downtime could be experienced for a portion of the Project.

As such, Vineyard Wind will work to maintain good in-house knowledge of component failure rates, maintenance requirements for such failures, repair periods, and spare part requirements. This allows Vineyard Wind to develop well-founded procedures which can be executed for corrective maintenance.

***4.3.4 Vessels, Vehicles, and Aircraft***

During operations and maintenance, many of the vessels used during construction (see Table 4.2-1) will be used for daily visits to the WDA, maintenance activities, and periodic significant repairs. Table 4.3-2 summarizes the anticipated annual vessel activity during the O&M period. On average, there will be approximately one vessel trip per day during the Project’s operational period.

**Table 4.3-2 Annual Vessel Use during O&M**

O&M Activity	Vessel Type	Description of Anticipated Vessel Activities	Annual Round Trips
<b>Scour Protection Repairs</b>			
Scour Protection Repair	Fall Pipe Vessel	One trip every 1.5 years, 2 days per trip	0.7
<b>Foundation Maintenance and Repairs</b>			
Noise Mitigation	Anchor Handling Tug Supply Vessel	One trip every 3 years, 4 days per trip	0.3
Marine Mammal Observations	Crew Transfer Vessel/Fishing Vessel	One trip per year, 5 days per trip	1
Guard Vessels	Crew Transfer Vessel/Fishing Vessel	One trip every 1.5 years, 7 days per trip	0.7
<b>ESP O&amp;M</b>			
Refueling Operations to ESP	Crew Transfer Vessel or Multipurpose Support Vessel	Two trips per year, 1 day per trip	2

**Table 4.3-2 Annual Vessel Use during O&M (Continued)**

O&M Activity	Vessel Type	Description of Anticipated Vessel Activities	Annual Round Trips
<b>WTG O&amp;M</b>			
WTG Transport	Heavy Cargo Vessel and/or Deck Carrier	One trip every 3 years	0.3
Main Repair Vessel	Jack-up Vessel	One trip every 3 years, 5 days per trip	0.7
Refueling Operations to WTG	Crew Transfer Vessel or Multipurpose Support Vessel	Two trips every 1.5 years, 1 day per trip	1.3
Ad Hoc Survey Work	Multi-role Survey Vessel	Up to 100 surveys over the Project's lifespan, 2 days per trip	3.3
<b>Cable Inspection/Repairs</b>			
Cable Inspection/Repair	Multi-role Survey Vessel	Eight surveys over the Project's lifespan, 15 days per trip (Years 1,2,3,6,9,12,15, and 20)	1
<b>Daily and Miscellaneous O&amp;M</b>			
Daily Crew Transfer	Crew Transfer Vessel	One trip per day for approximately 70% of the year (~ 256 days)	256
Daily Crew Transfer	Crew Transfer Vessel	One trip per day for approximately 35% of the year (~ 128 days)	128
Miscellaneous Repairs	Multipurpose Support Vessel	One trip every 3 years, 10 days per trip	0.3
<b>Total O&amp;M Vessels</b>			<b>396</b>

As noted in Section 3.2.6, helicopters may be used to supplement crew transport and for Project support during the O&M period.

#### **4.4 Decommissioning & Site Clearance Procedures**

##### ***4.4.1. Decommissioning Plan Requirements***

BOEM's decommissioning requirements are stated in Section 13, "Removal of Property and Restoration of the Leased Area on Termination of Lease," of the April 15, 2015 Lease for Area OCS-A 0501. Unless otherwise authorized by BOEM, pursuant to the applicable regulations in 30 C.F.R. Part 585, Vineyard Wind is required to "remove or decommission all facilities, projects, cables, pipelines, and obstructions and clear the seafloor of all obstructions created by activities on the leased area, including any project easements(s) within two years following lease termination, whether by expiration, cancellation, contraction, or relinquishment, in accordance with any approved SAP, COP or approved Decommissioning Application and applicable regulations in 30 CFR Part 585."

#### **4.4.2. Decommissioning Time Horizon**

The WTGs, ESPs, the supporting cabling, and the onshore substation infrastructure will be robustly designed and carefully maintained. As is typical of utility-grade generation and transmission infrastructure, the Project's equipment is expected to have a physical life expectancy of up to 30 years.

The first commercial-scale European offshore wind energy installation was constructed in 1991. Approximately 13,000 MW of offshore wind capacity has been installed in European waters over the past 25 years, and with a single exception,<sup>14</sup> all of this capacity remains in commercial operation. Accordingly, the following discussion outlines decommissioning procedures and methods that would be most appropriate given today's technology. However, it is reasonable to expect that by the end of the Lease term and beyond, experience in the European offshore wind industry and, more generally, technological advances in methods and equipment servicing the offshore industry, may result in some increased level of efficiencies as well as a reduced level of environmental impacts.

#### **4.4.3 General Decommissioning Concept**

Before ceasing operation of individual WTGs or the entire Project and prior to decommissioning and removing Project components, Vineyard Wind will consult with BOEM and submit a decommissioning plan for review and approval. Upon receipt of the necessary BOEM approval and any other required permits, Vineyard Wind would implement the decommissioning plan to remove and recycle equipment and associated materials.

As currently envisioned, the decommissioning process is essentially the reverse of the installation process. Decommissioning of the Project is broken down into several 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 possible removal of scour protection.
- ◆ Removal of ESPs.

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<sup>14</sup> In March of 2017, DONG Energy announced that it would be decommissioning the 1991 vintage Vindby (Denmark) project. The Vindby project consists of eleven 0.45 MW turbines (5 MW total) located in shallow waters a few kilometers off the southeast coast of Denmark. One of the 54 m high turbines will be displayed at the "Energimussett" (Danish Museum of Energy). The other turbines will be used for spare parts for other projects or recycled. The concrete foundations will be broken down using demolition shears.

- ◆ Possible removal of onshore export cables.

It is anticipated that the equipment and vessels used during decommissioning will likely be similar to those used during construction and installation. For offshore work, vessels would likely include cable laying vessels, crane barges, jack-up barges, larger support vessels, tug boats, crew transfer vessels, and possibly a vessel specifically built for erecting WTG structures.

For onshore work, subject to discussions with the host town(s) on the decommissioning approach that best meets the host town's needs and has the fewest environmental impacts, 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 likely be done using truck mounted winches, cable reels and cable reel transport trucks.

#### **4.4.4        *Decommissioning Plan and Procedures***

The offshore 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 66kV cables from the WTGs. Next, the inter-array cables would be pulled out of the J-tubes and extracted from their embedded position in the seabed. In some places, in order to remove the cables, it may be necessary to jet plow the cable trench to fluidize the sandy sediments covering the cables. Then, the cables will be reeled up onto barges. Lastly, the cable reels will then be transported to the port area for further handling and recycling. The same general process will likely be followed for the 220 kV offshore export cables. If protective concrete mattresses or rocks were used for portions of the cable run, they may 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 the port area for proper disposal and / or recycling. Next, the WTGs would be deconstructed (down to the transition piece at the base of the tower) in a manner closely resembling the installation process. The blades, rotor, nacelle, and tower would be sequentially disassembled and removed to port for recycling using vessels and cranes similar to those used during construction. It is anticipated that almost all of the WTG will be recyclable, except possibly for any fiberglass components.

After removing the WTGs, the steel transition pieces and foundation components would be decommissioned. Sediments inside the monopile could be suctioned out 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 in accordance with the BOEM's removal standards (30 C.F.R. 250.913). The portion of the foundation below the cut will likely remain in place.



Depending upon the available crane's capacity, the foundation/transition piece assembly above the cut may be further cut into several more manageable sections to facilitate handling. Then, 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.

The steel foundations would likely be cut below the mudline using one or a combination of: underwater acetylene cutting torches, mechanical cutting, or a high pressure water jet. The sediments previously removed from the inner space of the pile would be returned to the depression left once the pile 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, Vineyard Wind would likely propose that the scour protection be left in place. As described in Section 3.1.3, each of the WTGs and ESPs would have stone and/or rock scour protection. Given the very uniform sandy bottom conditions, the scour protection could provide useful habitat diversity and will have already been in place for at least two decades. However, if the scour protection is removed, the stone and/or rock would likely be excavated with a dredging vessel, set on a barge, and transported to shore for reuse or disposal at an onshore location.

The ESPs will be disassembled in a similar manner as the WTGs, using similar vessels. Prior to dismantling, the ESP would be properly drained of all oils, lubricating fluids, and transformer oil according to the established operations and maintenance procedures and OSRP. Removed fluids would be brought to the port area for proper disposal and / or recycling. Similarly, any SF6 in gas insulated switchgear would be carefully removed for reuse. Before removing the ESPs, the 220 kV offshore export cables would be disconnected from the ESP and removed, as discussed for inter-array cables above.

The substation platform itself would then be removed from its supporting monopile or jacket foundation, and placed on a barge for transport to port. Depending on the crane capacity available and design of the substation, some of the major electrical gear could be removed first, followed by the platform itself. The ESP foundation piles will likely be removed according to the same procedures used in the removal of the WTG foundations described above.

During decommissioning activities, a careful inventory of all Project components to be removed would be made. This inventory would include the WTGs, ESPs, foundations, offshore export cables, inter-array cables, inter-link cables, cable protection system, and so forth. As they are removed from the site, Project components would be counted and noted as removed in the inventory. This careful reporting system will ensure that all Project components are removed. No additional site clearance work or surveys are anticipated to be required to confirm site clearance.

The environmental impacts from these decommissioning activities would be generally similar to the impacts experienced during construction.

As noted above, the extent of the decommissioning of onshore components, such as the onshore export cable, will be determined in consultation with the host towns, as many of the onshore components could be retired in place or retained for future use. If decommissioning of the Landfall Site, transition vault, and onshore export cable components is required, the process will consist of pulling the cables out of the duct bank, loading them onto truck-mounted reels, and transporting them offsite for recycling or possible reuse. The splice vaults, conduits, and duct banks will likely be left in place, available for reuse. This approach will avoid disruption to the streets.

In addition, decommissioning of the offshore facilities would require the involvement of an onshore recycling facility with ability to handle the large quantities of steel and other materials from the Project. Such facilities currently in operate in New England. One example is the Prolerized New England, Inc. facility on Boston Harbor in Everett Massachusetts. The Everett facility is located in a heavy industrial area and has deep water access, allowing for the foundations, WTGs, and other large components to be directly offloaded from the barges, cut into manageable sections, shredded into smaller pieces, and then shipped to end-users as scrap metal. This facility also routinely handles large volumes of scrap metal from auto recycling and a variety of demolition projects.

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.

5.0 Regulatory Framework

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## 5.0 REGULATORY FRAMEWORK

Table 5-1 below lists the expected federal, Massachusetts, regional (county), and local level reviews and permits for the Project. At this juncture, the Project has filed the Massachusetts Energy Facilities Siting Board Petition and Massachusetts Environmental Protection Act Environmental Notification Form (“ENF”)<sup>15</sup> as well as this Construction and Operations Plan (“COP”).

**Table 5-1 Required Environmental Permits for the Project**

Agency/Regulatory Authority	Permit/Approval	Status
<i>Federal</i>		
Bureau of Ocean Energy Management	Site Assessment Plan (“SAP”) approval  Construction and Operations Plan (“COP”) approval  Consultation under Section 7 of the Endangered Species Act with National Marine Fisheries Service and US Fish and Wildlife Service	SAP filed March 31, 2017, deemed complete and sufficient November 21, 2017  COP filed with BOEM December 19, 2017  To be initiated by BOEM
US Environmental Protection Agency	National Pollutant Discharge Elimination System (“NPDES”) General Permit for Construction Activities  Outer Continental Shelf Air Permit	To be filed (“TBF”)  Notice of Intent (“NOI”) to apply for an air permit filed on December 11, 2017
US Army Corps of Engineers	Individual Clean Water Act Section 404 (Required for side-casting of dredged material and placement of foundations, scour protection, and cable protection)  Rivers and Harbors Act of 1899 Section 10 Permit (Required for all offshore structures and dredging activities)	TBF
US National Marine Fisheries Service	Incidental Harassment Authorization (“IHA”) or Letter of Authorization (“LOA”)	NMFS concurrence that no IHA required for 2017 survey activities received March 9, 2017. NMFS concurrence that no IHA required for 2018 survey activities received February 28, 2018.  LOA or IHA for pile-driving activities will be submitted.
US Coast Guard	Private Aids to Navigation authorization	TBF
Federal Aviation Administration	No Hazard Determination	TBF

<sup>15</sup> The ENF is the first step of a standard three step MEPA review, the DEIR and FEIR will follow.

**Table 5-1 Required Environmental Permits for the Project (Continued)**

<b>Agency/Regulatory Authority</b>	<b>Permit/Approval</b>	<b>Status</b>
<i>State/Massachusetts (for portions of the project within state jurisdiction)</i>		
Massachusetts Environmental Policy Act Office	Certificate of Secretary of Energy and Environmental Affairs on Final Environmental Impact Report	Environmental notification for ("ENF") filed on December 15, 2017
Massachusetts Energy Facilities Siting Board	G.L. ch. 164, § 69 Approval	Petition filed December 18, 2017
Massachusetts Department of Public Utilities	G.L. ch. 164, § 72, Approval to Construct G.L. ch. 40A, § 3 Zoning Exemption (if needed)	TBF
Massachusetts Department of Environmental Protection	Chapter 91 Waterways License; Water Quality Certification (Section 401 of the Clean Water Act)	TBF
Massachusetts Department of Transportation	Road Crossing Permits Rail Division Use and Occupancy License	TBF
Massachusetts Board of Underwater Archaeological Resources	Special Use Permit	Provisional permit issued May 23, 2017, final permit issued September 28, 2017
Natural Heritage and Endangered Species Program	Conservation and Management Permit (if needed)	TBF (if needed)
Massachusetts Historical Commission	Field Investigation Permits (980 C.M.R. § 70.00)	Reconnaissance survey application filed November 14, 2017
<i>Regional (for portions of the project within regional jurisdiction)</i>		
Cape Cod Commission (Barnstable County)	Development of Regional Impact Review	TBF
<i>Local (for portions of the project within local jurisdiction)</i>		
Yarmouth and Barnstable Conservation Commissions	Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non zoning bylaws)	TBF
Yarmouth DPW and/or Board of Selectmen	Street Opening Permits/Grants of Location	TBF
Barnstable DPW and/or Town Council	Street Opening Permits/Grants of Location	TBF
Barnstable Planning/Zoning	Zoning approvals as necessary	TBF
Edgartown, Nantucket, and/or Mashpee Conservation Commissions	Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non zoning bylaws) (if needed as dictated by final submarine route)	TBF

## 6.0 Agency Contacts and Stakeholder Coordination

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## 6.0 AGENCY CONTACTS AND STAKEHOLDER COORDINATION

Vineyard Wind has been actively consulting with BOEM, federal and state agencies, the Martha's Vineyard and Cape Cod Commission ("CCC"), and affected municipalities and federally-recognized tribes regarding Project status, planned studies, issues of concern, and related matters. In addition to regular BOEM consultations, Project representatives have met with a group of senior officials from the Massachusetts Executive Office of Energy and Environmental Affairs ("EEA") agencies, the Massachusetts Energy Facilities Siting Board ("MA EFSB") Director and senior staff, the Massachusetts "Ocean Team" agencies, the Massachusetts Department of Transportation, and the US Environmental Protection Agency ("EPA") Region 1 air quality team beginning in the spring of 2017. A list of meetings conducted to date with BOEM, other agencies, municipalities, and tribes is provided in Table 6-1.

Following the submittal of filings in December 2017, there will be a number of agency convened public hearings and informational meetings. These will include BOEM/National Environmental Policy Act scoping sessions, MA EFSB public statement hearing(s), and a MEPA "on-site" consultation session.

**Table 6-1 Consultations with Agencies, Tribes, and Municipalities**

<b>Date</b>	<b>Group</b>	<b>Topic</b>
<b>May 2017</b>	Army Corps of Engineers	Project update and permitting planning
<b>August 2016</b>	Aquinnah Board of Selectmen	General project information and updates including survey planning
<b>July 2017</b>	Aquinnah Board of Selectmen	General project information and updates including survey planning
<b>November 2017</b>	Aquinnah Board of Selectmen	Project update
<b>March 2017</b>	Barnstable: Town Manager, Assistant Town Attorney	Project overview and cable route discussion
<b>June 2017</b>	Barnstable: Town Manager, Assistant Town Manager, Director of the Growth Management Dept., and Assistant Town Attorney	Project update and cable route discussion
<b>October 2017</b>	Barnstable Town Council	Project update and cable route discussion
<b>October 2017</b>	Barnstable: Town Manager, Director of Growth Management, Asst. Town Attorney, Asst. Town Manager, Leisure Service Director, Conservation Admin, Harbormaster, Department of Public Works ("DPW") Director, Dir. Of Community Services, Town Attorney, Assessing Dept. Director	Project update and cable route discussion
<b>June 2016</b>	BOEM	Pre-survey meeting
<b>July 2016</b>	BOEM	Survey coordination

**Table 6-1 Consultations with Agencies, Tribes, and Municipalities (Continued)**

<b>Date</b>	<b>Group</b>	<b>Topic</b>
March 2017	BOEM	Review study plans
April 2017 (2 days)	BOEM	COP preparation
May 2017	BOEM	Review Certified Verification Agent (“CVA”) requirements
May 2017	BOEM	Pre-survey meeting
June 2017	BOEM	COP preparation
July 2017	BOEM	COP preparation
August 2017	BOEM	Review CVA scope
September 2017	BOEM	COP preparation
October 2017 4+ meetings	BOEM	COP preparation
November 2017	BOEM	COP preparation
December 2017	BOEM	COP preparation
April 2017	BOEM, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (“NMFS”), Massachusetts Division of Marine Fisheries (“MA DMF”)	Project overview and reviewed existing site data provided by Vineyard Wind and additional data provided by NMFS.
December 2016	CCC	Project introduction
October 2015	Cape Light Compact Board (municipal aggregator representing 23 towns on the Cape & Islands), including representatives from: Aquinnah, Barnstable, Barnstable County, Bourne, Brewster, Chatham, Chilmark, Dennis, Dukes County, Eastham, Edgartown, Falmouth, Harwich, Mashpee, Oak Bluffs, Orleans, Provincetown, Sandwich, Tisbury, Truro, Wellfleet, West Tisbury, Yarmouth	General project information and updates
July 2016	Chilmark Board of Selectmen	General project information and updates including survey planning
June 2017	Chilmark Board of Selectmen	Project update and survey planning
December 2017	Chilmark Board of Selectmen	Project update
July 2016	Edgartown Board of Selectmen	General project information and updates including survey planning
June 2017	Edgartown Board of Selectmen	Project update and survey planning
December 2017	Edgartown Board of Selectmen	Project update
March 2017	MA EFSB, EEA	Pre-permitting meeting
June 2017	MA EFSB	Pre-permitting meeting
December 2017	MA EFSB	Pre-permitting meeting
August 2017	EPA	Discuss Outer Continental Shelf Air Permit



**Table 6-1 Consultations with Agencies, Tribes, and Municipalities (Continued)**

<b>Date</b>	<b>Group</b>	<b>Topic</b>
<b>January 2017</b>	Falmouth: Selectman, Assistant Town Manager, Town Manager, DPW	Project overview
<b>May 2017</b>	MA and RI Joint Task Force Meeting: BOEM, MassCEC, MA Coastal Zone Management ("MA CZM"), Tribes, Municipalities, US Coast Guard("USCG")	Project update
<b>November 2016</b>	MA CZM and Massachusetts Clean Energy Center ("MassCEC")	Update on local outreach
<b>July 2017</b>	MA CZM	Survey planning
<b>July 2017</b>	MA DMF and MA CZM	Discussion on available data on fishing areas and gear types
<b>September 2017</b>	MA DMF	Discussion on available data on fishing areas and gear types
<b>April 2015</b>	MA Task Force Meeting: BOEM, MassCEC, MA CZM, Tribes, Municipalities, USCG	General project information and updates
<b>October 2015</b>	Martha's Vineyard All-Island Selectmen's Meeting	General project information and updates
<b>August 2016</b>	Martha's Vineyard Commission: Executive Director	General project information and updates including survey planning
<b>May 2017</b>	Martha's Vineyard Commission: Executive Director	Project update
<b>October 2017</b>	Martha's Vineyard Commission: Executive Director, Regional Planner, Coastal Planner, Administrative Assistant	Project Update
<b>November 2017</b>	Martha's Vineyard Commission: Full Commission	Project update
<b>June 2016</b>	Mashpee Wampanoag Tribe-Tribal Historic Preservation Officer ("THPO")	Project introduction
<b>August 2017</b>	Mashpee Wampanoag Tribe-THPO	Project update and survey planning Preliminary discussion on upland routing
<b>November 2017</b>	Mashpee Wampanoag Tribe-THPO	Discuss upland route and visual simulations
<b>April 2017</b>	Mashpee: Town Manager, DPW Director, Conservation Agent	Project overview and cable routing
<b>September 2017</b>	Massachusetts Department of Transportation, Highway and Rail Divisions	Project routing and construction techniques
<b>April 2017</b>	Massachusetts Ocean Team (CZM, MEPA Office, MA DMF, Massachusetts Department of Environmental Protection ["MA DEP"], Massachusetts Bureau of Underwater Archaeology)	Cable survey work
<b>December 2016</b>	Nantucket Board of Selectmen	Project introduction
<b>June 2017</b>	Nantucket Board of Selectmen	Project update and cable route discussion

**Table 6-1 Consultations with Agencies, Tribes, and Municipalities (Continued)**

<b>Date</b>	<b>Group</b>	<b>Topic</b>
September 2017	Nantucket Board of Selectmen	Project update
June 2017	Nantucket: DPW Director	Project update and cable route discussion
October 2017	Nantucket: DPW Director	Project update
October 2017	Nantucket: Land Bank	Project introduction
October 2017	Nantucket: Planning and Economic Development Council	Project introduction
October 2017	Nantucket: Wannacomet Water Company	Project update
June 2017	Nantucket: Wastewater Treatment Director, Town Energy Manager	Project update and cable route discussion
July 2016	Narragansett Indian Tribe-THPO	Pre-survey meeting
October 2017	NMFS - Fisheries division	Survey update and COP needs
October 2017	NMFS – Marine mammal division	COP needs
July 2016	Oak Bluffs Board of Selectmen	General project information and updates including survey planning
July 2017	Oak Bluffs Board of Selectmen	Project update and survey planning
November 2017	Oak Bluffs Board of Selectmen	Project update
July 2017	Ocean Team (EEA, MA DEP, MA DMF, MA CZM)	Project update and survey planning
November 2016	Public Meeting: EEA, MassCEC, BOEM	Assessment activities for future offshore wind projects in Federal wind lease areas
January 2016	Public Meeting: EEA, MassCEC, BOEM	Assessment activities for future offshore wind projects in Federal wind lease areas
September 2017	Rhode Island Department of Environmental Management, Division of Marine Fisheries	Discussion on available data on fishing areas and gear types and feedback on lessons learned for communication during construction.
September 2016	Tisbury Board of Selectmen	General project information and updates including survey planning
May 2017	Tisbury Board of Selectmen	Project overview, update
November 2017	Tisbury Board of Selectmen	Project update – letter of support request
June 2017	USCG	Project update and review draft project layout
October 2017	USCG, BOEM	Navigation Risk Assessment discussion
May 2017	US Fish and Wildlife Service (“USFWS”) and BOEM (Avian Study Plan)	Project update and reviewed study plans and available data
August 2017	USFWS, BOEM	Project update and avian discussion on COP needs
November 2017	US Navy	Project update, discussion for COP
June 2016	Wampanoag Tribe of Gay Head-THPO	General project introduction

**Table 6-1 Consultations with Agencies, Tribes, and Municipalities (Continued)**

<b>Date</b>	<b>Group</b>	<b>Topic</b>
<b>July 2016</b>	Wampanoag Tribe of Gay Head and Mashpee Wampanoag Tribe-THPOs	Pre-survey meeting
<b>August 2016</b>	Wampanoag Tribe of Gay Head – Tribal Council	General project information and updates including survey planning
<b>July 2016</b>	West Tisbury Board of Selectmen	General project information and updates including survey planning
<b>June 2017</b>	West Tisbury Board of Selectmen	Project update and survey planning
<b>December 2017</b>	West Tisbury Board of Selectmen	Project update
<b>March 2017</b>	Yarmouth: Town Manager, DPW Director	Project overview and cable route discussion
<b>June 2017</b>	Yarmouth: Town Manager, DPW Director	Project update and cable route discussion
<b>October 2017</b>	Yarmouth Board of Selectmen	Project update
<b>November 2017</b>	Yarmouth Board of Selectmen	Public Hearing

In addition to the consultations described in Table 6-1, extensive and ongoing consultation has been conducted by Vineyard Wind and Vineyard Wind’s community partner, Vineyard Power, with key stakeholders. Vineyard Wind conducted outreach on visual impacts and visual simulations on both Martha’s Vineyard and Nantucket in August and September of 2017, respectively. Notices advertising the meetings were placed in the local newspapers. The Project also held two community open houses in early November (November 7, 2017 in Hyannis/Barnstable and November 8, 2017 in Yarmouth). Vineyard Wind’s fisheries liaison’s and representative has also been active in organizing over 100 meetings with fisheries stakeholders.

The following list includes, but is not limited to, the groups Vineyard Wind has been consulting with and continues to meet with:

- ◆ Alliance to Protect Nantucket Sound
- ◆ Association to Preserve Cape Cod
- ◆ Bureau of Ocean Energy Management (BOEM)
- ◆ Cape and Islands Self-Reliance
- ◆ Cape and Vineyard Electrical Cooperative
- ◆ Cape Cod Fishermen’s Alliance
- ◆ Cape Light Compact
- ◆ Climate Action Business Association
- ◆ Coalition for Social Justice
- ◆ Conservation Law Foundation

- ◆ Coonamessett Farm foundation
- ◆ Eastern Fisheries
- ◆ Environment Massachusetts
- ◆ Environmental Business Council of New England
- ◆ Environmental League of Massachusetts
- ◆ Hercules SLR
- ◆ Long Island Commercial Fishing Association
- ◆ MA Clean Energy Center
- ◆ MA Fisheries Institute
- ◆ MA Fisheries Working Group
- ◆ MA Fishermen's Partnership and Support Services
- ◆ MA Habitat Working Group
- ◆ MA Lobstermen's Association
- ◆ Martha's Vineyard Fishermen Preservation Trust
- ◆ Massachusetts Audubon Society
- ◆ Massachusetts Clean Energy Center
- ◆ Nantucket Rotary Club
- ◆ National Academies of Sciences, Offshore Renewable Energy Development and Fisheries Conference
- ◆ National Wildlife Federation
- ◆ Natural Resources Defense Council
- ◆ NE Fisheries Sciences Center
- ◆ NE Fishery Management Council
- ◆ NE Fishery Sector Managers X, XI, XIII, VII, VIII
- ◆ New Bedford Harbor Development Commission
- ◆ New England Aquarium
- ◆ New England Energy and Commerce Association
- ◆ Port of New Bedford
- ◆ Recreational Fishing Alliance
- ◆ Rhode Island Fishermen's Advisory Board
- ◆ Rhode Island Habitat Advisory Board
- ◆ Scallop Industry Advisors Meeting
- ◆ Sierra Club

- ◆ Stoveboat- Saving Seafood
- ◆ The Nature Conservancy
- ◆ Town Dock
- ◆ University of Massachusetts (various campuses)
- ◆ Woods Hole Oceanographic Institution

Project updates and other information can be found at [www.vineyardwind.com](http://www.vineyardwind.com). Any interested parties can be added to the Project outreach mailing list by visiting [www.vineyardpower.com](http://www.vineyardpower.com).

Vineyard Wind plans to maintain an active level of consultation and outreach as the environmental review and permitting processes continue and is available to meet with any interested party (see contact information in Section 1.3.1).

## 7.0 References and Incorporation by Reference

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## 7.0 REFERENCES AND INCORPORATION BY REFERENCE

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United States Department of the Interior, Bureau of Ocean Energy Management. (2015). Commercial lease of submerged lands for renewable energy development on the Outer Continental Shelf, Lease number OCS-A 0501. Retrieved from <https://www.boem.gov/Lease-OCS-A-0501/>

United States Department of the Interior, Office of Renewable Energy Programs, Bureau of Ocean Energy Management. (2016). Guidelines for information requirements for a renewable energy Construction and Operations Plan (COP), version 3.0. Retrieved from <https://www.boem.gov/COP-Guidelines/>

Vineyard Wind. (2017). Site Assessment Plan (SAP), Vineyard Wind Lease OCS-A 0501.

Wind Europe. (2017). The European offshore wind industry: Key trends and statistics 2016. Retrieved from <https://windeurope.org/wp-content/uploads/files/about-wind/statistics/WindEurope-Annual-Offshore-Statistics-2016.pdf>

Appendix I-A

Draft Oil Spill Response Plan



DRAFT  
OIL SPILL RESPONSE PLAN  
for  
VINEYARD WIND, LLC  
New Bedford, Massachusetts

November 2017

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A Response Plan Cover Sheet, presenting basic information regarding the Project is provided below:

**Response Plan Cover Sheet**

Owner/operator of facility:		<b>Vineyard Wind, LLC</b>					
Facility name:		<b>Vineyard Wind</b>					
Facility mailing address:		<b>700 Pleasant Street, Suite 510, New Bedford, MA 02740</b>					
Facility phone number:		<b>(508) 717-8964</b>	Latitude:		<b>N 41.171</b>		
SIC code:		<b>4911</b>	Longitude:		<b>W -70.503</b>		
Dun and Bradstreet number:							
Largest aboveground oil storage capacity (gals):		<b>40,101 (power transformer)</b>	Maximum oil storage capacity (gals):		<b>64,634 (per ESP)</b>		
Number of aboveground oil storage tanks:		<b>(day tanks and diesel tank)</b>	Worst case oil discharge amount (gals):		<b>64,634</b>		
Facility distance to navigable water. Mark the appropriate line:							
<b>0-1/4 mile:</b> <b>X</b>		1/4-1/2 mile:		1/2-1 mile		> 1 mile:	
Applicability of Substantial Harm Criteria:							
Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?					<b>YES</b>	<b>X</b>	<b>NO</b>
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and, within any storage area, does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation?					<b>YES</b>		<b>NO</b> <b>X</b>
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments?					<b>YES</b>		<b>NO</b> <b>X</b>
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance such that a discharge from the facility would shut down a public drinking water intake?					<b>YES</b>		<b>NO</b> <b>X</b>
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?					<b>YES</b>		<b>NO</b> <b>X</b>

**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

**Management Certification**

This plan has been developed for the Project to prevent and/or control the spills of oil. Vineyard Wind, LLC herein commits the necessary resources to fully prepare and implement this plan and has obtained through contract the necessary private personnel and equipment to respond, to the maximum extent practicable, to a worst-case discharge or substantial threat of such a discharge.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and that based on my inquiry of those individuals responsible for obtaining information, I believe that the submitted information is true, accurate and complete.

Signature: \_\_\_\_\_ Title: \_\_\_\_\_

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Plan Distribution**

<b>Plan Number</b>	<b>Plan Holder</b>	<b>Location</b>
1	Qualified Individual	
2	Alternate Qualified Individual	
3	Alternate Qualified Individual	
4	Alternate Qualified Individual	
5	Operation Center	
6	BOEM Gulf of Mexico OCS and Atlantic Activities	1201 Elmwood Park Boulevard New Orleans, LA 70123-2394
7	EPA Region 1	EPA Region 1 Emergency Planning and Response Branch 5 Post Office Square Suite 100 (OSRR02-2) Boston, MA 02114-2023
8	USCG D1	USCG D1 408 Atlantic Avenue Boston, MA 02110



**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

**Table of Contents**

<b>List of Acronyms .....</b>	<b>vii</b>
<b>1. Plan Introduction Elements.....</b>	<b>1</b>
1.1 Purpose and Scope of Plan Coverage.....	1
1.2 Regulatory Applicability.....	2
1.3 General Facility Information .....	2
1.4 Plan Review and Revision .....	3
<b>2. Core Plan Elements.....</b>	<b>5</b>
2.1 Discovery and Initial Response.....	5
2.2 Notifications.....	7
2.2.1 Internal Notifications.....	7
2.2.2 External Notifications .....	7
2.3 Establishment of a Response Management System .....	10
2.3.1 Preliminary Assessment.....	10
2.3.2 Establishment of Objectives and Priorities .....	11
2.3.3 Implementation of Tactical Plan.....	12
2.3.4 Containment and Recovery Methods.....	12
2.4 Response Strategies for Containment and Recovery .....	13
2.4.1 Atlantic Ocean .....	13
2.4.2 Banks.....	13
2.4.3 Wetlands.....	14
2.4.4 Onshore Spills .....	15
2.4.5 Small Lakes.....	15
2.4.6 Offshore Environments.....	16
2.5 Waste Disposal and Oil Recovery.....	16
2.6 Potential Failure Scenarios .....	17
2.7 Procedures for Mobilization of Resources .....	17
2.8 Sustained Actions.....	17
2.9 Termination and Follow-Up Actions .....	18

**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

**List of Figures**

Figure 2-1 External Notification Flowchart ..... 8  
Figure 2-2 Guidelines for Determining Incident Classification ..... 11

**List of Tables**

Table of Contents ..... v  
Table 1-1 Facility Summary Information ..... 4  
Table 2-1 Initial Response Checklist..... 6  
Table 2-2 Qualified Individuals..... 7  
Table 2-3 Initial Agency Notifications..... 9  
Table 2-4 Containment and Diversion Booming Techniques ..... 13

**Annex List**

**Annex 1 – Facility Diagrams:**

- Figure A1-1: BOEM and MA Lease Areas Overview
- Figure A1-2: RI and MA Lease Areas Overview
- Figure A1-3: Vineyard Wind Lease Blocks
- Figure A1-4: Wind Development Area and Site Layout

**Annex 2 – Notification Contact List.**

- Table A2-1: Internal Notification List
- Table A2-2: External Notification and Call Lists

**Annex 3 – Response Management System**

- Figure A3-1: Initial Response Flowchart

**Annex 4 – Incident and Other Documentation Forms**

- Form A4-10: Initial Notification Data Sheet
- Form A4-11: Agency Call Back Information
- Form A4-12: Chronological Log of Events
- Form A4-13: Incident Report
- Form A4-14: Response Equipment Inspection Log
- Form A4-15: Secondary Containment Checklist and Inspection Form
- Form A4-16: Monthly Tank Checklist and Inspection Form
- Form A4-17: Response Equipment Maintenance Log

**Annex 5 – Training Exercises/Drills and Logs**

- Table A5-1: Response Training Exercises
- Table A5-2: Spill Response Drill Form Notification Exercise
- Table A5-3: Spill Response Drill Form Team Tabletop Exercise
- Table A5-4: Spill Response Drill Form Equipment Deployment Exercise
- Table A5-5: Vineyard Wind Training Log

**Annex 6 – Regulatory Compliance and Cross-Reference Matrix**

- Table A6-1: Oil Spill Response Plans for Outer Continental Shelf Facilities

**Annex 7 – Planning Calculations for Discharge Volumes and Response Equipment**

- Table A7-1: WTG Oil Storage
- Table A7-2: ESP Oil Storage

**Annex 8 – Agreement with Oil Spill Response Organization**

**Annex 9 – Equipment Inventory**

**Annex 10 – Safety Data Sheets**

**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

## List of Acronyms

ACP	Area Contingency Plan
AQI	Alternate Qualified Individual
Bbls	Barrels
BOEM	Bureau of Ocean Energy Management
BSSE	Bureau of Safety and Environmental Enforcement
COP	Construction and Operations Plan
CFR	Code of Federal Regulations
CTV	Crew Transport Vessels
EHS	Environmental, Health, and Safety
EMS	Emergency Management Services
EPA	Environmental Protection Agency
ERT	Emergency Response Team
ESI	Environmental Sensitivity Index
ESP	Electrical service platform
FOSC	Federal On-Scene Coordinator
ICO	Incident Command Organization
ICS	Incident Command System
JIC	Joint Information Center
kV	Kilovolt
LEPC	Local Emergency Planning Committee
MA	Massachusetts
MassDEP	Massachusetts Department of Environmental Protection
MEMA	Massachusetts Emergency Management Agency
MOU	Memorandum of Understanding
MVY	Airport code for Martha's Vineyard Airport
MW	Megawatt
NCP	National Contingency Plan
NHESP	National Heritage and Endangered Species Program
NIIMS	National Interagency Incident Management System
NOAA	National Oceanic & Atmospheric Administration
NRC	National Response Center
NWR	NOAA Weather Radio
NWS	National Weather Service
OCS	Outer Continental Shelf
OHM	Oil and Hazardous Materials

**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

O&M	Operation and Maintenance
OPA	Oil Pollution Act of 1990 (Public Law 101-380)
OSHA	Occupational Safety & Health Administration
OSPD	Oil Spill Preparedness Division
OSRO	Oil Spill Response Organization
OSRP	Oil Spill Response Plan
PPA	Power Purchase Agreements
PPE	Personal Protective Equipment
PREP	Preparedness for Response Exercise Program
QI	Qualified Individual
RCRA	Resource Conservation & Recovery Act
REPC	Regional Emergency Planning Committee
RFP	Request for Proposal
RI	Rhode Island
RQ	Reportable Quantity
RRT	Regional Response Team
SDS	Safety Data Sheet
SERC	State Emergency Response Commission
SERO	Southeast Regional Office of Massachusetts Department of Environmental Protection
SOV	Service Operations Vessel
SPCC	Spill Prevention Countermeasures and Control
TBD	To Be Determined
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
Vol	Volume
WCD	Worst Case Discharge
WTG	Wind Turbine Generators



**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

## 1. Plan Introduction Elements

### 1.1 Purpose and Scope of Plan Coverage

This Oil Spill Response Plan (OSRP) has been prepared for Vineyard Wind, LLC for the development of “the Project”. The Act to Promote Energy Diversity requires Commonwealth of Massachusetts utilities, working with Massachusetts Department of Energy Resources, to solicit on a competitive basis and, if economic proposals are received, award long term Power Purchase Agreements (PPAs) for approximately 1,600 MW of offshore wind by June 30, 2027. In accordance with the Act, the first solicitation or Request for Proposal (RFP) for commercial scale offshore wind was issued on June 29, 2017. The RFP requires each competitor to offer a 400 MW option. Competitors may also offer alternative proposals of up to 800 MW as well as proposals for as little as 200 MW. Lastly, competitors are expected to address the “expandable transmission” option. Responses to the RFP are due on December 20, 2017. Initial award selection(s) for long term PPA(s) are expected in the spring of 2018. Construction is scheduled to commence in 2020. The outcome of this procurement process will influence the size and buildout schedule of the Project.

The Project is located in the Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A-0501, which is located approximately 14.4 miles south of Martha’s Vineyard, a Massachusetts island located approximately 4 miles from mainland Massachusetts. The Project is an 800 MW project that consists of wind turbine generators (WTGs) and associated foundations, onshore work, inter-array and inter-link cables, export cables, electrical service platforms (ESPs). Oil sources in the WTGs include gear boxes, transformers, yaw gears, grease for yaw rings, and the pitch system, which total approximately 4,502 gallons per WTG. Oil sources in the ESPs include lubrication oil, diesel tanks, hydraulic oil for a platform crane, power transformers, reactors, and auxiliary/earthing transformers. Oil sources associated with one ESP totals approximately 64,634 gallons.

The Project is located in the Outer Continental Shelf (OCS), as defined by 30 CFR 254.6 and Section 2 of the Submerged Lands Act (43 U.S.C. 1301). Therefore, this plan has been written in accordance with the requirements of 30 CFR Part 254, Subpart B, Oil Spill Response Plans for Outer Continental Shelf Facilities. In accordance with 30 CFR 254, the OSRP demonstrates that Vineyard Wind can respond effectively in the unlikely event that oil is discharged from the Project. Please note that U.S. Environmental Protection Agency’s (EPA) Spill Prevention, Control, and Countermeasure (SPCC) requirements in 40 CFR §112 is only required for offshore facilities if they are classified as “oil drilling, production, or workover facilities”. Therefore, an SPCC Plan is not required for the Project. In addition, the Commonwealth of Massachusetts does not require planning and response submittals for review and approval with regards to offshore oil.

The purpose of this plan is to provide a written procedure for directing a plan of action in the event of a release or discharge of oil at the Project. The release or discharge may be the result of a spill, accident, natural disaster, or civilian threat. This OSRP adopts procedures to allow for a uniform plan of action that will assist in a systematic and orderly manner of response to the incident. This plan of action will minimize confusion and indecision, prevent extensive damage to the Project or injury to personnel, and minimize exposure to personnel within or outside of the Project. Routine training and exercises regarding the content of this plan will provide the confidence needed for employees to perform their assigned duties if such an event occurs. A designated Qualified Individual (QI) and Alternate Qualified Individuals (AQI) are considered Emergency Coordinators. Personnel, through the use of this plan, will utilize all resources necessary to bring any release under control. In order to prepare for such control, all personnel will be well trained and knowledgeable as to their various roles during a release.

**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

The OSRP has been prepared considering the National Oil and Hazardous Substances Contingency Plan (40 CFR §300) commonly called the National Contingency Plan or NCP, and the Standard Federal Region I Response Team (RRT) Regional Oil and Hazardous Substances Pollution Contingency Plan, which is the ACP. The Regional Oil and Hazardous Substances Pollution Contingency Plan is available at: <https://www.nrt.org/sites/38/files/2016%20Regional%20Contingency%20Plan%20Region%201.pdf>.

The OSRP is consistent with these plans in that it provides a method/process for communication, coordination, containment, removal, and mitigation of pollution and other emergencies. The preparation of this plan utilized the detailed information and support on local environmental information provided in the RRT plan. The specific guidelines presented in this plan have been carefully thought out, prepared in accordance with safe practices, and are intended to prepare personnel to respond to oil spills and other environmental emergencies. This plan has the full approval of Management at a level of authority to commit the necessary resources to implement this plan.

Specifically, this plan:

- Identifies the Qualified Individuals (QI) or Person in Charge having full authority to implement this response plan;
- Requires immediate communication with the appropriate Federal, state and local officials, and entities/persons providing personnel and equipment;
- Identifies, and ensures by contract or other means, the availability of personnel and equipment necessary to remove a worst-case discharge (WCD) and mitigate or prevent a substantial threat of such a discharge; and
- Describes training, equipment testing, periodic unannounced drills, and response actions.

**1.2 Regulatory Applicability**

The National Contingency Plan and the Standard Federal Region I Response Team (RRT) Regional Oil and Hazardous Substances Pollution Contingency Plan have been reviewed and this plan was written to comply with the Federal Oil Pollution Act of 1990.

**1.3 General Facility Information**

The Project is located on property in the Outer Continental Shelf (OCS) leased from the BOEM's WEA, which has been identified as Vineyard Wind Lease Area OCS-A-501. The Lease Area is located approximately 14.4 miles south of the island of Martha's Vineyard, which is located approximately 4 miles off of the southeastern coast of mainland Massachusetts. The Project is depicted in Figure 1-1 through 1-4 (Annex 1). The mailing address of the Project is 700 Pleasant Street, Suite 510, New Bedford, Massachusetts.

The Project consists of wind turbine generators (WTGs) and associated foundations, onshore work, inter-array and inter-link cables, export cables, wind turbines, and electrical service platforms (ESPs). Oil sources in the WTGs include gear boxes, transformers, yaw gears, grease for yaw rings, and the pitch system and total approximately 4,502 gallons per WTG. Oil sources in the ESPs include lubrication oil, diesel tanks, hydraulic oil for a platform crane, power transformers, reactors, and auxiliary/earthing transformers. Oil sources associated with one ESP total approximately 64,634 gallons.

Table 1-1 provides general information for the Project as it pertains to planning for potential spills. Annexes 1, 3, and 7 provide discussion of facility operations in greater detail regarding equipment description, drainage, secondary containment and emergency planning scenarios.

**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

**1.4 Plan Review and Revision**

The December 2017 version of the OSRP is a draft working copy. Additional details will be provided for the OSRP as the size and buildout schedule of the Project are finalized.

In accordance with 30 CFR §254.30, the OSRP must be reviewed at least every two years. Documentation of this review will be provided in the Review Table presented at the front of this OSRP. If the review does not result in modifications to the OSRP, the Chief of the Bureau of Safety and Environmental Enforcement (BSEE), and agency of the US Department of the Interior, should be notified that there are no changes. The BSEE Oil Spill Preparedness Division (Chief, OSPD) or designee must be notified in writing.

The OSRP must be modified and submitted to the Chief, OSPD for approval within 15 days when the following occurs:

- A change occurs which significantly reduces response capabilities;
- A significant change occurs in the worst-case discharge scenario or in the type of oil being handled, stored, or transported at the facility;
- There is a change in the name(s) or capabilities of the oil spill removal organizations cited in the OSRP;
- There is a significant change to the Area Contingency Plan(s) for the region; or
- The Chief, OSPD, requires that you resubmit your OSRP if it has become outdated, numerous revisions have made its use difficult, or if the OSRP has significant inadequacies.

**Vineyard Wind, LLC**  
**Oil Spill Response Plan**

**Table 1-1 Facility Summary Information**

Facility Owner	Vineyard Wind, LLC
Facility Name	Vineyard Wind
Facility Mailing Address	700 Pleasant Street Suite 510 New Bedford, MA 02740
Facility Qualified Individual	Person X
Facility Phone Number	(508) 717-8964 (New Bedford office)
E-mail Address	<a href="mailto:info@vineyardwind.com">info@vineyardwind.com</a>
Latitude	N 41.171
Longitude	W -70.503
SIC Code	4911
Wind Turbine Generators (WTGs)	<ul style="list-style-type: none"> <li>• WTGs will likely range from 8 to 10 MW.</li> <li>• Largest oil source in the WTGs is the gearbox/main bearings: 2,113 gallons</li> <li>• Total oil storage is 4,502 gallons</li> <li>• WTGs are equipped with secondary containment which is sized according with the largest container.</li> </ul>
Electrical Service Platforms (ESPs): Emergency Generators	<ul style="list-style-type: none"> <li>• Emergency Generators contain diesel day tanks and lubrication oil totaling 530 gallons</li> <li>• Largest oil source in the generator is the diesel day tank: 523 gallons.</li> </ul>
ESP: Diesel Tank	<ul style="list-style-type: none"> <li>• Diesel storage tank: 2,325 gallons</li> </ul>
ESP: Transformers	<ul style="list-style-type: none"> <li>• ESP will have power transformers and auxiliary/earthing transformers</li> <li>• Total oil storage is 41,263 gallons</li> <li>• Largest oil source is power transformers: 40,101 gallons</li> </ul>
ESP: Reactors	<ul style="list-style-type: none"> <li>• Reactors: 20,341 gallons</li> </ul>
ESP: Other	<ul style="list-style-type: none"> <li>• Hydraulic oil for platform crane: 174 gallons</li> </ul>
Operation and Maintenance Center	<ul style="list-style-type: none"> <li>• TBD</li> <li>• Possibly Martha's Vineyard or New Bedford</li> </ul>
Materials Stored / Oil Storage Start-Up Date	Petroleum Oil / Proposed 2022
Worst-Case Discharge Volume <sup>1</sup>	64,634 gallons
Maximum Most Probable Discharge Volume (USCG) <sup>2</sup>	6,463 gallons
Average Most Probable Discharge Volume (USCG) <sup>2</sup>	646 gallons
Oil Spill Response Organization (OSRO)	TBD

**\*Notes:**

1. Criteria established in 30 CFR 254.26 is for oil production platform facilities and pipeline facilities only. RPS has contacted BSEE for guidance regarding determining the worst-case discharge volume.

2. Definitions in 33 CFR 155.1020 are based percentage of cargo from a vessel during oil transfer operation

## 2. Core Plan Elements

### 2.1 Discovery and Initial Response

Detection of a spill or emergency is the first step in a response. There are several methods by which an emergency situation at the Project may be discovered including the following:

- Reported by company personnel;
- Abnormal operating conditions observed by operator; or
- Reported by private citizens or by public officials.

In every case it is important to collect accurate information and immediately notify the On-Duty Supervisor and any affected area personnel.

Initial response will take place as indicated in Table 2-1 Initial Response Actions Checklist. The Initial Notification Data Sheet Form (Annex 4) will be completed by the On-Duty Supervisor while discussing the incident when it is initially reported by the person detecting the spill/release. Information not immediately known may be added to the form as it becomes available.

The On-Duty Supervisor will notify the Qualified Individual (QI) or Alternate immediately upon receiving notification of an emergency event. The QI or his designee will make notifications as discussed in Section 2.2 to Federal, state and local agencies (Figure 2-1 and Table 2-3) immediately and shall assure that all required documentation is kept.

When making the initial notifications to the On-Duty Supervisor and affected personnel, one should attempt to provide the following information:

- Name of caller and callback number;
- Exact location and nature of the incident (e.g., fire, release);
- Time of incident;
- Name and quantity of material(s) involved, or to the extent known;
- The extent of personal injuries, damage and/or fire, if any;
- The possible hazards to human health, or the environment, outside the facility;
- Body of water or area affected;
- Quantity in water (size and color of slick or sheen) or amount released to the land or atmosphere;
- Present weather conditions—wind speed and direction, movement of slick or sheen, current/tide;
- Potential for fire; and
- Action being taken to control the release.

A log should be maintained which documents the history of the events and communications that occur during the response. See Annex 4 for form. It is important to remember that the log may become instrumental in legal proceedings, therefore:

- Record only facts, do not speculate.
- Do not criticize the efforts and/or methods of other people/operations.
- Do not speculate on the cause of the spill.
- If an error is made in an entry, do not erase; draw a line through it, add the correct entry above or below it and initial the change.

Vineyard Wind, LLC

Oil Spill Response Plan

- Always evaluate safety throughout the response actions.

**Table 2-1 Initial Response Checklist**

Action	Comments
<b>First Person on Scene</b>	
Take personal protective measures (PPE) and/or distance.	
Identify and control source if possible (close valve, turn off pump, blind the flange). Eliminate ignition sources.	
Notify the On-Duty Supervisor.	
Notify the affected personnel of the incident.	
Warn personnel in the area and enforce safety and security measures.	
If possible, implement countermeasures to control the emergency. If personal health and safety is not assured, do not attempt to reenter the emergency site.	
Designate a staging area where the Emergency Response personnel and equipment can safely report to without becoming directly exposed to the emergency release (until QI arrives).	
<b>On-Duty Supervisor</b>	
Activate local alarms and evacuate non-essential personnel.	
Notify QI.	
Initiate defensive countermeasures and safety systems to control the emergency (booms, sorbent material, loose dirt, sandbags, or other available materials). Eliminate ignition sources.	
Initiate Emergency Response notification system.	
Dispatch response resources as needed.	
Monitor and or facilitate emergency communications until QI arrives.	
Keep the public a safe distance from the release.	
<b>Qualified Individual (QI) or Designee</b>	
Notify Federal, state and local agencies.	
Establish On-Scene Command and respond to the Command Post.	
Assess situation and classify incident.	
Perform air monitoring surveys prior to entering a release area.	
Determine extent and movement of the release.	
Identify sensitive areas and determine protection priorities.	
Request additional or specialized response resources.	
Establish Isolation Zones (Hot, Warm, Cold) and Direct On-Scene Response Operations.	
Coordinate initial regulatory notifications and external contacts.	
Keep the public a safe distance from the release.	

**2.2 Notifications**

**2.2.1 Internal Notifications**

The individual discovering the spill will call the On-Duty Supervisor immediately and report initial facts about the incident. The On-Duty Supervisor will record the facts (see forms in Annex 4) and immediately (within 15 minutes) notify the Qualified Individual (QI). Table 2-2 lists the QIs and their 24-hour contact information.

**Table 2-2 Qualified Individuals**

Name	Position	Cell	Email
Person A	Qualified Individual, Title	(XXX) XXX-XXXXX	XXX@XXX.com
Person B	Alternate Qualified Individual, Title	(XXX) XXX-XXXX	XXX@XXX.com
Person C	Alternate Qualified Individual, Title	(XXX) XXX-XXXX	XXX@XXX.com
Person D	Alternate Qualified Individual, Title	(XXX) XXX-XXXX	XXX@XXX.com
The Qualified Individual or designated alternate on duty will be available 24-hours per day and capable of arriving to the Project in a reasonable amount of time after contacting (typically within 1 hour).			

**2.2.2 External Notifications**

External notifications to agencies are required for:

- Spills of 10 gallons or greater on land; and
- Any size oil spill on water or on land with a threat to impact water (i.e., Atlantic Ocean, wetlands).

For initial determination of external notifications follow the steps in Figure 2-1. **Please note that the initial calls to USCG must be made within the first hour of discovering a reportable spill. Initial calls to MassDEP must be made within two hours of discovery of a release.** Follow-up calls to agencies can be provided as more information is obtained.

The QI or designee will make all initial and follow-up federal, state, and local agency notifications. Use forms provided in Annex 4 to document details of notifications and ensure accurate information is being passed along. For follow-up purposes, agency specific phone numbers are provided in Table 2-3 as well as the requirements for notifications, additional phone numbers are provided in Annex 2. It is recommended that a courtesy call be placed to the appropriate agency in order to establish proper lines of communication if warranted by the situation.

There are a number of other contacts that must be made if the incident is of a magnitude that requires them, and they may include:

- Massachusetts Department of Environmental Protection (MassDEP);
- Emergency Medical Personnel;
- Oil Spill Response Organizations (OSROs) available 24/7;
- OSHA (if death or 3 personnel injuries result in hospitalization); and

Vineyard Wind, LLC

Oil Spill Response Plan

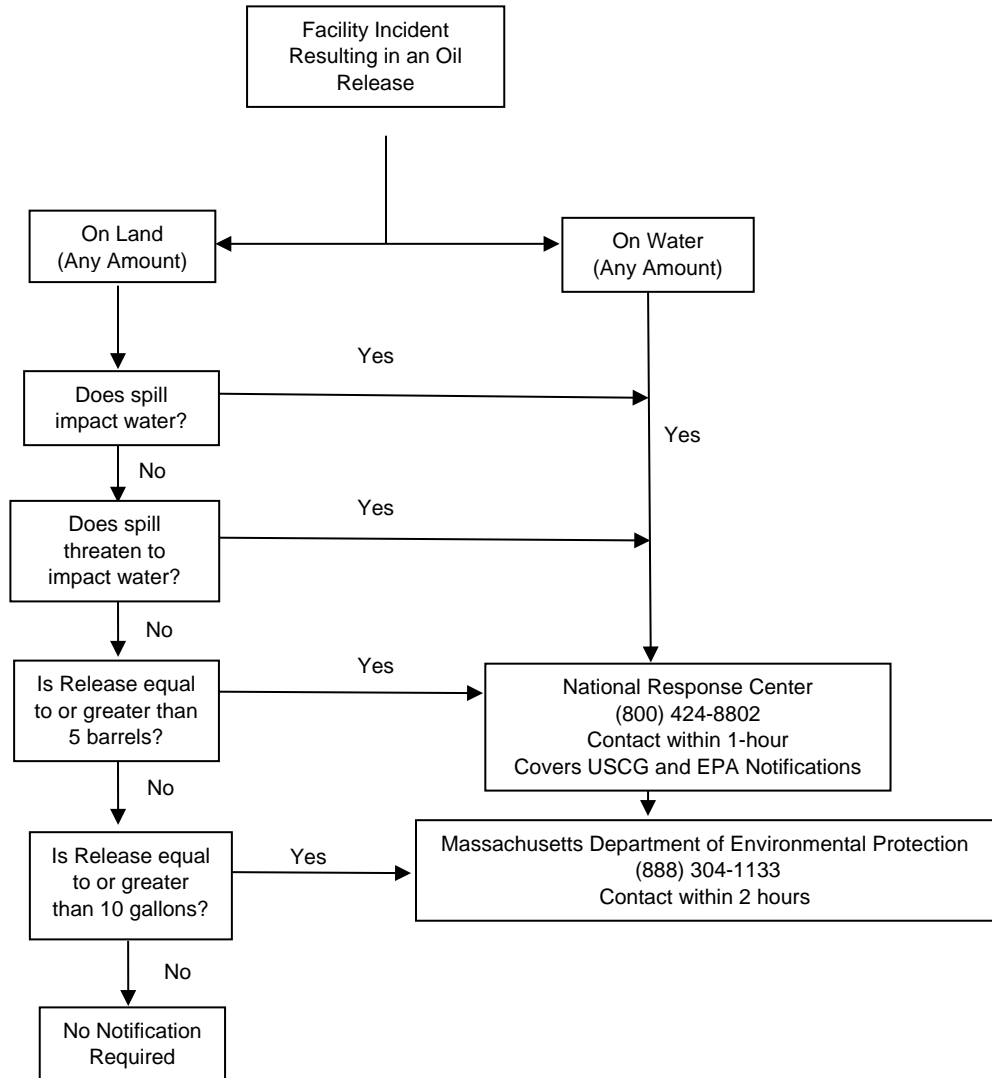
- Wildlife rehabilitation personnel if wildlife affected.

Contact information for these entities and others are included in Annex 2.

In the event that public notification of a spill is required, as deemed necessary by the Federal On-Scene Coordinator (FOSC), be prepared to discuss the following:

- The nature and extent of the economic losses that have occurred or are likely to occur;
- The persons who are likely to incur economic losses;
- The geographical area that is affected or is likely to be affected;
- The most effective method of reasonably notifying potential claimants of the designated source; and
- Any relevant information or recommendations.

Figure 2-1 External Notification Flowchart





## Vineyard Wind, LLC

### Oil Spill Response Plan

**Table 2-3 Initial Agency Notifications**

Agency	Phone	Requirements for Notifications
<b>Federal Agencies</b>		
National Response Center (NRC)	(800) 424-8802 (serves to notify EPA and USCG)	Immediate notification (less than one hour) is required for all discharges of oil sufficient to produce a sheen on navigable waters of the United States.
EPA Region 1	(888) 372-7341 or (617) 918-1251	The EPA must be <u>notified through the NRC</u> for all oil discharges into inland navigable waters of the U.S. sufficient to create a sheen. A written report is not required.  If the facility has discharged more than 1,000 gallons of oil in a single discharge or more than 42,000 gallons of oil in each of two discharges occurring within any twelve month period, the following must be submitted to EPA within 60 days: name of facility; name of reporting party; location of facility; maximum storage or handling of the facility and normal daily throughput; corrective action and countermeasures that have been taken, including a description of equipment repairs and replacements; adequate description of the facility, including maps, flow diagrams, and topographical maps; the cause of such discharge as including a failure analysis of the system or subsystem in which the failure occurred, additional preventive measures that have been taken or contemplated to minimize the possibility of recurrence and such other information as the EPA may reasonably require pertinent to the Plan or discharge.
USCG	(617) 223-4812 or (617) 406-9011	The USCG must be <u>notified via the NRC</u> for all oil discharges into coastal navigable waters of the U.S. sufficient to create a sheen. A written report is not required.
OSHA	(617) 565-9860	OSHA must be notified by telephone if an accident occurred which caused a death, or three personnel injuries which required hospitalization.
Bureau of Safety and Environmental Enforcement (BSEE)	(504) 736-2595 or (504) 400-7836	Documentation of the biennial review must be submitted to the BSEE Oil Spill Preparedness Division (Chief, OSPD) or designee in writing. If the OSRP must be modified, it must be submitted to the Chief, OSPD for approval within 15 days.
<b>State Agencies</b>		
Massachusetts Department of Environmental Protection (MassDEP)	(888) 304-1133	Immediate notification (less than two hours) is required for all discharges of oil to water and any spill equal to or greater than 10 gallons on land. In addition, the local fire department should be notified, if applicable.
<b>Local Authorities</b>		
Barnstable County REPC	(508) 375-6908	Contact for any release, fire, or explosion which could threaten human health, or the environment for Nantucket island.
Dukes County REPC	(508) 696-4240	Contact for any release, fire, or explosion which could threaten human health, or the environment for Martha's Vineyard.
Contact information for additional agencies or services that may become involved in an incident is provided in Annex 2.		

### **2.3 Establishment of a Response Management System**

The Qualified Individual (QI) at the facility will initially be the incident commander during any spill. As the incident escalates, more personnel will be called in to form the Incident Command System (ICS). The National Interagency Incident Management System (NIIMS) will be used by the facility, in concert with OSROs and federal, state, and local agencies. An outline of the ICS can be found in Annex 3.

The designated QI or AQI for the Project is English-speaking, located in the United States, available on a 24-hour basis, familiar with implementation of this response plan, and trained in their responsibilities under the plan. The QI or designated AQI has full written authority to implement this response plan, including:

- (1) Activating and engaging in contracting with identified oil spill removal organization(s);
- (2) Acting as a liaison with the pre-designated Federal On-Scene Coordinator; and
- (3) Obligating, either directly or through prearranged contracts, funds required to carry out all necessary or directed response activities.

#### **2.3.1 Preliminary Assessment**

After initial response has been taken to stop further spillage and notifications made to the required agencies further spill containment, recovery and disposal operations can begin. It is important to first identify the magnitude of the problem and resources threatened. The QI or designee will:

1. Classify the type and size of spill (see Figure 2-2).
2. Determine chemical and physical properties of spilled material for potential hazards (see Annex 10, Safety Data Sheets - SDS).
3. Obtain on-scene weather forecast such as wind speed, wind direction and tide schedules (12, 24, 48 and 72-hour).
4. Track oil movement or projected movement. Consider need for over flights.
5. Continuously assess human health and environmental concerns.
6. Determine extent of contamination and resources threatened (i.e., waterways, wildlife areas, economic areas).
7. Start chronological log of the incident.

Incident classifications, or levels, are used to quickly categorize the appropriate level of response, notifications, and resources which may be necessary to mitigate the emergency. The incident will be categorized based upon the nature of the incident, degree of containment and isolation, materials involved or size of the release, and any other additional information provided by the person reporting the release. Incident levels may be upgraded or downgraded from the initial determination if the call-in classification was inaccurate or the situation changes. The Incident Classification levels are presented in Figure 2-2.

Based on the preliminary assessment, additional clean-up personnel and equipment will be dispatched to the site and deployed to control and contain the spill.

**Figure 2-2 Guidelines for Determining Incident Classification**

**Level 1** – Minimal danger to life and property and the environment. Project personnel are capable of responding to the incident. The problem is limited to the immediate work area or release site and spills are generally less than 55 gallons.

**Level 2** – Serious situation or moderate danger to life, property, and the environment. The problem is currently limited to the Project Area, but does have the potential for either involving additional exposures or migrating offsite. The incident could involve a large spill of oil, a fire, and loss of electrical power.

**Level 3** – Crisis situation or extreme danger to life, property, and the environment. The problem cannot be brought under control, goes beyond the Project Area, and/or can impact public health and safety, and the environment, or a large geographic area for an indefinite period of time. Such incidents include a vessel fire or release of oil in a volume that can impact surrounding areas.

### **2.3.2 Establishment of Objectives and Priorities**

Emergency conditions will be managed in a controlled manner, and oil release response operations will be conducted with the following objectives:

1. Continuously assess personnel safety.
2. Secure or isolate the source.
3. Contain the release.
4. Protect sensitive areas.
5. Coordinate response actions and customize response organization to situation.
6. Think ahead and anticipate needs.
7. Recover product.
8. Document incident.

During a major oil spill, resource, time, and various response constraints may limit the amount of areas that can be immediately protected. Every attempt should be made to prevent impacts to areas surrounding a spill site.

The Project is located in the OCS. The island of Martha's Vineyard, which is the closest land mass, is located approximately 14.4 miles north of the Project. Martha's Vineyard is comprised of six towns and a sovereign tribal nation. The towns of Chilmark, West Tisbury, and Edgartown are located on the southern portion of the island. Resources of special economic or environmental importance located on the southern portion of Martha's Vineyard include:

- Public drinking water well and distribution systems;
- Primary schools located in Chilmark, West Tisbury, and Edgartown;
- Squibnocket Beach, Lucy Vincent Beach, Long Point Beach, Katama Beach, and East Beach;

## Vineyard Wind, LLC

### Oil Spill Response Plan

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- Sovereign tribal nation of the Wampanoag Tribe of Gay Head (Aquinnah); and
- Marinas of Edgartown, West Tisbury, and Chilmark.

Environmental Sensitivity Index (ESI) maps, available from NOAA, provide a summary of coastal resources that are at risk if an oil spill occurs in the area. Maps with coverage of Martha's Vineyard would be contained in: Massachusetts and Rhode Island: Volume 3 Buzzards Bay. The maps are available in pdf format at: <https://response.restoration.noaa.gov/maps-and-spatial-data/download-esi-maps-and-gis-data.html>.

#### 2.3.3 Implementation of Tactical Plan

*The Construction and Operations Plan (COP) for the Project is to be submitted to BOEM WEA by the end of 2017. Initial award selection(s) for long term PPA(s) are expected in the spring of 2018. Construction is scheduled to commence in 2020. Vineyard Wind will establish contractual agreements with an oil spill response organization (OSRO).*

The general procedures for implementation of a tactical plan are:

- Maximize protection of response personnel.
- Deploy containment resources and if appropriate divert spill to a suitable collection point that is accessible and has the least impact to surrounding areas.
- Boom off sensitive areas.
- Maximize on-water containment and recovery operations.
- Handle wastes to minimize secondary environmental impacts.

Vineyard Wind will establish contractual agreements with an OSRO to contain a spill on the waterway or land, and clean up the area after a spill. The Response Team will use containment equipment available at the site to surround or divert the spill until the contractor arrives on scene. Vineyard Wind personnel and equipment will assist in any way possible to expedite the cleanup operations.

#### 2.3.4 Containment and Recovery Methods

The objective of the initial phase of the containment procedure prevents the spread of the spill, especially on water, and confines it to as small an area as possible. The containment goals are to prevent liquid or vapors from reaching a possible ignition source (i.e., boat engines, electrical equipment) and any environmentally sensitive area (i.e., water, wetland, wildlife management area). The primary methods to be used in containing a release would be absorbents, if on the rig, or containment booms, if it reaches water. It may be necessary to use many different methods in one release.

Containment and recovery refer to techniques that can be employed to contain and recover onshore and aquatic petroleum spills. Responses on water should therefore emphasize stopping the spill, containing the oil near its source, and protecting sensitive areas before they are impacted.

Sorbents can be used to remove minor on-water spills on the WTGs and ESPs. For larger spills, or spills reaching water, booming is used to protect sensitive areas and to position oil so it can be removed with skimmers or vacuum trucks. Due to entrainment, booming is not effective when the water moves faster than one knot, or waves exceed 1.5 feet in height. Angling a boom will minimize entrainment. Using multiple parallel booms will also improve recovery in adverse conditions. A summary of booming techniques for both aquatic and onshore scenarios is provided in Table 2-4.

Vineyard Wind, LLC

Oil Spill Response Plan

Table 2-4 Containment and Diversion Booming Techniques

Type of Boom	Use of Boom
Containment/Diversion Berming	Berms are constructed ahead of advancing surface spills to contain spill or divert spill to a containment area.  May cause disturbance of soils and some increased soil penetration.
Containment Booming	Boom is deployed around free oil.  Boom may be anchored or left to move with the oil.
Diversion Booming	Boom is deployed at an angle to the approaching oil.  Oil is diverted to a less sensitive area.  Diverted oil may cause heavy oil contamination to the shoreline downwind and down current.  Anchor points may cause minor disturbances to the environment.

**2.4 Response Strategies for Containment and Recovery**

The WTGs and ESPs will be located in the OCS. Offshore cable systems will move power from the offshore substations to landfall on the south-central shore of Cape Cod (i.e., Landfall Site). Vineyard Wind has been engaged in route selection work for the necessary sea cable Landfall Site, the landside transmission cabling, the onshore substation and utility interconnection point. At this juncture, the Project is considering potential landfall sites in the Towns of Yarmouth and Barnstable; a single Landfall Site may be used for all cables for the ~800 MW project. If oil storage on the landside of the Project exceeds 1,320 gallons in capacity in aggregate for containers or oil-filled equipment with a capacity of 55 gallons or greater, an SPCC Plan or an Integrated Contingency Plan (ICP) will be developed to address spill response procedures. While onshore releases are not the primary focus of this plan, they are still addressed for completeness.

**2.4.1 Atlantic Ocean**

The Project is located in the OCS. Water depths in the area of the Project range from 115 feet to 161 feet. However, oils stored in the WTGs and ESPs have a specific gravity less than 1.0 and would float on the surface of the water. Feasible protection methods include skimming, booming, and improvised barriers.

**2.4.2 Banks**

The nearest land mass to the WTGs and ESPs is Martha’s Vineyard, which is located approximately 14.4 miles north of the Project. Therefore, it is not anticipated that a release of oil would impact the terrain alongside the bed of a river, creek, or stream. However, the following response discussion is made available for planning of such an event.

Vegetated Banks

Oil may penetrate the area and coat plants and ground surfaces. Oil can persist for months. Minimize cutting plants. A no-action alternative may be appropriate to minimize environmental impacts. Cleanup is usually unnecessary for light coatings, but heavier accumulations may require sediment surface removal to allow new growth. Low-pressure spraying and neutralization solutions may aid removal.

### Sand Beaches

Heavy accumulations of wastes can cover an entire beach surface and subsurface. Oil can penetrate the sand from 6 to 24 inches deep. Organisms living along the beach may be smothered or dangerously contaminated. Fine sand beaches are generally easier to clean. Clean by removing oil above the swash zone after all oil has come ashore. Minimize sand removal to prevent erosion. Soil treatment may be possible as well.

### Muddy Beaches

Mud habitats are characterized by a substrate composed predominantly of silt and clay sediments, although they may be mixed with varying amounts of sand or gravel. The sediments are mostly water saturated and have low bearing strength. In general, mud shorelines have a low gradient. These fine-grained habitats often are associated with wetlands. Mud habitats are highly sensitive to oil spills and subsequent response activities. Shoreline sediments are likely to be rich in organic matter and support an abundance of fauna. Muddy habitats are important feeding grounds for birds and rearing areas for fish. Oil will not penetrate muddy sediments because of their low permeability and high-water content, except through decaying root and stem holes, or animal burrows. There can be high concentrations and pools of oil on the surface. Natural removal rates can be very slow, chronically exposing sensitive resources to the oil. The low bearing capacity of these shorelines means that response actions can easily leave long-lasting imprints, cause significant erosion, and mix the oil deeper into the sediments. When subsurface sediments are contaminated, oil will weather slowly and may persist for years. Response methods may be hampered by limited access, wide areas of shallow water, fringing vegetation and soft substrate. Natural recovery is typically the best response action for light crude. Vacuum trucks may be used to remove pooled oil on the surface if accessible. Avoid digging trenches to collect oil because that can introduce oil deeper into the sediment.

### Riprap Structures

Oil contamination may penetrate deeply between the rocks. If left, oil can asphaltize and fauna and flora may be killed. If possible remove all contaminated debris. Use sorbents to remove oil in crevices. Best response may be to remove and replace heavily contaminated riprap to prevent chronic sheening and release.

### Walls/Pier/Barriers and Docks

Mussels, shellfish, and algae are often found attached to these structures, which may be constructed of concrete, stone, wood, or metal. Contamination may percolate between joints and coat surfaces. Heavy accumulations will damage or kill the biota. High-pressure spraying may remove oil and prepare the substrate for recolonization of fauna/flora. Consider concentration of oil and continual release concentration to make a determination as to whether an action is required to remove contamination from these structures.

## **2.4.3 Wetlands**

MassDEP's Priority Resource Map does not identify any wetland areas along the southern shoreline of Martha's Vineyard. Wetlands are located in the vicinity of Allen Point, Cobbs Point, Swan Neck Point, King Point, and Butler Neck. It is anticipated that a release of oil would impact the shoreline prior to impacting the wetlands areas. However, the following response discussion is made available for planning of such an event.

Wetlands are characterized by water, unique soils, and vegetation adapted to wet conditions. Wetlands include a range of habitats such as marshes, bogs, and swamps. The surfaces of wetlands usually have a low gradient, and vegetated areas are typically at, or under, the water level. Wetlands are highly sensitive to oil spills. The biological diversity in these habitats is significant and they provide critical habitat for many types of animals and plants. Oil spills affect both the habitat and the organisms that directly and indirectly rely on the habitat. Wetlands support populations of fish, amphibians, reptiles, birds, and mammals, with many species reliant upon wetlands for their reproduction and early life stages when they are most sensitive to oil. Migratory water birds depend heavily on wetlands as summer breeding locations, migration stopovers, and winter habitats.

For small to moderate spills and lighter oils, natural recovery avoids damage often associated with cleanup activities. However, the threat of direct oiling of animals using the wetland often drives efforts to remove the oil. Sorbents may be used, but overuse generates excess waste materials. Flooding can be used selectively to remove localized heavy oiling, but it can be difficult to direct water and oil flow towards recovery devices. Pooled oil can be removed by vacuum truck, if accessible, and trampling of vegetation can be avoided. The removal of heavily oiled vegetation may reduce the contamination of wildlife. Time of year is an important consideration for any clean-up method used in a wetland area.

#### **2.4.4 Onshore Spills**

The WTGs and ESPs are located in the OCS. It is unlikely that a release of oil from the WTGs or ESPs would result in an onshore spill. However, the following response discussion is made available for planning of such an event.

Onshore spills typically result from pipeline or equipment (i.e., pumps, valves) leaks. Secondary containment systems will be provided at operating areas more prone to spillage. The WTGs and ESPs are equipped with a secondary containment structure that will be sized according to the largest container. The ESP containment will drain to a sump tank. Spills occurring outside these areas should be contained at or near the source to minimize the size of the cleanup area and quality of soil affected.

Containment is most effected when conducted near the source of the spill, where the oil has not spread over a large area, and contained oil is of sufficient thickness to allow effective recovery and/or cleanup. The feasibility of effectively implementing containment and recovery techniques is generally dependent upon the size of the spill, available logistical resources, implementation time, and environmental conditions or nature of the terrain in the spill area.

For onshore spills, trenches, earthen berms, or other dams are the most effective response to contain oil migration on the ground surface. Recovery of free oil is best achieved by using pumps, vacuum trucks, and/or sorbents. Forming collection ponds for containing free product may be considered when attempting to recover free oil. Absorbents such as hay, straw, dry dirt or sand, and other commercial products may be considered as alternative methods of containment.

#### **2.4.5 Small Lakes**

Edgartown Great Pond and Tisbury Great Pond are located along the southern portion of Martha's Vineyard and have navigational channels connecting the pond to the Atlantic Ocean. It is anticipated that a release of oil from the WTGs and ESPs could be contained prior to reaching the navigational channels for the ponds. However, should this occur, the following response discussion is made available for planning of such an event.

Lakes and ponds are standing bodies of water of variable size and water depth. Water levels can fluctuate over time. The bottom sediments close to shore can be soft and muddy, and the surrounding

land can include wetlands and marshes. Floating vegetation can be common. Lakes provide valuable habitat for migrating and nesting birds and mammals, and support important fisheries. Wind will control the distribution of oil slicks, holding the oil against a shore, or spreading it along the shore and into catchment areas. Wind shifts can completely change the location of oil slicks, contaminating previously clean areas. Thus, early protection of sensitive areas is important. Oil impacts on floating vegetation depend to a large degree on dose, with possible elimination of plants at high doses. The best possible response method is to deploy booms to prevent oil from entering the lakes. If oil does enter any lakes, containing the oil to a small area with booms is the next best response.

#### **2.4.6 Offshore Environments**

The Project is located approximately 14.4 miles south of the southern shore of Martha's Vineyard. Therefore, it is anticipated that a release of oil from the WTGs and ESPs could be contained prior to reaching the coastline. However, should this occur, the following response information is included in this plan to assist in planning of such an incident.

The initial response to mitigate/contain a spill in a coastal environment is to review the ACP response plans for locating applicable sensitive areas. Oil that is deposited on an open water surface is generally distributed by wind direction and velocity. In addition, wave action causes emulsification of the oil, decreasing the recoverable amount, and increasing the area of contamination. These elements will be used as an advantage for containment/cleanup response. Deploy the containment boom in a V-shape, allowing the wind/wave action to move the oil, trapping, and funneling the oil towards recovery equipment near shore. Plan the recovery sites near roads, if possible, to allow tanker trucks and vacuum trucks to pick up the recovered material and transport it to disposal, recovery, or temporary storage. Clean up any accumulated amounts of contaminated shoreline debris. Store the debris on impervious material and cover it in the same manner.

#### **2.5 Waste Disposal and Oil Recovery**

Oil spill cleanup from recovery operations will involve the further handling of recovered oil and oiled materials. These will be directed to a state-approved reclamation/disposal site. Normally, the waste generated from a recovery operation will be classified as a non-RCRA state regulated waste. Waste Code MA01 is appropriate for used or unused waste oil that is not otherwise RCRA hazardous waste. Waste Code MA97 is appropriate for Class A regulated recyclable material (including, but not limited to, specification used oil fuel) that is shipped using a hazardous waste manifest. Waste Code MA98 is appropriate for off-specification used oil fuel that is shipped using a hazardous waste manifest. In rare instances, where it is suspected that extraneous substances have been introduced into a spill, it is appropriate to test the recovered oil for hazardous waste characteristics (ignitability, reactivity, corrosivity, and toxicity).

The different types of wastes generated during response operations require different disposal methods. Waste will be separated by material type for temporary storage prior to transport to an approved recovery or treatment/storage/disposal facility.

Skimmer tanks allow for gravity separation of the oil from the water. The separated water is transferred through a hose and discharged forward of the recovery pump. This method is called "decanting". This process is vital to the efficient mechanical recovery of spilled oil because it allows maximum use of limited storage capacity, thereby increasing recovery operations. Approval must be obtained from federal and state agencies prior to decanting.

Recovered oil may be transferred to portable tanks. It is important to ensure temporary storage devices are of sufficient size to allow continued operations.



## Vineyard Wind, LLC

### *Oil Spill Response Plan*

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Oily debris collected requires specific handling. Contaminated materials will be placed in leak proof, sealable containers, such as drums or roll-off boxes, and transported to appropriate facilities for processing, recycling, or disposal.

Clean sand and shoreline materials can be separated from oiled materials and returned to the shoreline. Not only is this cost effective from an operations perspective, it also provides an efficient means of returning clean, excavated material back to the shoreline as a restorative measure.

#### **2.6 Potential Failure Scenarios**

Specific mitigation actions and responses to be taken (exact pumps to shut down, valves to close, etc.) depend on the way the transfer is performed and the nature of the situation; however, certain failure scenarios share common characteristics for mitigation. Mitigation procedures will be performed with consideration for health and safety as the top priority.

The Project is being developed and permitted using an “Envelope” concept. The Envelope concept allows Vineyard Wind to properly define and bracket Project characteristics for purposes of environmental review and permitting, while maintaining a reasonable degree of flexibility with respect to selection and purchase of key Project components. Potential failure scenarios will be developed as key Project components are selected. General mitigation procedures are included in Annex 3.

#### **2.7 Procedures for Mobilization of Resources**

A major consideration during a spill is the organization and direction of the transportation of manpower, equipment, and materials used in response operations. The QI will work with local authorities (state police) to establish land routes which will expedite the movement of personnel, equipment, materials, and supplies to the Staging Area, and waste products from the Staging Area. The facility will utilize status boards to coordinate all equipment, personnel, and materials mobilized to the spill site. Equipment will first be mobilized from the OSRO warehouse to the Staging Area. A Staging Area Manager will be designated to direct which equipment will be delivered to which Division/Task Force.

Once the first increment of the Project is installed, tested, and commissioned, the Project will enter a 20 to 30 year operating phase. In support of Project operations and the necessary maintenance activities, Vineyard Wind will have management and administrative team offices, a control room, and an Operation and Maintenance Facility (O&M facility). These functions will be co-located, if feasible. Details regarding spill response materials, services, equipment, and response vessels has not been finalized at this time. Vineyard Wind will retain a third-party OSRO that is licensed as hazardous waste transporters, and can provide emergency response services and cleanups of oil and/or hazardous material (OHM) spills. MassDEP emergency response contractors located in close proximity to the Project include Frank Corporation (New Bedford), Global Remediation Services, Inc. (Sandwich), Clean Harbors, Incorporated (Braintree), and Cyn Oil Corporation (Stoughton). Response times for mobilization of OSRO resources will be dependent on the location of the OSRO.

#### **2.8 Sustained Actions**

The WTGs and ESPs are equipped with secondary containment, which would reduce the potential for the need for a sustained action. Most incidents are able to be handled by a few individuals without implementing an extensive response management system. However, an incident could occur where clean-up is not possible within seven days, transition from the initial emergency stage. A sustained action stage may be required where more prolonged mitigation and recovery actions may be warranted.

Response operations will need to be managed 24-hours a day, seven days a week, until the operation is complete. The facility’s Incident Command Organization (ICO) team members are available to be

cascaded in to support response operations. Once the initial emergency stage of the spill situation has transformed to the sustained action stage, the response management structure will develop more prolonged mitigation and recovery action strategies.

### **2.9 Termination and Follow-Up Actions**

Cleanup will be conducted as thoroughly as possible, but will be terminated when, in the opinion of the FOSC and the QI;

- There is no detectable oil in the water;
- Further removal actions would cause more environmental harm than the remaining oil;
- Cleanup measures would be excessive in view of their insignificant contribution to minimizing a threat to the public health, welfare, or the environment; and
- Actions required to repair unavoidable damage resulting from removal activities have been completed.

Once the determination has been made that the response can be terminated, certain regulations may become effective once the “emergency” is declared over. Orderly demobilization of response resources will need to occur. Follow-up actions such as accident investigation, response critique, plan review, and written follow-up reports are needed.

The QI will develop a plan of demobilization and assist to ensure that an orderly, safe, and cost-effective demobilization of personnel and equipment is accomplished.

General demobilization considerations for all personnel are the following:

- Complete all work assignments;
- Brief subordinates regarding demobilization;
- Complete and file required forms and reports;
- Follow check out procedures provided by the QI;
- Evaluate performance of subordinates prior to release;
- Return communications equipment or other non-expendable supplies; and
- Report to assigned departure points on time, or slightly ahead of schedule.

The QI will convene a meeting to summarize the incident, and a complete report will be developed within 180 days. This report will record the incident as it developed and will identify, in detail, the actions taken, resources committed, and any problems encountered. The QI will include a recommendation outlining any suggested changes of policies or procedures.

## **Annex 1 – Facility Diagrams**

**Vineyard Wind, LLC**  
*Oil Spill Response Plan*

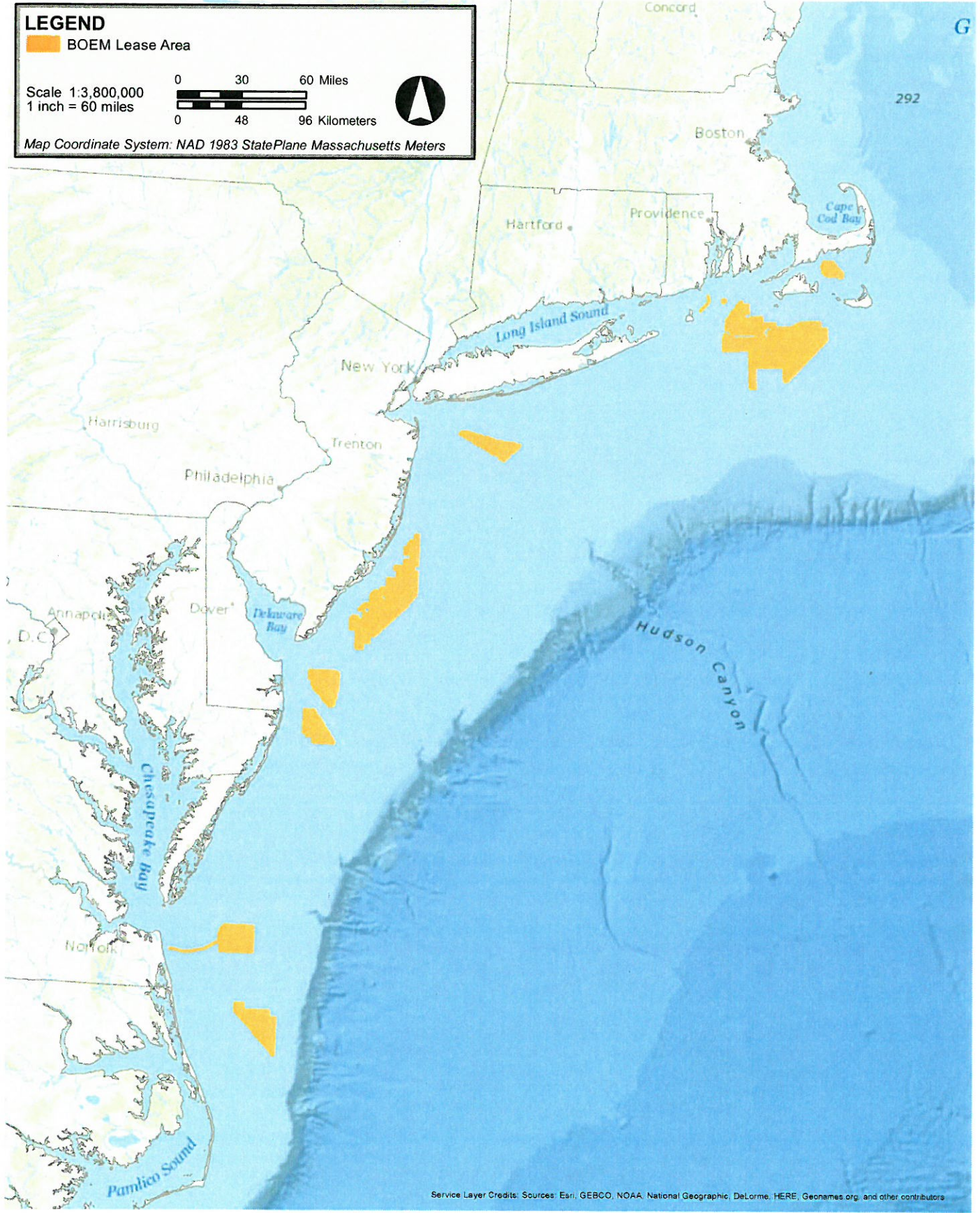
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Figure A1-1: BOEM Lease Areas Overview

Figure A1-2: RI and MA Lease Areas Overview

Figure A1-3: Vineyard Wind Lease Blocks

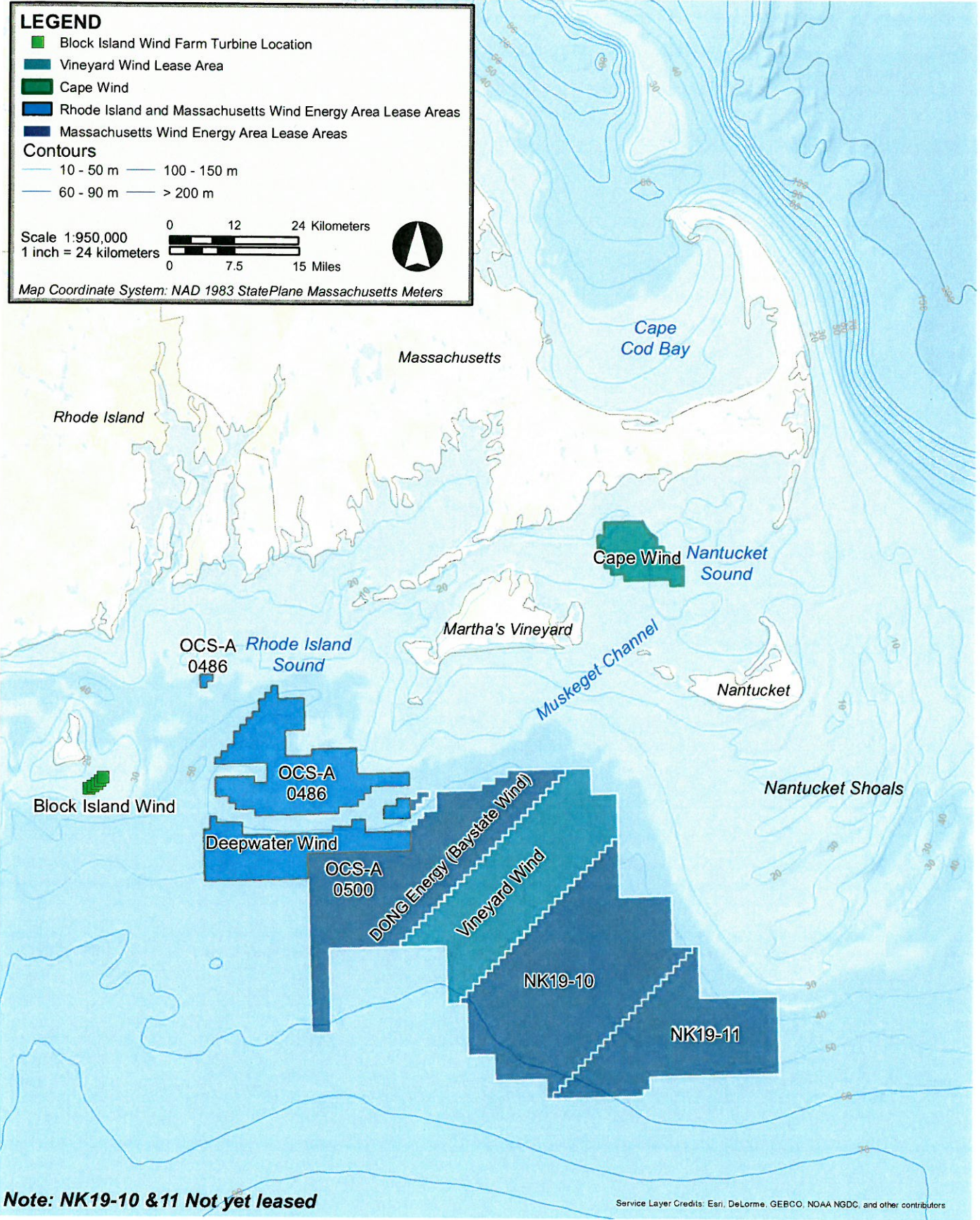
Figure A1-4: Vineyard Wind Turbine Layout



### Vineyard Wind Project



**Figure 1**  
Overview, BOEM Offshore Wind Lease Areas,  
Atlantic Coast



Vineyard Wind Project



**Figure 2**  
BOEM, Massachusetts Wind Energy Area,  
Lease Areas

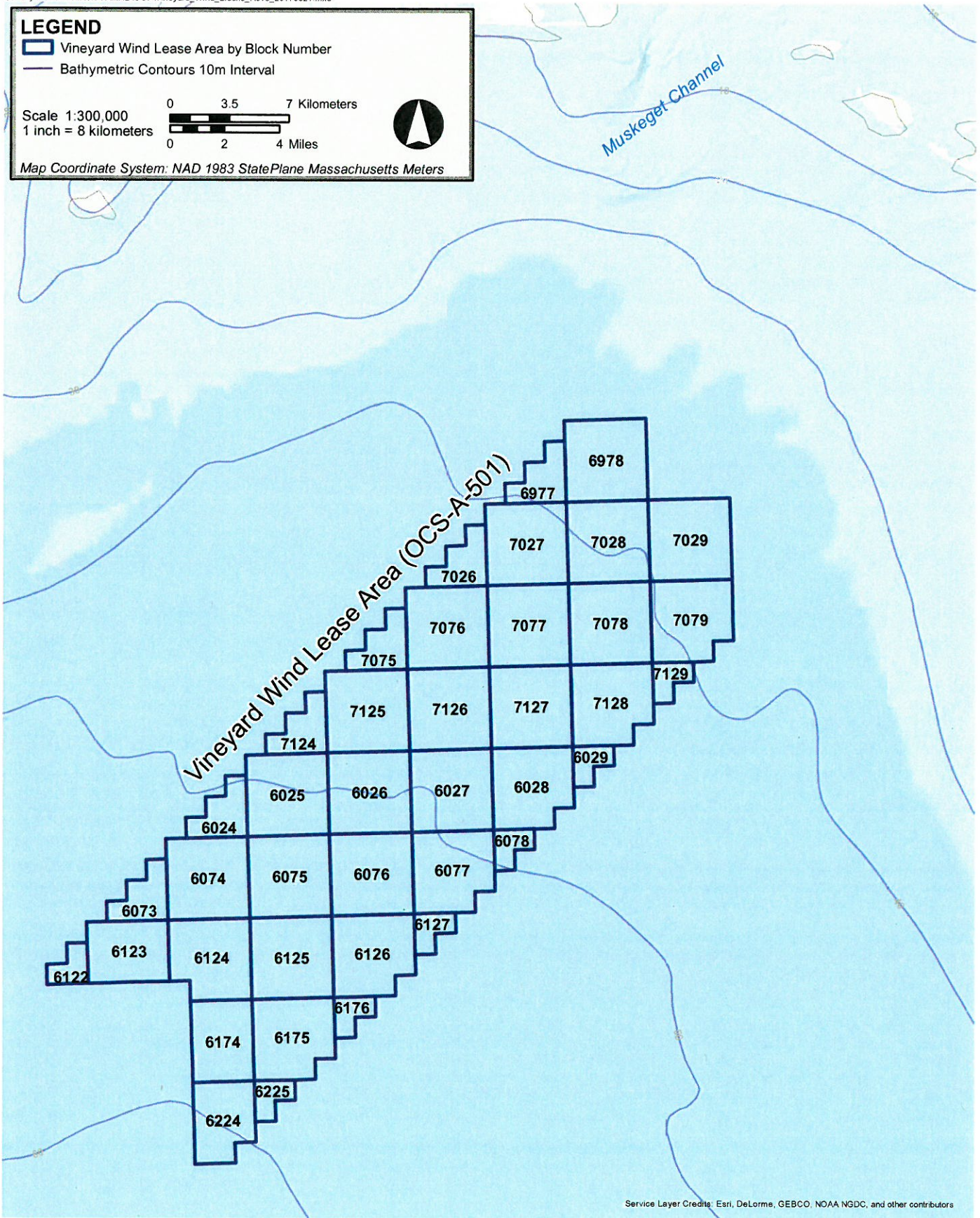
**LEGEND**

- Vineyard Wind Lease Area by Block Number
- Bathymetric Contours 10m Interval

Scale 1:300,000  
1 inch = 8 kilometers

0 3.5 7 Kilometers  
0 2 4 Miles

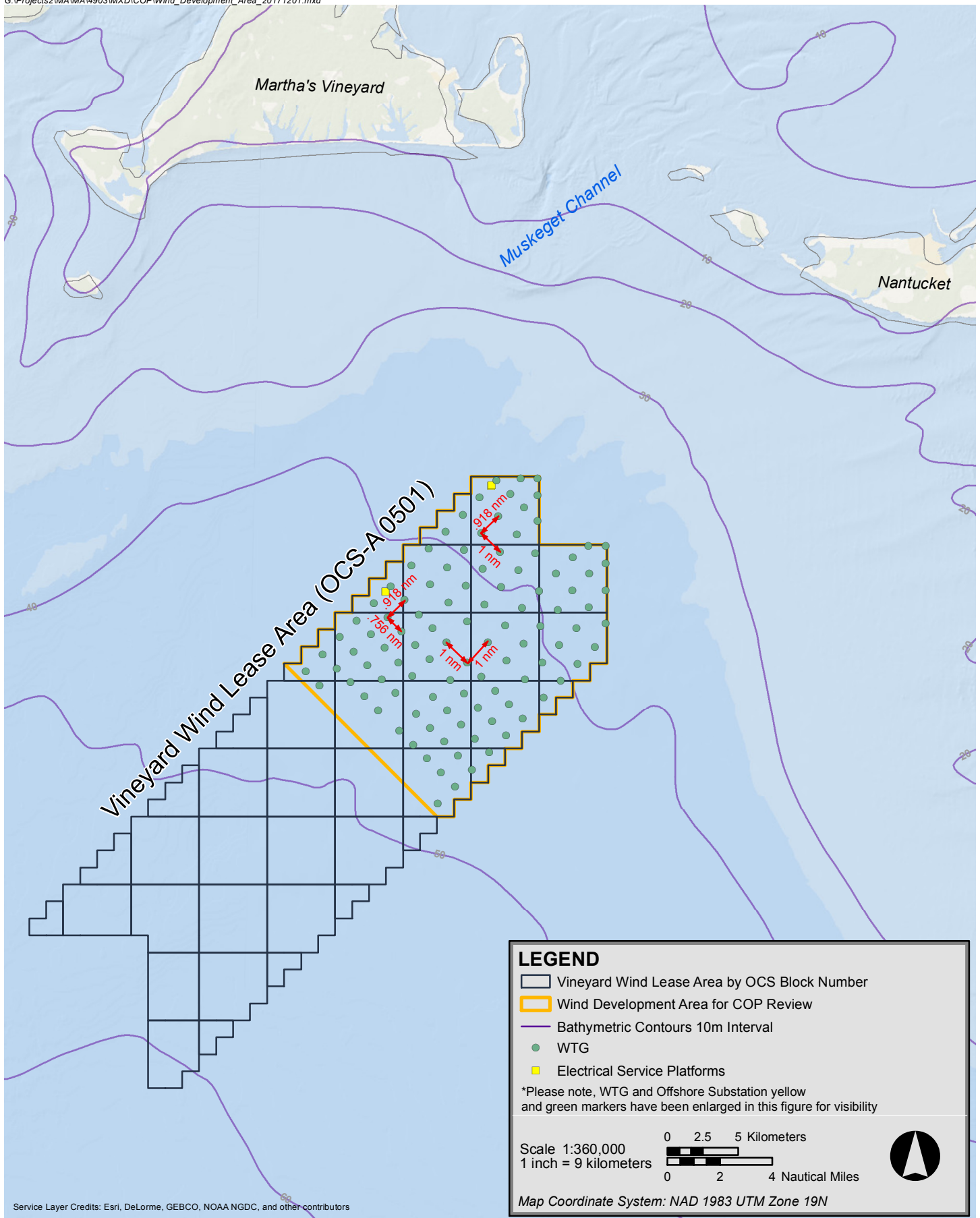
Map Coordinate System: NAD 1983 StatePlane Massachusetts Meters



Vineyard Wind Project



**Figure 3**  
Vineyard Wind Lease Area,  
with BOEM Block Designation



Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

## Vineyard Wind Project



.....Figure ( )  
Wind Development Area and Site Layout



## **Annex 2 – Notification Contact List**

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*Oil Spill Response Plan*

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**Table A2-1 Internal Notification List**

*The Project has not yet been approved. Construction of the Project is scheduled to commence in 2020. Details regarding QI personnel have not been finalized at this time.*

<b>Name</b>	<b>Title</b>	<b>Phone Number</b>
Person A	Qualified Individual, Title	(XXX) XXX-XXXX
Person B	Alternate QI, Title	(XXX) XXX-XXXX
Person C	Alternate QI, Title	(XXX) XXX-XXXX
Person D	Alternate QI, Title	(XXX) XXX-XXXX
Person E	Manager EHS	(XXX) XXX-XXXX
Person F	Director of Communications	(XXX) XXX-XXXX
Person G	Chief Financial Officer	(XXX) XXX-XXXX
Person H	Director of Administration	(XXX) XXX-XXXX

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**Table A2-2 External Notification and Call Lists**

Agency	Location	Telephone
<b>Initial Required Notifications</b>		
National Response Center	c/o USCG (CG-3RPF-2) 2100 2 <sup>nd</sup> Street Southwest Room 2111-B Washington, D.C. 20593-0001	800-424-8802 (24 hr) 202-267-2675 (24 hr) 202-267-1322 (fax)
Massachusetts State Emergency Response Commission (SERC)	MEMA 400 Worcester Road Framingham, MA 01702	508-820-2010
U.S. Coast Guard (any discharge on navigable water)	408 Atlantic Avenue Boston, MA 02110	617-223-4812 or 617-406-9011
Massachusetts Department of Environmental Protection (10 gallons or more)	1 Winter Street Boston, MA 02108	888-304-1133
EPA Region 1 (>5 barrels on land or any amount on water)	5 Post Office Square Boston, MA 02109	888-372-7341 or 617-918-1251
Bureau of Safety and Environmental Enforcement (BSSE)	1201 Elmwood Park Boulevard New Orleans, LA 70123-2394	504-736-2595 or 504-400-7836
Dukes County REPC (Threat to Martha's Vineyard)	32 Water Street Tisbury, MA 02568	508-696-4240
Wampanoag Tribe of Gay Head (Threat to tribal lands on MV)	20 Black Brook Road Aquinnah, MA 02535	508-645-9265
Barnstable County REPC (Threat to Nantucket)	3195 Main Street Barnstable, MA 02630	508-375-6908
OSHA (fatality or 3 or more employees sent to hospital)	200 Constitution Avenue Washington, D.C. 20210	800-321-6742
<b>USCG Classified Oil Spill Response Organizations (OSRO)</b>		
Vineyard Wind has not selected a OSRO at this time. MassDEP maintains a list of licensed hazardous waste transporters who provide Emergency Response Services in MassDEP's Southeast Region. The list is available here: <a href="http://www.mass.gov/eea/docs/dep/cleanup/serohwtr.pdf">http://www.mass.gov/eea/docs/dep/cleanup/serohwtr.pdf</a>		
<b>Weather</b>		
National Oceanic & Atmospheric Administration National Weather Service National Weather Service	445 Myles Standish Boulevard Taunton, MA 02870	508-822-0634 (forecasts) 508-828.2672 (general info) <a href="http://www.weather.gov/box/">http://www.weather.gov/box/</a>
NOAA Weather Radio (NWR) Hyannis, MA	Camp Edwards Hyannis, MA	Call sign: KEX73 VHF: 162.550
NOAA National Data Buoy Center	<a href="http://www.ndbc.noaa.gov/maps/Northeast.shtml">http://www.ndbc.noaa.gov/maps/Northeast.shtml</a>	
MVY: Martha's Vineyard Airport	<a href="http://myyairport.com/">http://myyairport.com/</a>	
<b>Aviation Resources</b>		
Vineyard Wind has not selected aviation resources at this time. A list of Massachusetts charter operators is available at: <a href="http://www.aircharterguide.com/US_Operators/MA/Massachusetts">http://www.aircharterguide.com/US_Operators/MA/Massachusetts</a>		
<b>Marine Resources</b>		
Steamship Authority	1 Cowdry Road Woods Hole, MA 02543	508-548-5011

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### Oil Spill Response Plan

Agency	Location	Telephone
<b>Regulatory Agencies for Wildlife</b>		
U.S. Fish and Wildlife Service North East Regional Office	300 Westgate Center Drive Hadley, MA 01035	413-253-8200
U.S. Fish and Wildlife Service New England Field Office	70 Commercial Street Suite 300 Concord, NH 03301	603-223-2541
Massachusetts Environmental Police (fish kills)	251 Causeway Street Boston, MA 02114	800-632-8075
MassWildlife	1 Rabbit Hill Road Westborough, MA 01581	508-389-6300
MA Department of Fish and Game	251 Causeway Street Boston, MA 02114	617-626-1500
<b>Other Wildlife Resources</b>		
Mass Audubon	208 South Great Road Lincoln, MA 01773	781-259-9500 or 800-823-8266
Felix Neck Wildlife Sanctuary	100 Felix Neck Drive Edgartown, MA 02539	508-627-4850
International Fund for Animal Welfare	290 Summer Street Yarmouth Port, MA 02675	508-743-9548
New England Aquarium	1 Central Wharf Boston, MA 02110	617-973-5247
NOAA Greater Atlantic Fisheries Office	55 Great Republic Drive Gloucester, MA 01930	866-755-6622
National Audubon Society	New York, NY	212-979-3196
<b>Licensed Wildlife Rehabilitation Providers</b>		
The Commonwealth of Massachusetts maintains a list of licensed wildlife rehabilitators at: <a href="https://www.mass.gov/service-details/wildlife-rehabilitators-southeast-district">https://www.mass.gov/service-details/wildlife-rehabilitators-southeast-district</a>		
<b>Medical Facilities</b>		
Martha's Vineyard Hospital	1 Hospital Road Oak Bluffs, MA 02557	508-693-0410
Vineyard Medical Care (Walk-in Clinic)	364 State Road Vineyard Haven, MA 02568	508-693-4400
<b>Ambulances</b>		
Tri-Town Ambulance	West Tisbury, MA	508-693-4922
Oak Bluffs Ambulance Department	Oak Bluffs, MA	508-693-5380
Tisbury Ambulance	Vineyard Haven, MA	508-696-4112
Boston MedFlight (Air lift)	Bedford, MA	781-863-2213
Coast Guard Air Station Cape Cod (Medevac)	Buzzards Bay, MA	508-968-6673
<b>Fire Aid (911)</b>		
Edgartown Fire Department	Edgartown, MA	508-627-5167
Oak Bluffs Fire Department	Oak Bluffs, MA	508-693-0077
West Tisbury Fire Department	West Tisbury, MA	508-693-2749
Chilmark Fire Department	Chilmark, MA	508-645-2207
Vineyard Haven Fire Department	Vineyard Haven, MA	508-696-6726

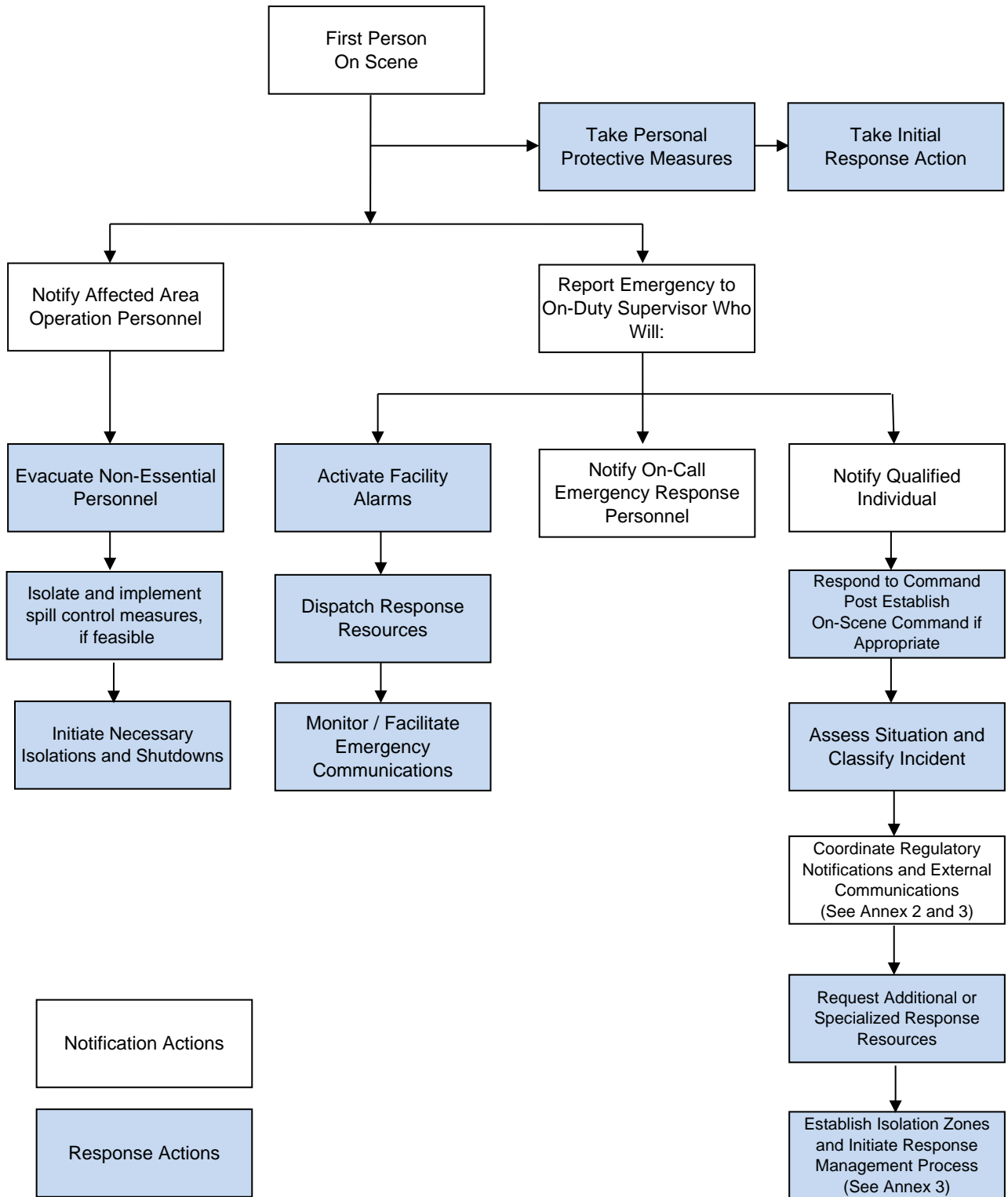
**Vineyard Wind, LLC***Oil Spill Response Plan*

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<b>Police Aid (911)</b>		
Massachusetts State Police	Oak Bluffs, MA	508-693-0545
Dukes County Sherriff	Edgartown, MA	508-627-5328
Massachusetts Environmental Police	Boston, MA	800-632-8075
Massachusetts Department of Public Safety	Boston, MA	617-727-3200
US Marshals Services	Boston, MA	617-748-2500
Federal Bureau of Investigation	Chelsea, MA	857-386-2000
<b>Local Government and Agencies</b>		
Wampanoag Tribe of Gay Head (Aquinnah)	Aquinnah, MA	508-645-9265
Dukes County Health Department	Vineyard Haven, MA	508-696-3844
Martha's Vineyard Chamber of Commerce	Vineyard Haven, MA	508-693-0085
Edgartown Town Hall	Edgartown, MA	508-627-6100
Oak Bluffs Town Hall	Oak Bluffs, MA	508-693-3554
Town of Tisbury	Vineyard Haven, MA	508-696-4200
West Tisbury Town Hall	West Tisbury, MA	508-696-4700
Chilmark Town Hall	Chilmark, MA	508-645-2100
Aquinnah Town Selectman	Aquinnah, MA	508-645-2310
<b>Other Industrial Facilities in Local Area</b>		
Not Applicable		

## **Annex 3 – Response Management System**

Figure A3-1 Initial Response Flowchart



## Annex 4 – Incident and Other Documentation Forms

The Qualified Individual (QI) will coordinate the documentation during the incident, and for post-incident review, in conjunction with federal, state, and local officials, as well as with others familiar with the incident. Forms to assist in documentation and presentation of consistent notification information are presented at the end of this Annex for use during an incident. These include:

- Initial Notification;
- Agency Call Back for Information;
- Chronological Log of Incident; and
- Incident Report.

As an alternative, or in addition to, the National Incident Management Systems (NIMS) Incident Command Forms noted below may also be used. These can be accessed on-line at:

<http://www.fema.gov/emergency/nims/JobAids.shtm>

**Table A4-1 ICS Forms National Incident Management System (NIMS) Alternative**

ICS Form No.	Description
IAP	Cover Sheet Incident Action Plan
201	Incident Briefing
202	Incident Objectives
203	Organization Assignment List
204	Assignment List
204a	Assignment List Attachment
205	Incident Radio Communications Plan
206	Medical Plan CG
207	Organizational Chart
208	Site Safety Plan
209	Status Summary (SITREP/Opsum)
210	Status Change
211	Check-In List
213	General Message
213-RR	Resource Request
214	Unit Log
215	Operational Planning Worksheet
216	Radio Requirements Worksheet
217	Radio Frequency Assignment Worksheet
218	Support Vehicle Inventory
219	Resource Status Card (T-Cards)
220	Air Operations Summary
221	Demobilization Checkout
224	Crew Performance Rating
225	Personnel Performance Rating
226	Individual Personnel Rating
230	Daily Meeting Schedule
232	Resources at Risk Summary
232a	ACP Site Index



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*Oil Spill Response Plan*

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233	Open Action Tracker
234	Work Analysis Matrix
235	Facility Needs Assessment

The post-incident investigation will begin after the source of the incident has been corrected, eliminated, or repaired, and the facility has been declared safe by the QI. The QI will take the following steps during a post-accident investigation:

- Obtain all data, information, and reports pertaining to the incident.
- Interview in person, or by telephone, each person knowledgeable of the incident.
- Review the response of operations personnel to see if procedures and training were adequate or if changes are warranted.
- Evaluate other potentially dangerous situations which could have occurred, and if the response of personnel and safety systems would have accommodated those situations had they occurred.
- Prepare recommendations as appropriate for changes to:
  - Design of facility;
  - Operating procedures;
  - Training;
  - Communications; and
  - Emergency response plans and procedures.
- The QI will prepare and issue a written report to all supervisors with any changes deemed appropriate.

The QI will prepare a Post-Incident report. This annex will contain an accounting of incidents that occur including proof that the Project met its legal notification requirements for any given incident (i.e., signed record of initial notifications and certified copies of written follow-up reports submitted after a response).

Examples of routine equipment and maintenance checklists/ logs are also provided. These include:

- Response Equipment Inspection Log;
- Secondary Containment Checklist and Inspection Form;
- Tank Inspection Form; and
- Maintenance Log.

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**Form A4-10 Initial Notification Data Sheet**

Date:	Time:
<b>INCIDENT DESCRIPTION</b>	
Reporters Name:	Position:
Reporters Phone Number:	Address:
Company:	
Latitude:	Longitude:
Date of Incident:	Time of Incident:
Spill/Incident Location:	Source and/or Cause of spill/incident:
Material spilled and total volume:	Vessel Name and Number (if applicable):
Is the material spilled in water?	Is the source secured?
Weather conditions:	Precipitation?
Incident Description:	
Name of Incident Commander:	Where is the Incident Command Post (directions)?
<b>RESPONSE ACTIONS</b>	
Actions taken to correct, control or mitigate incident:	
Number of injuries:	Number of deaths:
Were there evacuations?	Number of evacuated:
Areas affected:	Damage estimate:
Any other information about impacted medium:	
<b>CALLER NOTIFICATIONS</b>	
National Response Center (NRC): 800-424-8802	Texas State Emergency Response Commission: 800-832-8224
NRC Incident Assigned Number:	Other Agencies Notified: <input type="checkbox"/> USCG <input type="checkbox"/> EPA <input type="checkbox"/> OSHA <input type="checkbox"/> USFWS <input type="checkbox"/> MassDEP
Other Information Not Recorded Elsewhere:	

Note: Do Not Delay Notifications Pending Collection of All Information. Notify within 1 hour of discovery.





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Oil Spill Response Plan

Form A4-13 Incident Report

Incident No. \_\_\_\_\_

Reviewed by:	Final Date:
<input type="checkbox"/> Attach Initial Notification Form for basic data, update as incident progresses.	
Incident Duration (dates and time):	Type and Location of Incident:
Categorical Level of Incident and what portions of response team were assembled? Identify all leader positions and names.	Does the incident create a potential compliance issue? If yes, describe.
Material released:	Final released volume:
Were there any abnormal operating conditions immediately before the emergency? If yes, describe.	Were there any equipment problems or changes immediately before the emergency? If yes, describe.
Description of media impacted:	Was all media cleaned up to satisfaction of regulatory agencies?
Type and volume of waste generated: (attach waste tracking log if applicable)	How and where was waste disposed or recovered?
Were all spilled materials recovered? If not, describe what was not recovered and why.	

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*Oil Spill Response Plan*

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Provide description of clean-up methods utilized:	
Describe decontamination procedures and include pieces of equipment decontaminated.	
Has stock of emergency equipment been replenished to pre-incident conditions?	Date demobilization was completed.
Describe what worked and did not work during incident:	
Recommendations for improvement:	



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*Oil Spill Response Plan*

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*The Project is being developed and permitted using an “Envelope” concept. The Envelope concept allows Vineyard Wind to properly define and bracket Project characteristics for purposes of environmental review and permitting while maintaining a reasonable degree of flexibility with respect to selection and purchase of key Project components. Specific details will be identified in the final version of the OSRP.*

**Form A4-15 Secondary Containment Checklist and Inspection Form**

**Incident No.** \_\_\_\_\_

<b>Area(s) Inspected:</b>	<b>Date/Time:</b>	<b>Inspected By:</b>
<b>Inspection Item</b>	<b>Acceptable (Y/N)</b>	<b>Comments/Corrective Action</b>
Level of precipitation in containment		
Presence of spilled or leaked material		
Operational status of drainage valves		
Debris		
Location/status of pipes, inlets, drainage		
Cracks		
Discoloration		
Corrosion		
Valve conditions		



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*The Project is being developed and permitted using an “Envelope” concept. The Envelope concept allows Vineyard Wind to properly define and bracket Project characteristics for purposes of environmental review and permitting while maintaining a reasonable degree of flexibility with respect to selection and purchase of key Project components. Specific details will be identified in the final version of the OSRP.*

**Form A4-16 Monthly Checklist and Inspection Form**

**Incident No.** \_\_\_\_\_

<b>Tank(s) Inspected:</b>	<b>Date/Time:</b>	<b>Inspected By:</b>
<b>Inspection Item</b>	<b>Acceptable (Y/N)</b>	<b>Comments/Corrective Action</b>
<b>Emergency Generator (Day Tank and Lubrication Oils)</b>		
<b>Diesel Tank</b>		
<b>Platform Crane</b>		
<b>Power Transformers</b>		
<b>Reactors</b>		
<b>Auxiliary/Earthing Transformers</b>		
<b>Wind Turbine Generators</b>		

**Inspect for the following:**

- **Support structure is in good condition (no corrosion or damage)**
- **External shell structure is in good condition (no corrosion or damage)**
- **Drip pans are in place (if applicable)**
- **Foundation is in good condition (stable and level)**
- **Liquid level gauge is in place and in good working condition (if applicable)**

**Remarks:**



## **Annex 5 – Training Exercises/Drills and Logs**

## Vineyard Wind, LLC

### *Oil Spill Response Plan*

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Facility response training, drills/exercises, personnel response training, and spill prevention meetings in this section comply with the requirements of 30 CFR 254.41. Per 30 CFR 254.41(d), training certificates and training attendance records must be maintained in a designated location for at least two years. Vineyard Wind will maintain documentation of training in the New Bedford, Massachusetts office. Training records must be made available to any authorized BSEE representative upon request. The Emergency Response Critique forms used to document inspections, drills and training are included in Appendix A5-1.

#### **A5.1 Drills and Exercises**

Per 30 CFR 254.42(a), the entire OSRP must be exercised at least once every three years. However, to satisfy this requirement, separate exercises may be conducted over a 3-year period. Exercises must simulate conditions in the area of operations, including seasonal weather variations, to the extent practicable. In addition, exercises must cover a range of scenarios, such spills of a short duration and limited volume, large continuous spills, and the worst-case scenario discharge.

A schedule of exercises will be determined by management in accordance with 30 CFR §254.42(b). The Chief, OSPD may require a change in the frequency of required exercises. Actual training exercises will be coordinated with the OSRO. Response training programs will comply with the Preparedness for Response Exercise Program (PREP) and the USCG/EPA training guidelines for oil spill response. Table A5-1 includes a list of regular personnel training exercises. Appendix A5-1 presents Drill/Exercise Documentation Forms associated with the training exercises.

The Chief, OSPD and BOEM must be notified at least 30 days prior to the following exercises: annual spill management team tabletop exercise; annual deployment exercise of response equipment identified in the OSRP that is staged at onshore locations; and semi-annual deployment exercise of any response equipment which the BSEE Regional Supervisor requires an owner or operator to maintain at the facility or on dedicated vessels. The annual Incident Command Organization (ICO) tabletop exercise will include the actual notification to the NRC, BSEE Regional Supervisor, BOEM, and the OSRO, to determine availability and response times. Each call that is made will begin with the statement "This is a drill".

As detailed in this annex, several types of drills are conducted as part of the drill program as follows:

- Notification drills to test communications procedures are conducted monthly.
- Qualified Individual (QI) notification drills are conducted at least quarterly to verify that the QI can be reached in an emergency situation to perform required duties.
- The Spill Management Team participates in a table-top drill annually and is included in other drills as often as possible.
- Unannounced annual notification drills are performed. These drills are conducted with BOEM and OSRO participation. These annual drills will simulate a response action and conveyance of key information between the QI, BOEM, and the OSPD.
- Every effort is made to cooperate in local drills requested by regulatory agencies and neighbors.
- Spill removal organizations under contract are drilled at least annually.

The annual notification drill will be an opportunity for the QI, BOEM, and OSPD to simulate an incident command post setting that is capable of supporting response efforts (e.g., deployment of personnel and equipment, tracking containment efforts, taking samples, shoreline cleanup, etc.) for a variety of spill scenarios. Prior to the drill, the size and scope of the drill will be defined and will be structured of various

## Vineyard Wind, LLC

### *Oil Spill Response Plan*

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levels of complexity to test events ranging from implementation of specific components of the OSRP to full implementation of the plan.

Facility spill response drills are comprehensive and designed to improve response actions at the level of the first responder. A tabletop planning session is held prior to the drill, with a limited number of supervisory personnel informed of the drill.

Drills are conducted to enable personnel who will act as initial responders during an actual spill to become familiar with response equipment. During spill drills, the techniques of pulling and placing boom such as for diversion, deflection, and containment are practiced. Drills are also conducted to allow personnel to become familiar with climatic conditions, such as the interactions of wind, tide, and wave actions and their effect on oil movement. In spill drills, consideration is given to sensitive areas which may be affected and need protection.

As part of the drill process, a critique is held following the drill. All personnel who participate in the drill, including observers, also participate in the critique. The purpose of this is to review the drill for procedures which worked well and procedures which did not work well. Each individual has an opportunity to provide for input. Recommendations are submitted to management.

Annually, at least one of the exercises listed in Table A5-1 must be unannounced. Unannounced means the personnel participating in the exercise must not be advised in advance, of the exact date, time, and scenario of the exercise. The staff from the Project will also participate in unannounced exercises as directed by the lead federal agency. The objectives of the unannounced exercises will be to test notifications and equipment deployment for response to the average most probable discharge. After participating in an unannounced exercise directed by the lead federal agency, Project personnel will not be required to participate in another unannounced exercise for at least 3 years from the date of the exercise.

Project personnel will also participate in Area exercises as directed by the applicable On-Scene Coordinator. The Area exercises will involve equipment deployment to respond to the spill scenario developed by the Exercise Design Team, of which Project will be a member. After participating in an Area exercise, Vineyard Wind will not be required to participate in another Area exercise for at least six years.

All drills and exercises will be documented on the Exercise Drill Logs and maintained by the Training Department. An example training log form is presented in Appendix A5-2. Records of these activities will be maintained for a period of three years, as per 30 CFR 254.42(e).

## Vineyard Wind, LLC

### *Oil Spill Response Plan*

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#### **A5.2 Planned Training**

Planned training sessions are held for staff and operations personnel on an annual basis to gain an understanding of the OSRP process. The intent of these sessions is to keep personnel informed of their obligation to respond to all emergencies, prevent pollution incidents, and to improve spill control and response techniques. These briefings highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures to prevent spills.

All field personnel will be indoctrinated in the proper procedures for the reporting of spills. Included in this training are procedures for contacting the Qualified Individual (QI) on a 24-hour basis. They will also review procedures on how and where to place facility containment/recovery materials depending on where the spill occurs and various seasonal conditions. Personnel will be informed that detergents or other surfactants are prohibited from being used on an oil spill in the water, and that dispersants may only be used with the approval of the Regional Response Team.

Records of all training activities are maintained for at least five years following completion of training. The facility will maintain records for each individual as long as these individuals are assigned duties in this plan. Individuals will sign documentation when participating in training classes or exercises as provided in Appendix A5-2.

Credit for any of the above drills and exercises may be taken by Vineyard Wind if an actual incident occurs and records of the incident are maintained to show evidence of complying with any of the above drill or exercise requirements.

Vineyard Wind, LLC

Oil Spill Response Plan

Table A5-1 Response Training Exercises

Exercise	Purpose/Scope	Objectives	Frequency	Participants
QI Notification Exercise	Ensure the QI can be contacted in a spill response emergency in order to carry out required duties.	<ul style="list-style-type: none"> <li>• Contact QI by telephone, radio, fax, pager, or email.</li> <li>• Confirmation received from QI of notification.</li> </ul>	Monthly	Qualified Individuals
Incident Command Organization Team (table top) *	Ensure the Incident Command Organization's emergency management team is familiar with the procedures.	<ul style="list-style-type: none"> <li>• ICO Team is familiar with emergency response procedures.</li> <li>• Employs proper procedures during a simulated emergency response.</li> </ul>	Annually	ICO Management Team, OSPD, BOEM
On-Site Equipment Deployment Exercise	Verify that required response equipment is operable and personnel are capable of deploying the equipment.	<ul style="list-style-type: none"> <li>• Verify that designated equipment is available.</li> <li>• Deploy at least minimum required equipment during exercise.</li> <li>• Verify that personnel tasked with deployment have received required training.</li> </ul>	Annually	Project Response Team, OSPD, BOEM, OSRO
OSRO Equipment Deployment Exercise	Same as above, but performed by OSRO	<ul style="list-style-type: none"> <li>• Same as above</li> </ul>	Annually	OSRO
Discharge Prevention Briefings	Conduct Discharge Prevention Briefings	<ul style="list-style-type: none"> <li>• Personnel have adequate understanding of the OSRP.</li> <li>• Describe known discharges or failures.</li> <li>• Discuss any recently developed precautionary measures.</li> </ul>	Annually (optional)	Oil-handling Personnel
Simulated Spill Drill**	Test the resources and response capabilities of the OSRO.	<ul style="list-style-type: none"> <li>• Demonstrate OSRO's ability to deploy resources to include:                             <ul style="list-style-type: none"> <li>○ On water containment and recovery</li> <li>○ Sensitive habitat protection</li> </ul> </li> <li>• Storage</li> </ul>	Every three years	Oil-handling Personnel

\* In a 3-year period, at least one of these exercises must include a worst-case discharge scenario.

\*\* In a 3-year period, all components of the response plan must be exercised.

Annually at least one of the first three exercises listed must be unannounced to participants.

## Vineyard Wind, LLC

### *Oil Spill Response Plan*

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#### **A5.2 Training Documentation and Record Maintenance**

Spill response personnel training records will be maintained at the Vineyard Wind office in New Bedford, example training record is provided in Appendix A5-2. Records will be maintained at this location for five years and will include:

- Documentation of yearly training associated with the OSRP as provided to ICO and facility personnel;
- Records of personnel training in accordance with OSHA at 29 CFR §1910.120 regulations; and
- Records of training provided for response contractor personnel will be maintained at the respective contractor's office and will be verified by facility personnel on-site.
- Logs of volunteer workers (if applicable) and activities performed.



Vineyard Wind LLC

Oil Spill Response Plan

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Table A5-2 Spill Response Drill Form Notification Exercise

VINEYARD WIND LLC  
SPILL RESPONSE DRILL/EXERCISE DOCUMENTATION FORM  
NOTIFICATION EXERCISE

1. Date performed: \_\_\_\_\_

2. Exercise or actual response: \_\_\_\_\_

3. Facility initiating exercise: \_\_\_\_\_

4. Name of person notified: \_\_\_\_\_

Is this person identified in your response plan as qualified individual or designee? \_\_\_\_\_

5. Time initiated: \_\_\_\_\_

Time in which qualified individual or designee responded: \_\_\_\_\_

6. Method used to contact:

\_\_\_\_ Telephone

\_\_\_\_ Pager

\_\_\_\_ Radio

\_\_\_\_ Other \_\_\_\_\_

7. Description of notification procedure:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Evaluation of Drill:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. Changes to be implemented (if any):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Certifying Signature \_\_\_\_\_

Vineyard Wind LLC

Oil Spill Response Plan

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Table A5-3 Spill Response Drill Form Team Tabletop Exercise

VINEYARD WIND LLC  
SPILL RESPONSE DRILL/EXERCISE DOCUMENTATION FORM

SPILL MANAGEMENT TEAM TABLETOP EXERCISE

1. Date performed: \_\_\_\_\_
2. Exercise or actual response: \_\_\_\_\_  
If an exercise, announced or unannounced: \_\_\_\_\_
3. Location of tabletop: \_\_\_\_\_
4. Time started: \_\_\_\_\_  
Time completed: \_\_\_\_\_
5. Response plan scenario used (check one):  
 Average most probable discharge                       Worst case discharge  
 Maximum most probable discharge                       Size of (simulated) spill-bbls/gals
6. Describe how the following objectives were exercised:
  - a) Spill management team's knowledge of oil-spill response plan:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - b) Proper notifications:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - c) Communications system:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - d) Spill management team's ability to access contracted oil spill removal organizations:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - e) Spill management team's ability to coordinate spill response with On-Scene Coordinator, State and applicable agencies:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - f) Spill management team's ability to access sensitive site and resource information in the Area Contingency Plan:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**SPILL MANAGEMENT TEAM TABLETOP EXERCISE (Continued)**

7. Evaluation of Exercise:

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8. Changes to be implemented (if any):

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Certifying Signature: \_\_\_\_\_

Vineyard Wind LLC

Oil Spill Response Plan

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Table A5-4 Spill Response Drill Form Equipment Deployment Exercise

VINEYARD WIND LLC  
SPILL RESPONSE DRILL/EXERCISE DOCUMENTATION FORM  
EQUIPMENT DEPLOYMENT EXERCISE

1. Date performed: \_\_\_\_\_
2. Exercise or actual response: \_\_\_\_\_  
If an exercise, announced or unannounced: \_\_\_\_\_
3. Deployment location(s):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. Time started: \_\_\_\_\_  
\_\_\_\_\_ Time OSRO called (if applicable)  
\_\_\_\_\_ Time on-scene  
\_\_\_\_\_ Time boom deployed  
\_\_\_\_\_ Time recovery equipment arrives on-scene  
\_\_\_\_\_ Time completed
5. Equipment deployed was:  
\_\_\_\_\_ Facility-owned  
\_\_\_\_\_ OSRO-owned; if so, which OSRO: \_\_\_\_\_  
\_\_\_\_\_ Both
6. List type and amount of all equipment (e.g., boom and skimmers) deployed and number of support personnel employed:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
7. Describe goals of the equipment deployment and list any Area Contingency Plan strategies tested. Attach a sketch of equipment deployments and booming strategies:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
8. For deployment of facility-owned equipment, was the amount of equipment deployed at least the amount necessary to respond to your facility's average most probable spill?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Vineyard Wind LLC

Oil Spill Response Plan

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**EQUIPMENT DEPLOYMENT EXERCISE (Continued)**

9. Was the equipment deployed in its intended operating environment?

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10. For deployment of OSRO-owned equipment, was a representative sample (at least 1000 feet of each boom type and at least one of each skimmer type) deployed?

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11. Was the equipment deployed in its intended operating environment?

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12. Are all facility personnel that are responsible for response operations involved in a comprehensive training program, and all pollution response equipment involved in a comprehensive maintenance program?

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13. Date of last equipment inspection: \_\_\_\_\_

14. Was the equipment deployed by personnel responsible for its deployment in the event of an actual spill? \_\_\_\_\_

15. Was all deployed equipment operational? If not, why not?

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16. Evaluation of Exercise:

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17. Changes to be implemented (if any):

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Certifying Signature: \_\_\_\_\_



## **Annex 6 – Regulatory Compliance and Cross-Reference Matrix**

## Vineyard Wind LLC

### Oil Spill Response Plan

**Table A6-1 Oil Spill Response Plans for Outer Continental Shelf Facilities**

<b>Oil Spill Response Plans for Outer Continental Shelf Facilities 30 CFR254, Subpart B</b>		<b>Plan Reference</b>
254.21(b)(1)	Table of Contents	Table of Contents
254.21(b)(2)	Emergency response action plan	Annex 3
254.21(b)(3)(i)	Equipment response inventory	Annex 9
254.21(b)(3)(ii)	Contractual agreements	Annex 8
254.21(b)(3)(iii)	Worst case discharge scenario	Annex 7
254.21(b)(3)(iv)	Dispersant use plan	Annex 7: Response
254.21(b)(3)(vi)	In situ burning plan	Annex 7: Response
254.21(b)(3)(vi)	Training and drills	Annex 5
254.22(a)	Facility location and type	OSRP Section 1.3
254.22(b)	Table of Contents	Table of Contents
254.22(c)	Record of changes	OSRP Page iv
254.22(d)	Cross reference table	Annex 6
254.23(a)	Designation of QI	OSRP: Section 2.2, Table 2-2, Section 2.3
254.23(b)	Designation of spill management team	TBD <sup>1</sup>
254.23(c)	Spill response operating team	TBD <sup>1</sup>
254.23(d)	Spill response operation center	TBD <sup>1</sup>
254.23(e)	Oil stored, handled, or transported	Annex 7
254.23(f)	Procedures for early detection of a spill	OSRP Section 2.1
254.23(g)(1)	Spill notification procedures	OSRP Section 2.2 Annex 4
254.23(g)(2)	Methods to detect/predict spill movement	Annex 7
254.23(g)(3)	Methods to prioritize areas of importance	OSRP Section 2.5, Annex 7
254.23(g)(4)	Methods to protect areas of importance	OSRP Section 2.6
254.23(g)(5)	Containment and recovery equipment deployment	Table 2-4
254.23(g)(6)	Storage of recovered oil	OSRP Section 2.6.3
254.23(g)(7)	Procedures to remove oil and oil debris from shallow waters	OSRP Section 2.6.2
254.23(g)(8)	Procedure to store, transfer, and dispose of recovered oil and oil-contaminated materials	OSRP Section 2.6.3
254.23(g)(9)	Methods to implement dispersant use plan and in situ burning plan	Annex 7: Response
254.24(a)	Inventory of spill response resources	Annex 9



## Vineyard Wind LLC

### Oil Spill Response Plan

Oil Spill Response Plans for Outer Continental Shelf Facilities 30 CFR254, Subpart B		Plan Reference
254.24(b)	Procedures for inspecting and maintaining spill response equipment	Annex 9
254.25	Contractual agreements	Annex 8
254.26(a)	Volume of worst case discharge	Annex 7
254.26(b)	Trajectory analysis	Annex 7
254.26(c)	List of special economic and environmentally important resources	Table 2-4
254.26(d)(1)	Response equipment	Annex 9
254.26(d)(2)	Personnel, materials, and support vessels	TBD <sup>1</sup>
254.26(d)(3)	Oil storage, transfer, and disposal equipment	Annex 9
254.26(d)(4)	Estimation of time to mobilize	TBD <sup>1</sup>
254.26(e)	Suitability of response	TBD <sup>1</sup>
254.27	Dispersant use plan	Annex 7: Response
254.28	In situ burning plan	Annex 7: Response
254.29(a)	Training	Annex 5
254.29(b)	Drills	Annex 5
254.30	Revision of OSRP	OSRP Page iv

**Note:** The Construction and Operations Plan (COP) for the Project is to be submitted to BOEM WEA by the end of 2017. Initial award selection(s) for long term PPA(s) are expected in the spring of 2018. Construction is scheduled to commence in 2020.

## **Annex 7 – Planning Calculations for Discharge Volumes and Response Equipment**

## Vineyard Wind LLC

### Oil Spill Response Plan

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Per 30 CFR 254.26, the volume of the worst-case discharge scenario must be determined using the criteria in 30 CFR 254.47. The criteria in 30 CFR 254.47 applies to oil production platform facilities and pipeline facilities. The Project does not fall into either one of these categories. Per BOEM WEA, each region is responsible for Worst Case Discharge Determination (WCD) verifications and decision documentation for plans in their regional jurisdiction. The Atlantic Region does not have guidance available for wind farms. For calculating the worst-case scenario, information on what fluids will be present and associated quantities was provided.

#### A7.1 Facility Information

Vineyard Wind is developing an ~800 MW offshore wind project for the northern half of BOEM WEA Lease Area OCS-A-0501 (the Project). The Project is being developed and permitted using an “Envelope” concept. The Envelope concept allows Vineyard Wind to properly define and bracket Project characteristics for purposes of environmental review and permitting while maintaining a reasonable degree of flexibility with respect to selection and purchase of key Project components (the wind turbine generators, the foundations, the offshore cable system, the offshore substations, etc.). This flexible approach is particularly important in this situation because the RFP process is designed to reward the most economic projects.

The Project will include Wind Turbine Generators (WTGs) likely ranging from 8 to 10 MW. If 8 MW WTGs are selected, up to 106 locations could be occupied. If 10 MW WTGs are used, up to 88 positions could be needed. The offshore substations or electrical service platforms (ESPs) will include step-up transformers (66 kV to 220 kV) and other electrical gear. If conventional ESPs are used, there will be one per 400 MW increment of WTGs. If light weight ESPs are used, there would likely be two per 400 MW increment, installed on either a monopile or jacket foundation. The ESPs are expected to be located along the northwest edge of the Lease Area.

**Table A7-1 WTG Oil Storage**

Oil Source	Volume (Liters)	Kilograms	Approximate Gallons
Gearbox, yaw, and hydraulics	8,000		2,113
Transformer	6,000		1,585
Grease for Yaw Ring	40		10.6
Diesel	3,000		792.5
<b>TOTAL</b>			<b>4,502</b>

## Vineyard Wind LLC

### Oil Spill Response Plan

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**Table A7-2 ESP Oil Storage**

Oil Source	Volume (Liters)	Gallons
Emergency Generator – Diesel Day Tank	3,960	523
Emergency Generator – Lubrication Oil	55	7
Diesel Tank	17,600	2,325
Platform Crane – Hydraulic Oil	1,320	174
Power Transformers (2 units)	151,800	40,101
Reactors (2 units)	77,000	20,341
Auxiliary/Earthing Transformer	4,400	1,162
<b>TOTAL</b>		<b>64,634</b>

#### A7.2 Oil Volume and Spill Containment

If all the oils associated with the ESPs were released, the worst-case scenario would be 64,634 gallons per ESP. However, control measures (e.g. containment structures) would be in place to contain a release of oil. Where possible, biodegradable oils will be used. In addition, monitoring equipment will be used to detect a release of oil. Monitoring equipment being considered include closed circuit televisions (CCTVs), supervisory control and data acquisition (SCADA), alarm systems (e.g. tank level, containment liquids, etc.), and oil detection equipment for the sump tank. The equipment will be monitored remotely from a “control room”. Specific details will be identified in the final version of the OSRP.

The ESP platform is designed to be equipped with a drain system consisting of containment structures, piping, an oil water separator, and a sump tank. The containment structures are sized according to the largest container and are connected via a piping system, draining liquids under gravity to an oil water separator and a sump tank. The sump tank can store the largest oil volume on one transformer and its cooler. The sump tank may be emptied by a service vessel for proper disposal of the oily substances onshore.

In general, all equipment that contains an environmentally harmful substance is placed above drip trays. The central area of the platform where the transformers are placed is a plated area with drains, acting as drip trays. Drip trays that have the potential to collect rain water, such as the central area, are connected via the oil water separator to the sump tank. Other drip trays (e.g. indoor) which collect only harmful substances may be connected directly to the sump tank.

Rain water and oily substances are separated in the oil water separator before water is led overboard. Water being led overboard is monitored for oil contamination. The overboard line will be closed and the drained liquids are fed to the sump tank and stored, in the event of a release.

Any temporary piping connections transporting oily substances (e.g. between diesel storage container and emergency generator) will be made using off-shore certified dry-break connectors and placed above a drip tray. A simple oil spillage kit, allowing to mitigate small, local spillage during maintenance, will be part of the delivery. The WTGs contain approximately 4,502 gallons of oil per WTG. The WTGs are

**Vineyard Wind LLC**

*Oil Spill Response Plan*

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designed to have a fiberglass secondary containment system, which would be sized according to the largest container.

## Vineyard Wind LLC

### Oil Spill Response Plan

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#### A7.3 Oil Spill Trajectory

An oil spill analysis has not been conducted at this time. Currently, Vineyard Wind and BOEM WEA are meeting to discuss if modeling is necessary due to the nature and location of the Project. If required by BOEM WEA, modeling will be conducted prior to finalization of the OSRP.

#### A7.4 Resources of Special Economic or Environmental Importance

*If an oil spill trajectory is required by BOEM WEA, then resources of special economic or environmental importance will be identified.*

According to the Regional Oil and Hazardous Substances Pollution Contingency Plan, MassDEP is the designated representative of Region I RRT for the Commonwealth of Massachusetts. In addition, MassDEP is the Trustee for Natural Resources under OPA. MassDEP has established a Priority Resource Map, which includes data such as sole source aquifers, wellhead protection areas, protected open space areas, areas of critical environmental concern, and estimated habitats of rare wildlife. The mapping does not include the Project area, since it is in the OCS.

The nearest land mass to the Project is the island of Martha's Vineyard, which is located approximately 14.4 miles north of the Project. The island of Martha's Vineyard is an EPA designated sole source aquifer. The central and eastern portions of Martha's Vineyard have been identified as potentially productive aquifers. An area that has been designated as a NHESP Estimated Habitat of Rare Wildlife is located south of Martha's Vineyard in the Atlantic Ocean. This area extends approximately 1 mile offshore in the western and central portions of Martha's Vineyard to approximately 4.5 miles offshore in the eastern portion of Martha's Vineyard. Open spaces on Martha's Vineyard include Manuel F. Correllus State Forest in the central portion of the island and several beaches located along the perimeter of the island.

Environmental Sensitivity Index (ESI) maps, available from NOAA, provide a summary of coastal resources that are at risk if an oil spill occurs in the area. Maps with coverage of Martha's Vineyard would be contained in: Massachusetts and Rhode Island: Volume 3 Buzzards Bay. The maps are available in pdf format at: <https://response.restoration.noaa.gov/maps-and-spatial-data/download-esi-maps-and-gis-data.html>.

#### A7.5 Response

*The Project has not yet been approved. Details regarding spill response materials, services, equipment, and response vessels have not been finalized at this time.*

The WTGs and ESPs have been designed to utilize secondary containment systems to prevent a release of oil to the environment. Containment will be provided considering the size of the largest container. . The secondary containment for the ESPs are connected to a sump tank. In addition, an oil/water separator will be in use. It is unlikely that a release of oil would not be contained by the containment systems.

Oils used by the Project have a specific gravity of less than 1.0. Therefore, any releases of oil to water would float on the surface of the water and on-water techniques could be used to recover the released oil.

Vineyard Wind will retain a third-party Oil Spill Response Contractor to assist in the unlikely event of a release of oil to the environment. In addition, Vineyard Wind will maintain pier space for Crew Transport Vessels (CTV) and other support vessels. CTVs are purpose built to support offshore wind energy projects; they are typically 75 feet in length and set up to safely and quickly transport personnel, parts and equipment. In addition to vessels, Vineyard Wind will maintain spill response equipment such as a spill

## Vineyard Wind LLC

### *Oil Spill Response Plan*

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overpack drum, containment bladders, absorbent booms, pigs, socks, and other sorbent materials. In addition, Vineyard Wind will have on-hand personal protective equipment (PPE) such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g. Tyvek suits).

Massachusetts Department of Environmental Protection (MassDEP) maintains a list of companies licensed as hazardous waste transporters who provide emergency response services and cleanups of oil and/or hazardous material (OHM) spills. MassDEP SERO emergency response contractors located in close proximity to the Project include Frank Corporation (New Bedford), Global Remediation Services, Inc. (Sandwich), Clean Harbors, Incorporated (Braintree), and Cyn Oil Corporation (Stoughton). Both companies maintain boats and other equipment to respond to releases of oil on the in a marine environment. Once a spill response contractor has been selected, additional details will be provided regarding spill response resources and the time needed for procurement of the spill response resources. In addition, a discussion of response to worst case scenario in adverse weather conditions will be addressed once a spill response contractor has been selected. Per 33 CFR 115.1020, factors to consider when evaluating adverse weather include, but are not limited to, significant wave height, ice, temperature, weather-related visibility, and currents.

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) restricts dispersant use to only areas where agreements have been established. In addition, the NCP limits restricts dispersant use to only those approved by EPA. Per Appendix 4 of the RRT Regional Oil and Hazardous Substances Pollution Contingency Plan, pre-authorization for the use of chemical dispersants has been established. The Massachusetts/Rhode Island Dispersant Pre-Authorization Policy establishes conditional approval zone for areas in Massachusetts and Rhode Island within two nautical miles of the mainland or designated islands, or areas that have a mean low water depth of less than 40 feet. The Project is located in the OCS and is beyond two nautical miles of the mainland or designated islands. In addition, water depths in the area of the Project are approximately 115 to 161 feet. Therefore, the Project is not located in an area that has pre-authorization for the use of dispersants. Vineyard Wind does not propose to use dispersants, and a dispersant use plan is not warranted.

In-situ burning is regulated by Subpart J of the NCP. In addition, the NCP restricts in-situ burning to areas where agreements have been made between state and federal regulatory authorities. Per Appendix 2 of the RRT Regional Oil and Hazardous Substances Pollution Contingency Plan, Region 1 has established an In-Situ Burning Memorandum of Understanding (MOU). The MOU establishes three zones and designates decision of authority for use of in-situ burning in these zones. Zone A is defined as all waters subject to the jurisdiction of the United States located seaward of a line measured six miles from the mean waterline along the coasts and islands of Maine, Massachusetts, New Hampshire, and Rhode Island. Zone B is defined as all waters subject to the jurisdiction of the United States located seaward of a line measured one mile and terminating six miles from the mean low waterline along the coasts and islands of Maine, Massachusetts, New Hampshire, and Rhode Island. Zone C is defined as waters that are shoreward of a line measured 1 mile seaward of the mean low water mark along the coasts and islands of Maine, Massachusetts, New Hampshire, and Rhode Island. The nearest land to the Project is the island of Martha's Vineyard, which is located approximately 14.4 miles north of the Project. Therefore, the Project is not located in an area that has pre-authorization for the use of in-situ burning. Vineyard Wind does not propose to use in-situ burning, and an in-situ burning plan is not warranted.

**Vineyard Wind LLC**

*Oil Spill Response Plan*

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## **Annex 8 – Agreement with Oil Spill Response Organization**



## **Vineyard Wind LLC**

### *Oil Spill Response Plan*

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*The Project has not yet been approved. Construction of the Project is scheduled to begin in 2020. Details regarding contractual agreements have not been finalized at this time.*

Per 30 CFR 254.25, the contractual agreements appendix must furnish proof of any contracts or membership agreements with OSROs, cooperatives, spill-response service providers, or spill management team members who are not Vineyard Wind employees that are cited in the OSRP. Documentation should include copies of the contracts, or membership agreements, or certification that contracts or membership agreements are in effect. The contract or membership agreement must include provisions for ensuring the availability of the personnel and/or equipment on a 24-hour-per-day basis.

Vineyard Wind will retain a third-party OSRO. MassDEP SERO emergency response contractors located in close proximity to the Project include Frank Corporation (New Bedford), Global Remediation Services, Inc., (Sandwich), Clean Harbors, Incorporated (Braintree), and Cyn Oil Corporation (Stoughton).

Appendix 9 of the Regional Oil and Hazardous Substances Pollution Contingency Plan contains the Coast Guard/Environmental Protection Agency Response Jurisdiction Boundary. This document demarcates the boundary between inland and coastal zones for the purpose of pre-designation of on-scene coordinators for pollution response. Martha's Vineyard, Nantucket, and all other islands lying off the coast of Massachusetts are the responsibility of the US Coast Guard for providing the pre-designated Federal On-Scene Coordinator. USCG will be responsible for general agency and incident specific responsibilities under the NCP and Area Contingency Plan.

## **Annex 9 – Equipment Inventory**

## Vineyard Wind LLC

### Oil Spill Response Plan

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*The Project has not yet been approved. Details regarding spill response materials, services, equipment, and response vessels has not been finalized.*

#### **A9.1 Maintenance Facilities**

In support of Project operations and the necessary maintenance activities, Vineyard Wind will have a management and administrative team, a “control room” operation, and maintenance facilities. These functions will be co-located, if feasible. Vineyard Wind is in the early stages of evaluating possible locations for the O&M facilities; possible locations include Martha’s Vineyard, New Bedford, and other locations.

The technicians and engineers responsible for long term Project maintenance will operate from the maintenance facilities. The maintenance operation will include office and training space, shop space, warehouse space for parts and tools, and pier space for Crew Transport Vessels (CTV), and other support vessels. CTVs are purpose-built to support offshore wind energy projects; they are typically 75 to 85 feet in length and set up to safely and quickly transport personnel, parts, and equipment. The CTVs are typically used in conjunction with helicopters. Helicopters can be used for fast response visual inspections and repair activities, as needed. The maintenance operation may also make use of larger Service Operations Vessels (SOVs). SOVs are typically 260 to 300 feet in length with a deadweight of approximately 4,000 tons at maximum draft. SOVs are usually diesel electric powered with dynamic positioning.

In addition to the vessels above, it is anticipated that Vineyard Wind will maintain spill response equipment such as a spill overpack drum, containment bladders, absorbent booms, pigs, socks, and other sorbent materials. In addition, Vineyard Wind will have on-hand personal protective equipment (PPE) such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g. Tyvek suits).

#### **A9.2 Electrical Service Platform (ESP)**

The offshore substations or electrical service platforms (ESPs) will include step-up transformers (66 kV to 220 kV) and other electrical gear. If conventional ESPs are used, there will be one per 400 MW increment of WTGs. If light weight ESPs are used, there would likely be two per 400 MW increment. The ESPs are expected to be located along the northwest edge of the Lease Area.

Vineyard Wind will maintain spill response equipment at the ESPs. Brooms, shovels, sorbents, pigs, socks, and a spill overpack drum will be maintained at the ESP for response to minor leaks and spills. In addition, Vineyard Wind will have on-hand personal protective equipment (PPE) such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g. Tyvek suits).

#### **A9.3 Oil Spill Response Contractor**

Vineyard Wind will retain a third-party OSRO. Massachusetts Department of Environmental Protection (MassDEP) maintains a list of companies licensed as hazardous waste transporters who provide emergency response services and cleanups of oil and/or hazardous material (OHM) spills. The list is updated annually by MassDEP and is organized by MassDEP Regions. The Southeast Regional Office (SERO) is affiliated with Martha’s Vineyard and New Bedford. The list of contractors for the SERO Region is available at: <http://www.mass.gov/eea/docs/dep/cleanup/serohwtr.pdf>. MassDEP emergency response contractors located in close proximity to the Project include Frank Corporation (New Bedford), Global Remediation Services, Inc. (Sandwich), Clean Harbors, Incorporated (Braintree), and Cyn Oil Corporation (Stoughton).

## Vineyard Wind LLC

### *Oil Spill Response Plan*

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The selected spill contractor will be responsible for the inspection and maintenance of their equipment. The equipment should be inspected on at least a monthly basis.

#### **A9.4 Inspections (30 CFR 254.43)**

Response equipment will be inspected when the WTG is otherwise visited or at least quarterly and maintained to ensure optimal performance. Records of inspections of response equipment must be maintained for at least two years and made available to authorized BSEE representatives upon request. Inspections of contractor equipment is addressed in A9.8.

The program of maintenance and testing of emergency response equipment involves four activities: Operability Check, Inventory, Inspection, and Maintenance. The Emergency Response Team (ERT) Coordinator or designee is required to sign the inspection form, and will be responsible for any follow-up actions that may be required as a result of the inspection, inventory or test of emergency response equipment. For any items that cannot be replaced or repaired during the inspection, test or inventory, the inspector will indicate need of further action on the inspection form. It will then become the responsibility of the ERT Coordinator to take further actions(s) as required.

#### **A9.5 Operability Check (Semi-annual)**

This activity is intended to periodically insure the operability of certain items of equipment in the Project's emergency equipment inventory so that it is in a constant state of readiness for deployment. The designated inspector will check the operability of equipment including safety monitoring equipment and outboard motors. Any equipment that is electronic, electrical, or mechanical will be tested under actual load or use conditions.

During the operability check, the inspector will also perform routine maintenance on the equipment, as needed, such as battery replacements, oil and filter changes, and cleaning of boom. The inspector will indicate on the inspection form any problems encountered with the equipment and corrective measures taken or needed.

#### **A9.6 Inventory (Monthly)**

The inspector will verify the availability and condition of the variety of supplies, materials, and tools that are maintained in storage. The inspector will work from a list of items that are required to be maintained at all times. Any discrepancies in the list, or item replacement needs, will be noted on the inventory form. Inspection for condition of emergency resources will be checked semi-annually.

#### **A9.7 Inspections**

The semi-annual inspection of the sorbent booms will involve complete removal of booms from storage and the laying-out of the booms in an area that would not cause damage to the fabric of the booms. The inspector will examine each length of boom closely, making note of any fabric damages or wear, broken or frayed cable, missing weights and damaged connectors. The inspector will also verify the quantity of boom that is in storage to ensure there is sufficient supply. Any damages will be repaired, if possible. If the length of boom cannot be economically repaired, the inspector will request replacement.

#### **A9.8 Contractor Equipment**

The ERT will ensure that the contractor has a maintenance program established for its equipment. A copy of the program would be requested and kept on file.

## **Annex 10 – Safety Data Sheets**

**Vineyard Wind LLC**

*Oil Spill Response Plan*

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Include SDSs for oils to be located at the Project.

**Appendix I-B**

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Draft Safety Management System

VINEYARD WIND SAFETY MANAGEMENT SYSTEM DESCRIPTION

## VINEYARD WIND SAFETY MANAGEMENT SYSTEM

Vineyard Wind LLC

<b>Document Title:</b>	<b>VINEYARD WIND SAFETY MANAGEMENT SYSTEM</b>
Company	Vineyard Wind LLC
Date:	3/12/2018
Document Type:	Plan
Revision:	1
Previous versions:	
Authors:	



# TABLE OF CONTENTS

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1	INTRODUCTION .....	1
2	ABBREVIATIONS AND ACRONYMS.....	2
3	MANAGEMENT COMMITMENT .....	2
	3.1 Roles	3
	3.2 Training Requirements	3
4	EMPLOYEE INVOLVEMENT .....	4
5	SAFETY POLICIES .....	4
	5.1 Organizational Reporting Structure	5
	5.2 Key Roles and Description of Responsibilities	6
	5.2.1 Project Director	6
	5.2.2 Health and Safety Coordinator	6
	5.2.3 Environmental Coordinator	6
	5.2.4 Marine Coordinator	7
	5.2.5 Security Coordinator	7
	5.3 Safety Committee	7
6	CONTRACTOR MANAGEMENT .....	8
	6.1.1 Audits	8
	6.1.2 Training	9
7	MANAGEMENT OF CHANGE.....	9
	7.1 Roles and Responsibilities	9
	7.2 MOC Review and Audit Requirements	9
	7.3 Management of Change Process	9
	7.4 Management of Change Communication	10
	7.5 Training Requirements	10
	7.6 Management Review	10
	7.7 Audits and Assessments	10
	7.8 Continuous Improvement	11
8	UNSAFE WORKING CONDITIONS .....	11
	8.1 Reports of Unsafe Work Conditions	11
	8.2 Stop Work Authority	11
9	SAFETY TRAINING AND COMPETENCE .....	12
	9.1 Workplace Safety and Health - 33 CFR 142	13
	9.1.1 Personal Protective Equipment	14
	9.2 Design and Equipment - 33 CFR 143	14
	9.2.1 Lights and warning devices	14
	9.2.2 Means of Escape	14
	9.2.3 Personnel Landings	15
	9.2.4 Guards and Rails	15
	9.3 Lifesaving Equipment - 33 CFR 144.10	15

9.4	Firefighting Equipment - 33 CFR 145	<b>15</b>
9.5	Operations - 33 CFR 146	<b>15</b>
9.5.1	Person in charge	15
9.5.2	Maintenance of Emergency Equipment	15
9.5.3	Work vests	16
9.5.4	Notice of casualties	16
9.5.5	Diving casualties	16
9.5.6	Pollution Incidents	16
9.5.7	Other Safety Procedures	17
10	EMERGENCY RESPONSE .....	<b>17</b>
10.1	Training Requirements for Emergency Response	<b>18</b>
11	HAZARD IDENTIFICATION AND RISK MANAGEMENT .....	<b>18</b>

## 1 INTRODUCTION

This document provides an overall description of the key elements to be included in the Safety Management System for the Vineyard Wind Offshore Wind Farm. It describes, in general, the policies of Vineyard Wind with response to the safety requirements set forth in the Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP).

The Safety Management System (SMS) is a dynamic document and is expected to be further developed as the project develops. However, the core principals of the SMS will remain the same. Specifically, the SMS will describe and in compliance with:

APPLICABLE REGULATIONS AND GUIDANCE depending on specific work and location

- 30 CFR 585.810 gives BOEM the authority to regulate all renewable energy development activities on the Outer Continental Shelf (OCS).
- 30 CFR 585.627(d) requires safety management system description in the COP that describes:
  - How Vineyard Wind will ensure the safety of personnel or anyone on or near its offshore and onshore wind facilities; Vineyard Winds worksites will be continually analysed for existing and potential hazards
  - Remote monitoring, control, and shutdown capabilities;
  - Emergency response procedures;
  - Fire suppression equipment,
  - How and when the Safety Management System will be established and verified; and
  - How to ensure that personnel are properly trained
- 30 CFR 585.811 The Safety Management System to be fully functional when Vineyard Wind begins activities described in the approved COP. Vineyard Wind will conduct all activities described in approved COP in accordance with the Safety Management System as described, as required by §585.810.
- OSHA regulations apply for construction activities (29 CFR 1926) on land and up to 3nm offshore.
- OSHA regulations apply for general industry activities such as operations and maintenance (29 CFR 1910) on land and up to 3nm offshore apply.
- OSHA regulations apply for shipyard, marine terminals and longshoring activities (29 CFR 1915, 1916 and 1917).
- United States Coast Guard regulations 33 CFR Subchapter N and 46 CFR apply for inspected vessels:

- (i) Workplace Safety and Health – 33 CFR Part 142;
- (ii) Design and Equipment – 33 CFR Part 143;
- (iii) Lifesaving Appliances – 33 CFR 144.10;
- (iv) Firefighting Equipment – 33 CFR Part 145; and
- (v) Operations – 33 CFR Part 146.

## 2 ABBREVIATIONS AND ACRONYMS

BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
COP	Construction Operations Plan
EHS	Environment, Health, and Safety
JSA	Job Safety Analysis
LOTO	Lock Out/Tag Out
MOC	Management of Change
OCS	Outer Continental Shelf
OSHA	United States Occupational, Health, and Safety Administration
PIC	Person in Charge
SMS	Safety Management System
USCG	United States Coast Guard

## 3 MANAGEMENT COMMITMENT

The commitment of Vineyard Wind’s Leadership and Management is paramount to the implementation of a Safety Management System by creating a culture of “Zero Injury” with the goal of eliminating safety related incidents. Vineyard Wind Management will take the approach of leadership by example, will set clear policy, allocate necessary resources and designate parties to provide subject matter expertise.

To achieve the objective of Zero Injury, Vineyard Wind will:

- Ensure a systematic approach to the management of EHS, and implement a safety management system designed to ensure compliance with regulations as a minimum and to achieve continuous performance improvement

- Take responsibility and provide clear leadership
- Be a leader in promoting best practice in the offshore wind energy industry
- Set targets for EHS audits, improvement metrics and reporting of performance
- Require all Contractors to manage EHS in line with Vineyard Wind policy
- Ensure that EHS compliance is the responsibility of all managers, teams and individuals
- Empower everyone to stop any work, or prevent work from starting, where adequate controls of EHS risks are not found to be in place without retribution
- Include EHS performance in the appraisal of all staff
- Encourage and promote involvement by all employees regardless of job title

Vineyard Wind is committed to the safety of all employees, contractors, visitors and vendors at all Vineyard Wind facilities. To guide Vineyard Wind in executing their commitment to safety, and building on lessons learned from the offshore wind, oil & gas, and other industries, a combination of regulatory sources has been assessed to support the development of the strongest possible safety management program. The Safety Management System outlined in this document draws on regulations from 33 CFR 140 - 145 and incorporates information based on certain elements of 30 CFR 250, Subpart S, Safety and Environmental Management Systems (SEMS). In addition, OSHA regulations have been consulted to identify any additional safety standards and practices that could be incorporated into the Vineyard Wind SMS.

### 3.1 Roles

The following table defines the roles that are tasked with fostering and implementing a Safety Management System:

Role	
Executive Leadership	Those leaders who set the tone and provide support at the highest levels of leadership for the implementation of a Safety Management System.
Steering Committee	Senior Leaders comprised of representatives from functional areas that are positioned to support and drive SMS success.
Management	All other levels of Management outside of Executive Leadership and the Steering Committee.
Employee	All employees not previously categorized.

### 3.2 Training Requirements

Individuals who have duties that fall within the scope of Leadership and Management Commitment, will receive training in the form of reviewing this document and the SMS report

materials. Directors, managers and supervisors shall have an acute awareness of US construction, USCG, OSHA and maritime health, safety and environmental legislation in order to successfully lead on EHS matters

Management will have the required training to insure:

- Provide overall leadership to the project team
- Responsibility for the safe management of all works associated with the project
- Ensure that the project is fully and competently staffed for managing EHS and that objectives are clearly defined
- Ensure that all levels of staff receive adequate and appropriate training
- Ensure that disciplinary procedures are adequate to act against those who breach EHS practices

Set a personal example

#### **4 EMPLOYEE INVOLVEMENT**

It is of great importance to Vineyard Wind that all employees are engaged in the safety program. Employee involvement in the Safety Management program will be maximized through initial safety orientation, continuous safety awareness training, and management programs that include:

- Safety Meetings
- Safety Committee Membership
- Safety Training Program
- Safety Recognition Program
- Safety Incentive Program

Vineyard Wind will establish a disciplinary policy that clearly defines the expectations of all employees. The policy encourages employees to use good judgement when undertaking work and follow established safety policies and procedures. The disciplinary policy clearly defines consequences and disciplinary actions when safety policies are violated.

#### **5 SAFETY POLICIES**

Specific safety policies and associated training will be developed in accordance with 29 CFR 1910 – Occupational Safety and Health Standards, 29 CFR 1926 – Safety and Health Regulations for Construction, and 30 CFR 585 – Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf.

Vineyard Wind Safety Policies will be adhered to through training, regular safety meetings, documentation and audits. The follow safety topics comprise the Vineyard Wind Safety Program.

- Smoking Policy

- Drug and Alcohol Policy
- Following Manufacturer's Transportation, Installation, Operations and Maintenance Manuals
- Bypassing of Safety Systems
- Policy of working in Teams for Safety
- Policy related to critical equipment
- Fitness for Duty
- Stop Work Authority
- Policy related to Emergencies
- Lockout and Tagout
- Marine survival training
- CPR and First Aid
- Vessel or site specific induction
- Emergency escape training / confined space rescue training
- Knowledge of the H&S conditions at site
- Wind Turbine rescue from height training (if job includes WTG access)
- Turbine tower lift rescue / recovery training
- Electrical awareness including a basic understanding of electrical safety and the electrical safety rules in place on the project
- Fire safety awareness

### **5.1 Organizational Reporting Structure**

Vineyard Wind will develop an organizational structure that ensures responsibilities are delineated and accountability is described for all levels of the organization. This section includes the minimum organizational structure that will be in place prior to project implementation. As needed, positions and duties will be added to the structure, consistent with the safety needs of the project and in coordination with project contractors.

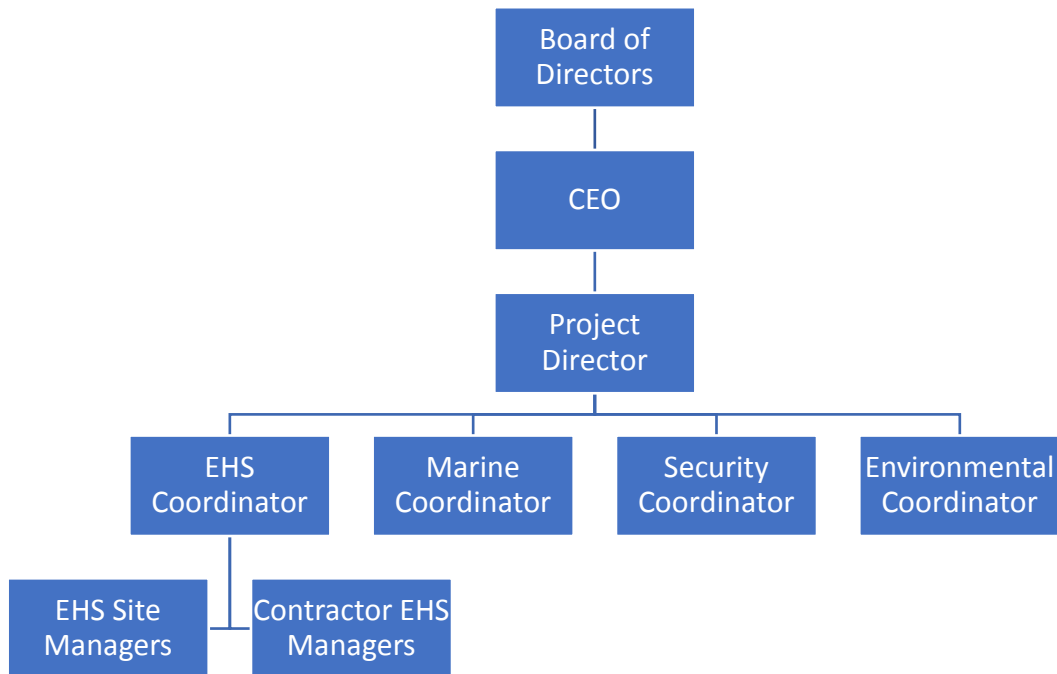


Figure 5-1 Vineyard Wind Safety Organization

## 5.2 Key Roles and Description of Responsibilities

This section lists the responsibilities of project personnel with respect to administering the SMS. Other duties may be required of these individuals that are not included in this document.

### 5.2.1 Project Director

The Project Director will lead the project and will work to ensure that the project is constructed safely, in accordance with the environmental permits, and to proper quality standards. The Project Director will be Vineyard Wind’s authorized representative during the engineering and construction period for all matters related to the SMS including coordination with government authorities, first-responder emergency agencies, and coordination between contractors.

### 5.2.2 Health and Safety Coordinator

The Health and Safety Coordinator will report to the Project Director and will be responsible for monitoring compliance with the approved Construction and Operations Plan, the SMS, all safety-related regulatory requirements, and overall health and safety conditions for the project. The Health and Safety Coordinator will review all contractor’s safety management plans for compliance with the COP SMS, regulatory, and contract requirements. The Health and Safety Coordinator will establish a “safety first” working mentality at the project sites and on vessels involved in transport and construction.

### 5.2.3 Environmental Coordinator

The Environmental Coordinator will report to the Project Director and will ensure that all local, state and federal permit requirements and laws relating to environmental protection and reporting are adhered to. The Environmental Coordinator will monitor contractors for compliance with project specific environmental requirements and shall be responsible for



verifying compliance with environmental protection programs and protocols for environmental incident response. The Environmental Coordinator will coordinate deployment of certified marine mammal observers and other environmental resource observers on the vessels as required by the conditions of the project permits and approvals. The Environmental Coordinator will ensure contractors have compliant oil spill response plans, hazardous waste plans, and waste management plans in place.

#### **5.2.4 Marine Coordinator**

The Marine Coordinator will report to the Project Director and will ensure compliance with permit requirements and applicable laws relating to the project vessel activities (including installation vessels, transport vessels, service vessels, tugs, rescue boats, etc.). The Marine Coordinator will be kept informed of all planned vessel deployment each day. The Marine Coordinator will be the primary liaison with the USCG, port authorities, state and local law enforcement, marine patrol, and commercial operators (including ferry, tourist, and fishing boat operators). The Marine Coordinator will be responsible for all marine updates such as coordination with USCG regarding any required Notice to Mariners.

It will be the Marine Coordinator's responsibility to be knowledgeable of weather forecasts and have a communications plan in place with all contractors and vessels involved in the project.

The Marine Coordinator will be kept informed of all diving and dredging activities. The Marine Coordinator will coordinate with the USCG and local law enforcement authorities for planning in the event of trespassing vessels within any safety zone established for the offshore project construction activity.

The Marine Coordinator will conduct regular meetings with contractors to discuss vessel operation and deployments as appropriate for the level of marine activities scheduled.

#### **5.2.5 Security Coordinator**

The Security Coordinator will report to the Project Director. The Security Coordinator will liaise with all contractors and subcontractors on the project to address security provisions. In addition to the physical security of the onshore project staging area and port areas, the Security Coordinator is expected to work closely with the Health and Safety Coordinator and the Marine Coordinator to ensure that appropriate agency notification plans are in place with federal, state, and local government first responders.

The Security Coordinator will become responsible for security of the offshore WTGs and ESP once these are commissioned.

### **5.3 Safety Committee**

To ensure continuous adherence to safety standards and regulations, and to maintain the strong safety culture of Vineyard Wind, a Safety Committee will be established comprised of key members of the management team and representatives across all work disciplines

To maintain the goal of continuous improvement the Safety Committee will perform reviews of safety practices and ensure alignment between the COP, SMS, safety regulations, personnel training, and working conditions. The Safety Committee will be responsible for addressing any safety issues that arise with Vineyard Wind employees, contractors, vendors, visitors, etc. and for establishing, approving and maintaining company safety standards, including the COP and SMS.

The safety committee will review daily and weekly safety meetings findings and suggestions.

## **6 CONTRACTOR MANAGEMENT**

Third party contractors and support services will be integrated into the safety management system. Specific requirements will be developed for contracting, including:

- Minimum requirements for bridging documents
- Contractor safety audits
- Minimum contractor safety training
- Contractor roles in an emergency

Contractors are required to follow the same policies and procedures that Vineyard Wind employees follow for maintaining safety. Vineyard Wind will manage all contractors to ensure safety policies and practices are adhered to. Contractors EHS representative should be well versed in the projects SMS and be responsible for;

- Day-to-day site EHS supervision (onshore/offshore)
- EHS monitoring, inspection and auditing
- Support the EHS Director in establishing and fulfilling project training needs
- Participate in planning and coordination of all marine operations relating to the project
- Assist with preparation and maintenance of all EHS documentation;
- Management of PPE inventory, inspection and testing
- Participation in EHS meetings, risk reviews and workshop
- Set a personal example.

Contractor operations should not expose Vineyard Wind employees or the public to hazards in violation of governmental regulations and Vineyard Wind policy. Contractors will submit proof of training and copies of certificates to the Site EHS Manager before the start of any work activity. The competencies and training records of all employees will be requested and examined by the Site EHS Manager before commencing work activities.

### **6.1.1 Audits**

Safety programs for all contractors will be subject audit by Vineyard Wind. Audits may include review of safety policies, procedures, training records, etc. and may be performed prior to contracting and during the course of the contract.

### 6.1.2 Training

All contractors will be fully qualified to perform the roles for which they are contracted, including any prescribed safety standards and training. Vineyard Wind will provide safety orientation to familiarize contractors with any site-specific safety issues. Contractors may be required to demonstrate, through documentation or practical application, their knowledge and understanding of safety requirements for offshore wind farm construction.

## 7 MANAGEMENT OF CHANGE

Vineyard Wind will maintain a procedure for Management of Change (MOC), which helps to identify the potential risks associated with the change and receive any required approvals prior to the introduction of such changes.

The MOC process provides a coherent, systematic, and simple mechanism for identifying and controlling hazards through the change process with emphasis on the transition phase. When well implemented, MOC ensures that the safety of wind farm and its personnel is safeguarded by the evaluation of hazards, threats, and other potential undesired events related to a significant change, and the intended benefits of the change are fully realized as planned.

### 7.1 Roles and Responsibilities

The Project Director will be responsible for the implementation of the Management of Change program. All MOC documentation will be maintained by the Health and Safety Coordinator.

### 7.2 MOC Review and Audit Requirements

Any Company employee can initiate the MOC process. The following table depicts the required frequency of recurring actions defined in the MOC program:

Action	Frequency
Audit	Every 3 years
Document Review	Annually
Management Review	Annually
Training	Initial and as needed refresher

### 7.3 Management of Change Process

The Management of Change policy shall be utilized for at least the following changes whether they are temporary or permanent:

- Physical Changes, including work site changes such as changes in construction vessels, working platforms, access and egress locations, etc.
- Organizational Changes, including changes in personnel, individual responsibilities, contractor or sub-contractor changes, etc.

- Technological Changes, including changes in equipment, equipment design, software controls or the technology used on the work site, etc.
- Procedural Changes, including changes to processes (i.e., work schedules, materials, equipment unavailability, new equipment, or operating conditions).

Vineyard Wind will develop a form to facilitate the processing of changes. The change form will, at a minimum, include a description and the purpose of the change, the technical basis for the change, safety and health considerations, documentation of changes for the operating procedures, maintenance procedures, inspection and testing, P&IDs, electrical classification, training and communications, pre-startup inspection, duration (if a temporary change), approvals, and authorization.

For a more complex or significant design change, a hazard and risk evaluation procedure will be used, such as a Hazard Identification (HAZID) workshop (The HAZID is further described in Section 11). Risk assessments should demonstrate that the risks with controls are ‘As Low as Reasonably Practical.’ Contractors also have a responsibility to carry out risk assessments based on the risks associated with their scope of work.

Documentation of changes will be kept in an accessible location to ensure that design changes are available to any member of Vineyard Wind who may require them.

#### 7.4 Management of Change Communication

The communication of changes to appropriate personnel is essential to safety and preventing incidents. The following table lists activities that fulfil those requirements:

Action	Frequency
MOC Committee Meeting	As Needed; for any Organizational, Procedural, or Technological change
MOC Email Notification	For each implemented change

#### 7.5 Training Requirements

All individuals will receive initial training on the MOC program and will also receive annual refresher training.

#### 7.6 Management Review

On an annual basis, management will review progress on the MOC process and advise improvements or areas to refocus. Ensure that the MOC policy has been properly implemented and all elements have been completed and documented.

#### 7.7 Audits and Assessments

Audits of the MOC program shall validate that the exercise of the MOC policy includes the following:

- Reason for change
- Authority for approving changes
- Analysis of implications
- Acquisition of required work permits
- Documentation of change process
- Communication of change to affected parts of the organization
- Time limitations
- Qualification and training of personnel affected by the change (including contractors)

### **7.8 Continuous Improvement**

Management of Change metrics and risk assessments are an input into the Management Review and Risk Management elements. This element shall be reviewed annually for updating and audited every 3 years.

## **8 UNSAFE WORKING CONDITIONS**

All employees, contractors, and subcontractors have the personal responsibility and work-place authority to report any unsafe work practice or to immediately stop any unsafe work practice during operations.

Unsafe work conditions may be reported anonymously. Emergent safety issues shall be addressed immediately.

### **8.1 Reports of Unsafe Work Conditions**

All employees, contractors, and subcontractors shall report any violation of any Company safety regulation or any other hazardous or unsafe working condition on any Company owned or leased property, facility, structure, or equipment.

All employees, contractors, subcontractors, visitors or guests to any Vineyard Wind property, have the right to report any possible violation of applicable safety regulations or unsafe condition to the US Coast Guard. The identity of the reporting person shall not be known to the Company without consent of the person making the report.

### **8.2 Stop Work Authority**

All employees and contractors have the responsibility and authority to stop any unsafe task or operation where the risk to people, the environment, or equipment cannot be managed in accordance with company's established safety policies, procedures or safe work practices.

No employee or contractor will be retaliated against for stopping work that is based on a good faith belief that it is unsafe.

## 9 SAFETY TRAINING AND COMPETENCE

As part of the company safety culture, safety training is an ongoing function of the Vineyard Wind safety program. Safety training and awareness will include the following topics, as well as any emergent safety issues that may arise. The training topics listed in this section are the minimum required training for all contractors and designated employees.

### Orientation Training

#### Visitors

- Site safety rules for moving around on the site
- Safety equipment for moving around on the site
- Restricted areas
- Emergencies and rally points

#### Site workers

- Site safety rules for moving around on the site
- Safety equipment for moving on site
- Restricted areas
- Emergencies & associated procedures
- Driving rules (on site and off site)
- Hazardous substances
- Waste, dust emission and noise on site
- Permit systems
- Welfare arrangements
- PPE requirements
- The importance of conformance with the H&S procedures
- Employee's role and responsibility in general
- Incident reporting procedure
- Security arrangements

Example of Minimum EHS training requirements depending on job function

- Working from heights

- Electrical safety
- Sea survival
- Confined space
- First aid and CPR
- Fire fighting

#### Example of Specialized and Task Specific Training

- Use of specialized equipment
- Scaffolding and personnel platform equipment
- Diving operations
- High Voltage and switching

#### Medical Audits and Fitness for Duty

Pre-employment screening completed by an occupational doctor may consist of the following:

- Medical history
- Occupational history
- Physical Examination
- Determination of fitness to work wearing PPE
- Baseline monitoring for specific exposures.

Periodic Medical Examination completed by an occupational doctor may include:

- Yearly update of medical and occupational history
- Yearly physical examination
- More frequent testing based on specific exposures

#### 9.1 Workplace Safety and Health - 33 CFR 142

The Company will maintain compliance with applicable workplace safety and health regulations and will frequently review processes to identify/recognize hazards, propose and implement changes to maintain the workplace safety and/or free from recognized hazards Recognized

Hazard in this context is that defined by 33 CFR 150.60(c)(1) as “generally known among persons in the affected industry as causing or likely to cause death or serious physical harm to persons exposed to those conditions; and routinely controlled in the affected industry.”

#### 9.1.1 Personal Protective Equipment

All Vineyard Wind personnel and contractors will receive training, or should be able to demonstrate that they have received training on Personal Protective Equipment (PPE) and its requirements for use, maintenance, and care for all specific safety related equipment, as appropriate.

At a minimum, the following PPE will be included:

- Eye and face protection
- Head protection
- Foot protection
- Hearing protection
- Protective clothing
- Respiratory protection
- Safety belts and lifelines
- Personal flotation devices
- Eyewash equipment

In addition to care and maintenance of PPE, training will also address:

- Housekeeping
- Guarding of deck openings

## 9.2 Design and Equipment - 33 CFR 143

### 9.2.1 Lights and warning devices

Appropriate lights and warning signals will be deployed during construction and when the wind farm is operational. Requirements for lights, markings, and warning devices for structures are codified in 30 CFR 67. Vessels associated with contraction and operation of the wind farm will adhere to lights and warning devices requirements under the International Regulations for Preventing Collisions at Sea 1972 (COLREGS) and any local rules, if applicable.

### 9.2.2 Means of Escape

All workers who require access to the offshore structures will receive training and participate in drills to test the means of escape from the structures. Training will include a description of a primary escape means, as appropriate for unmanned structures and in accordance with the requirements of 30 CFR 143.101.



### **9.2.3 Personnel Landings**

Although personnel landings are not required for unmanned structures, during construction, it is anticipated that personnel landings may be used.

### **9.2.4 Guards and Rails**

All required guards and rails will be installed, and appropriate training will be provided on the requirements for guards and rails for the unprotected perimeter of all floor or deck areas and openings, catwalks and stairways. Training will ensure all workers are aware of the requirements and have sufficient knowledge to report any deficiencies.

## **9.3 Lifesaving Equipment - 33 CFR 144.10**

Training will be provided on the use and care of lifesaving equipment that will be available in accordance with applicable regulations, particularly the type and number of personal flotation devices and ring life buoys. It will also include the required markings, any affixed apparatus, and how they will be made accessible to personnel.

## **9.4 Firefighting Equipment - 33 CFR 145**

Training will be provided on fire hazards associated with offshore wind farms and the appropriate firefighting equipment. It will also include a list of the rating and type of fire extinguishers for each structure and a description of the maintenance program for firefighting equipment as well as the fire detection systems.

Firefighting equipment and techniques will be consistent with the following standards, at a minimum:

- 29 CFR 1926 Subpart F (Fire Protection and Prevention)
- 29 CFR 1910 Subpart L (Fire Protection)
- 33 CFR Part 145 Firefighting Equipment
- Applicable NFPA standards

## **9.5 Operations - 33 CFR 146**

### **9.5.1 Person in charge**

Vineyard Wind will designate a Person in Charge of the wind farm. Designation will include contact information, title, and order of succession.

### **9.5.2 Maintenance of Emergency Equipment**

Each piece of emergency equipment will be part of the Vineyard Wind maintenance program. All emergency equipment in use will be listed and include a description of the maintenance requirements or technical references for maintaining each piece of equipment.

### **9.5.3 Work vests**

All workers who require transport and access to the wind farm will be required to wear an appropriate work vest. Vineyard Wind will provide awareness training on the type(s) of approved work vests and their uses, stowage, care, and inspection, including additional requirements for hybrid work vests, if used.

### **9.5.4 Notice of casualties**

Vineyard Wind will notify the Coast Guard and/or BOEM of casualties. At a minimum, casualty reporting will be mandatory for:

- Death
- Injury to 5 or more persons in a single incident,
- Damage affecting the usefulness of primary lifesaving or firefighting equipment
- Injury causing any person to be incapacitated for more than 72 hours
- Damage to the facility exceeding \$25,000 resulting from a collision by a vessel with the facility

Vineyard Wind will provide a written report of casualty in accordance with 33 CFR 146.30.

### **9.5.5 Diving casualties**

There are specific reporting requirements for diving casualties. Vineyard Wind will adhere to requirements of reporting diving casualties in accordance with 46 CFR 197.484 and 197.486. Diving casualty reports are required under the follow circumstances:

- Loss of life.
- Diving-related injury to any person causing incapacitation for more than 72 hours.
- Diving-related injury to any person requiring hospitalization for more than 24 hours.

The notice will contain the following:

- Name and official number (if applicable) of the vessel or facility.
- Name of the owner or agent of the vessel or facility.
- Name of the person-in-charge.
- Name of the diving supervisor.
- Description of the casualty including presumed cause.
- Nature and extent of the injury to persons.

### **9.5.6 Pollution Incidents**

Pollution incidents will be reported in accordance with 33 CFR 146.45. The approved Vineyard Wind Oil Spill Response Plan will be followed for specific pollution response actions.

### 9.5.7 Other Safety Procedures

In addition to the procedures for safe operations defined in this section, Vineyard Wind will develop and incorporate safety practices and procedures to reduce risks of casualties throughout its operations. Specific practices include:

- Drills and Exercises to test procedures
- Training Standards - This may include a list of training requirements for workers (listed in Section 6), previous certification, documentation, etc.
- Job Hazard Analysis, Job Safety Analysis, tool box talks before start of each job
- Work Permits
- Hot Work Procedures
- Routine Access/Egress Procedures (including safe use of ladders)
- Confined Space Entry
- Right to Know
- Material Handling (lifting operations)
- High Voltage and Medium Voltage Electricity, ARC Flash training (NFPA 70E)
- Working from Heights, including crane lift procedures, fall arresters, full-body harness, shock absorbers, lanyards, etc.
- Rescue from Heights
- First Aid
- Stop Work Authority
- Hearing Conservation
- Heat Stress
- Cold Weather
- Respiratory Protection

## 10 EMERGENCY RESPONSE

The SMS is primarily focused on preventing incidents. However, it is also important to be prepared if emergencies do occur. For this reason, Emergency Preparedness and Response plans are essential for responding effectively to an incident. Proper planning, training and drilling will ensure that any impact of an incident will be kept to a minimum for the public and the environment.

Emergency response plans will be developed for a range of emergency situations. Plan development will include procedures for testing emergency plans through drills and exercises. Plans will be developed, at a minimum, for the following scenarios:

- Collision between service vessel and structure
- Fire on structure and/or service vessel
- Evacuation
- Pollution Incidents
- Adverse weather
- Emergency Response and Search & Rescue
- Remote monitoring, Control and Shut Down procedures

### **10.1 Training Requirements for Emergency Response**

Any individuals who will lead emergency responses, as well as those who will participate as emergency response team members, will receive initial training prior to their first involvement in an emergency response. These individuals shall also receive refresher training on an annual basis.

Learnings from past drill and actual events shall be incorporated into training. Learning from external events not related to Vineyard Wind shall also be incorporated.

## **11 HAZARD IDENTIFICATION AND RISK MANAGEMENT**

Vineyard Wind will implement a systematic hazard identification and risk management program for existing and potential hazards. The goal will always be to reduce the hazard to a level as low as reasonably practicable.

Risk assessment methods will be used to decide on priorities and to set objectives for eliminating hazards and reducing risks. Wherever possible, risks are eliminated through selection and design of facilities, equipment and processes. If risks cannot be eliminated, they are minimized using physical controls, or as a last resort, through operating procedures and personal protective equipment.

Vineyard Wind will incorporate the use of Hazard Identification (HAZID) Workshops to help identify and manage risks. HAZID workshops are usually performed during initial facility planning and engineering, when considerable modifications, upgrades or re-design of existing facilities are carried out, or may be driven by events such as accidents, critical situations or near misses.

The purpose of a HAZID is to identify main hazards, review the effectiveness of selected safety measures and, where required, to expand the safety measures to achieve a risk as low as reasonably practicable.

The HAZID provides documentation that Vineyard Wind installations are operated in a manner that major hazards are identified, mitigated or eliminated. Vineyard Wind management will be kept up-to-date on the potential hazards and their possible effects.

Key elements of HAZID

- Identification of hazards and their potential effects

- Assessment of the related risks
- Develop a Risk Assessment Matrix and record in a risk register
- Implementation of controls to eliminate or reduce those risks to a level as low as reasonably practical
- Elimination of hazard with engineering and/or administrative controls and/or PPE
- Implementation of recovery measures to minimize the consequences of an incident
- Documentation of the decision-making process

Appendix I-C

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Statement of Qualifications for Certified Verification Agent (CVA) Services

Appendix redacted in its entirety

## Appendix I-D

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### CVA Scope of Work and Verification Plan

Appendix redacted in its entirety

## Appendix I-E

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### Hierarchy of Standards

Appendix redacted in its entirety