SITE ASSESSMENT PLAN

Deepwater Wind
North Lease OCS-A 0486

Prepared for:

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ACRONYMS AND ABBREVIATIONS

Acronym	Full Name
BMPs	Best Management Practices
BOEM	Department of Interior's Bureau of Ocean Energy Management
BP	Before Present
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulations
CMECS	Coastal and Marine Ecological Classification Standard
CO	carbon monoxide
CO2e	carbon dioxide equivalents
CVA	Certified Verification Agent
Deepwater Wind	Deepwater Wind New England, LLC
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAD	Fish Aggregation Devices
FLiDAR 6M (Met Buoy)	AXYS Floating Light Detection and Ranging 6M buoy
FONSI	Finding of No Significant Impact
ft	feet
GHG	Greenhouse Gases
Gray & Pape	Gray & Pape, Inc.
HAPC	Habitat Areas of Particular Concern
HAPs	Hazardous Air Pollutants
HRG	High-resolution Geophysical
Hz	hertz
LNM	Local Notice to Mariners
m	meters
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standard
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOMAD	Navy Oceanographic Meteorological Automated Device
NO_X	nitrogen oxide
nT	nanotesla
NTL	Notice to Lessees and Operators
O_3	ozone
OCS	Outer Continental Shelf
OPAREA	Operating Area
OSI	Ocean Surveys, Inc.
PATON	Private Aid to Navigation
PM	particulate matter

Acronym	Full Name
Rhode Island Ocean SAMP	Rhode Island Ocean Special Area Management Plan
RI-MA	Rhode Island-Massachusetts
RI-MA EA	Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts Revised Environmental Assessment
SAP	Site Assessment Plan
SO2	sulfur dioxide
SOC	Standard Operating Condition
TOC	Total organic carbon
UDP	Unanticipated Discoveries plan
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VOCs	volatile organic compounds
Watch Man	WatchMan™ 500 controller
WEA	Wind Energy Area

1.0 INTRODUCTION

On September 12, 2013, the Department of Interior's Bureau of Ocean Energy Management (BOEM) and Deepwater Wind New England, LLC (Deepwater Wind) executed two commercial leases on the outer continental shelf (OCS) in federal waters off the coast of Rhode Island and Massachusetts (Renewable Energy Lease Numbers OCS-A 0486 and OCS-A 0487) for the purpose of the siting and development of offshore wind energy. Renewable Energy Lease Number OCS-A 0486, referred to as the "North Lease," is approximately 97,498 acres; and Renewable Energy Lease Number OCS-A 0487, referred to as the "South Lease" is approximately 67,252 acres. Both the North and South Lease areas are located within the area designated by BOEM as the Rhode Island-Massachusetts (RI-MA) Wind Energy Area (WEA).

Deepwater Wind has prepared this Site Assessment Plan (SAP) for the North Lease in support of the installation and operation of a stand-alone offshore meteorological data collection system referred to as the AXYS Floating Light Detection and Ranging 6M buoy (FLiDAR 6M [Met Buoy]).

The Met Buoy will be located at or about 41° 05' 16" N 71° 13' 22" W of the Official Protraction Diagram Providence NK19-07 (see Addendum A of North Lease; Figure 1-1: Met Buoy Installation Area). Table 1-1 and Figure 1-1 illustrates where the buoy will be located in relation to the North Lease. The data collected by the Met Buoy will be used to determine energy production estimates and design inputs for a wind energy project within the North Lease Area. The Met Buoy will be installed, operated, and decommissioned by a vendor under contract to Deepwater Wind. Deepwater Wind will either own or lease the Met Buoy.

Table 1-1 Location of the Deepwater Wind Met Buoy

Latitude	Longitude	OCS Lease Block	Aliquot
41° 05' 16" N	71° 13' 22" W	6965	M

This SAP has been prepared in accordance 30 Code of Federal Regulations (CFR) §§ 585.606, 610, and 611 (see Table 1-2), as well as the Guidelines for Information Requirements for a Renewable Energy SAP issued by BOEM on February 24, 2016. Prior to installation of the Met Buoy, Deepwater Wind will obtain all required permits and approvals from various jurisdictional agencies as identified in Table 1-3. Deepwater Wind will include copies of the final agency authorizations as part of the SAP (see Appendix A). Copies will also be provided to BOEM prior to the initiation of SAP activities. All installation, operation, and decommissioning activities will be conducted in compliance with any additional requirements stipulated in the final permits to be issued by other regulatory agencies.

The Met Buoy, and its respective instrumentation platform, described in this SAP will collect wind resource, metocean, and biological data to support development of the North Lease area. The Met Buoy would be affixed to the seafloor via a mooring chain attached to 1 or 2 clump weight anchors. This design results in minimal impacts in comparison to the other option for meteorological data collection which is a fixed meteorological tower. The installation, operation, and decommissioning of the Met Buoy will result in short term, minor, localized impacts. Table 2-1 summarizes the minimal affect the Met Buoy will have on the surrounding environment as well as how this SAP conforms to the stipulations of the North Lease and the RI-MA Finding of No Significant Impact (FONSI).

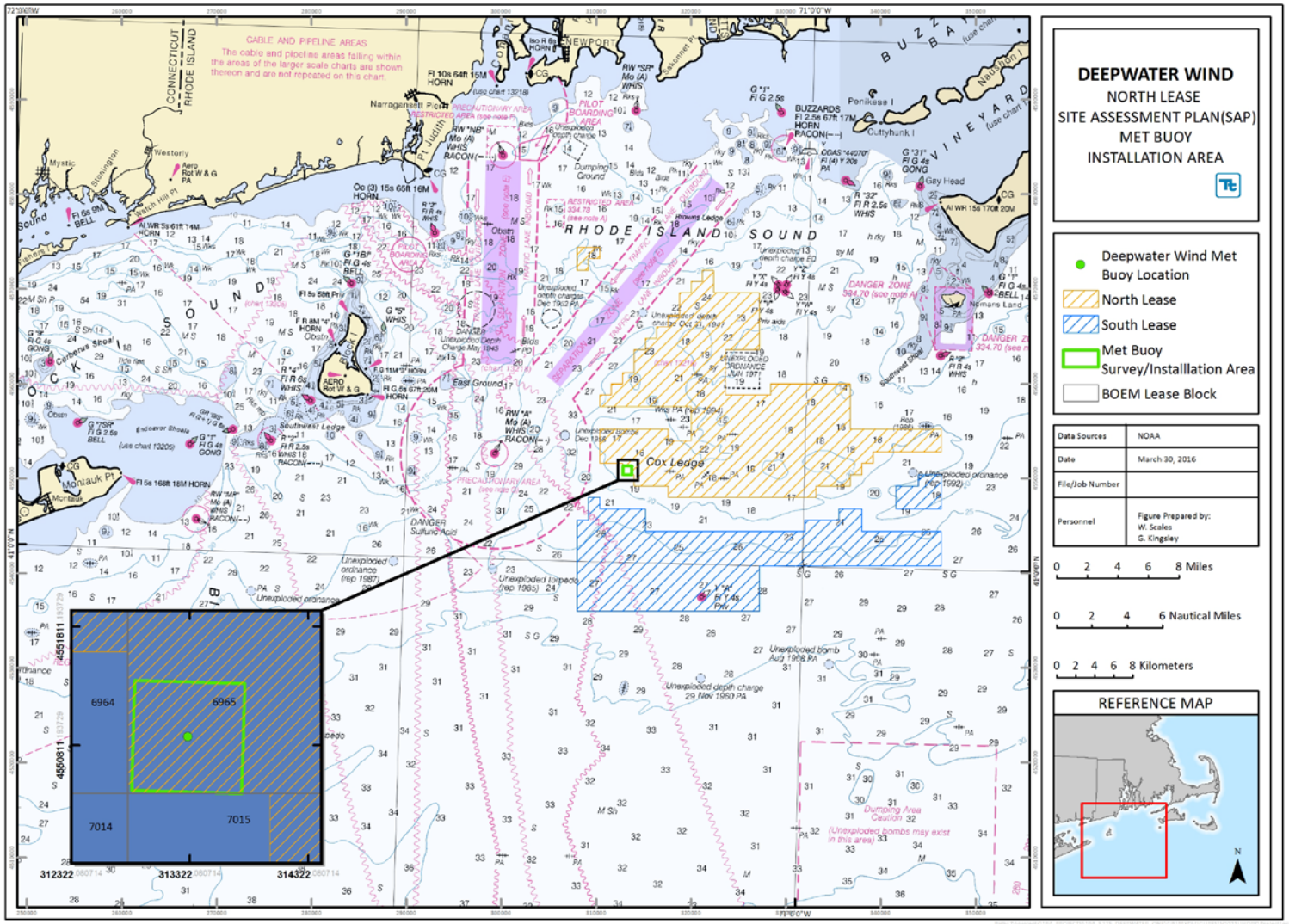

Figure 1-1 Met Buoy Installation Area

Table 1-2 Site Assessment Plan Requirements for Commercial Leases Pursuant to §585.105(a), 606(a), 610(a) and (b), and 611(a) and (b)

Requirement	Compliance Statement
§ 585.105(a)	
1) The design of the environmental monitoring buoy and conduct of planned activities ensures safety and will not cause undue harm or damage to natural resources and will take measures to prevent unauthorized discharge of pollutants into the offshore environment.	Deepwater Wind will comply with this requirement, as evidenced in this SAP.
§ 585.606(a)	
1) The Project will conform to all applicable laws, regulations, and lease provisions.	Deepwater Wind will comply with this requirement. See Table 1-2, Table 1-3, Table 2-1, and Appendix A.
2) The Project will be safe.	Deepwater Wind will comply with this requirement. Specifically, see Section 4.1.6.
3) The Project will not unreasonably interfere with other uses of the OCS, including national security or defense.	Deepwater Wind will comply with this requirement. See Table 2-1 for specific activities to ensure compliance.
4) The Project will not cause undue harm or damage to natural resources; life; property; the marine, coastal, or human environment; or historical or archeological resources.	See Section 7 for an analysis of site characteristics and for avoidance and mitigation measures.
5) The Project will use best available and safest technology.	Deepwater Wind will comply with this requirement. See Section 3.1 and Appendix B for a description and technical specifications on the selected Met Buoy.
6) The Project will use best management practices.	Deepwater Wind will comply with this requirement. Best management practices are described in Table 1-3, Sections 4, 5, and 7.
7) The Project will use properly trained personnel.	Deepwater Wind will comply with this requirement.
§ 585.610(a)	
1) Contact Information	Jeffrey Grybowski, CEO Deepwater Wind New England, LLC 56 Exchange Terrace, Suite 300 Providence, RI 02903 Phone: 401-868-4228
2) Site assessment concept	Meteorological, metocean, and biological data collection one stand-alone environmental monitoring buoy.
3) Designation of operator	Not applicable. See Section 1.1.
4) Commercial lease stipulations and compliance	See Table 2-1.
5) A location plat	See Figure 1-1.
6) General structural and project design, fabrication and installation information	See Sections 3, 4, and 5.
7) Deployment activities	See Section 4.
8) Measures for avoiding, minimizing, reducing, eliminating, and monitoring environmental impacts	This SAP has been prepared in accordance with the Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts Revised Environmental Assessment (RI-MA EA), and Stipulations in the Commercial Lease. Specific efforts to avoid, minimize, reduce, eliminate, or monitor environmental impacts can be found in Sections 7 and 4.1.3. Conformance with the RI-MA EA is detailed in Section 2.
9) Certified Verification Agent nomination	n/a, see Section 1.2.
10) Reference information	See Section 8
11) Decommissioning and site clearance procedures	See Section 6
12) Air quality information	See Section 7.3.1
13) A listing of all federal, state, and local authorizations or approvals required to conduct site assessment activities on your lease	See Table 1-3.
14) 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	See Appendix A.

Table 1-2 Site Assessment Plan Requirements for Commercial Leases Pursuant to §585.105(a), 606(a), 610(a) and (b), and 611(a) and (b)

Requirement	Compliance Statement
15) Financial assurance information	To be provided by Deepwater Wind prior to initiation of installation activities, if requested.
§585.610(b)	
Geotechnical	
(i) A description of all relevant seabed and engineering data and information to allow for the design of the foundation for that facility…	Section 7.1, Appendix D
Shallow Hazards	
(i) Shallow faults;	Section 7.1.1
(ii) Gas seeps or shallow gas;	Section 7.1.1
(iii) Slump blocks or slump sediments;	Section 7.1.1
(iv) Hydrates; or	Section 7.1.1
(v) Ice scour of seabed sediments.	Section 7.1.1
Archaeological Resources	
(i) A description of the results and data from the archaeological survey;	Section 7.3.3, Appendix E
(ii) A description of the historic and prehistoric archaeological resources, as required by the National Historic Preservation Act (NHPA) of 1966, as amended.	Section 7.3.3, Appendix E
Geological Survey	
(i) Seismic activity at your proposed site;	Section 7.1.1
(ii) Fault zones;	Section 7.1.1
(iii) The possibility and effects of seabed subsidence; and	Section 7.1.1
(iv) The extent and geometry of faulting attenuation effects of geologic conditions near your site.	Section 7.1.1
Biological	
(i) Live bottoms	Section 7.2.1
(ii) Hard bottoms	Section 7.2.1
(iii) Topographic features; and	Section 7.2.1
(iv) Surveys of other marine resources such as fish populations (including migratory populations), marine mammals, sea turtles, and sea birds.	Sections 7.2.1 and 7.2.2
§ 585.611(a) and (b) Requirements	
Hazard information	Section 7.1.1
Water quality	Section 7.3.1
Biological resources	
(i) Benthic communities	Section 7.2.1 and Appendix F
(ii) Marine mammals	Section 7.2.2
(iii) Sea turtles	Section 7.2.2
(iv) Coastal and marine birds	Section 7.2.3
(v) Fish and shellfish	Section 7.2.1
(vi) plankton and seagrasses, and	Section 7.2.1
(vii) plant life	Section 7.2.1
Threatened or endangered species	Sections 7.2.2 and 7.2.3
Sensitive biological resources or habitats	Section 7.2
Archaeological resources	Section 7.3.3, Appendix E
Social and economic resources	Section 7.3.2
Coastal and marine uses	Section 8.3.2.1.

Table 1-2 Site Assessment Plan Requirements for Commercial Leases Pursuant to §585.105(a), 606(a), 610(a) and (b), and 611(a) and (b)

Requirement	Compliance Statement
Consistency Certification	Table 1-3
Other Resources, conditions, and activities	N/A

Table 1-3 Permit Matrix

Permitting Agency	Applicable Permit or Approval	Statutory Basis	Regulations	Applicant Requirements
National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS)	Endangered Species Act Section 7 Consultation	16 United States Code (U.S.C.) 1536	50 Code of Federal Regulations (CFR) 402	No Action Required.. These consultations were completed prior to the issuance of the North Lease.
	Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) Section 305(b) Consultation	16 U.S.C. 1801	50 CFR 600	No action required. These consultations were completed prior to the issuance of the North Lease.
	Incidental Take Authorization (IHA)	Marine Mammal Protection Act (MMPA)	16 USC §§ 1361 *et seq.*	No action required. As detailed in Section 7.2.2 installation, operation and decommissioning of the Met Buoy will not result in the harassment of marine mammals protected under the MMPA.
U.S. Army Corps of Engineers (USACE)	Category 1 General Permit	Clean Water Act 33 U.S.C.134	33 CFR 320 *et seq.*	Deepwater Wind will file a letter with the USACE documenting eligibility under and conformance with the terms of the General Permit.
United States Coast Guard (USCG)	Approval for Private Aids to Navigation	14 U.S.C. 81	33 CFR Part 66	Deepwater Wind will submit an application to the USCG for a Private Aids to Navigation (PATON) prior to the installation of the Met Buoy.
U.S. Department of Interior, Bureau of Ocean Energy Management (BOEM)	National Historic Preservation Act (NHPA) Section 106 Consultation	NHPA 16 U.S.C. 470	36 CFR Part 60, Part 800	No action required. BOEM has executed a Programmatic Agreement that establishes procedures for consultations for site assessment activities in the RI-MA WEA and under NHPA Stipulations for the identification and protection of cultural resources are included in the North Lease.
	Abandoned Shipwreck Act/Consultation and Determination	Abandoned Shipwreck Act 43 U.S.C. 2101 et seq.		Section 7.3.3 and Appendix E provide an evaluation of cultural resources that could occur in the Met Buoy Installation Area. Results of this assessment indicated that the installation, operation and decommissioning of the Met Buoy will have no impact on submerged archaeological properties.
U.S. Fish and Wildlife Service	Endangered Species Act Section 7 Consultation	16 U.S.C. 1536	50 CFR 402	No action required. These consultations were completed prior to the issuance of the North Lease.
Rhode Island Coastal Resource Management Council (CRMC) and the Massachusetts Office of Coastal Zone Management (CZM)	Coastal Zone Program Consistency Certification	Coastal Zone Management Act	15 CFR 930 Subpart C	No action required. A final Coastal Zone Consistency Determination has been issued for SAP activities in the RI-MA WEA.

1.1 Authorized Representative and Designated Operator

The Met Buoy will be installed, operated, and decommissioned by a vendor under contract to Deepwater Wind. Deepwater Wind will either own or lease the Met Buoy.

Deepwater Wind does not request to designate an operator. The contact information for Deepwater Wind's Authorized Representative is as follows:

Name of Authorized Representative	Jeffrey Grybowski
Title	Chief Executive Officer
Phone Number	401-868-4228
Email	jgrybowski@dwwind.com
Address	Deepwater Wind New England, LLC 56 Exchange Terrace, Suite 300 Providence, RI 02903

1.2 Certified Verification Agent Waiver Request

Pursuant to 30 CFR § 585.610(a)(9), BOEM may require a Certified Verification Agent (CVA) to certify to BOEM that the Met Buoy is designed to withstand the environmental and functional load conditions for the intended life of the Met Buoy at the Installation Area. Deepwater Wind requests a waiver of the CVA requirement per 30 CFR § 585.705(c) because the Met Buoy is a commercially available technology that has been deployed in similar conditions. The Deepwater Wind engineering team, which includes a Professional Engineer, will review and accept the design. Deepwater Wind will also inspect the equipment prior to installation, witness the installation, and prepare an installation report. This report will include a description of the equipment and the installation, including final coordinates of the installation site, the results of all commissioning tests, the plans and schedule for upcoming inspections and maintenance, and any noted problems or issues to be addressed.

1.3 Best Management Practices

Best management practices (BMPs) are described in Sections 1.3, 4.2.4, and 7.0. As stated in Section 4.1.6. In addition, Deepwater Wind will use many of the BMPs identified in the *Establishment of an OCS Alternative Energy and Alternate Use Program*, Record of Decision, December 2007. See Table 1-4 for a summary of these BMPs (numbering in Table 1-4 corresponds to the format of the noted Record of Decision).

Table 1-4 Best Management Practices

Best Management Practice	Location in SAP Document
7. Avoid known sensitive seafloor habitats	Section 7.1.1 and Appendix F
8. Avoid anchoring on sensitive seafloor habitats	Section 7.1.1 and Appendix F
9. Minimize seafloor disturbance during installation of the equipment	Sections 7.1.1 and 4.1
11. Routine inspection of the facilities to monitor scouring and ensure structural integrity	Section 5.2
12. Avoid the use of explosives that may impact fish or benthic organisms	No explosives will be used for activities proposed in the SAP.
15, 16, 18, and 22 related to minimizing/avoiding vessel impacts to marine mammals and sea turtles.	Section 4.1.3
19. Use existing data to identify important, sensitive, and unique marine habitats in the vicinity of the project and design the deployment to avoid adverse impacts to these habitats	Section 7
20. Minimize construction activities in areas containing anadromous fish during migration periods	Section 7.2.1

Table 1-4 Best Management Practices

Best Management Practice	Location in SAP Document
21. Minimize seafloor disturbance during installation of the buoys	Section 4.1
26. Minimize perching opportunities	Section 7.2.3
29. Comply with USCG lighting and marking requirements while using lighting technology that minimizes impacts to avian species	Table 1-2 and Section 4.1
37. Avoid impacts to the commercial fishing industry by marking the buoy(s) with USCG-approved marking and lighting to ensure safe vessel operation	Table 1-2 and Section 4.1
39. Avoid hard-bottom habitats, including seagrass communities and kelp beds	Section 7.2.1 and Appendix F
54. Prepare an oil spill response plan	Prior to commencing installation of the Met Buoy Deepwater Wind will submit an Oil Spill Response Plan for review and approval to the Oil Spill Response Division of the Bureau of Safety and Environmental Enforcement (BSEE). The plan will demonstrate compliance with 30 CFR 254.22(a), 254.23(a) and 254.23(g)(1).

2.0 CONFORMANCE WITH THE COMMERCIAL LEASE AND THE RI-MA EA/FONSI

On June 4, 2013, BOEM issued a FONSI based on a comprehensive Environmental Assessment (referred to herein as the "RI-MA EA") (BOEM 2013). The RI-MA EA analyzed the foreseeable consequences associated with issuing commercial leases within the WEA, which is inclusive of the North Lease location (Figure 1-1), as well as the site assessment activities including the installation of meteorological towers and monitoring buoys. The Met Buoy and associated equipment proposed is consistent with the equipment that has been analyzed in the RI-MA EA. BOEM identified several mitigation measures or SOCs in the RI-MA EA for buoy installation, operation, and decommissioning. The SOCs were developed by BOEM in consultation with other federal and state agencies to reduce or eliminate the potential environmental risks to or conflicts with individual environmental and socioeconomic resources upon issuance of a commercial lease for site assessment and characterization activities. BOEM has issued the mitigation measures for Deepwater Wind's lease-specific site characterization activities and site assessment activities in the North Lease based upon these SOCs. Table 2-1 and Section 7 of this SAP demonstrate how Deepwater Wind will conform to the SOCs required pursuant to the North Lease.

Table 2-1 Conformance with the Commercial Renewable Energy Lease Number OCS-A 0486 Stipulations

Addendum C Stipulation	Description	SAP Document
3 National Security and Military Operations		
3.2.4 Lessee Point-of-Contact for Evacuation/Suspension Notifications	The Lessee must inform the Lessor of the persons/offices to be notified to implement the terms of 3.2.2 and 3.2.3.	Paul Murphy, VP of operations Deepwater Wind New England, LLC 56 Exchange Terrace, Suite 300 Providence, RI 02903 Office: (401) 648-0613 Mobile: (412) 901-6587
3.2.5 Coordination with Command Headquarters	The Lessee must establish and maintain early contact and coordination with the appropriate command headquarters, in order to avoid or minimize the potential to conflict with and minimize the potential effects of conflicts with military operations.	Deepwater Wind will establish an appropriate point of contact at Fleet Forces in Norfolk, Virginia, as provided in the Commercial Lease.
3.3 Electromagnetic Emissions	The Lessee, prior to entry into any designated defense operating area, warning area, or water test area, must enter into an agreement with the commander of the appropriate command headquarters prior to commencing survey activities undertaken to support SAP or [Construction and	The Met Buoy Installation Area is located within the Narragansett Bay Operating Area (OPAREA). Deepwater Wind will provide the frequencies the Met buoy will use to

Table 2-1 Conformance with the Commercial Renewable Energy Lease Number OCS-A 0486 Stipulations

Addendum C Stipulation	Description	SAP Document
	Operations Plan] submittal, to coordinate the electromagnetic emissions associated with any survey activities. The Lessee must ensure that all electromagnetic emissions associated with such survey activities are controlled as directed by the commander of the appropriate command headquarters.	transmit data to confirm electromagnetic emissions from the SAP activities will not conflict with military operations.
4 Standard Operating Conditions		
4.1.1 Vessel Strike Avoidance Measures	The Lessee must ensure that all vessels associated with activities performed in support of plan (i.e., SAP and/or COP) submittal comply with the vessel-strike avoidance measures specified in stipulations 4.1.1.1 through 4.1.1.8, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.	See Section 4.1.3, Protected Species Avoidance
4.1.2 Marine Trash and Debris Prevention	The Lessee must ensure that vessel operators, employees and contractors actively engaged [in] site characterization activities performed in support of plan (i.e., SAP and/or COP) submittal are briefed on marine trash and debris awareness and elimination, as described in the Bureau of Safety and Environmental Enforcement Notice to Lessees (NTL) No. 2012-G01 ("Marine Trash and Debris Awareness and Elimination"), except that the Lessor will not require the Lessee, vessel operators, employees and contractors to undergo formal training or post placards. The Lessee must ensure that vessel operator employees, and contractors are made aware of the environmental and socioeconomic impacts associated with marine trash and debris and their responsibilities for ensuring that trash and debris are not intentionally or accidentally discharged into the marine environment. The above-referenced NTP provides information the Lessee may use for this awareness training.	On October 7, 2016 BOEM notified Deepwater Wind that NTL 2012-G01 had been superseded by NTL 2015-G03. Deepwater Wind will comply with this stipulation and NTL 2015-G03, except that formal training will not be conducted and placards will not be posted.
4.5.1 Reporting Injured or Dead Protected Species	The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals or sea turtles) are reported to the National Marine Fisheries Service Greater Atlantic Regional Fisheries Office Marine Mammal and Sea Turtle Stranding & Entanglement Hotline (866-755-6622) within 24 hours of sighting, regardless of whether the injury or death is caused by a vessel. In addition, if the injury or death was caused by a collision with a project-related vessel, the Lessee must ensure that the Lessor is notified of the strike within 24 hours. The notification of such strike must include the date and location (latitude/longitude) of the strike, the name of the vessel involved, and the species identification or a description of the animal, if possible. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS.	See Section 4.1.3.

3.0 PROJECT DESCRIPTION AND OBJECTIVES

3.1 Project Description and Objectives

The Met Buoy would be deployed for the purpose of collecting wind resource, metocean, and biological data to support development of offshore wind energy within the North Lease Area. The meteorological data will be used to model energy production estimates.

Deepwater Wind has selected a state-of-the-art Met Buoy that incorporates the best available technology. Design drawings of the technology proposed are provided in Appendix B. The Met Buoy will consist of instrumentation systems and supporting systems atop a floating moored buoy platform (Figure 3-1). The

floating platform consists of the AXYS Navy Oceanographic Meteorological Automated Device (NOMAD) hull, mooring chain, and clump weight anchor (Figure 3-2). The NOMAD hull consists of marine grade aluminum and measures 19.7 ft (6 m) long by 10.2 ft (3.1 m) wide. The vertical profile of the Met Buoy including instrumentation will be approximately 13.8 ft (4.2 m) from the sea surface to the top of the hull mast. The submerged portion of the hull would measure approximately 11.5 ft (3.5 m) below the sea surface from the water line to the bottom of the mooring yoke. The outer hull is finished with a marine grade epoxy and polyurethane yellow paint and bumpers. The hull has also been designed with consideration for avian species. Landing areas have been minimized and anti-perching devices will be installed.

The hull would be moored to the seabed using a steel chain attached to 1 or 2 concrete clump weight anchors. The anchors would weigh a total of up to 10 metric tons and sit on the seabed for an area of up to 108 ft^2 (10 m^2). The chain would be attached to the base of the hull via the steel mooring yoke. The area of the anchor chain sweep associated with the long-term operation of the Met Buoy is anticipated to be approximately 12 acres (based on an anchor chain radius of approximately 410 ft (125 m) on the sea floor. Anodes will be installed on the mooring yoke and hull for corrosion protection.

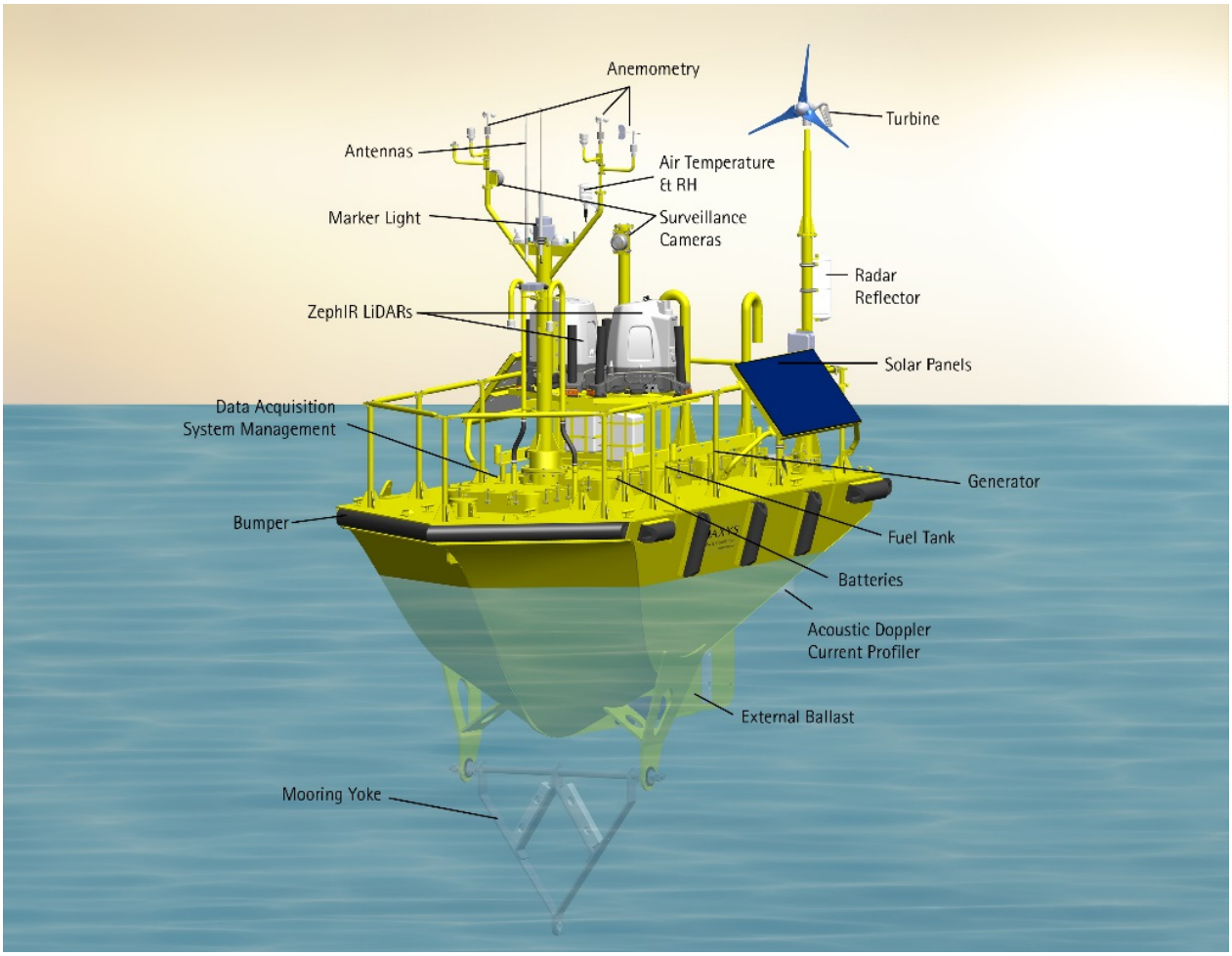

Figure 3-1 AXYS FLiDAR 6M™ Meteorological Buoy Proposed for Deepwater Wind

A single or dual light detection and ranging (LIDAR) instrumentation package will be installed atop the hull. The LIDAR unit is a wind profiling device capable of remotely collecting wind data at heights up to 656 ft (200 m) above the platform level. Each LIDAR unit is approximately 3.3 ft (1 m) in height. In addition to the LIDAR package, the Met Buoy instrumentation package consists of the following sensors:

- a wave sensor for measuring wave height, direction, and period;
- acoustic doppler current profiler (ADCP) for measuring current speed and direction;
- wind anemometer for measuring surface wind speed and direction;
- a sensor for measuring air temperature and relative humidity;
- barometric pressure sensor or measuring ambient air pressure; and
- an avian and bat monitor sensor.

Supporting systems for navigational aids, power supply, position tracking, and remote monitoring and data acquisition will also be installed atop the hull, including the following components:

- navigation aids such as lights, radar reflectors, and broadcasting devices;
- rechargeable batteries, powered by onboard wind turbines, solar panels, and a backup generator;
- global positioning system (GPS) and motion sensor for recording and transmitting buoy position; and
- onboard computers, antennas, and cameras for system monitoring and data acquisition, processing, and transmission.

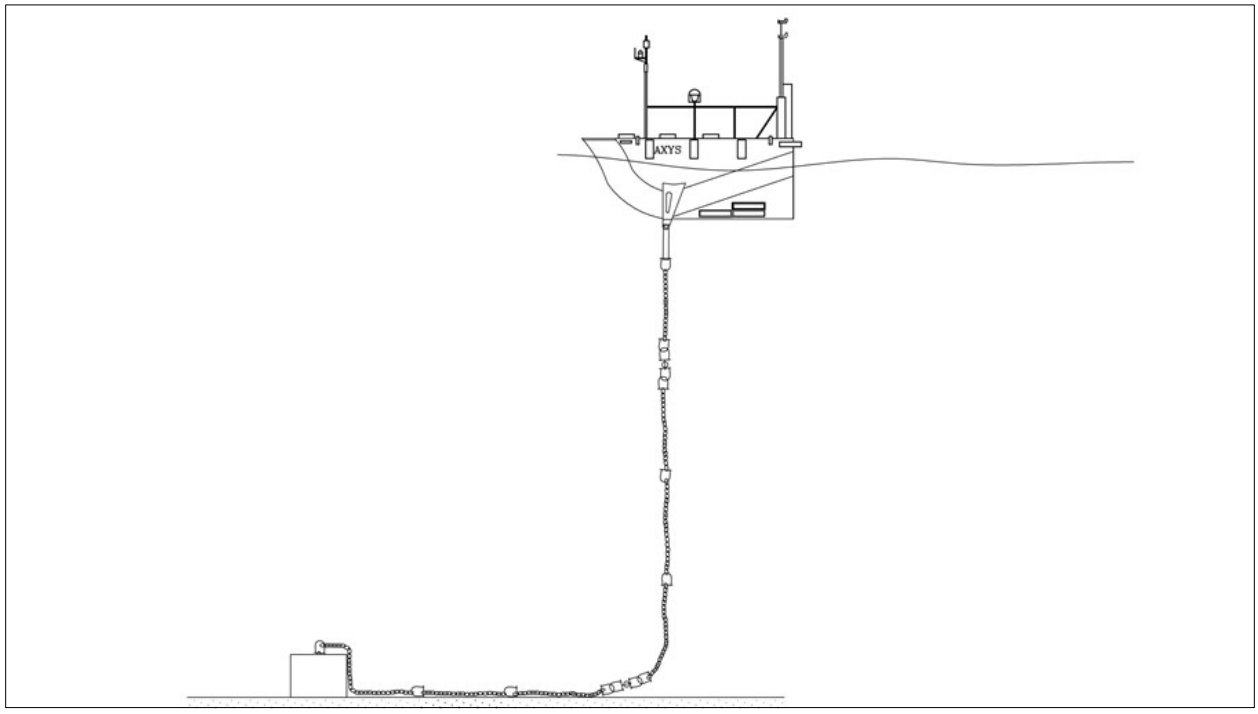

Figure 3-2 Mooring Arrangement for the Deepwater Wind Met Buoy

3.2 Schedule

Deepwater Wind plans to deploy the Met Buoy in the spring/summer of 2017. The operational life of the Met Buoy is anticipated to be 6 years. The Met Buoy will be decommissioned at the end of its operational life as described in Section 6.

3.3 Site Location

The Met Buoy will be deployed in federal waters of the Atlantic Ocean within OCS Block 6965, Aliquot M of the Official Protraction Diagram Providence NK19-07 (see Addendum A of North Lease, and Figure 1-1). The location of the Met Buoy is at or about 41° 05' 16" N and 71° 13' 22" W. Water depth at the Met Buoy Installation Area is approximately 115 ft (35.1 m). For the purposes of this SAP, the location of the Met Buoy is referred to as the Met Buoy Installation Area. The Met Buoy Installation Area is located approximately 23 mi (37 km) from the Rhode Island mainland and approximately 17 mi (27 km) from Block Island, Rhode Island.

4.0 DEPLOYMENT / INSTALLATION

Installation of the Met Buoy is planned over a 2 to 4-day installation period, barring weather delays, and will be staged out of Quonset, Rhode Island or comparable existing port in the northeast.

4.1 Overview of Installation and Deployment Activities

As part of the mobilization process, Deepwater Wind will notify mariners and other users of the area by submitting a request to the United States Coast Guard (USCG) for publication of a Local Notice to Mariners (LNM) two weeks prior to the start of the in-water work. This notice will include the contact names for the installation vessels, channels of communication, and the duration of the work. Copies of all USCG communications will be provided to BOEM as required. Additionally, in accordance with standard maritime practices, the vessel captain(s) will broadcast via VHF radio on Marine Channel 16 notification to mariners of their position and limited mobility during installation activities and submit an application to the USCG for a PATON for the Met Buoy (see Table 1-3)..

The installation process will be completed in two stages. The first stage will consist of installation of the clump weight anchor and mooring chain. The second stage will consist of connection of the hull to the mooring chain. All personnel participating in the installation will attend a health, safety, and environmental (HSE) briefing prior to commencing work.

Upon commencement of the work, the installation vessel will position itself near the clump weight deployment location. A marker float and rope will be attached to the free end of the mooring chain section that is connected to the clump weight and released into the water. This section of the mooring chain will then be released into the water. The installation vessel will adjust its position as necessary prior to deploying the clump weight. Upon reaching the desired location, the clump weight will be lifted via an A-frame or crane from the installation vessel into the water and lowered to the desired location. Deepwater Wind may elect to utilize a Remotely Operated Vehicle (ROV) to observe the underwater installation.

The Met Buoy installation can be achieved either by towing the hull to site or by deploying off of the deck of the installation vessel. The installation vessel and/or support tug will then retrieve the marker float connected to the previously deployed anchored mooring chain. The anchored section of the mooring chain will then be connected via shackle to the section connected to the mooring yoke on the hull of the Met

Buoy. The completed mooring will then be released into the water. Post installation checks will be completed, including visual checks of the mooring behavior and buoy movement.

4.2 Vessels

Deepwater Wind will employ a qualified marine contractor to transport and deploy the Met Buoy under the management and direction of Deepwater Wind. The marine contractor is expected to use the vessel types described in Table 4-1.

Table 4-1 Vessels to be Used for Met Buoy Installation

Vessel Type	Name	Approximate Dimensions	Lifting Capacity	Remarks
Work Vessel	TBD	200' x 60'	30 tons	Flat-topped barge or comparable work vessel with sufficient deck space to store and secure clump weight, mooring chain, hull, and all miscellaneous monitoring equipment to be installed on the Met Buoy. May use anchors or dynamic positioning for station keeping.
Handling Tug	TBD	TBD	N/A	Ocean-going tug for moving the work barge, anchor handling, and installation support.
Crew Boat	TBD	TBD	N/A	30-person crew boat to bring personnel to the work vessel twice per day as needed.

The installation vessel would utilize a two to four-point anchor or dynamic positioning system to hold position during installation activities. Vessel anchors would consist of up to four 4-ton anchors, each covering an area up to 10 ft by 10 ft (3 m by 3 m) to a depth of up to 12 ft (3.7 m). The anchor radius for a typical installation vessel would be up to approximately 2,000 ft (600 m).

4.3 Pre-Installation Briefing

Prior to the installation of the Met Buoy, all personnel will attend a HSE and installation plan briefing. In addition to the HSE, the briefing will also to establish responsibilities of each person, define the chains of command, discuss communication procedures, provide an overview of planned installation activities, and emergency procedures. The Deepwater Wind operations manager will have the authority to stop or delay any construction activity, if deemed necessary. New personnel will be briefed as they join the work in progress. Additional topics for the briefing include protected species avoidance, marine trash and debris awareness, and oil spill response procedures.

4.4 Protected Species Avoidance

All whales, dolphins, and porpoises in the northeast region are federally protected by the Marine Mammal Protection Act (MMPA) and many large whales in the area, as well as sea turtles, are further protected under the Endangered Species Act (ESA).

The North Lease contains specific stipulations to minimize risk to marine mammals and sea turtles that must be followed. Installation of the Met Buoy will not require pile-driving; accordingly, mitigations to reduce adverse impacts on protected species from pile driving do not apply to this installation. The Lease stipulations summarized in Table 4-2 apply to activities associated with installation, operation and decommissioning of the Met Buoy and must be adhered to.

Table 4-2 North Lease Protected Species Avoidance Stipulations

North Lease Stipulation Number	Requirement
4.1.1 Vessel Strike Avoidance Measures	The Lessee must ensure that all vessels conducting activity in support of plan (i.e., SAP and/or COP) submittal comply with the vessel-strike avoidance measures specified in stipulations 4.1.1.1 through 4.1.1.7, except under extraordinary circumstances when the safety of the vessel or crew are in doubt or the safety of life at sea is in question.
4.1.1.1	The Lessee must ensure that vessel operators and crews maintain a vigilant watch for cetaceans, pinnipeds, and sea turtles and slow down or stop their vessel to avoid striking these protected species.
4.1.1.2	The Lessee must ensure that all vessel operators comply with 10 knot (<18.5 km/hr) speed restrictions in any Dynamic Management Area (DMA) [1]. In addition, the Lessee must ensure that vessels 65 feet in length or greater, operating from November 1 through July 31, operate at speeds of 10 knots (<18.5 km/hr) or less.
4.1.1.3 North Atlantic right whales	
4.1.1.3.1	The Lessee must ensure all vessels maintain a separation distance of 500 m (1,640 ft) or greater from any sighted North Atlantic right whale(s).
4.1.1.3.2	The Lessee must ensure that the following avoidance measures are taken if a vessel comes within 500 m (1,640 ft) of a North Atlantic right whale(s):
4.1.1.3.2.1	If underway, vessels must steer a course away from any sighted North Atlantic right whale(s) at 10 knots (<18.5 km/h) or less until the 500 m (1,640 ft) minimum separation distance has been established (except as provided in 4.1.1.3.2.2).
4.1.1.3.2.2	If a North Atlantic right whale is sighted in a vessel's path, or within 100 m (328 ft) to an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. The Lessee must not engage the engines until the North Atlantic right whale(s) has moved outside the vessel's path and beyond 100 m (328 ft).
4.1.1.3.3	If a vessel is stationary, the vessel must not engage engines until the North Atlantic right whale(s) has moved beyond 100 m (328 ft), at which point the Lessee must comply with 4.1.1.3.2.1.
4.1.1.4 Non-delphinoid cetaceans other than the North Atlantic right whale.	
4.1.1.4.1	The Lessee must ensure all vessels maintain a separation distance of 100 m (328 ft) or greater from any sighted non-delphinoid cetacean(s) other than a North Atlantic right whale.
4.1.1.4.2	The Lessee must ensure that the following avoidance measures are taken if a vessel comes within 100 m (328 ft) of any non-delphinoid cetacean(s) other than a North Atlantic right whale:
4.1.1.4.2.1	If any non-delphinoid cetacean(s) other than a North Atlantic right whale is sighted, the vessel underway must reduce speed and shift the engine to neutral, and must not engage the engines until the non-delphinoid cetacean(s) has moved outside of the vessel's path and beyond 100 m (328 ft).
4.1.1.4.2.2	If a vessel is stationary, the vessel must not engage engines until the non-delphinoid cetacean(s) has moved out of the vessel's path and beyond 100 m (328 ft).
4.1.1.5 Delphinoid cetaceans.	
4.1.1.5.1	The Lessee must ensure that all vessels maintain a separation distance of 50 m (164 ft) or greater from any sighted delphinoid cetacean(s).
4.1.1.5.2	The Lessee must ensure the following avoidance measures are taken if the vessel comes within 50 m (164 ft) of a sighted delphinoid cetacean(s):
4.1.1.5.2.1	The Lessee must ensure that any vessel underway remain parallel to a sighted delphinoid cetacean's course whenever possible, and avoid excessive speed or abrupt changes in direction. The Lessee may not adjust course and speed until the delphinoid cetacean(s) has moved beyond 50 m (164 ft) and/or the delphinoid cetacean(s) has moved abeam of the underway vessel.
4.1.1.5.2.2	The Lessee must ensure that any vessel(s) underway reduce vessel speed to 10 knots (18.5 km/h) or less when pods (including mother/calf pairs) or large assemblages of delphinoid cetaceans are observed. The Lessee may not adjust course and speed until the delphinoid cetaceans have moved beyond 50 m (164 ft) and/or abeam of the underway vessel.
4.1.1.6 Sea Turtles.	
4.1.1.6.1	The Lessee must ensure all vessels maintain a separation distance of 50 m (164 ft) or greater from any sighted sea turtle(s).
4.1.1.7	The Lessee must ensure that all vessel operators are briefed to ensure they are familiar with the requirements specified in 4.1.1.

Table 4-2 North Lease Protected Species Avoidance Stipulations

North Lease Stipulation Number	Requirement
4.1.2 Marine Trash and Debris Prevention. [2]	The Lessee must ensure that vessel operators, employees, and contractors engaged in activity in support of plan (i.e., SAP and/or COP) submittal are briefed on marine trash and debris awareness and elimination, as described in the BSEE NTL No. 2012-G01 ("Marine Trash and Debris Awareness and Elimination") or any NTL that supersedes this NTL, except that the Lessor will not require the Lessee, vessel operators, employees, and contractors to undergo formal training or post placards. The Lessee must ensure that these vessel operator employees and contractors are made aware of the environmental and socioeconomic impacts associated with marine trash and debris and their responsibilities for ensuring that trash and debris are not intentionally or accidentally discharged into the marine environment. The above-referenced NTL provides information the Lessee may use for this awareness training.
Note: 1 A DMA is defined in Section 1.2 of the North Lease. Vessel operators may send a blank email to ne.rw.sightings@noaa.gov for an automatic response listing all current DMAs. 2 On October 7, 2016 BOEM notified Deepwater Wind that NTL 2012-G01 had been superseded by NTL 2015-G03. Deepwater Wind will comply with the revised NTL.	

4.4.1 Reporting of Injured or Dead Protected Species

During all phases of marine activities, Stipulation 4.4 in the North Lease specifies that sightings of any injured or dead protected species (sea turtles and marine mammals) will be reported within 24 hours, regardless of whether the injury or death was caused by a vessel. All marine activities will be suspended immediately and the circumstances reported as specified below if a dead or injured right whale is found in the Met Buoy Installation Area. The Lease stipulations summarized in Table 4-3 below apply and must be adhered to.

Table 4-3 North Lease Injured or Dead Protected Species Reporting Stipulations

North Lease Stipulation Number	Requirement
4.4.1 Reporting Injured or Dead Protected Species.	The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals or sea turtles) are reported to the NMFS Northeast Region's Stranding Hotline (800-900-3622 or current) within 24 hours of sighting, regardless of whether the injury or death is caused by a vessel. In addition, if the injury or death was caused by a collision with a project-related vessel, the Lessee must ensure that the Lessor is notified of the strike within 24 hours. The notification of such strike must include the date and location (latitude/longitude) of the strike, the name of the vessel involved, and the species identification or a description of the animal, if possible. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS.
4.4.2 Reporting Observed Impacts to Protected Species.	The Lessee must ensure that the observer report any observations concerning impacts on Endangered Species Act listed marine mammals or sea turtles to the Lessor and NMFS within 48 hours. The Lessee must report any injuries or mortalities using the NMFS Incident Report in Appendix A. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality must be reported within 24 hours to the Lessor and NMFS.
4.4.3 Report of Activities and Observations.	The Lessee must provide the Lessor and NMFS with a report within 90 calendar days following the commencement of HRG and/or geotechnical sampling activities that includes a summary of the survey activities and an estimate of the number of listed marine mammals and sea turtles observed or Taken during these survey activities.
4.4.4 Report Information	Data on all protected-species observations must be recorded based on standard marine mammal observer collection data by the protected-species observer. This information must include: dates, times, and locations of survey operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, behavior); and details of any observed Taking (e.g., behavioral disturbances or injury/mortality).

In addition to the above stipulations, if the injury or death was caused by a Project vessel or Project-related equipment or material/activity (e.g., support vessel, entanglement, buoy, etc.), Deepwater Wind will notify the National Marine Fisheries Service's (NMFS) Greater Atlantic Regional Fisheries Office (GARFO),

Protected Resources Division (978-281-9328) and BOEM immediately, and will provide a full report to NMFS.

BOEM has recently recommended that in addition to recording the above-listed information, wind energy projects should report any obtainable information as indicated on the Incident Report published in Appendix A of Addendum C of the North Lease. Deepwater Wind will use the Incident Report, a copy of which is included as Appendix C of this document. As required, should an incident occur resulting in injury or death to marine mammals or sea turtles, the Incident Report will be submitted to BOEM and NMFS within 24 hours. Any incident otherwise resulting in impacts to marine mammals or sea turtles, the Incident Report will be submitted to BOEM and NOAA Fisheries within 48 hours.

4.5 Marine Trash and Debris Awareness and Elimination

Deepwater Wind will comply with ensure that all employees and contractors are briefed on marine trash and debris awareness elimination, as required in Addendum C, Section 4.1.2 of the North Lease and as described in the BSEE NTL No. 2015-G03 which has superseded NTL 2012-G01.

4.6 Oil Spill Response

The Met Buoy will carry approximately 225 gallons of diesel to provide fuel for the backup generator. Prior to deploying the Met Buoy, Deepwater Wind will submit an Oil Spill Response Plan for review and approval to the Oil Spill Response Division of the BSEE. The plan will demonstrates compliance with 30 CFR 254.22(a), 254.23(a) and 254.23(g)(1). The Deepwater Wind Project Team includes an FQS-qualified individual.

4.7 Health and Safety

Deepwater Wind will implement a project-specific Health and Safety Plan to ensure the health and safety of all personnel involved in the installation, operation, and maintenance, and decommissioning of the Met Buoy. The project-specific plan will be prepared in accordance with the Deepwater Wind corporate health and safety plan. The plan will also address emergency response and reporting requirements.

5.0 OPERATIONS AND MAINTENANCE

5.1 Data Collection and Operations for Wind and Metocean Data

The Met Buoy will remain moored in position and transmit wind data and metocean measurements autonomously via a satellite telecommunications link. Operating status, including buoy power supply and GPS position, will be monitored remotely by a shore side base. Data packets including 10-minute average min/max/mean speed and direction will be downloaded daily for analysis. Routine operations will be limited to checking system status and data validation, troubleshooting, and remote resets if necessary.

5.2 Maintenance Activities

Planned on-site maintenance would be scheduled twice per year and would be completed by comparable or smaller vessels as the installation vessel. Planned maintenance activities would include replacement of consumables, service of sensors, data retrieval, and checking the mooring configuration.

5.3 Reporting

A copy of the maintenance and inspection report will be provided to BOEM with Semi-Annual Progress Reports required by the Commercial Lease (Stipulation No. 2.2.1), or upon request.

5.4 Potential Faults or Failures

The Met Buoy will be remotely monitored for the duration operations. Unplanned maintenance activities may be required in the event of a power supply failure, hull leak, buoy drift outside of designated area, mooring component failure, or other such event. If any of these problems are suspected, a technical service crew would be promptly dispatched to investigate and repair the issue. The Met Buoy is capable of operating at full capacity without renewable power or backup generator supply to the batteries for up to one week.

6.0 DECOMMISSIONING

BOEM requires decommissioning of facilities described in the SAP in accordance with § 585.901. Deepwater Wind will submit a decommissioning application to BOEM as required by § 585.902(b) prior to decommissioning of the buoy. Following BOEM approval of the decommissioning application, Deepwater Wind will notify BOEM at least 60 days prior to vessel deployment.

6.1 Overview of Decommissioning Activities

Upon completion of SAP activities, the Met Buoy will be decommissioned. The decommissioning process will be similar to the installation process but in reverse. Similar types and numbers of vessels used for the installation of the Met Buoy would be used for decommissioning. The work vessel would position itself on-site to detach the hull from the mooring chain and attach float markers to the loose ends of the mooring chain. The Met Buoy would then either be recovered to deck or towed off site. The clump weight would then be connected to the crane or A-frame of the work vessel and recovered to deck. The mooring chain would then be recovered to site.

6.2 Site Clearance Survey

Following decommissioning, Deepwater Wind will conduct a photographic or video bottom survey to provide objective evidence to BOEM that the area has been cleared as required in § 585.902(a)(2). The operation of the Met Buoy is not expected to result in any trash or bottom debris.

6.3 Reporting

As specified in the North Lease, Addendum C, Section 2.2, Deepwater Wind will submit a final progress report to BOEM at the conclusion of the activities covered by the SAP or at the conclusion of the site assessment term, whichever comes first. Deepwater Wind will notify BOEM of decommissioning activities in accordance with § 585.900-913. The notification and reporting process involves the following requirements:

- Prior to decommissioning, Deepwater Wind will submit a decommissioning application to BOEM in accordance with § 585.902 and § 585.905. Deepwater Wind will notify BOEM six months prior to decommissioning to allow BOEM sufficient time to respond.
- Once BOEM approves the decommissioning application, a decommissioning notice must be submitted to BOEM at least 60 days before commencing decommissioning activities.
- If an archaeological resource is discovered while conducting decommissioning activities, bottom-disturbing activities within 1,000 feet of the discovery will be halted. The discovery will be reported to BOEM within 72 hours. BOEM will inform Deepwater Wind on how to proceed. The discovery will be kept confidential outside of required BOEM notifications.
- Deepwater Wind will provide BOEM with documentation of any coordination efforts made with other agencies regarding decommissioning activities.

- Deepwater Wind will submit a decommissioning report to the BOEM within 60 days of completion of the decommissioning activities.

7.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

A detailed understanding of the biological resources, archaeological resources, and geophysical and geotechnical conditions has been developed through site surveys and analysis that were conducted in October 27 through November 2, 2015 in support of the North Lease SAP. The Survey Area covered a 930 m by 930 m (0.5 nm by 0.5 nm) site within the North Lease (Figure 1-1). Site surveys and analysis followed a detailed SAP Survey Plan which included protocols, methods, and/or used data that represented the state of industry techniques and knowledge at the time of the study. The SAP Survey Plan, detailing the SAP survey approach, timing, identified surveys, and reporting, was accepted by BOEM on August 19, 2015.

The following sections describe the affected environment, impacts and proposed mitigation measures for resources known to occur within the Met Buoy Installation Area. The Met Buoy Installation Area encompasses the entire Survey Area evaluated during the October and November 2015 survey activities. The analysis focuses on the maximum area of potential disturbance associated with the installation, operation, and decommissioning of the Met Buoy, approximately 12 acres (4.9 hectares).

7.1 Geologic Conditions

7.1.1 Affected Environment

The Met Buoy Installation Area is located on the shallow shelf of the Atlantic continental margin approximately 17 mi (28 km) east-southeast of Block Island and 28 mi (45 km) south of Newport, Rhode Island. A bathymetric and geophysical survey was conducted by Ocean Surveys, Inc. (OSI) between October 27 and November 2 2015. The high-resolution geophysical (HRG) surveying and sampling was conducted in accordance with BOEM guidelines to evaluate the impact of the installation on physical and potential cultural resources as well as to characterize seafloor and sub-seafloor conditions that could affect the Met Buoy installation, operation, and decommissioning activities. Survey operations included bathymetric mapping with a multibeam echo sounder, seafloor imaging with side scan sonar, shallow-penetration sub-bottom imaging with a chirp system, medium-penetration sub-bottom imaging with a boomer system, magnetic intensity measurements, sediment grab sampling, and acquiring underwater camera video of the seabed.

Data from this survey effort, along with information from published regional and local geological investigations, were compiled and reviewed to describe the surface and subsurface geologic conditions in the Met Buoy Installation Area.

The HRG survey investigations were performed within the Met Buoy Installation Area measuring 930 m by 930 m (0.5 nm by 0.5 nm) within OCS BOEM Lease Block 6965. The seafloor within the Met Buoy Installation Area is relatively flat to gently sloping with depths ranging from 106 ft to 119 ft (32.2 m to 36.2 m). The water depth at the Met Buoy Location is approximately115 ft (35.1 m).

The surficial sediments throughout much of the site are comprised of coarse-grained sands, gravel, and boulders. Boulder concentration and size vary but seem to be most pronounced in the northern half of the site and especially in the northwest quadrant. Sub-bottom profile data document the area is underlain by unconsolidated sediments, with a surficial layer of 16.4 ft to 21.3 ft (5 m to 6.5 m) of coarse sands. Three fairly prominent and one intermittent subsurface reflectors were identified underlying the site within 98.4 ft

(30 m) of the seafloor. Sub-bottom data suggest that coarse sediment and boulders may be encountered in the shallow subsurface of the site but sub-bottom reflectors suggestive of bedrock were not detected.

Side scan sonar imagery, sub-bottom profiling, grab samples and underwater video imagery provided information to characterize the seafloor within the site. Based on the integrated analysis of these data sets, a general surficial reflectivity/sediment classification scheme has been defined for the Met Buoy Installation Area. These seabed types are summarized in Table 7-1 and presented in Drawing 4 of Appendix 9 in Appendix D. In general the Type areas can be differentiated by the presence of boulders. Within Type 1 areas boulders are absent whereas within Type 2 and 3 areas boulders are present. Within the Type 2 areas boulders appear to be scattered while within the Type 3 areas they are abundant and concentrated. Sand ripples are also generally concentrated in the Type 2 and 3 areas. Sand ripples were generally small (less than 3.3 ft [1 m] wave height), oriented northeast/southwest, and had wavelengths less than 3.3 ft (1 m). The scale and distribution of ripples and lack of observed larger sediment bedforms or evidence of scour around the boulders indicates that significant bottom currents are not present within the installation area.

Table 7-1 Geological Conditions and Anthropogenic Hazards in the Met Buoy Installation Area

Platform Identification	Water Depth (m MLLW)	Surficial Sediment Types	Identified Survey Targets with a recommended avoidance distance
Met Buoy	35.1	Type 1: Unconsolidated fine to coarse sands Type 2: Unconsolidated medium to coarse sands with gravel, cobbles, and isolated boulders Type 3: Unconsolidated medium to coarse sands with gravel, cobbles, and abundant boulders	Magnetometer Contacts: None Side-Scan Sonar Targets: None

Side scan sonar imagery was also reviewed along with magnetometer data to identify isolated seafloor features. A total of 1,062 side scan sonar targets and 69 magnetic anomalies have been identified within the Met Buoy Installation Area. These side scan sonar targets and magnetic targets are presented in plan view in Drawing 3 of Appendix 9 in Appendix D. The average height for all of the sonar targets identified is approximately 2.6 ft (0.8 m) and the maximum target height is approximately 9.2 ft (2.8 m). As expected, the vast majority of sonar targets identified appear to be oblong shaped boulders on the seafloor. Of the magnetic anomalies identified, all but five are less than 25 nanotesla (nT) and only one is greater than 100 nT. Many of the magnetic anomalies are located within 82 ft (25 m) of a side scan sonar target and are listed as possibly associated with the target; however, since the amplitude of these anomalies is generally very small (less than 25 nT), they likely do not indicate that the target represents a feature of significant ferrous mass. No alignment of magnetic anomalies was detected that might be suggestive of a submarine cable or pipeline in the area. An evaluation of the potential cultural significance of these targets is provided in Appendix E and summarized in Section 7.3.3.

The geophysical and geotechnical datasets were analyzed for seafloor and sub-seafloor hazards, which could pose a potential risk to the installation and operation of the Met Buoy. These hazard are summarized in Table 7-2. The sidescan and multibeam bathymetry datasets were interpreted and found to contain no evidence of the surficial expression of shallow faults, and the sub-bottom profiler data showed no significant offsets of sedimentary bedding indicative of shallow faults. No areas of acoustic whiteouts or other amplitude anomalies were observed in the sub-bottom profiler data, as would be anticipated for any significant accumulation of shallow gas. The sub-bottom profiler records do not contain any bottom simulating reflectors, which are a typical indication of the presence of hydrates. The generally low relief of the Met Buoy Installation Area, along with the lack of observed buried failure planes, slump blocks, or other evidence of mass wasting in the sub-bottom profiler records indicate that slump blocks and slump

sediment are not found within the study area. The interpretation of the sidescan sonar, multibeam bathymetry, and sub-bottom profile datasets provide no evidence of ice scour, such as seabed gouging by either icebergs or sea ice pressure ridges. Additionally, no craters or other seabed evidence of strudel scours were noted in any of the datasets.

The geophysical and geotechnical datasets were used to confirm additional geological hazards were not present. The sidescan sonar, multibeam bathymetry, and sub-bottom profiler datasets were reviewed and do not provide any evidence of seismic activity, such as extensive or regional faulting or slump and mass wasting features. Additionally, no fault zones, nor any other faulting activity, are identified either from seabed data or from the sub-bottom profiler records, as would typically be indicated by offset sedimentary bedding planes in the sub-bottom profiles or linear fault-related features on the seabed. No faults or other sedimentary features indicative of differential compaction or localized seabed subsidence have been identified. As there has been no faulting identified, there has also been no evidence of faulting attenuation effects observed in the geophysical datasets. These results are consistent with the expected nature of the passive continental margin off of Rhode Island.

Table 7-2 Seafloor and Sub-Seafloor Hazards

Hazard	Definition	Identified and Description
Seafloor		
Scarp	An exposed face of soil above the head of a landslide.	None present
Channels	The deepest portion of a body of water through which the main volume or current of water flows.	None present
Ridges	A relatively narrow elevation which is prominent on account of steep angle at which it rises.	None present
Bedforms	Features that develop due to the movement of sediment by the interaction of flowing water; critical angle and forces required for movement are dependent upon many factors.	Sand ripples detected in site. Generally small (less than 1 m wave height), oriented northeast/southwest and had wavelengths less than 1 m.
Exposed Rocky Area	Surface expression of bedrock outcropping on seafloor.	Bedrock surface not resolved within project depth of interest.
Boulders	Glacial erratics (boulders) greater than 12 inches in diameter (USCS); outcropping coarse till/drift or lag deposit.	Cobbles and boulders present on the seafloor within the site; sub-meter to several meters in size. The largest boulder detected ~8 meters along its longest axis and extending ~2.5 meters from seafloor. Primary boulder concentration in northwest quadrant of site.
Buried Boulders	Glacial erratics (boulders) greater than 12 inches in diameter (USCS); subsurface coarse till/drift or lag deposits.	Cobbles and boulders expected in the subsurface within coarse sediment unit mapped within 5-6.5 meters of seafloor.
Pock Marks / Depressions	Craters in the seabed caused by fluids (gas and liquids) erupting /streaming through the seabed sediments.	None present
Seabed Scars / Ice Scour / Drag Marks	Incisions or cuts into the seafloor may be associated with glacial advances/retreats or bottom fishing activity.	None present
Buried Channels	Former fluvial drainage pathways during sea level low stands, usually only deepest portion of the waterway in-filled and preserved. Mark ancestral patterns of glacier meltwater runoff.	None present
Submarine Canyons	Steep-sided valley cut into the seafloor of the continental slope, sometimes extending well onto the continental shelf.	None present
River Channel	Outline of a path of relatively shallow and narrow body of fluid	N/A
Exposed Hardbottom Surfaces	Any semi-lithified to solid rock strata exposed at the seafloor; in this area, may include bedrock or a nearly continuous pavement of fragmented rock or boulders.	None present

Table 7-2 Seafloor and Sub-Seafloor Hazards

Hazard	Definition	Identified and Description
Shallow Gas	Subsurface concentration of material in gaseous form that has accumulated by the process of decomposition of carbon-based materials (former living organisms).	None present
Gas Hydrates	Subsurface gas deposits that were formed at or near the seafloor in association with hydrocarbon seeps.	None present
Gas/Fluid Expulsion Features	Upward movement of gas/fluid via low resistance pathways through sediments onto the seafloor; may be related to other hazards diapirs, faults, shallow water flows).	None present
Diapiric Structure Expressions	The extrusion of more mobile and ductily-deformable material forced onto the seafloor from pressure below.	None present
Karst Areas	Landscape formed from the dissolution of soluble rocks.	N/A
Faults, Faulting Expression, Fault Activity	Physiographic feature (surface expression) related to a fracture, fault, or fracture zone along which there has been displacement of the sides relative to one another.	None present
Slumping, Sliding Seafloor Features	Large scale structures that result from the downslope movement of sediments due to instability and gravity. In the submarine environment these structures are often found in slope environments along coastal margins.	None present
Steep/Unstable Seafloor Slopes	Large scale feature/stretch of ground forming a natural or artificial incline, with a slope that approaches the angle of repose (maximum angle at which the material remains stable).	None present
Scour/Erosion Features	Erosion of material due to water flow. Often associated with erosion adjacent to larger natural and man-made structures.	None present
Sensitive Benthic Habitats (chemosynthetic communities, SAV)	Shallow water habitats of submerged aquatic vegetation (SAV) including macroalgae and sea grasses	None present

7.1.2 Potential Impacts and Proposed Mitigation Measures

Based on the results of the 2015 Site Characterization Survey of the Met Buoy Installation Area and associated report (Appendix D), the site conditions are suitable for the installation of the Met Buoy and associated mooring equipment. No notable hazards have been identified which would preclude installation at this location. Caution should be used when deploying and recovering the anchors and mooring lines to monitor for possible entanglement with seabed boulders, which could foul the lines, increase anchor recovery tensions, and cause increased abrasion of mooring lines.

The lack of large-scale sediment bedforms and the absence of scour or moats around the boulders indicates that seabed scour due to bottom currents is unlikely to be an issue. Evidence of scour at the anchor locations will be investigated during regular maintenance, but is not anticipated to be a problem for the Met Buoy or mooring system. Additional maintenance surveys will be conducted, as needed, following major storm events to monitor for movement of the anchors, sediment deposition, and/or scour around the anchors.

7.2 Biological Resources

7.2.1 Benthic and Fisheries Resources

Affected Environment

To support the evaluation of the benthic and fisheries resource conditions in the Met Buoy Installation Area, a desktop analysis was performed to gather information on the benthic, demersal, and pelagic species, and sediment grain size. Published data sources indicated that the benthic habitat both throughout the Met Buoy Installation Area as well as at the Met Buoy location is primarily medium and coarse-grained sand (Greene

et al. 2010; LaFrance et al. 2010; EPA 2012; Northeast Ocean Data 2014). This type of substrate provides habitat for infaunal polychaete annelids and molluscs, and does not support any seagrasses, hardbottom, livebottom, or any other unique or sensitive habitat features.

In October and November 2015, OSI under contact to Deepwater Wind conducted a Site Characterization Survey of the Met Buoy Installation Area (see Section 7.1 and Appendix D). During this survey, two benthic grab samples and video imagery were collected within the Met Buoy Survey/Installation Area. These data were evaluated to further support and verify the results of the desktop analysis. Results of the complete Benthic Site Assessment are provided in Appendix F. Per discussions with BOEM, only one sample was required for analysis, so the sample closest to the Met Buoy Installation Area was analyzed in the laboratory (Grab Sample No. DW-01). Benthic grab DW-01, collected from within the Met Buoy Installation Area, provided data on sediment grain size, total organic carbon (TOC), and benthic infauna composition. Sample DW-01 was primarily composed of very coarse and coarse sand (43.95%), followed by medium sand (29.10%). The sample also contained granule gravel (14.05%), pebble gravel (9.32%), and very fine and fine sand (3.58%). No cobble gravel or silt and clay was evident in the sample. TOC was less than 100 mg/kg.

Results of the sediment sample analysis, as well as the results of the Site Characterization Survey performed by OSI (Appendix D) and the Nature Conservancy's Benthic Habitat Model (Greene et al. 2010) confirmed that the benthic habitat is dominated by medium and coarse-grained sand; however, the Site Characterization Survey also verified the presence of gravel and boulders (sub-meter to over 26 ft [8 m] in size) within the Met Buoy Installation Area, which were not predicted by Greene et al. (2010). Based upon the site-specific survey, boulder concentration is most pronounced in the northern half of the site, especially in the northwest quadrant of the Met Buoy Installation Area (approximately 179 m from the buoy installation site). The Met Buoy Installation Area is, however, boulder-free (Figure 7-1).

Surficial sediment types identified in the Site Characterization Survey were classified by grain size and relief into three types (Table 7-1), which can be simultaneously categorized into Coastal and Marine Ecological Classification Standard (CMECS) groups (NOAA 2012). Type 1 surficial sediment represents fine unconsolidated substrate, or sand (from very coarse sand to fine sand); type 2 represents coarse unconsolidated substrate, or gravel mixes (sandy to muddy gravel) and gravelly (gravelly sand to gravelly mud); and type 3 represents gravel (boulder to granule), another type of coarse unconsolidated substrate. Within the survey area, boulders are only present in types 2 and 3, while type 1 is only sand. The distribution of surficial types, and thus, the overlap of CMECS groups, throughout the entire Met Buoy Installation Area is shown in Table 3 in Appendix F, and Drawing 4 in Appendix 9 of Appendix D. These seabed types are also summarized in Table 7-1 and Figure 7 in Appendix D. A total of 1,062 side scan sonar targets have been identified within the survey area. The average height for all of the sonar targets identified is 0.8 meters and the maximum target height is 2.8 meters. As expected, the vast majority of sonar targets identified appear to be oblong shaped boulders on the seafloor, as summarized in Appendix 5 of Appendix D.

Benthic infauna results were also representative of the benthic habitat at the Met Buoy Installation Area. Analysis of sample DW-01 revealed a total of 58 individuals from 16 species. Polychaetes were the most numerically abundant phylum present in the sample; however, at the species-level, the most abundant organism was a juvenile sea urchin (class Echinoidea). Arthropods and nematodes were also identified. These results are consistent with other studies. For example, LaFrance et al. (2010) found that arthropods, molluscs, polychaete worms, and echinoderms dominated the benthic infauna in the general area around the Met Buoy Location within Rhode Island Sound; these organisms, with the exception of molluscs, were

Figure 7-1 Sediment Classification

also present in the DW-01 sample. However, with the variation in substrate type, it would be expected that benthic infauna would vary somewhat throughout the Met Buoy Installation Area. Further details on the benthic sampling methods and results can be found in the Benthic Site Assessment provided in Appendix F.

Fish and invertebrate abundance and distribution within the Met Buoy Installation Area are influenced by benthic habitat and by physical and chemical characteristics of the water (e.g. depth, temperature, salinity, nutrient concentrations, and ocean currents) (Helfman et al. 2009; Levinton 2009). Other factors, including predator/prey relationships, water quality, and refuge (e.g., physical structure or vegetation cover) may affect fish distribution; however, these factors operate on more regional or local spatial scales (Helfman et al. 2009).

In 1996, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was reauthorized and amended by the Sustainable Fisheries Act, which mandated numerous changes to the existing legislation designed to prevent overfishing, rebuild depleted fish stocks, minimize bycatch, enhance research, improve monitoring, and protect fish habitat (Public Law 104-267). These mandates additionally reauthorized the Essential Fish Habitat (EFH) provision, which provides the means to conserve fish habitat. EFH is defined as those waters and seafloor necessary (required to support a sustainable fishery and the managed species) to fish for spawning, breeding, feeding, or growth to maturity (i.e., full life cycle) (16 USC §1802 [10]). These waters include aquatic areas and their associated physical, chemical, and biological properties used by fish, and may additionally include areas historically used by fish. Benthic and water column habitats at the Met Buoy Location include EFH for several federally-managed fish species.

The benthic environment refers to anything associated with or occurring on the bottom of a body of water. Species within this environment are adapted to live on the substrate, and may burrow into the ocean floor. The benthic macroinvertebrates associated with the waters off of Rhode Island consists of a wide variety of species. Macrobenthic fauna generally comprise several species groups that show varying affinities to certain bottom types and the potential for seasonality within those habitats (RI Ocean SAMP 2011). It was anticipated that coarser sands, as found throughout the Met Buoy Installation Area, may be dominated by several amphipod and polychaete species (Steimle 1982); results of the benthic infauna analysis of DW-01 revealed that polychaetes were the most abundant taxa, but echinoderms were the most abundant individuals. These types of soft substrates are also likely to be well-oxygenated and may maintain a mix of organisms such as amphipods, bivalves, and polychaete worms. The harder substrate types (e.g., cobble and gravel) found within the Met Buoy Installation Area are likely to be dominated by macrobenthic invertebrate species (Knebel et al. 1982).

A variety of benthic macroinvertebrates may also occur within the Met Buoy Installation Area. These species include short finned squid (*Illex illecebrosus*), long finned squid (*Loligo pealeii*), Atlantic surfclam (*Spisula solidissima*), ocean quahog (*Arctica islandica*), and Atlantic sea scallop (*Placopecten magellanicus*) (Greene et al. 2010). Of these invertebrate species, only the ocean quahog (in the juvenile and adult stages) has designated EFH at the Met Buoy Installation Area (NOAA EFH Mapper 2014; NOAA-GARFO 2014). Many of these macroinvertebrates are also considered to be of economic importance to the region (See Section 7.2.5).

Fish species that occur within the Met Buoy Installation Area can be divided into two groups based upon their habitat preferences: demersal or pelagic. The demersal zone refers to the part of the water column closest to bottom substrate in an aquatic or marine system. Fish within this grouping occupy waters adjacent to bottom areas, feed on benthic organisms, and may have a strong relationship with benthic habitat complexity (e.g., hardbottom, reef), as complex habitats contain greater fish diversity (Malek et al. 2010).

Many demersal fish may occur year-round in these waters; however, abundances may vary with both season and life stage. Seventeen demersal finfish have recognized EFH located within the Met Buoy Installation Area. These species are summarized in Table 7-3.

Table 7-3 Demersal Fish with Identified EFH within the Met Buoy Installation Area (NOAA EFH Mapper 2014; NOAA-GARFO 2014)

Common Name	Scientific Name	Life Stage (s) with Designated EFH at Location
American plaice	*Hippoglossus hippoglossus*	Larvae
Atlantic cod	*Gadus morhua*	Eggs, Larvae, Juveniles, Adults
Black sea bass	*Centropristis striata*	Juveniles
Haddock	*Melanogrammus aeglefinus*	Larvae
Little skate	*Leucoraja erinacea*	Juvenile, Adults
Monkfish	*Lophius americanus*	Eggs, Larvae, Adults
Ocean pout	*Macrozoarces americanus*	Eggs, Larvae, Juveniles, Adults
Red hake	*Urophycis chuss*	Eggs, Larvae, Juveniles
Scup	*Stenotomus chrysops*	Juveniles, Adults
Silver hake (whiting)	*Merluccius bilinearis*	Eggs, Larvae, Juveniles, Adults
Spiny dogfish	*Squalus acanthias*	Juveniles, Adults
Summer flounder	*Paralichthys dentatus*	Eggs, Larvae, Adults
Witch flounder	*Glyptocephalus cynoglossus*	Eggs, Larvae
Windowpane flounder	*Scophthalmus aquosus*	Eggs, Larvae, Juveniles, Adults
Winter flounder	*Pseudopleuronectes americanus*	Eggs, Larvae, Juveniles, Adults
Winter skate	*Leucoraja ocellata*	Juveniles, Adults
Yellowtail flounder	*Limanda ferruginea*	Eggs, Larvae, Juveniles, Adults

At the Met Buoy Installation Area, the pelagic zone refers to the surface or mid-water depths. Pelagic fish can be broadly categorized into horizontal and vertical distributions in the water column, with the highest number and diversity occurring where the habitat is most diverse, reflecting the structural complexity (habitat structure/relief, seamounts, Sargassum patches, etc.), and/or a variety of physical and chemical conditions (currents, upwelling, nutrients, dissolved oxygen, and temperature) in the Met Buoy Installation Area (Parin 1984; Moyle and Cech 1996; Helfman et al. 2009). Pelagic fish feed on organisms within the water column or on the water surface.

Thirteen of the pelagic finfish species potentially occurring at the buoy location have identified EFH within the Met Buoy Installation Area. These species are summarized in Table 7-4.

Table 7-4 Pelagic Fish with Identified EFH within the Met Buoy Installation Area (NOAA EFH Mapper 2014; NOAA-GARFO 2014)

Common Name	Scientific Name	Life Stage (s) with Designated EFH at Location
Atlantic bluefin tuna	*Thunnus thynnus*	Juveniles, Adults
Atlantic herring	*Clupea harengus*	Larvae, Juveniles, Adults
Atlantic mackerel	*Scomber scombrus*	Eggs
Bluefish	*Pomatomus saltatrix*	Eggs, Larvae, Adults
Blue shark	*Prionace glauca*	Larvae, Juveniles, Adults
Cobia	*Rachycentron canadum*	Eggs, Larvae, Juveniles, Adults
Dusky shark	*Carcharhinus obscurus*	Juveniles
King mackerel	*Scomberomorus cavalla*	Eggs, Larvae, Juveniles, Adults
Sandbar shark	*Carcharhinus plumbeus*	Juveniles, Adults

Table 7-4 Pelagic Fish with Identified EFH within the Met Buoy Installation Area (NOAA EFH Mapper 2014; NOAA-GARFO 2014)

Common Name	Scientific Name	Life Stage (s) with Designated EFH at Location
Shortfin mako shark	*Isurus oxyrinchus*	Larvae, Juveniles
Spanish mackerel	*Scomberomorus maculatus*	Eggs, Larvae, Juveniles, Adults
Thresher shark	*Alopias vulpinus*	Larvae, Juveniles, Adults
Tiger shark	*Galeocerdo cuvieri*	Larvae

Of the thirteen pelagic finfish species listed with an EFH at the buoy locations, seven are listed as Atlantic Highly Migratory Species. These species include:

- Atlantic bluefin tuna
- Blue shark
- Dusky shark
- Sandbar shark
- Shortfin mako shark
- Thresher shark
- Tiger shark

The potential locations of Habitat Areas of Particular Concern (HAPC) were also researched using desktop analysis. HAPCs are a discrete subset of EFH that provide extremely important ecological functions or are especially vulnerable to degradation. Desktop analysis did not identify any HAPCs at the Met Buoy Installation Area (NOAA EFH Mapper 2014).

Potential Impacts and Proposed Mitigation Measures

Deployment of the Met Buoy in the Installation Area is not expected to result in significant effects to fisheries resources or result in significant changes in local community assemblage and diversity, or the availability of habitat and forage items.

Installation and maintenance activities, including support vessel anchoring activities would result in the short-term disturbance of the seafloor habitat. It is anticipated that benthic fauna directly within the small footprint of the buoy anchor system and at support vessel anchoring locations will experience mortality. Benthic fauna that may be located at these sites will be particularly susceptible to harm or mortality if located in the area of anchor chain sweep; however, as BOEM concluded in the RI-MA EA in consultations with NOAA, because impacts are expected to be localized, short-term, and temporary, it is unlikely that loss of benthos during the installation, operation, or decommissioning activities of the Met Buoy would affect the general population or productivity of the surrounding area (BOEM 2013). Additionally, opportunistic species, including polychaetes and amphipods known to occur in the Met Buoy Installation Area, are some of the quickest species to recolonize following physical disturbance to habitats (Newell et al. 2004; Gill 2005). This allows new habitat to be created if the conditions are suitable (Kaiser and Spencer 1996; Gill 2005). BOEM (2013) estimates recovery after disturbance to the soft-bottom habitat similar to those found to dominate the Met Buoy Installation Area typically occurs within one to three years (BOEM 2013).

Since the Met Buoy will float on the water surface, with only a clump weight mooring in contact with the seabed during operations, impacts on the seabed will be limited(Wilhelmsson et al. 2006). The installation of the buoy and moorings would introduce an artificial hard substrate tot the otherwise soft substrate. In addition, like some of the boulders and hard substrate located throughout the Met Buoy Installation Area,

the mooring structures may provide an ecological purpose, functioning as an artificial reef habitat for invertebrates and pelagic and demersal fish species, enhancing the local ecosystem in the process (Gill 2005). Growth on the buoy and mooring system may stimulate invertebrate species community growth, allowing them to accumulate on the seafloor (Langhamer and Wilhelmsson 2009; Boehlert and Gill 2010). Though the anticipated artificial reef effect provided by the buoy and associated mooring system may stimulate some species but negatively affect others, placements in sandy substrate areas, as found in the Met Buoy Installation Area, will likely result in greater invertebrate biodiversity, potentially benefiting the wider marine environment (Inger et al. 2009; Boehlert and Gill 2010). The overall ability for species to colonize these structures is, however, heavily influenced by a number of factors, including age, texture, depth, complexity, and position in the water column (Langhamer et al. 2009).

The Met Buoy may modify the pelagic habitat by providing a structure where none existed before, they may, therefore, increase both the density and biomass of various marine species (e.g., krill, mysids, and fishes), when compared with surrounding benthic areas (Wilhelmsson et al. 1998; Wilhelmsson and Malm 2008; Inger et al. 2009). In doing so, this structure may serve as fish aggregation devices (FAD), providing protection, food, geographical references, meeting points, spawning substrates, cleaning stations, and resting areas for fish species (Castro et al. 2002). Both benthic and semi-pelagic fishes have been found in high abundances near marine structure, so a new structure such as the Met Buoy may act as an artificial reef or FAD in the area (Wilhelmsson et al. 2006). This effect may particularly be seen in migratory pelagic fish, as noted in previous research performed on bigeye and yellowfin tuna (Itano and Holland 2000).

After completion of site assessment activities, the Met Buoy would be removed and transported by vessel to shore. When the Met Buoy is removed, the areas disturbed by the mooring system will fill in through natural processes and will ultimately be recolonized with native benthic species (Lundquist et al. 2010). The temporary and isolated disturbance of buoy installation and decommissioning activities is expected to result in negligible impacts to fish and benthos (BOEM 2013).

7.2.2 Marine Mammals and Sea Turtles

Affected Environment

Kenney and Vigness-Raposa (2010) report 50 species of marine mammals (whales, dolphins, porpoise, and seals) that are protected by the MMPA and are known to be present, at least seasonally, in the continental shelf waters of the North Atlantic Ocean. Of these 50 marine mammal species, 30 cetacean species, 5 pinnipeds, and the West Indian manatee (*Trichechus manatus*) have been sighted within the coastal waters of Rhode Island (Table 7-5). Most of the species identified are migratory and pass through Rhode Island Sound, the adjacent Atlantic Ocean, and the deeper continental shelf waters during annual migrations from feeding grounds to mating grounds. Some whale species (fin, humpback, and minke whales) are present year-round in the continental shelf waters but are relatively rare in the more shallow waters of Rhode Island Sound; most cetaceans found off the Rhode Island coast are, in general, more likely to be found during the spring and summer (Kenney et al. 1985).

Table 7-5 Marine Mammal Occurrence in Rhode Island Sound

Common Name	Scientific Name	Seasonality	Status	Estimated Auditory Bandwidth[1]
Odontocetes (Toothed Whales)				
Phocoenidae				
Harbor Porpoise	*Phocoena phocoena*	Spring, Summer, Fall	MMPA	200 Hz to 180 kHz
Delphinidae				

Table 7-5 Marine Mammal Occurrence in Rhode Island Sound

Common Name	Scientific Name	Seasonality	Status	Estimated Auditory Bandwidth[1]
White-Sided Dolphin	*Lagenorhynchus acutus*	Fall, Winter, Spring	MMPA	150 Hz to 160 kHz
Short-beaked Common Dolphin	*Delphinus delphis*	Year-round	MMPA	150 Hz to 160 kHz
Bottlenosed Dolphin	*Tursiops truncates*	Winter, Spring, Summer	MMPA	150 Hz to 160 kHz
Clymene Dolphin	*Stenella clymene*	Unlikely	MMPA	150 Hz to 160 kHz
Pan-Tropical Spotted Dolphin	*Stenella attenuata*	Unlikely	MMPA	150 Hz to 160 kHz
Atlantic Spotted Dolphin	*Stenella frontalis*	Unlikely	MMPA	150 Hz to 160 kHz
Striped Dolphin	*Stenella coeruleoalba*	Unlikely	MMPA	150 Hz to 160 kHz
Risso's Dolphin	*Grampus griseus*	Unlikely	MMPA	150 Hz to 160 kHz
Spinner Dolphin	*Stenella longirostris*	Unlikely	MMPA	150 Hz to 160 kHz
Killer Whale	*Orcinus orca*	Unlikely	Endangered-certain populations	150 Hz to 160 kHz
False Killer Whale	*Pseudorca crassidens*	Unlikely	MMPA	150 Hz to 160 kHz
Melon-headed whale	*Peponocephala electra*	Unlikely	MMPA	150 Hz to 160 kHz
Sperm Whale	*Physeter macrocephalus*	Occasional Summer	Endangered	150 Hz to 160 kHz
Dwarf Sperm Whale	*Peponocephala electra*	Unlikely	MMPA	150 Hz to 160 kHz
Pygmy Sperm Whale	*Kogia breviceps*	Unlikely	MMPA	200 Hz to 180 kHz
Long-finned Pilot Whale	*Globicephala melas*	Occasional Year-round	MMPA	150 Hz to 160 kHz
Short-finned pilot whale	*Globicephala macrorhynchus*	Unlikely	MMPA	150 Hz to 160 kHz
Ziphiidae				
Blainville's Beaked Whale	*Mesoplodon densirostris*	Unlikely	MMPA	150 Hz to 160 kHz
True's Beaked Whale	*Mesoplodon mirus*	Unlikely	MMPA	150 Hz to 160 kHz
Gervais' Beaked Whale	*Mesoplodon europaeus*	Unlikely	MMPA	150 Hz to 160 kHz
Cuvier's Beaked Whale	*Ziphius cavirostris*	Unlikely	MMPA	150 Hz to 160 kHz
Sowerby's Beaked Whale	*Mesoplodon bidens*	Unlikely	MMPA	150 Hz to 160 kHz
Mysticetes (Baleen Whales)				
Balaenopteridae				
Humpback Whale	*Megaptera novaeangliae*	Spring, Summer	Endangered	7 Hz to 22 kHz
Fin Whale	*Balaenoptera physalus*	Year- round	Endangered	7 Hz to 22 kHz
Sei Whale	*Balaenoptera borealis*	Unlikely	Endangered	7 Hz to 22 kHz
Minke Whale	*Balaenoptera acutorostrata*	Spring, Summer	MMPA	7 Hz to 22 kHz
Blue Whale	*Balaenoptera musculus*	Unlikely	Endangered	7 Hz to 22 kHz
Bryde's Whale	*Balaenoptera edeni*	Unlikely	MMPA	7 Hz to 22 kHz
Balaenidae				
North Atlantic Right Whale	*Eubalaena glacialis*	Spring and Fall	Endangered	50 to 600 Hz[2]
Sirenia				
Trichechidae				
West Indian Manatee	Trichechus manatus	Unlikely	Endangered	10 to 60 kHz
Pinnipeds				
Phocidae				
Harbor Seal	*Phoca vitulina*	Fall/Winter/Spring	MMPA	75 Hz to 75 kHz

Table 7-5 Marine Mammal Occurrence in Rhode Island Sound

Common Name	Scientific Name	Seasonality	Status	Estimated Auditory Bandwidth[1]
Gray Seal	*Halichoerus grypus*	Infrequent Fall/Winter/Spring	MMPA	75 Hz to 75 kHz
Harp Seal	*Pagophilus groenlandicus*	Rare January-May	MMPA	75 Hz to 75 kHz
Hooded Seal	*Cystophora cristata*	Rare Summer/Fall	MMPA	75 Hz to 75 kHz
Ringed Seal	*Pusa hispida*	Unlikely	MMPA	75 Hz to 75 kHz
Sea Turtles				
Atlantic hawksbill sea turtle	*Eretmochelys imbricate*	Unlikely	Endangered	Unknown
Atlantic (Kemp's) ridley sea turtle	*Lepidochelys kempii*	Unlikely, juveniles rarely found in shallow water	Endangered	100 to 500 Hz[3]
Green sea turtle	*Chelonia mydas*	Unlikely, juveniles rarely found in shallow water	Endangered	100 to 500 Hz[3]
Loggerhead sea turtle	*Carretta caretta*	Occasional Summer, Fall	Threatened	250 to 750 Hz[4]
Leatherback sea turtle	*Dermochelys coriacea*	Occasional Summer, Fall	Endangered	Unknown

Hz – hertz; kHz – kilohertz; MMPA – Marine Mammal Protection Act
1 Southall et al. (2007)
2 Vanderlaan et al. (2003) and Parks et al. (2010)
3 Bartol and Ketten (2006)
4 Bartol et al. (1999)

Six species of marine mammals known to occur in Rhode Island waters are listed under the ESA. These species include the North Atlantic right whale, humpback, sei, fin, blue, sperm whale, and the West Indian manatee. These species are highly migratory and do not spend extended periods of time in a localized area. The waters of Rhode Island and southern Massachusetts are primarily used as a stopover point for these species during seasonal movements north or south between important feeding and breeding grounds. The typical migratory routes for right whales and other baleen whales lie further offshore and outside of the Met Buoy Installation Area (Kenney and Vigness-Raposa 2010; RI Ocean SAMP 2010). While the fin, humpback, and right whales have the potential to occur near the Met Buoy Installation Area, the sperm, blue, and sei whales are more pelagic and/or northern species and their presence is unlikely. Additionally, the while the West Indian manatee has been sighted in Rhode Island waters, such events have been extremely rare.

In addition to marine mammals there are five species of sea turtles listed as threatened or endangered under the ESA that have historically been reported to occur in the waters off the coast of Rhode Island (Table 7-5). These species include the leatherback (endangered), loggerhead (threatened), Atlantic (Kemp's) ridley (endangered), green (endangered), and hawksbill (endangered). Of these species, the only sea turtles that are likely to be encountered off the coasts of Rhode Island are the loggerhead, leatherback, Kemp's ridley, and green turtles during summer and fall. However, the loggerhead turtle is more likely to be encountered in offshore waters. The remaining sea turtle species (Atlantic and hawksbill turtles) generally range outside of the Met Buoy Location, usually in more pelagic waters, or are so rarely sighted that their presence is unlikely.

Potential Impacts and Proposed Mitigation Measures

Potential impacts to marine mammals and sea turtles from installation of an environmental monitoring buoy was analyzed in the RI-MA EA (BOEM 2013). Based on BOEM's assessment, the installation of an environmental monitoring buoy similar to the one proposed by Deepwater Wind is not anticipated to result in any significant or population-level effects to marine mammals. The potential effects to marine mammals

are expected to be very localized and temporary resulting in minimal to negligible harassment. Activities associated with installation of the Met Buoy that may affect marine mammals include: (1) deployment and decommissioning of the buoy itself; (2) vessel traffic; and (3) discharges of waste materials and accidental fuel releases.

Marine mammals and sea turtles may be affected by surface vessel noise during buoy deployment, decommissioning, and any subsequent maintenance needs during operation. Vessel noise associated with these activities, as analyzed by BOEM in the RI-MA EA for standard vessels anticipated to be within an acoustic range of 150 to 170 decibels re 1 µPa-m, would generally produce low levels of noise at frequencies below 1,000 hertz (Hz) that would dissipate quickly with distance from the source. In general, exposure of marine mammals and sea turtles to individual vessels would be transient, and the noise intensity would vary depending upon the source and specific location. Reactions of marine mammals may include apparent indifference, cessation of vocalizations or feeding activity, and evasive behavior (e.g., turns, diving) to avoid approaching vessels (Richardson et al. 1995; Nowacek and Wells 2001). BOEM (2013) concluded that behavior would likely return to normal following passage of the vessel, and it is unlikely that such short-term effects would result in long-term population-level impacts for marine mammals. Thus, impacts from vessel noise would be negligible if detectible, and short-term.

For potential benthic habitat impacts that may affect marine mammals and sea turtles, BOEM (2013) concluded that re-suspension of bottom sediment and the ensuing sedimentation that would occur around a recently-deployed buoy would have only minor temporary effects that could impact the habitat and food availability for marine mammals and sea turtles due to limited utilization of the benthic environment by these species and the limited impact to the benthos itself from buoy installation, operation and decommissioning. As described in section 7.2.1, the installation of the Met Buoy is not expected to result in any changes in local community assemblage and diversity or the availability of habitat and forage items for marine mammals and sea turtles.

Vessels associated with buoy installation, operation and decommissioning could collide with marine mammals and sea turtles during transit. However, considering the protected species avoidance measures outlines in the North Lease (Table 4-2), the limited spatial and temporal scale of buoy installation/decommissioning, and Deepwater Wind's compliance with the vessel strike avoidance measures outlined in the North Lease (see Section 4.1.3), no significant impacts due to vessel strikes are anticipated. Moreover, due to the nature and volume of existing and historic vessel traffic in the area, it is unlikely that the vessel traffic associated with the Met Buoy would substantially increase the risk that marine mammals are struck during activities.

BOEM (2013) has also concluded that the limited amount of vessel traffic associated with installation/decommissioning of environmental monitoring buoys would result in infrequent, if any, release of liquid wastes. Therefore, impacts to marine mammals and sea turtles from the discharge of waste materials or the accidental release of fuels during Met Buoy installation, operation (maintenance) and decommissioning are expected to be minor, if they occur at all. In addition, as stated in Section 4.1.2, all support personnel will participate in a pre-installation briefing that will cover topics that not only include protected species avoidance, but also marine trash and debris awareness and oil spill response procedures.

7.2.3 Avian and Bat Resources

Affected Environment

According to recent assessments and studies the Met Buoy Installation Area provides habitat for approximately 25 waterbird species, including seaducks, loons, gulls, scoters, terns, alcids, gannets, and shorebirds (BOEM 2013). With the exception of gulls, use of the Met Buoy Installation Area by most waterbird species is seasonal. Some passerine species, raptors, and other landbirds may occur in coastal waters or on nearby terrestrial areas, and may migrate through the Met Buoy Installation Area (BOEM 2013). Furthermore, since the Met Buoy Installation Area is located within the Atlantic Flyway, other migratory birds are likely to pass through the Met Buoy Installation Area during spring and fall migration (BOEM 2013). Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) migrate and forage over land, inland water bodies, and bays, but not the open ocean.

The federally listed threatened piping plover (*Charadrius melodus*) and red knot (*Calidris canutus ssp. rufa*), and the federally listed endangered roseate tern (*Sterna dougallii dougallii*) are known to occur or migrate through the region surrounding the Met Buoy Installation Area (BOEM 2013). Piping plover and red knot do not have additional state status, but the roseate tern is considered a "state historical" species since it has been documented in the last 100 years, but has otherwise not been documented in Rhode Island since 1979 (RINHP 2006). All three species use the coastal habitats that area near the Met Buoy Installation Area. Piping plovers are known to occur in Rhode Island's Newport and Washington counties but, since they tend to stay within narrow coastal margins during migration, they are not expected to occur in the Met Buoy Installation Area (BOEM 2013). The exact migration routes of red knots and Roseate terns are unknown, but it is possible that both species may pass through the Met Buoy Installation Area during spring and fall migration (BOEM 2013). Red knots breed in the arctic, and little activity is expected from roseate terns in the Met Buoy Installation Area during nesting and post-breeding staging periods (BOEM 2013).

Bat occurrence patterns in the Met Buoy Installation Area, and offshore in general, are poorly understood. Bats that are known to currently or historically occur in Rhode Island include big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*L. cinereus*), tri-colored bat (*Perimyotis subflavus*), silver-haired bat (*Lasionycterus noctivagans*), eastern small-footed bat (*Myotis leibii*), little brown bat (*M. lucifugus*), and northern long-eared bat (*Myotis septentrionalis*) (BOEM 2013). Northern long-eared bats are a federally listed threatened species. Big brown bat, tri-colored bat, eastern small-footed bat, little brown bat, and northern long-eared bat are all cave-dwelling species that do not migrate over the ocean, so they are not expected to be in the Met Buoy Installation Area. Little is known about bat migration over the ocean 20 miles offshore. The only bats with potential to migrate through the Met Buoy Installation Area on their way between breeding and wintering grounds in the spring and fall are the eastern red bat, hoary bat, and silver-haired bat (BOEM 2013).

Potential Impacts and Proposed Mitigation Measures

In the RI-MA EA BOEM has concluded, and United States Fish and Wildlife Service (USFWS) has concurred, that there "is no expected threat of significant impact" on avian or bat resources from either site characterization or assessment activities in the Met Buoy Installation Area (BOEM 2013). Meteorological buoys are close to the water surface and have minimal equipment, which reduces the likelihood of collisions. Loons, shearwaters, storm-petrels, gannets, sea ducks, gulls, terns, and alcids tend to fly lower than other birds and, thus, may be at slightly higher risk of collision but overall risk is still considered to be low. Collision risk may also increase in foggy conditions. Since the Met Buoy Installation Area is offshore, the Met Buoy is not expected affect bald or golden eagles.

While the impact of the Met Buoy on both avian and bat species are anticipated to be minimal, to ensure potential interactions are avoided to the maximum extent possible, Deepwater Wind has committed to implement several BMPs during installation, operation, and decommissioning of the Met Buoy. Specifically the Met Buoy has been designed to have rounded rails that will reduce perching. Landing areas have also been minimized and anti-perching devices will be installed. While birds may still perch on the buoy and/or associated equipment, it will not pose a threat to any species.

Artificial lights have also been known to attract birds and bats migrating at night. However, the increase in artificial lighting from the Met Buoy would be negligible compared with other sources of light in the area, including lighting on commercial, recreational, and military vessels. In addition, it is anticipated that installation of the Met Buoy will occur during daylight hours and that artificial lighting will not be necessary on the installation vessels. Should any artificial lights be deemed necessary on the installation or operational support vessels, Deepwater Wind will ensure they are hooded and downward directed.

In the unlikely event that Deepwater Wind identifies any federal or state-listed avian fatalities during the installation or operation of the Met Buoy, they will be reported within 24 hours to both BOEM and USFWS. In addition, an annual report will be provided to BOEM documenting any dead or injured birds or bats found on vessels and structures during construction, operations, and decommissioning. The report will contain the following information: the name of the species, date found, location, a picture to confirm species identity (if possible), and any other relevant information. Carcasses with Federal or research bands must be reported to the U.S. Geological Society Bird Band Laboratory, available at https://www.pwrc.usgs.gov/bbl/.

7.3 Physical Resources

7.3.1 Water and Air Quality

Water Quality

Since the vast majority of pollutants and threats to marine waters originate on land, there are far fewer identified threats to marine water quality originating from activities in the marine environment. Vessel discharges, including bilge and ballast water and sanitary waste, may affect water quality when vessels are traveling to and from the Met Buoy during installation, operation, and decommissioning. However, BOEM concluded in the revised RI-MA EA that any impacts to coastal and marine waters caused by vessel discharges and structure installation and decommissioning would be minimal, if detectable (BOEM 2013). Deepwater Wind will comply with BSEE NTL 2015-G03 (see Table 2-1) regarding marine trash and debris prevention. Because the discharge of trash is generally prohibited, BOEM has concluded that no environmental effects are likely to occur as a result of trash discharge, even if some trash or debris is discharged accidentally. Deepwater Wind will implement an Oil Spill Response Plan. Additionally as stated in Sections 4.1.4 and 4.1.5, Deepwater Wind will ensure that all employees and contractors are briefed on marine trash and debris awareness elimination and as appropriate and oil spill response procedures.

Air Quality

The entire state of Rhode Island was recently designated as unclassifiable/attainment with the 2008 8-hour ozone (O_3) standard in the revised National Ambient Air Quality Standard (NAAQS), meaning that there is not enough information to make a determination at this time and/or the state does not need to take additional steps to control emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOCs), the pollutants that react in the atmosphere to form O_3. However, 40 CFR 81 still retains the moderate

nonattainment designation for all of Rhode Island for the 1997 8-hour O_3 standard. In addition, the Environmental Protection Agency (EPA) has designated Rhode Island as an unclassifiable/attainment area for the new one-hour NO_2 NAAQS, which were promulgated in 2010, pending the collection of additional monitoring data. A similar designation is expected for the one-hour sulfur dioxide (SO_2) NAAQS. Rhode Island is in attainment of all other NAAQS (RIDEM OAR 2011). With the exception of Dukes County, Massachusetts (closest to meeting the standards or "marginal" designation), the State of Massachusetts was also listed as unclassifiable/attainment by the EPA. Additionally, all of Rhode Island and Massachusetts are within the Northeast Ozone Transportation Region as designated by the Clean Air Act.

The installation, operation and decommissioning of the Met Buoy has the potential to impact local air quality. Potential emission sources would however be limited to a tug boat, work vessels, a crane and other equipment that could be used for the installation, operation, and decommissioning. Vessels associated with these activities would emit criteria air pollutants (NO_x, carbon monoxide [CO], sulfur dioxide [SO_2], particulate matter less than 10 microns in diameter [PM_{10}], particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), and VOCs), hazardous air pollutants (HAPs) and greenhouse gasses [GHGs]). Vessels would emit pollutants both in state and federal waters while traveling to and from the Met Buoy Installation Area throughout the operational lifecycle. Impacts from pollutant emissions associated with these vessels would likely be localized within immediate vicinity of the Met Buoy location and in the vicinity of vessel activity.

It is anticipated that the installation and decommissioning of the Met Buoy would each be completed over a period of approximately 2 to 4 days for a total of 4 to 8 days. To be conservative, Deepwater Wind completed air emission calculations based on 10 days for installation and an additional 10 days for decommissioning for a total of 20 days. This contingency covers the potential for weather and other unforeseen events that, although unlikely, could occur. Deepwater Wind has assumed 8 round trips per year of a work boat during the 6 year operational period for a total of 42 round trips during the operations phase. A summary of the air emission estimates is presented in the Table 7-6, and the detailed emission calculations and assumptions are presented in Appendix G.

Table 7-6 Deepwater Wind Met Buoy Air Emissions Summary

Met Facilities Activity	VOC tons	NO_X tons	CO tons	PM/PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAPs tons	GHG tons CO_2e
Installation Activities	0.31	6.10	3.07	0.37	0.36	0.004	0.06	435.72
Annual Maintenance Activities	0.008	0.304	0.155	0.008	0.008	0.000	0.002	21.384
Decommissioning Activities	0.31	6.10	3.07	0.37	0.36	0.004	0.06	435.72
Maximum Annual Emissions [1]	0.32	6.40	3.22	0.38	0.37	0.0043	0.063	457.1

Note:
1. The maximum annual emissions assumes that the annual maintenance activities and either the installation or decommissioning activities occur in the same year.

Emissions associated with the installation, operation, and decommissioning of the Met Buoy would be minor based on the estimate of less than 50 tons per year of NO_X and VOCs, 100 tons per year of the other criteria air pollutants, and 25 tons per year of HAPs or 10 tons per year of any individual HAP. The majority of these emissions would occur within Met Buoy Installation Area and therefore would not affect local onshore air quality in either Rhode Island or Massachusetts. Additionally, since the Met Buoy would not be considered an OCS source and the project emissions are associated with mobile sources, and OCS air permit for these activities will not be required.

7.3.2 Social and Economic Resources

Commercial and Recreational Fishing

Affected Environment

The Met Buoy Installation Area borders an area of highly concentrated fishing effort referred to as Cox Ledge. Cox Ledge represents one of the most notable benthic communities in the vicinity of the Lease Areas. Along Cox Ledge there is a major change in depth which creates upwellings that provide warmer water temperatures during the winter period. Consequently, this area provides unique food, shelter, and reproductive benefits for various fish species (BOEM 2013). Recently, the New England Fishery Management Council as part of the Omnibus Essential Fish Habitat Amendment 2 Final Alternatives as of April 2015, approved the establishment a habitat management area on Cox Ledge within which the use of trawler ground cables and hydraulic clam dredges will be prohibited. The Met Buoy Installation Area is approximately 1,214 ft (370 m) from the northern edge of the Cox Ledge habitat management area. In addition to fishing activity along Cox Ledge, commercial and recreational fishing effort is concentrated in the western portion of the North Lease Area.

There are numerous port and marina locations shoreward of the Met Buoy Installation Area can be used by both commercial and recreational fishermen from Rhode Island, Massachusetts and from other states along the East Coast. New Bedford Harbor, for example, is used for marine shipping, commercial and recreational fishing, boating tourism, and a mix of other commercial, industrial, and recreational uses. In 2010, New Bedford ranked 10th in terms of pounds landed and 1st in terms of dollars landed out of all United States ports. For the New England Region, this port was ranked 1st in both pounds and dollars landed (National Ocean Economics Program 2014). In Rhode Island, the two major commercial fishing ports are Point Judith/Galilee and Newport, along with several smaller fishing ports used by both commercial and recreational fishermen (e.g., Sakonnet Point and Block Island). In 2010, Point Judith ranked 25th in terms of pounds landed and 26th in terms of dollars landed out of all major ports in the United States. In the New England Region, this port is ranked 4th both in pounds and dollars landed (National Ocean Economics Program 2014). These commercial fishing ports serve commercial fishermen and fishing vessels from Rhode Island and from other states along the East Coast.

Commercial fishing is generally segregated into either mobile or fixed gear fishing. Mobile gear fisheries are those in which fishing gear such as an otter trawl mid-water trawls, purse seins, gill nets, dredges, and rod and reel are deployed while in motion aboard a vessel, while fixed gear fisheries use gear such as lobster pots, fish traps, and gillnets, which are set in one location and then checked or retrieved later. The “mixed species” otter trawl fishery that occurs throughout the year in Rhode Island and southern Massachusetts waters targets some combination of squid, butterfish, scup, and whiting (RI Ocean SAMP 2010). In the federal waters associated with the Met Buoy Installation Area mid-water trawlers, as well as purse seiners from Rhode Island, Massachusetts and New York target herring and mackerel during the fall and winter months. (RI Ocean SAMP 2010). From 2000 to 2010, the top commercial fish species by pounds landed has varied by state and by year, alternating between squid and Atlantic herring in Rhode Island, Atlantic herring and mackerel in Massachusetts, and quahogs and squid in New York. The most economically valuable species landed during the same period ranged from quahogs in New York, American lobster in Rhode Island, and sea scallops in Massachusetts (NOAA 2014).

The Met Buoy Installation Area is located within a designated recreational fishing area (Figure 7-1). Recreational fishing in the region occurs year-round, but is most intensive from April through November. Recreational fishing vessels operate out of numerous ports located in Rhode Island, New York, Connecticut,

and southeastern Massachusetts, including the Elizabethan Islands and Martha's Vineyard. The most commonly targeted recreational species include Atlantic bonito, Atlantic cod, black sea bass, bluefish, scup, striped bass, summer flounder, winter flounder, tautog, yellowfin tuna, and bluefin tuna (NOAA Fisheries 2015). There are three types of saltwater recreational fishing activities common in offshore and along the coasts of Rhode Island and Southern New England, including shore-based fishing, fishing by private vessels, and fishing by charter vessels. Of these three types, fishing by private vessel comprises over 45 percent of the total within the Rhode Island. Conversely, party/charter vessel fishing comprises just 5 percent. Shore-based fishing accounts for the final 50 percent of Rhode Island's saltwater fishing (RI Ocean SAMP 2011). In contrast, Massachusetts recreational fishing activities in 2013 was comprised mostly of party/charter (52%), while private vessels and shore-based fishing comprised only 21 and 27 percent, respectively (NOAA Fisheries 2015). Saltwater fishing tournaments are also frequently held during the summer months in Rhode Island waters. The Rhode Island Saltwater Anglers Association currently sponsors 15 special fishing tournaments each year that target a variety of different species (e.g., cod, black sea bass, bluefish, striped bass, haddock, tuna and fluke) (RI Ocean SAMP 2010). Other tournaments held annually out of local ports in Rhode Island include such places as Snug Harbor and Block Island (RI Ocean SAMP 2010). Massachusetts also hosts approximately 44 tournaments which also involve waters of Southern New England (Northeast Regional Planning Body 2015).

BOEM (2013) collected data on high value commercial and recreational fishing areas within the North Lease Area during the development of the RI-MA EA including data provided by the Rhode Island Fisheries Advisory Board to support the assessment of impacts. Based on this information the fishing activities to occur in the Met Buoy Installation Area are likely to include a mixture of mobile (e.g., trawlers) or static gear (e.g., pots and gillnets) depending on the season. However it has been concluded by BOEM (2013) that fishing pressure in this area is lower in intensity as compared to surrounding area.

Potential Impacts and Proposed Mitigation Measures

Potential impacts to commercial and recreational fishing from installation of an environmental monitoring buoy was analyzed in the RI-MA EA (BOEM 2013). Based on BOEM's assessment, the installation of the Met Buoy is not anticipated to result in any significant effects to fishing activities. The potential effects associated with installation of the Met Buoy that may affect commercial and recreational fishing activities can be grouped into two broad categories: (1) displacement of fishing activities and (2) target species availability/species disturbance.

It is anticipated that installation and decommissioning of the Met Buoy would each take approximately 2 to 4 days and only require the support of two to three vessels. Given the limited extent of these activities BOEM (2013) has concluded that the increase in vessel traffic and activities related to the installation/operation of an environmental monitoring buoy would not measurably impact commercial or recreational fishing activities, the total catch of fish and shellfish, or navigation over any substantial period of time. Additionally, based on BOEM (2013) any impacts on localized fishing displacement and/or target species availability within the Met Buoy Installation Area are expected to be temporary, and to result in negligible impacts on fishing.

While no specific stipulations concerning interactions with commercial and recreational fishing are provided in the North Lease, as recommended in BOEM's October 20, 2015 Fisheries Social and Economic Conditions guidance document (BOEM 2015c), Deepwater Wind has hired a Fisheries Liaison, Ms. Elizabeth Casoni. As necessary, Ms. Casoni will conduct outreach with the surrounding commercial and recreational fishing communities including but not limited to Montauk, Point Judith, and New Bedford

prior to buoy deployment. Outreach with commercial and recreational fishermen will continue throughout the buoy deployment period as part of Deepwater Wind's standard fisheries communication plan. In addition, Deepwater Wind will notify commercial and recreational fishermen, as well as other users the area about the proposed activities via a Local Notice to Mariners and broadcasts on Marine Channel 16 prior to installation and decommissioning. Deepwater Wind will also submit an application to the USCG for a PATON for the Met Buoy (see also Section 4.0 and Table 1-3).

With regard to species disturbance, BOEM (2013) has concluded that impacts related to installation, operation, and decommissioning of the Met Buoy are expected to be minor and are not expected to result in changes in local community assemblage and diversity (see also Section 7.2.1). As such, these activities are not expected to have population-level impacts that would affect fisheries and the availability of fish to catch during or between fishing seasons.

Coastal and Marine Uses

Affected Environment

In addition to commercial and recreational fishing other coastal and marine uses such as seasonal tourism associated with beaches, sport fishing, and other coastal activities such as water sports and wildlife viewing are important to the local economies of many Rhode Island and Southern Massachusetts communities.

While the majority of recreational boating takes place in state waters within 3 nm (5.6 km) of the Rhode Island and Massachusetts coastlines, there is a long-distance sailboat racing route that traverses near the Met Buoy Installation Area (Figure 7-1). Wildlife viewing including bird watching, whale watching, and shark diving also occur near the Met Buoy location (Figure 7-1). The Met Buoy is also located within the Narragansett Bay Naval Operating Area but is not within areas restricted by the military. In addition, the Met Buoy Location avoids designated areas for commercial vessel traffic including fairways and recommended vessel routes, traffic separation schemes, deepwater routes, and precautionary and caution areas (Figure 1-1).

Potential Impacts and Mitigation Measures

Due to the limited spatial extent of the Met Buoy as well as the limited amount of activities necessary to support installation, operation and decommissioning of the Met Buoy will not significantly impact offshore social and economic resources including military uses, commercial shipping, recreational boating, sailboat racing and wildlife viewing (BOEM 2013). Adherence to the International Regulations for Preventing Collisions at Sea 1972 and the "Rule of Good Seamanship" by vessel operators will mitigate risks that the buoy may pose to safe navigation. Deepwater Wind will notify mariners and other users of the area about the proposed activities via a LNM and broadcasts on Marine Channel 16 prior to installation and decommissioning. Deepwater Wind will also submit an application to the USCG for a PATON for the Met Buoy (see also Section 4.0 and Table 1-3). Additionally, the navigational lighting will notify vessels of the Met Buoy so it can be safely avoided.

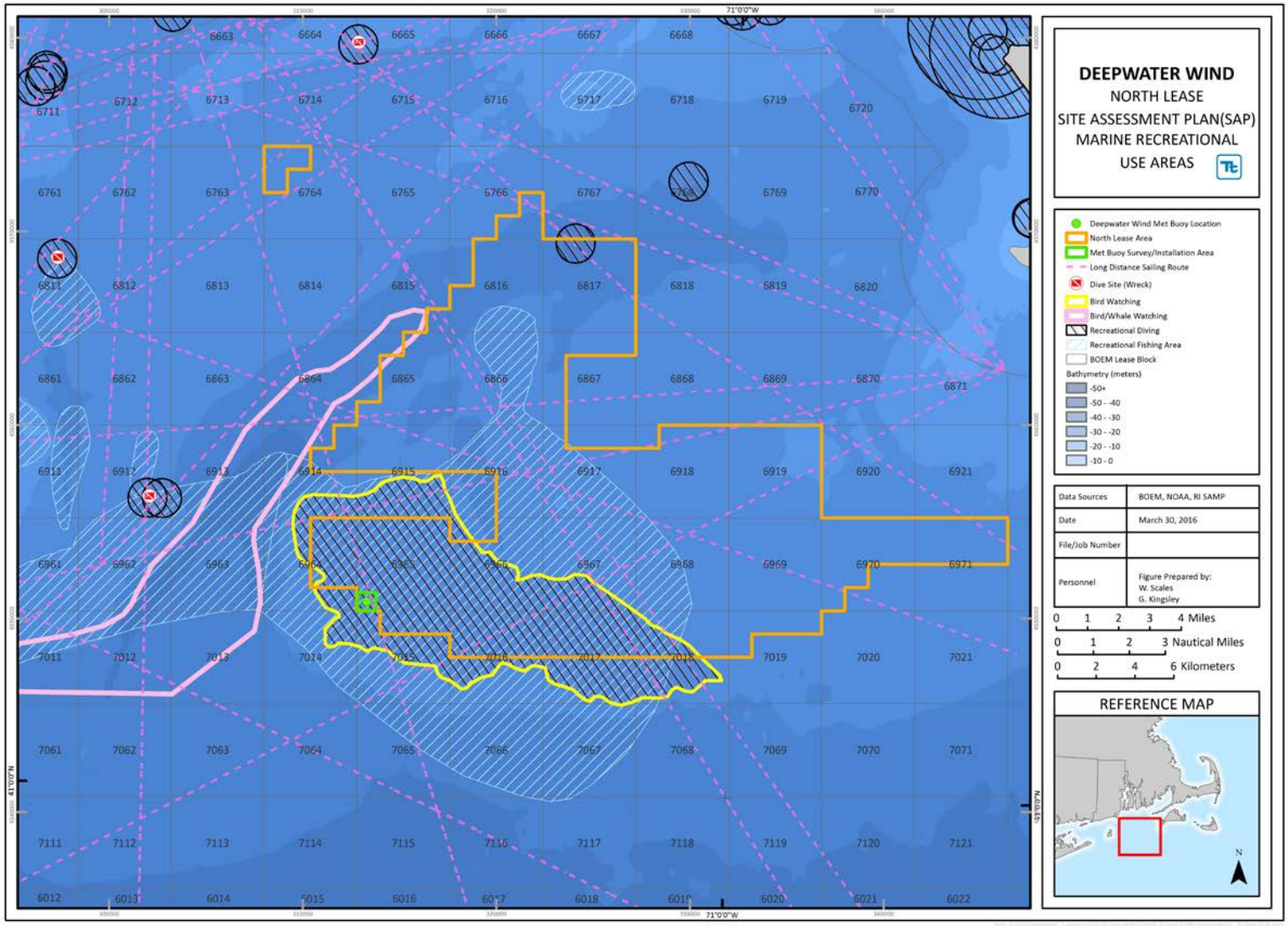

Figure 7-2 Marine Recreational Resources

7.3.3 Archeological Resources

Affected Environment

Installation of the Met Buoy has the potential to affect submerged archaeological resources that may relate to the prehistoric and historic time periods. Documentary and field research results show the submerged area to have limited potential for human activity and archaeological sensitivity for prehistoric cultural resources within the Met Buoy survey area is assessed as low.

During the prehistoric era, the region was habitable post 24,000 Before Present (BP). From an archaeological perspective the area was only subaerial during the Paleoindian period (circa 12,500-10,000 BP) and was inundated due to rapid marine transgression prior to the initiation of the subsequent Archaic period. The perspective of the Narragansett Indian Tribe does not document the marine transgression environmental change but asserts that the OCS was an open plain and potentially habitable for at least 24,000 years. Both archaeologists and Tribal oral historians agree there is potential that archaeological/Tribal materials from the cultural groups who inhabited portions of the OCS more than 15,000 years ago, when sea levels were recognized by both groups to be lower, may be in evidence during examinations of the seafloor today. Details of both the archaeological and Tribal perspectives on prehistoric occupation are in Appendix E. To date, no previously identified pre-contact archaeological sites have been documented in the Met Buoy Installation Area (Tuttle et al. 2016).

Historic period archaeological sites that could occur within offshore portions of the survey area are predominantly related to marine activity, such as historic shipwrecks from the 17th to 20th centuries (BOEM 2013). Historic documents indicate that there have indeed been numerous shipwrecks as well as aircraft losses in Rhode Island Sound. However, none have been specifically reported or located within the Met Buoy Installation Area (Tuttle et al. 2016).

In 2015 Gray & Pape, Inc. (Gray & Pape) conducted an archaeological assessment of the site-specific HRG remote sensing survey performed by OSI. The HRG survey and archaeological analysis were performed in accordance with BOEM's guidelines (BOEM 2015a and 2015b) and associated SOCs for cultural resources as defined in both the North Lease and the RI-MA EA. The detailed Marine Archaeological Resource Assessment Report in Support of the Deepwater Wind Offshore Wind Energy Project Met Buoy Placement Area Rhode Island Sound, Rhode Island is provided in Appendix G. The area surveyed was 0.5 nm by 0.5 nm (930 m by 930 m). Within this area anticipated maximum horizontal including seabed disturbance from the Met Buoy mooring system and associated support vessels is estimated to be a 12 acres (4.9 hectares). The vertical area of potential affect associated with the Met Buoy clump weight anchor's vertical penetration into the seabed, is estimated to be approximately 6.6 to 9.8 ft (2 to 3 m). Using the formula 1.17* square root of height in feet gives the distance an object can be observed due to the curvature of the earth in nautical miles. An object 13.8 feet tall may be seen at a distance of approximately 4.3 nautical miles. The Met Buoy will be well beyond this range from shore and will have no visual impact.

The HRG survey utilized numerous remote survey methods including: marine magnetometer, side scan sonar, subbottom profiler (chirp and boomer), multibeam sounding system, and sediment grabs. The survey activities conducted covered significantly larger area both horizontally and vertically to insure that any activities during the installation, operation and decommissioning of the Met Buoy will not endanger any potentially significant cultural resources (see Section 7.1 and Appendix E).

Gray & Pape's archaeological analysis of the HRG survey data identified no potential submerged cultural resources. Although there were 69 magnetic anomalies and over 1,060 side scan sonar contacts, several

which were co-located or in close proximity with magnetic anomalies, none had the obvious characteristics potential shipwreck or prehistoric site. Results of the archaeological assessment were reviewed with the Narragansett Indian Tribe on January 25, 2016.

Potential Impacts and Proposed Mitigation Measures

Based upon the results of the 2015 marine archaeological investigations, installation and operation of the Met Buoy would result in no impacts to marine archaeological resources. However, in compliance with 30 CFR 585.802, the Deepwater Wind North Lease, and in support of the SOCs, Deepwater Wind will develop an Unanticipated Discoveries Plan (UDP) prior to the start of installation. In the case of an inadvertent discovery of a cultural resource, Deepwater Wind's UDP will be implemented to prevent further disturbance of the resource.

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APPENDIX A

PERMITS AND CONSULTATIONS

APPENDIX B

EQUIPMENT SPECIFICATIONS

(CONFIDENTIAL – PROVIDED UNDER SEPARATE COVER)

APPENDIX C

PROTECTED SPECIES OBSERVATION INCIDENT REPORT

APPENDIX D

SITE CHARACTERIZATION REPORT

APPENDIX E

MARINE ARCHAEOLOGICAL RESOURCE ASSESSMENT REPORT IN SUPPORT OF THE DEEPWATER WIND OFFSHORE WIND ENERGY PROJECT MET BUOY PLACEMENT AREA RHODE ISLAND SOUND, RHODE ISLAND

(CONFIDENTIAL – PROVIDED UNDER SEPARATE COVER)

APPENDIX F

BENTHIC ASSESSMENT

APPENDIX G

AIR QUALITY EMISSIONS CALCULATIONS