# Site Assessment Plan

## Beacon Wind
## Massachusetts Wind Energy Lease Area OCS-A-0520

**Submitted to**


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and

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# EXECUTIVE SUMMARY

Beacon Wind, LLC (Beacon Wind) has prepared this Site Assessment Plan (SAP) in support of the installation and operation of one Floating Light Detection and Ranging (Floating LiDAR) buoy, two current meter moorings, and two wave and metocean buoys (collectively referred to as Metocean Equipment). The Floating LiDAR buoy is located in Official Protraction Diagram Block Island Shelf NK19-10 Block 6128, one metocean and one subsurface current meter buoy located in Official Protraction Diagram Block Island Shelf NK19-10 Block 6129, and one metocean and one subsurface current meter mooring in Protraction Diagram Block Island Shelf NK19-10 Block 6178 (Lease Area 0520; Figure 1-1). **Beacon Wind intends to relocate the equipment previously approved and deployed within Lease Area OCS-A 0512 (Empire Wind) into Lease Area OCS-A 0520 (Lease Area).** Beacon Wind will continue working with RPS Group Inc. (RPS) for the buoy equipment as RPS designed and maintained this equipment for the Empire Wind deployments. The Floating LiDAR Buoy, RPS Wave and Metocean Buoys, and subsurface current meter moorings are equipped with three CM-04 Acoustic Current Meters and three Seabird SBE37 conductivity and temperature-CT loggers (CM/CT Mooring [collectively referred to as the Metocean Facilities]) as the proposed meteorological and metocean data collection technologies, respectively.

This SAP has been prepared in accordance with 30 Code of Federal Regulations (CFR) §§ 585.606, 610, and 611 (see Table 2-1), the Guidelines for Information Requirements for a Renewable Energy SAP issued by Bureau of Ocean Energy Management (BOEM) in June 2019, and the stipulations of the Lease (see Table 3-2). Prior to installation of the Metocean Facilities, Beacon Wind will obtain the required permits and approvals from agencies identified in Table 2-1. Installation, operation, maintenance, and decommissioning activities will be conducted with additional requirements should they be stipulated in final permits to be issued. Table 2-1 provides an overview of permits and approvals from pertinent agencies. Beacon Wind plans to install the Metocean Facilities directly following the issuance of SAP approval and other relevant permits.

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# Acronyms and Abbreviations

| | |
|---|---|
| ° | degrees |
| % | percent |
| Applicant | Beacon Wind LLC |
| BMP | Best Management Practice |
| BP | before present |
| BOEM | Bureau of Ocean Energy Management |
| C | Celsius |
| CD | consistency determination |
| CFR | Code of Federal Regulations |
| CM/CT Mooring | Subsurface current meter mooring equipped with three CM-04 Acoustic Current Meters and 3 Seabird SBE37 conductivity and temperature CT loggers |
| cm | centimeter |
| CO | carbon monoxide |
| COLOS | coastal buoy and the coastal oceanographic line-of-sight |
| COP | Construction and Operations Plan |
| CT | conductivity temperature |
| CVA | Certified Verification Agent |
| DMA | dynamic management area |
| EA | environmental assessment |
| EPA | Environmental Protection Agency |
| ESA | Endangered Species Act |
| FCP | Fisheries Communications Plan |
| FONSI | Finding of No Significant Impact |
| FR | Federal Register |
| ft | feet |
| $ft^2$ | square feet |
| GPS | global positioning system |
| GHG | greenhouse gas |
| HAP | hazardous air pollutant |
| hPa | hectopascal |
| HRG | high-resolution geophysical |
| HSE | health, safety, and environmental |
| kg | kilogram |
| km | kilometer(s) |
| km/hr | Kilometers per hour |
| lb | pound |
| LiDAR | Light Detection and Ranging |
| m | meter |
| $m^2$ | square meter |
| m/s | meter per second |
| mm | millimeter |
| MMPA | Marine Mammal Protection Act |
| nm | nautical mile(s) |
| NAAQS | National Ambient Air Quality Standards |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NOMAD | naval oceanographic and meteorological automated devices |
| $NO^2$ | nitrogen dioxide |
| $NO_x$ | nitrogen oxide |
| NTL | notice to lessees |
| O3 | ozone |
| OCS | Outer Continental Shelf |
| PATON | private aids to navigation |
| $PM_{2.5}$ | particulate matter less than 2.5 microns in diameter |
| $PM_{10}$ | particulate matter less than 10 microns in diameter |
| PSO | Protected Species Observer |
| RH | relative humidity |
| RMS | root-mean-square |
| RPS | RPS Group |
| SAP | Site Assessment Plan |
| SOC | standard operating conditions |
| SO2 | sulfur dioxide |
| TBD | to be determined |
| TSS | traffic separation schemes |
| U.S. | United States |
| USCG | United States Coast Guard |
| USFF | United States Fleet Forces |
| VOC | volatile organic compounds |
| WEA | wind energy area |

# 1.0 Introduction

## 1.1 Project Overview 585.610 (a)(1) and Study Objectives 585.610 (a)(6)

Beacon Wind, LLC (Beacon Wind) has prepared this Beacon Wind Site Assessment Plan (SAP) in support of the installation and operation of one floating light detection and ranging buoy (Floating LiDAR), two metocean buoys, and two subsurface current meter moorings to be located within Massachusetts Lease OCS-A-0520, with the Floating LiDAR buoy located in block 6128, one metocean and one subsurface current meter buoy in block 6129 and one metocean and one subsurface current meter mooring in block 6178 (Lease Area 0520; Figure 1-1). **Beacon Wind intends to relocate the equipment previously approved and deployed within Lease Area OCS-A 0512 (Empire Wind) into Lease Area OCS-A 0520 (Lease Area). The equipment, mooring design, and operational activities described herein were previously approved in the Empire Wind Site Assessment Plan (November 21, 2018).**

Beacon Wind will continue working with RPS Group Inc. (RPS) for the buoy equipment as RPS designed and maintained this equipment for the Empire Wind deployments. The Floating LiDAR Buoy, RPS Wave and Metocean Buoys, and subsurface current meter moorings are equipped with three CM-04 Acoustic Current Meters and three Seabird SBE37 conductivity and temperature-CT loggers (CM/CT Mooring [collectively referred to as the Metocean Facilities]) as the proposed meteorological and metocean data collection technologies, respectively. As described in the Empire Wind Site Assessment Plan the equipment has the following mitigating benefits:

- Buoy power systems with 100% renewable charging sources, avoiding backup generators and subsequent emissions and potential for fuel spills;
- Power supply, data storage and mooring integrity that reduces service visit frequency and disturbance to marine life and other users of the marine environment;
- Mooring designs that are fully recoverable, using techniques that reduce the footprint of anchors and remove dynamic heavy chains in contact with the seabed; and
- Subsurface acoustic mooring recovery systems that reduce the risk of entanglement of marine life.

The Installation Areas are contained within the Lease OCS-A-0520 (Lease Area)[1] as defined under the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (Lease). The Lease was awarded to Equinor Wind on December 14, 2018, with an effective date of April 1, 2019.

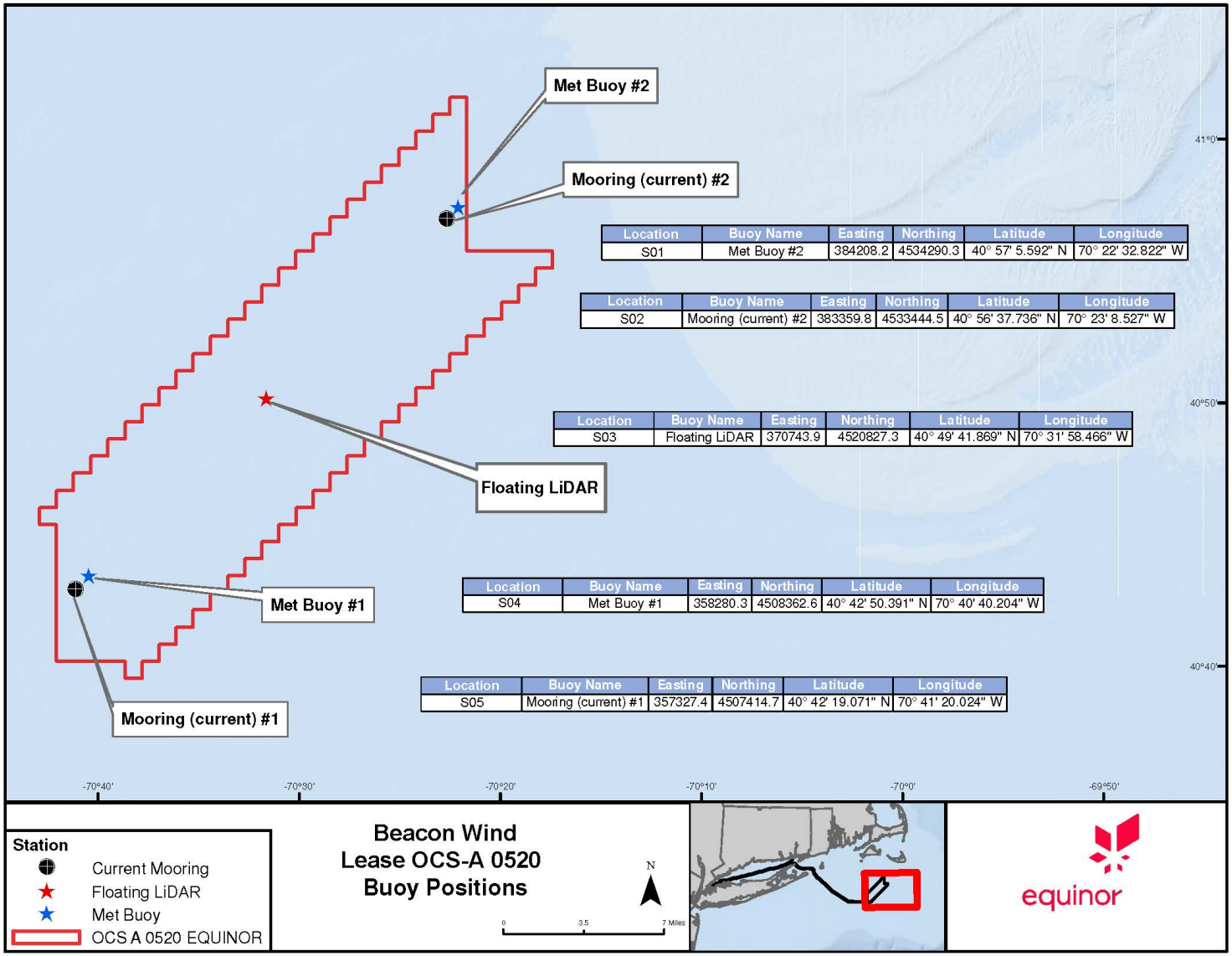
On September 10, 2020, Equinor Wind and BP Wind Energy North America Inc. (“BP”) announced a transaction in which BP will acquire a 50% ownership interest in holding companies that will own the Empire Wind and the Beacon Wind offshore wind projects.[2] Related to the transaction, Equinor Wind submitted an application to BOEM to assign Lease OCS-A 0520 to Beacon Wind LLC (“Beacon Wind”) on December 10, 2020. BOEM approved the lease assignment on January 27, 2021, and at that time Beacon Wind became the lessee and proponent of this SAP.

Point of contact information for the Beacon Wind project is provided within Table 1-1. This SAP has been prepared in accordance with permitting requirements (Figure 2-1) and 30 Code of Federal Regulations (CFR) §§ 585.606, 610, and 611 (see Table 2-2), the Guidelines for Information Requirements for a Renewable Energy SAP issued by Bureau of Ocean Energy Management (BOEM) in June 2019, and the stipulations of the Lease (see Table 2-3).

Prior to installation of the Metocean Facilities, Beacon Wind will obtain the required permits and approvals from jurisdictional agencies to deploy this equipment. Beacon Wind will include copies of the final agency authorizations as part of the SAP (see Appendix A). Copies of agency authorizations will also be provided to BOEM prior to the initiation of SAP activities after SAP has been submitted. Installation, operation, and decommissioning activities will be conducted in compliance with additional requirements stipulated in the final permits. The Metocean Facilities described in this SAP will collect wind resource and metocean data to support development of the Lease Area.

[1] The Lease Area is defined by Addendum A of BOEM Lease No. OCS-A0520, Section II. Description of the Lease Area. The total acreage of the Lease Area is approximately 128,811 acres. The Lease Area is depicted in its entirety on Figure 1-1 of this SAP.
[2] See Press Release, Equinor ASA, Equinor partners with BP in US offshore wind to capture value and create platform for growth (Sept. 10, 2020), https://www.equinor.com/en/news/2020-09-offshore-wind.html.

**Figure 1-1.** **Beacon Wind Metocean Facilities**




| Location | Buoy Name | Easting | Northing | Latitude | Longitude |
|---|---|---|---|---|---|
| S01 | Met Buoy #2 | 384208.2 | 4534290.3 | 40° 57' 5.592" N | 70° 22' 32.822" W |

| Location | Buoy Name | Easting | Northing | Latitude | Longitude |
|---|---|---|---|---|---|
| S02 | Mooring (current) #2 | 383359.8 | 4533444.5 | 40° 56' 37.736" N | 70° 23' 8.527" W |

| Location | Buoy Name | Easting | Northing | Latitude | Longitude |
|---|---|---|---|---|---|
| S03 | Floating LiDAR | 370743.9 | 4520827.3 | 40° 49' 41.869" N | 70° 31' 58.466" W |

| Location | Buoy Name | Easting | Northing | Latitude | Longitude |
|---|---|---|---|---|---|
| S04 | Met Buoy #1 | 358280.3 | 4508362.6 | 40° 42' 50.391" N | 70° 40' 40.204" W |

| Location | Buoy Name | Easting | Northing | Latitude | Longitude |
|---|---|---|---|---|---|
| S05 | Mooring (current) #1 | 357327.4 | 4507414.7 | 40° 42' 19.071" N | 70° 41' 20.024" W |

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

## 1.2 Authorized Representative and Designated Operator

As the lease holder, Beacon Wind is also the lease operator. Beacon Wind proposes the following as the Authorized Representative and to have RPS serve as the contracted operator for the Metocean Facilities. The contact information for both Authorized Representative and RPS's Authorized Representative is as follows:

**Table 1-1. Point of Contact Information 585.610 (a)(1)**

| | |
|---|---|
| **Name of Authorized Representative** | Scott Lundin |
| **Title** | Head of Permitting – New England |
| **Phone Number** | 617-655-3077 |
| **Email** | SCLU@equinor.com |
| **Address** | Beacon Wind, LLC<br>120 Long Ridge Rd Stamford, CT 06902 |

| | |
|---|---|
| **Name of Authorized Metocean Representative** | Kevin Redman |
| **Title** | Sr. Oceanographer / Regional Manager |
| **Phone Number** | +1 206 526 5622 office; +1 206 819 4966 cell |
| **Email** | Kevin.Redman@RPSGroup.com |
| **Address** | 4608 Union Bay Pl. N.E. Seattle, WA 98372 |

## 1.3 Certified Verification Agent Waiver Request 610(a)(9), 705(c) and 706

Pursuant to 30 CFR § 585.610(a)(9), BOEM may require a Certified Verification Agent (CVA) to certify to BOEM that the Metocean Facilities are designed to withstand the environmental and functional load conditions for the intended life of the Metocean Facilities in the Installation Areas. Beacon Wind requests a waiver of the CVA requirement per 30 CFR § 585.705(c) because the selected Metocean Facilities are a commercially available technology that have been successfully deployed on many occasions in similar conditions by the selected supplier. Beacon Wind has had a Measurements Engineer from RPS perform the duties similar to those of a CVA. The Measurements Engineer will also inspect the equipment prior to installation, witness the installation, and prepare an installation report as described in Section 4.0.

# 2.0 Conformance with Permits, Regulations, Commercial Lease, Regulatory Requirements, and the Environmental Assessment

## 2.1 Schedule 585.610 (a)(2)

Beacon Wind plans to install the Metocean Facilities directly following the issuance of SAP approval and other relevant permits.

## 2.2 Conformance with Permits, Regulations, Commercial Lease and Regulatory Requirements

The activities and equipment proposed in this SAP will be covered by the appropriate bond or other approved security, as required by 30 CFR 585.515 and 585.516. This information will be provided to BOEM prior to the deployment of the Metocean Facilities.

Prior to installation of the Metocean Facilities, Beacon Wind will obtain the required permits and approvals from agencies identified in Table 2-1. Installation, operation, maintenance, and decommissioning activities will be conducted with additional requirements should they be stipulated in final permits to be issued. Table 2-1 provides an overview of permits and approvals from pertinent agencies.

Table 2-2 provides an overview of BOEM's stipulations in Addendum C of the Lease that are applicable to the SAP - including a description of requirements, how Beacon Wind proposes to comply and where in the SAP the information is located. Site Assessment Plan Requirements for Commercial Leases pursuant to §585.105(a), 606(a), 610(a) and (b), and 611(a) and (b) are provided within Table 2-3.

## 2.3 Conformance with Offshore Massachusetts Environmental Assessment

On June 3, 2014, BOEM issued a Finding of No Significant Impact (FONSI) based on a comprehensive Environmental Assessment, referred to herein as the "Offshore EA" (BOEM 2014). The Offshore EA analyzed the foreseeable consequences associated with issuing commercial leases within the Massachusetts WEA, which is inclusive of the Lease Area (Figure 1-1), as well as the site assessment activities including the installation of Metocean Facilities. The Metocean Facilities and proposed activities described herein are consistent with Section 3.1.4 of the Offshore EA, with the selected concept demonstrating lower impacts than some worst case, but acceptable concepts within the EA. Table 2-4 below provides a comparison of the information assessed in the Offshore EA and the relevant detail being proposed by Beacon Wind herein.

## 2.4 Consistency Determination

The Coastal Zone Management Act (CZMA) Regional Consistency Determination associated with the Offshore EA was carried out by BOEM to confirm that the potential leasing activities, site characterization surveys and data collection structures are consistent with state policies. That Regional Consistency Determination covers the activities proposed in this SAP.

**Table 2-1. 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 (ESA) Section 7 Consultation | 16 United States Code (U.S.C.) 1536 | 50 CFR 402 | These consultations were completed prior to the issuance of the Lease. However, pursuant to its obligations under Section 7 of the ESA, BOEM is required to consult with NMFS prior to approval of any site assessment activities that may affect ESA-listed species that occur within the Lease Area. |
| | Magnuson-Stevens Fishery Conservation and Management Act Section 305(b) Consultation | 16 U.S.C. 1801 | 50 CFR 600 | No action required. BOEM will consult with NMFS to complete the essential fish habitat assessment and determination based on details provided herein. |
| | Incidental Take Authorization | Marine Mammal Protection Act of 1972 (MMPA) | 16 U.S.C. §§ 1361 et seq. | No action required. As detailed in Sections 4, 5, and 6, installation, operation, and decommissioning of the Metocean Facilities will not result in the harassment of marine mammals protected under the MMPA. In addition, as demonstrated in Section 2, Beacon Wind will comply with Lease stipulations. The Lease stipulations are based on the Standard Operating Conditions (SOCs) included in Appendix B of the Offshore EA which are consistent with Incidental Take Statement of the NMFS Biological Opinion dated April 10, 2013.<br>Additionally, on April 15, 2019, Beacon Wind received a Letter of Concurrence for its preliminary geophysical survey campaign and the geophysical plan was approved by BOEM on August 5, 2020. |
| U.S. Army Corps of Engineers (USACE), Massachusetts District | Nationwide Permit 5 – Scientific Measurement Devices | Clean Water Act 33 U.S.C. 134 | 33 CFR 320 *et seq*. | Beacon Wind submitted a Self-Verification Notification Form (SVNF) for a General Permit with the United States Army Corps of Engineers for the installation of the Metocean Facilities on August 26, 2020. The USACE confirmed receipt on August 27, 2020, and assigned the SVNF file number NAE-2020-02225. Beacon Wind has included a copy of the SVNF and USACE receipt confirmation as part of Appendix A. |
| United States Coast Guard (USCG) | Approval for Private Aids to Navigation | 14 U.S.C. 81 | 33 CFR Part 66 | Beacon Wind will submit an application to the USCG for a Private Aids to Navigation (PATON) approval prior to the installation of the Metocean Facilities. Beacon Wind will submit a copy of the approved PATON to BOEM prior to buoy deployment. |
| U.S. Department of Interior, BOEM | 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 Massachusetts Wind Energy Area (WEA) and NHPA Stipulations for the identification and protection of cultural resources are included in the Lease. |
| 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 Lease during the BOEM Offshore EA. |
| Massachusetts Department of State, Division of Coastal Resources | Coastal Management Program Consistency Certification | Coastal Zone Management Act | 15 CFR 930 Subpart C | No action required. A final Coastal Zone Consistency Determination (CD) has been issued by BOEM for SAP activities in the Massachusetts and Rhode Island WEA. |

**Table 2-2. Conformance with the Commercial Renewable Energy Lease OCS-A-0520 Stipulations as Contained in Addendum C to the Lease**

| Lease OCS-A-0520 Addendum C Stipulation | Description | SAP Document |
|---|---|---|
| **2.0 General Lease Information** | | |
| 2.1.2 Pre-Installation Survey Briefing(s) with the Lessor | At least 60 days prior to the initiation of survey activities in support of the submission of a plan (i.e., SAP and/or COP), the Lessee must hold a pre-survey briefing with the Lessor to discuss the applicable proposed survey plan and timelines. The Lessee must ensure the presence at this meeting of a Qualified Marine Archaeologist and any other relevant subject matter experts (e.g., terrestrial archaeologist, architectural historians) related to the proposed historic property identification surveys described in the survey plan unless otherwise authorized by the Lessor. The Lessor may request the presence of other relevant subject matter experts at this meeting. | Beacon Wind has and will comply with this stipulation. See Section 3.0 |
| **3.0 National Security and Military Operations** | | |
| 3.1 Hold and Save Harmless | Whether compensation for such damage or injury might be due under a theory of strict or absolute liability or otherwise, the Lessee assumes all risks of damage or injury to persons or property, which occur in, on, or above the Outer Continental Shelf (OCS), to any persons or to any property of any person or persons in connection with any activities being performed by the Lessee in, on, or above the OCS, if such injury or damage to such person or property occurs by reason of the activities of any agency of the United States Government, its contractors, or subcontractors, or any of its officers, agents or employees, being conducted as a part of, or in connection with, the programs or activities of the individual military command headquarters (hereinafter "the appropriate command headquarters") listed in the contact information provided as an enclosure to this lease. Notwithstanding any limitation of the Lessee's liability in Section 9 of the lease, the Lessee assumes this risk whether such injury or damage is caused in whole or in part by any act or omission, regardless of negligence or fault, of the United States, its contractors or subcontractors, or any of its officers, agents, or employees. The Lessee further agrees to indemnify and save harmless the United States against all claims for loss, damage, or injury in connection with the programs or activities of the command headquarters, whether the same be caused in whole or in part by the negligence or fault of the United States, its contractors, or subcontractors, or any of its officers, agents, or employees and whether such claims might be sustained under a theory of strict or absolute liability or otherwise. | Beacon Wind has and will comply with this stipulation. See Section 3.0 |
| 3.3 Electromagnetic Emissions | The Lessee, prior to entry into any designated defense operating area, warning area, or water test area, for the purpose of commencing survey activities undertaken to support SAP or COP submittal must enter into an agreement with the commander of the appropriate command headquarters to coordinate the electromagnetic emissions associated with such 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. | Beacon Wind has and will comply with this stipulation. See Section 3.0 |
| **4.0 Standard Operating Conditions, Archaeology, Geological and Geophysical Requirements** | | |
| **4.1 Standard Operating Conditions** | | |
| 4.1.1 General - Vessel Strike Avoidance Measures | The Lessee must ensure that all vessels conducting activities in support of plan (i.e., SAP and COP) submittal, including those transiting to and from local ports and the lease area, comply with the vessel-strike avoidance measures specified in stipulations 4.1.1.1 through 4.1.1.8.3, except under extraordinary circumstances when complying with these requirements would put the safety of the vessel or crew at risk. This includes ensuring that all vessel operators and crew members, including PSOs, are familiar with and understand the requirements specified in | Beacon Wind has and will comply with this stipulation. See Section 3.0 |

| Lease OCS-A-0520 Addendum C Stipulation | Description | SAP Document |
|---|---|---|
| | Addendum C of the Lease. | |
| 4.1.2 General - Marine Trash and Debris Prevention | The Lessee must ensure that vessel operators, employees, and contractors actively engaged in activity in support of a plan (i.e., SAP and COP) submittal are briefed on marine trash and debris awareness and elimination, as described in the BSEE NTL No. 2015-G03 ("Marine Trash and Debris Awareness and Elimination") or any NTL that supersedes this NTL, except that the Lessor will not require the Lessee to post placards. The Lessee must ensure that these vessel operator employees and contractors receive training on 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. Briefing materials on marine debris awareness, elimination, and protected species are available at http://oocma in. theooc. us /page41.html. | Beacon Wind has and will comply with this stipulation. See Section 3.0 |
| **4.2 Archaeological Requirements** | | |
| 4.2.7 Archaeological Requirements | If the Lessee, while conducting geotechnical exploration or any other bottom-disturbing site characterization activities in support of plan (i.e., SAP and COP) submittal and after review of the location by a Qualified Marine Archaeologist under 4.2.4, discovers an unanticipated potential archaeological resource, such as the presence of a shipwreck (e.g., a sonar image or visual confirmation of an iron, steel, or wooden hull, wooden timbers, anchors, concentrations of historic objects, piles of ballast rock) or evidence of a pre-contact archaeological site (e.g. stone tools, pottery or other pre-contact artifacts) within the project area, the Lessee must: Post-Review Discovery Clauses. Notify the Lessor within 24 hours of discovery; Notify the Lessor in writing via report to the Lessor within 72 hours of its discovery; Conduct any additional investigations as directed by the Lessor to determine if the resource is eligible for listing in the National Register of Historic Places (30 CFR 585.802(b)). | Beacon Wind has and will comply with this stipulation. See Section 3.0 |
| **4.3 Geological and Geophysical (G&G) Requirements** | | |
| 4.3.1 – 4.3.7 G&G Requirements | The Lessee must ensure that all vessels conducting activity in support of a plan (i.e., SAP and COP) submittal comply with the geological and geophysical survey requirements specified in 4.3.1 to 4.3.7 except under extraordinary circumstances when complying with these requirements would put the safety of the vessel or crew at risk. | Beacon Wind has and will comply with this stipulation. See Section 3.0 |

**Table 2-3. 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 and Location Within SAP |
|---|---|
| **§ 585.105(a)** | |
| 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. | Beacon 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. | Beacon Wind will comply with this requirement. See Table 2-2, Table 2-5, Table 3-1, Table 3-2, and Appendix A. |
| 2) The Project will be safe. | Beacon Wind will comply with this requirement. Specifically, see Section 3.5. |
| 3) The Project will not unreasonably interfere with other uses of the Outer Continental Shelf (OCS), including national security or defence. | Beacon Wind will comply with this requirement. See Table 2-2 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 archaeological resources. | See Section 6 for an analysis of site characteristics and Sections 3.7 and 6.2 and Table 2-2 for avoidance and mitigation measures. |
| 5) The Project will use best available and safest technology. | Beacon Wind will comply with this requirement. See Sections 2.6, Table 3-1, and Appendix B for a description and technical specifications on the selected Metocean Facilities. |
| 6) The Project will use best management practices. | Beacon Wind will comply with this requirement. Best management practices are described in Table 2-5 and Section 2.4. |
| 7) The Project will use properly trained personnel. | Beacon Wind will ensure that all personnel meet the company's standard technical as well as health, safety, and environmental (HSE) standards for the work being conducted. |
| **§ 585.610(a)** | |
| 1) Contact Information. | Section 1.2. |
| 2) Site assessment concept. | Meteorological, metocean, and biological data collection using one RPS Floating LiDAR Buoy, two RPS Wave and MetBuoy, and two RPS Current Meter Mooring consisting of 3 CM-04 Acoustic Current Meters and 3 Seabird SBE37 conductivity and temperature CT loggers. |
| 3) Designation of operator. | Section 1.2. |
| 4) Commercial lease stipulations and compliance. | See Section 2.2 and 2.3 Table 2-3. |
| 5) A location plat. | See Figure 1-1. |
| 6) General structural and project design, fabrication and installation information. | See Sections 2 3. and Section 4.1. |
| 7) Deployment activities. | See Section 4. |
| 8) Certified Verification Agent nomination. | See Section 2.4. |
| 9) Reference information. | See Section 7. |
| 10) Decommissioning and site clearance procedures. | See Section 6. |
| 11) Air quality information. | See Section 6.8. |
| 12) A list of all federal, state, and local authorizations or approvals required to conduct site assessment activities on your lease. | See Table 2-1. |
| 13) 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. |

| Requirement | Compliance Statement and Location Within SAP |
|---|---|
| 14) Financial assurance information. | Activities and facilities proposed herein will be covered by an appropriate bond or other approved security. |
| **§585.610(b)** | |
| 1) Geotechnical | |
| (i) A description of all relevant seabed and engineering data and information to allow for the design of the foundation for that facility. | See Section 6.1, Appendix C |
| 2) Shallow Hazards | Appendix C |
| (i) Shallow faults; | See Section 6.1 |
| (ii) Gas seeps or shallow gas; | See Section 6.1. |
| (iii) Slump blocks or slump sediments; | See Section 6.1. |
| (iv) Hydrates; or | See Section 6.1. |
| (v) Ice scour of seabed sediments. | See Section 6.1. |
| 3) Archaeological Resources | |
| (i) A description of the results and data from the archaeological survey; and | See Section 6.2, Appendix D. |
| (ii) A description of the historic and prehistoric archaeological resources, as required by the National Historic Preservation Act of 1966 (NHPA), as amended. | See Section 6.2, Appendix D. |
| 4) Geological Survey | |
| (i) Seismic activity at your proposed site; | See Section 6.1. |
| (ii) Fault zones; | See Section 6.1. |
| (iii) The possibility and effects of seabed subsidence; and | See Section 6.1. |
| (iv) The extent and geometry of faulting attenuation effects of geologic conditions near your site. | See Section 6.1. |
| 5) Biological Survey | |
| (i) Live bottoms; | See Section 6.3, Appendix E |
| (ii) Hard bottoms; | See Section 6.3, Appendix E |
| (iii) Topographic features; and | See Section 6.3, Appendix E |
| (iv) Surveys of other marine resources such as fish populations (including migratory populations), marine mammals, sea turtles, and sea birds. | See Section 6.3. |
| **§ 585.611(a) and (b) Requirements** | |
| 1) Hazard information. | See Section 6.1, 6.11. |
| 2) Water quality. | See Section 6.7. |
| 3) Biological resources | |
| (i) Benthic communities; | See Section 6.3., Appendix E |
| (ii) Marine mammals; | See Section 6.5. |
| (iii) Sea turtles; | See Section 6.5. |
| (iv) Coastal and marine birds; | See Section 6.6. |
| (v) Fish and shellfish; | See Sections 6.4. |
| (vi) Plankton and seagrasses; and | See Section 6.3. |
| (vii) Plant life | See Sections 6.3, 6.4. |
| 4) Threatened or endangered species. | See Sections 6.4, 6.5, 6.6. |
| 5) Sensitive biological resources or habitats. | See Sections 6.3, 6.4. |
| 6) Archaeological resources. | Section 6.2, Appendix D. |
| 7) Socioeconomic resources. | See Section 6.9. |
| 8) Coastal and marine uses. | See Section 6.10. |
| 9) Consistency Certification. | See Table 2.1. |
| 10) Other Resources, conditions, and activities. | Not Applicable. |

**Table 2-4. Comparison of Offshore EA and SAP Elements**

| Project Component | Assessed in EA | Proposed in SAP | Summary |
|---|---|---|---|
| # of Buoy | Max 2 buoys per lease area<br>and an additional small tethered buoy | 1 RPS Floating LiDAR buoy, 2 RPS Wave and Met Buoys, 2 RPS Current Meter Moorings consisting of 6 CM-04 Acoustic Current Meters, and 6 Seabird SBE37 conductivity and temperature CT loggers. | The number of buoys proposed in this SAP are consistent with what was assessed in the EA. |
| Meteorological Buoy Specifications | Specific to hull type, discus- shaped (33 to 40 ft [10 to 12 m] in diameter), boat- shaped (20 ft (6 m), and spar buoy | RPS Floating LiDAR Buoy: 15.2 feet (ft, 4.6 meters [m]) diameter, weighing 9480 pounds (4.3 metric tons) | The Metocean Facilities proposed in this SAP are smaller and weigh less that what was assessed in the EA.<br>The direct consequence is a reduction in the anchor requirement and subsequent footprint, and heavy mooring chain in dynamic contact with the seabed. |
| Meteorological Buoy Hull Type | Naval Oceanographic and Meteorological Automated Devices (NOMAD), Coastal Buoy and the Coastal Oceanographic Line-of-Sight (COLOS) | RPS Floating LiDAR: toroidal shape<br>dodecagon steel hull with aluminium superstructure | Beacon Wind is proposing to use a hull type that is consistent with what was assessed in the EA. |
| Meteorological Buoy Height above ocean surface | 30-40 ft (9-12 m) | RPS Floating LiDAR: 10.8 ft (3.3 m) | The Metocean Facilities proposed in this SAP are less than half the height of what was assessed in the EA |
| Meteorological Buoy Mooring Design | Specific to buoy type, all chain or a combination of chain, nylon, and buoyant polypropylene materials with 6,000- to 8,000-pound (lb) (2,721.5 to 3,628.7 kilogram [kg]) anchors, 6 square foot ($ft^2$) footprint, 370,260 $ft^2$ anchor sweep. | U-shaped mooring, with a combination of chain, polypropylene materials, wire rope, trawl floats, viny floats, amsteel rope dispensers and rubber cords with primary and secondary clump weight of 2,646 lbs and 330 lb (1,200 kg and 150 kg for the wave and metocean moorings, 9,920 lbs and 661 lbs (4,500 kg and 300 kg) for the floating LiDAR mooring, and 992 lbs (450) kg for the current meter moorings, with steel chain clump weights or steel constructed wagon wheel weights no larger than 6 $ft^2$ resting on seafloor. Total area of mooring on seafloor, inclusive of both clump weights, chains, and wire ropes, is 67.8 $ft^2$ (6.3 $m^2$). | The weight and area of anchor resting on the sea floor is generally consistent with what was assessed in the EA. However, due to the mooring design, there is not expected to be an anchor sweep associated with the mooring proposed by Beacon Wind. Polypropylene rope will only be used where essential for mooring integrity and safe deployment/recovery operations and will be under tension, removing the risk of entanglement with marine life. |
| Small Tethered Buoy size | 10 ft (3 m) in diameter or less | 8.5 ft (2.6 m) | The proposed wave and met buoy is consistent with what was assessed in the EA. |
| Data transmission | Transmit operational status and data to receiver on shore | Transmit operational status and data to shore via satellite or cellular telemetry. | The data transmission protocols proposed by Beacon Wind are consistent with what was assessed in the EA. |

| Project Component | Assessed in EA | Proposed in SAP | Summary |
|---|---|---|---|
| Maintenance | Monthly or quarterly | Every 6 months | The maintenance schedule proposed in this SAP is less frequent than what was proposed in the EA, which is expected to result in lower impacts through reduced disturbance to marine life and other maritime users. Equinor Wind utilized this maintenance schedule for the same Metocean Facilities while installed in the Empire Wind Lease Area and found it to be sufficient to properly maintain the equipment. |
| Installation and decommissioning process | Carried or towed by vessel, lower or place buoy over final location, drop mooring anchor, decommissioning is reverse of installation | Towed by vessel, deploy mooring system, lower anchor over final location, decommissioning is reverse of installation | The installation and decommissioning processes proposed by Beacon Wind are consistent with what was assessed in the EA. |
| Installation and decommissioning timeframe | Installation 1 day per buoy. Decommissioning 1 day per buoy | Installation up to seven days for all Metocean Facilities: three separate vessel trips, including transit. Decommissioning up to seven days for all Metocean Facilities: three separate vessel trips, including transit. Subject to weather. | The installation and decommissioning timeframes proposed by Beacon Wind are consistent with what was assessed in the EA. |
| Power supply | Solar, Wind, Backup Diesel Generator | RPS Floating LiDAR: Solar and Wind<br>RPS Wave and Met Buoy: Solar | The power supply options proposed by Beacon Wind are consistent with what was assessed in the EA. However, unlike similar buoys that have been proposed and deployed on the Atlantic OCS, the RPS Floating LiDAR and Met/Wave Buoy do not have a backup diesel generator, and, as such, minimizes potential environmental impacts associated with fuel spills and emissions. |

## 2.5 Best Management Practices 585.610 (a)(4)

Best management practices (BMPs) are described in this section. Beacon Wind will use its standard internal project execution structure to manage activities described in the SAP. As stated in Section 4.8, SAP activities will be supported by a detailed HSE Plan, which is included as Appendix B.

In addition, Beacon Wind will use many of the BMPs identified in the Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (BOEM 2019) and Establishment of an OCS Alternative Energy and Alternate Use Program, Record of Decision, December 2007 (BOEM 2007). See Table 2-5 for a summary of these BMPs (numbering in Table 2-5 corresponds to the format of the noted SAP Guidelines).

**Table 2-5. Best Management Practices**

| Best Management Practices | Location in SAP Document |
|---|---|
| 1, 3. Minimize the area disturbed by pre-construction site monitoring and testing activities installation and consolidate necessary infrastructure requirements whenever practicable. | Section 3.5 |
| 2. Contact and consult with the appropriate affected Federal, state, and local agencies early in the planning process. | Tables 2-2 and 3-2 and Section 4.1 |
| 5. Conduct seafloor surveys to ensure that the project is sighted to avoid or minimize impacts associated with seafloor instability and other hazards. | Section 3.5 |
| 7. Avoid locating facilities near known sensitive seafloor habitats. | Section 7.1.9 |
| 8. Avoid anchoring on sensitive seafloor habitats. | Section 7.1.9 |
| 9. Reduce scouring action by ocean currents around foundation and to seafloor topography by taking all reasonable measures and employing routine inspections to ensure structural integrity. | Section 5.2 |
| 10. Avoid the use of explosives that may impact fish or benthic organisms. | No explosives will be used for activities proposed in the SAP |
| 13, 14, and 21 related to minimizing/avoiding vessel impacts to marine mammals and sea turtles. | Section 4.3 |
| 18. 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 7.1 |
| 19. Minimize construction activities in areas containing anadromous fish during migration periods. | Section 7.1.10 |
| 20. Minimize seafloor disturbance during installation of the buoy. | Section 4.1 |
| 26. Minimize perching opportunities. | Section 7.1.11.3 |
| 27. Comply with USCG lighting and marking requirements while using lighting technology that minimizes impacts to avian species. | Table 2-2, Section 7.1.11.3 |
| 31 and 32. Minimize potential conflicts with commercial and recreational fishing interests by working with commercial/recreational fishing entities and reviewing planned activities with potentially affected parties. | Section 7.1.10 |
| 33. Use practices and operating procedures that reduce the likelihood of vessel accidents and fuel spills. | Table 4-1 |
| 34. Avoid impacts to the commercial fishing industry by marking the buoys with USCG-approved marking and lighting to ensure safe vessel operation. | Table 2-2 and Section 7.2 |
| 33. Avoid hard-bottom habitats, including seagrass communities and kelp beds. | Section 7.1.9 |
| 45. Prepare waste management plan, hazardous material plan, and an oil spill response plan. | The Metocean Facilities will not require a backup generator or any other fuel dependent equipment. As such, no Oil Spill Response Plan or Oil Spill Response Measures will be required. |

## 2.6 Project Location 585.610 (a)(5)

The location of the proposed Metocean Facilities will fall within the area that was surveyed and evaluated by Beacon Wind in Fall 2020 (Table 2-6, Figure 1-1). This site is referred to as the Installation Area (Figure 1-1). For the purpose of the discussion in this SAP, the equipment within the Installation Area have been given unique identifiers: the RPS Floating LiDAR Buoy is referenced as **Floating LiDAR**, the RPS Wave and Met Buoy **is referenced as Metocean 1 and Metocean 2, and** the CM/CT Moorings are is referenced as **CM/CT 1 and CM/T 2**. The coordinates for these locations are provided in Table 2-6 and depicted on Figure 1-1.

The Metocean Facilities will be deployed within the proposed Installation Areas at the coordinates listed in Table 2-6.

**Table 2-6. Location of Metocean Facilities**

| | | |
|---|---|---|
| **Current Mooring (CM/CT) #1 (South)** | Aliquot Number | 6275 |
| | Latitude | 40˚ 42’ 19.071” N |
| | Longitude | 70˚ 41’ 20.024” W |
| | Water Depth (m) [MLLW] | -61.5 |
| | General Seafloor Trend | Downslope NE to SW |
| **Current Mooring (CM/CT) #2 (North)** | Aliquot Number | 6030 |
| | Latitude | 40˚ 56’ 37.736” N |
| | Longitude | 70˚ 23’ 8.527” W |
| | Water Depth (m) [MLLW] | -43.1 |
| | General Seafloor Trend | Downslope NE to SW |
| **Wave and Met Buoy (Metocean) #1 (South)** | Aliquot Number | 6275 |
| | Latitude | 40˚ 42’ 50.391” N |
| | Longitude | 70˚ 40’ 40.204” W |
| | Water Depth (m) [MLLW] | -60.7 |
| | General Seafloor Trend | Downslope NE to SW |
| **Wave and Met Buoy (Metocean 2) #2 (North)** | Aliquot Number | 6030 |
| | Latitude | 40˚ 57’ 5.592” N |
| | Longitude | 70˚ 22’ 32.822” W |
| | Water Depth (m) [MLLW] | -42.5 |
| | General Seafloor Trend | Downslope NE to SW |
| **Floating LiDAR Buoy (LiDAR)** | Aliquot Number | 6178 |
| | Latitude | 40˚ 49’ 41.869” N |
| | Longitude | 70˚ 31’ 58.466” W |
| | Water Depth (m) [MLLW] | -53.4 |
| | General Seafloor Trend | Upslope NE to SW |

## 2.7 Mooring Designs, Power Supply, and Instrumentation

The location for the Installation Areas of the proposed Metocean Facilities as presented in Table 2-6 was based on a review of existing data, information collected during 2020 high resolution geophysical (HRG) surveys conducted within the Lease Area (See Appendix B), the most likely development scenarios for the Lease Area and the best available technologies. The Metocean Facilities are the same instruments that were approved by BOEM for use in the Equinor Wind Empire Wind Lease area (OCS-A-0512) and will be transported by RPS from the Empire Wind area to the Beacon Wind Lease Area. The following sections provide detailed descriptions of the proposed Metocean Facilities as well as their associated mooring designs, power supply, and instrumentation.

RPS carried out rigorous mooring design and modeling for the Floating LiDAR, Met and Wave Buoy and the Current Meter CM/CT using their decades of first-hand experience designing and deploying metocean moorings and utilizing the latest mooring technology and modelling software, ORCAFLEX. The Floating LiDAR, Met and Wave Buoy and the Current Meter CM/CT Mooring designs and testing processes were independent of each other due to differences in surface buoy characteristics and data measurement requirements. Mooring designs went through multiple design iterations and model runs until modelling results returned acceptable and safe values when run at extreme local metocean condition thresholds. Values used in models were 72.9 knots (37.5 meters per second [m/s]) wind speed, 2.9 knots (1.5 m/s)

currents, and 43.3 ft (13.2 m) Hs at 16.2 seconds Tp. The Floating LiDAR, Met and Wave Buoy, and Current Meter CM/CT moorings were designed with the following objectives:

The surface Floating LiDAR buoy and Met and Wave Buoy remain secure on the sea surface without risk of detachment, submersions, significant overtopping from waves and within satisfactory limits of tilt for sensors:

- The mooring components are rated to a good level of safety factor when under tension to minimize risk of mooring failure during operational life and lifting operations;
- The mooring components can survive benign conditions without the risk of tangling or rubbing and causing self-wear;
- The mooring components are of a material and length with 'stopping off points' that allow for safe deployment and recovery on a range of vessels; and
- Where feasible, mooring designs use components and materials that minimize risk to marine life and other marine users.

The mooring designs have been selected to be consistent with other similar moorings deployed in the Massachusetts Lease Areas, including moorings that consist of acoustic detection made up of a combination of anchor weights, chain and rope with floats. The recovery sections of the moorings are deemed to avoid the risk of entanglement for the following reasons:

- The 65.61 ft (20 m) of polypropylene rope on the Floating LiDAR and Met and Wave Buoy recovery section is under constant tension, provided by the 198 lbs (90 kg) of positive buoyancy. This removes the risk of looping sections of rope and available slack.
- The upper 9.8 ft (3 m) of polypropylene rope on the recovery sections are fed through the three viny floats, exposing approximately 5 ft (1.5 m) of rope, which is not considered to be long enough to cause an entanglement risk. This section of rope is also under constant tension from the 198 lbs (90 kg) of positive buoyancy produced by the viny floats.
- The combination of three subsurface viny floats, a rope dispenser and an acoustic release would provide an adequate target to produce a return signal from marine mammals using echo location, therefore it is expected that there is an ability to detect and avoid this section of mooring.

The Floating LiDAR and Met and Wave Buoy mooring designs utilize a combination of rubber cords and chain from the buoy to the primary anchor weight to allow the buoy to ride the waves, with the rubber cords acting to absorb the tension and reduce a tugging/snatching action on the buoy and mooring. The lower section of rubber cord is held clear of the seabed by a float with 110 lb (50 kg) buoyancy to remove the risk of the non- buoyant rubber cord wearing on the seabed or anchor. Modelling results demonstrated that the Floating LiDAR buoy and mooring system responds better to wave motion when the mooring line is secured to the side of the buoy hull as opposed to the underside of the buoy hull. The Met and Wave buoy mooring system is attached to the bottom of the buoy. The upper section of rubber cord is attached to the buoy via a section of heavy chain to ensure the upper section of rubber cord cannot rub and wear against the side of the Floating LiDAR or the underside of the Met and Wave Buoy hull. Extensive modelling demonstrated that the most effective means of ensuring mooring integrity through strength and an ability to respond to wave and current action was a section of mooring line between the upper and lower rubber cord sections, also acting as a means to separate the two sections of rubber cord and to give sufficient mooring line length. The use of chain or wire rope was not deemed to be feasible in this section as it introduces non-buoyant material that would act to pull the two rubber cord sections towards each other. These materials also introduce the risk of wear to and therefore failure of the rubber cords should they come into regular contact.

A section of wire rope ground line extends from the primary anchor weight with a length and material strength to allow for safe recovery of the primary anchor weight to the vessel during mooring recovery operations. The ground line is attached to a smaller secondary anchor weight, which serves both to secure the ground line to the seabed and to anchor the mooring recovery system.

For the mooring recovery system, a rope dispenser concept on an acoustic release positioned inline above the secondary anchor weight on a combination of polypropylene rope, chain and floatation has been selected. When the acoustic release is activated, the amsteel rope dispensers release high strength Spectra rope that floats to the surface on the three viny floats. The U-mooring design facilitates recovery of the Wave and Met Buoy in higher sea state conditions by allowing the mooring to be recovered and the Wave and Met Buoy to be towed without the need for lifting the buoy at sea.

The available rope dispensers house 131 ft (60 m) of recovery line. To ensure there is adequate slack on the recovery line when activated during recovery operations, the rope dispenser needs to be raised off the seabed. This slack is required to ensure personnel on the recovery vessel have sufficient rope to secure

on to with a recovery boat hook or grappling line and to have enough rope section to get onboard the vessel to secure it to a winch to then haul in the mooring. In addition to the slack required, the 32.8 ft (10 m) section of mooring line from the secondary anchor weight to the acoustic release and rope dispenser is required to allow for safe deployment, as it allows the floats, acoustic release and rope dispenser to float clear of the vessel stern before the anchor weight is released to the seabed. Polypropylene rope has been used in this section of the mooring to allow for a semi-buoyant material during deployment, as alternative materials such as chain and wire rope introduce non-buoyant sections that would restrict the ability of the floats, acoustic release and rope dispenser to float clear of the vessel stern prior to releasing the anchor weight. In addition, this section of mooring is planned to be deployed by hand and therefore polypropylene rope is deemed the safest material to handle as opposed to chain or wire rope. Lighting and marking of the proposed Metocean Facilities will be in compliance with USCG and PATON requirements.

## 2.8 RPS Floating LiDAR Buoy

The proposed approach is to utilize a BOEM approved Floating Light Detection and Ranging (Floating LiDAR) buoy currently located in Equinor Wind's New York Lease OCS-A 0512. It will be moved to Beacon Wind's Lease OCS-A 0520 following permitting approvals. The measurements would be conducted over 24 months with 6-month servicing. The Floating LiDAR Buoy will be moved to the Lease Area in the first quarter of 2021, directly following the issuance of SAP approval and other relevant permits for a 2-year deployment.

The BOEM-approved RPS Floating LiDAR Buoy will be attached to the seafloor by means of a U-shaped mooring in ~50 m water depth consisting of a surface tracking RPS custom built toroidal Floating LiDAR buoy fitted with dual logging and transmitting system to collect profiled wind speed and direction. A Sonardyne acoustic release and rope canister will be used on the recovery end of the mooring. The RPS Floating LiDAR will transmit all data in near real time via iridium satellite network or 4G. The U-shaped mooring design which is comprised of chain, polypropylene rope, wire rope, trawl floats, an amsteel rope dispenser with acoustic release and rubber cords that connect the RPS Floating LiDAR Buoy to both a primary and secondary clump anchor on the sea floor as well as three underwater viny floats that sit approximately 55.8 ft (17 m) above the seabed as part of the mooring recovery system (Figure 2-1).

The primary and secondary clump weights would weigh approximately 4,409 lbs (4,500 kg) and 660 lbs (300 kg), respectively and sit on the seabed for a total area of up to 21.5 $ft^2$ (2 square meters [$m^2$]) per clump weight. The chain would be attached to the side of the Floating LiDAR hull via the 12T bow shackle. Due to the use of rubber cords in the mooring design, there will be no anchor chain sweep associated with the long-term operation of the RPS Floating LiDAR Buoy. Total area of mooring resting on the seafloor, inclusive of both clump weights, chains and wire ropes, would be approximately 67.8 $ft^2$ (6.3 $m^2$). Vertical penetration of the primary and secondary clump weights into the seabed is anticipated to be approximately 1.6 ft and 0.7 ft (0.5 m to 0.2 m), respectively. Clump weights will be fully recovered.

The RPS Floating LiDAR Buoy instrumentation will be powered by 30 x 110 Amp-hour Victron Gel batteries, charged by 12 x 335-Watt solar panels and 4 x D200 wind generators. Five regulators protect the batteries from being damaged by possible overcharging. Beacon Wind has selected a concept that has avoided the use of backup generators using traditional fuels in an attempt to mitigate the risk of oil spills and reduce emissions. The acoustic release is powered by an alkaline or lithium battery pack.

In the event of failure of the key power supply systems, the RPS Floating LiDAR Buoy instrumentation would be capable of operating at full capacity on battery power alone for up to ten days. The life of the acoustic release battery pack is over a year.

A ZephIR300M LiDAR and KONGSBERG MRU-5 motion reference unit will be installed atop the RPS Floating LiDAR Buoy. The ZephIR300M unit is a wind profiling device capable of remotely measuring and collecting wind speeds and directions up 656 ft (200 m). The KONGSBERG MRU-5 motion reference unit collects high accuracy roll, pitch and heave measurements. The RPS Floating LiDAR Buoy would also contain the following equipment:

Table 2-7 provides a list of the parameters measured by the RPS Floating LiDAR Buoy, the associated instrumentation, as well as the range and accuracy of the measurements.

**Table 2-7. Parameters Measured and Recorded by the RPS Floating LiDAR BUOY**

| Parameter | Instrumentation | Range | Accuracy |
|---|---|---|---|
| Wind Speed | ZephIR 300 LiDAR | <1 m/s to 70 m/s | 0.1 m/s |
| Wind Direction | | 0 to 360° | <0.5° |
| Temperature | | -40 + 50° C | NA |
| Orientation | KONGSBERG MRU-5 | +180° | 0.02° RMS |
| Gyro | | +149°/s | 0.08% RMS |
| Acceleration | | +30 $m/s^2$ | 0.1 $m/s^2$ RMS |
| Heave | | +50 m | 0.01 m/s RMS |

The RPS Floating LiDAR Buoy will store data using a combination of the M200 data loggers and the Zephir LiDAR 300m instrument.

The M200 data logger is latest version of data loggers constructed by RPS. Custom firmware is written for the M200, thus allowing maximum control of communication options and data transmission protocols. The M200 logger has the ability to integrate various sensors via analogue, digital, serial and Ethernet inputs. Each RPS Floating LiDAR Buoy has two M200 data loggers installed to allow redundancy in data logging and transmission. The M200 Data Logger has a 64-gigabyte flashcard installed, which allows for years of data logging without the need for erasing.

Both M200s (System A and B) on the buoy will be connected to the LiDAR via Ethernet. The LiDAR 10-minute data will be retrieved via Modbus polling of the LiDAR, logged and transmitted by each M200 in an Iridium Short Burst Data message.

The M200 Data Logger will also receive 1 Hertz continuous data from the global positioning system (GPS) compass, KVH compass and MRU. All of this data will be stored in daily files which will be retrieved once per day via 4G or Iridium Broadband (should 4G coverage not be available). The GPS compass is used to correct the M200 clock to GPS time once per day at midnight UTC.

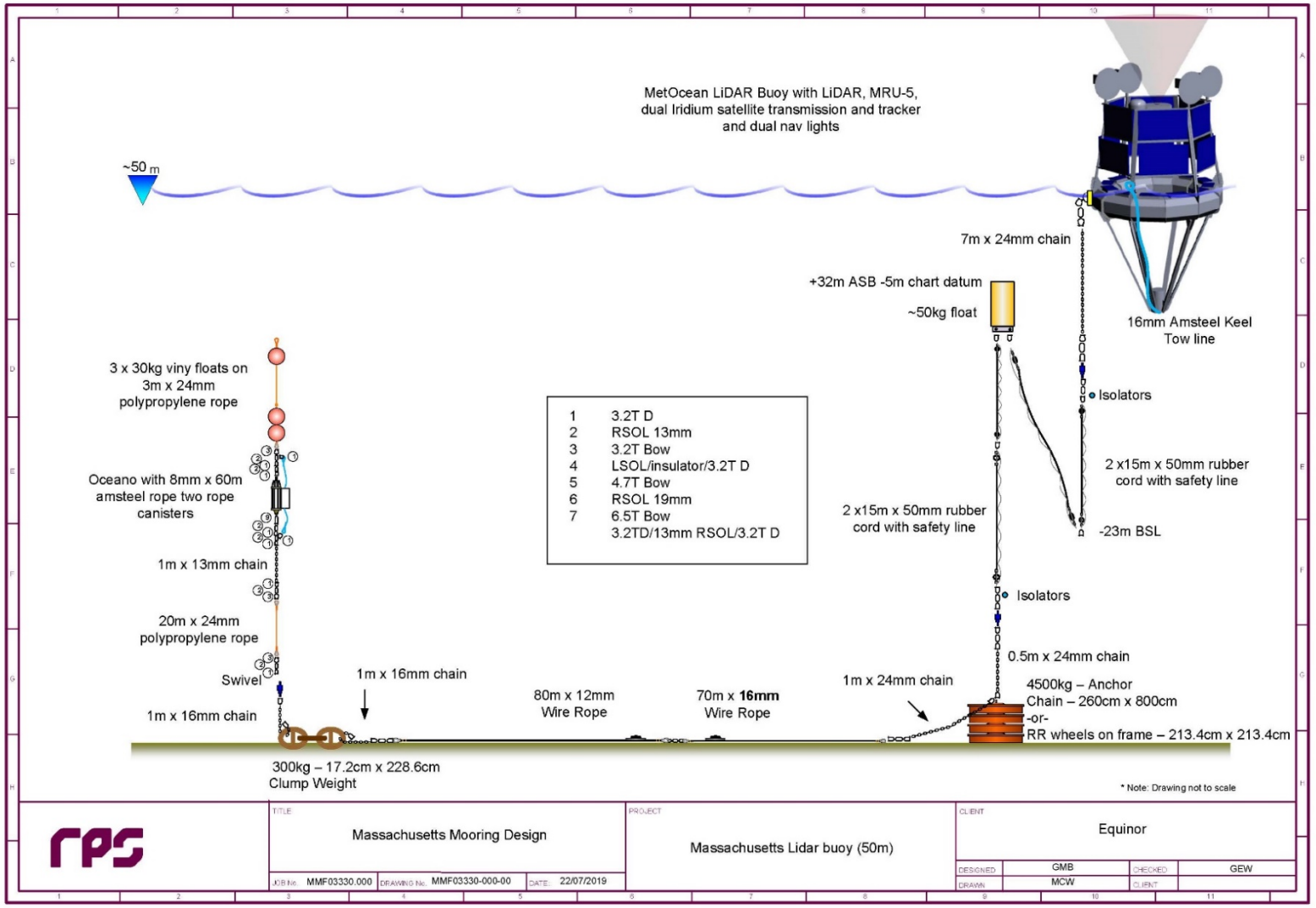
The Zephir LiDAR 300M will log the 10-minute averaged LiDAR data as well as the raw data in daily files. The raw LiDAR data will be retrieved once per day via 4G or Iridium Broadband (should 4G coverage not be available).

The following supporting systems for navigational aids, position tracking, and remote monitoring will also be installed on the RPS Floating LiDAR Buoy:

- Buoy tracking system;
- V104S GNSS Compass;
- Two KVH Compass;
- Two M200 Logger units; and
- Two self-contained Global Star tracker units.

**Using the maintenance plan described in Section 5.2, equipment on the RPS Floating LiDAR Buoy will have a minimum two-year operational lifespan.**

**Figure 2-1. Floating LiDAR Mooring Design**



## 2.9 Wave and Metocean Buoy

The Wave and Met Buoy mooring design will also consist of the U-shaped mooring design. The Wave and Met Buoy will be attached to the seafloor by means of a U-mooring design which is comprised of a chain, polypropylene rope, wire rope trawl floats, and amsteel rope dispenser with acoustic release and rubber cord that connects the RPS Wave and Met Buoy to both a primary and secondary clump anchor on the sea floor as well as 3 underwater viny floats that sit approximately 55.8 ft (17 m) above the seabed (Figure 2-2). The wave and metocean buoys are known technology and already being used in offshore wind energy monitoring programs in the New York Bight area, which have been approved by BOEM.

The primary and secondary clump weights would weigh approximately 2646 lbs (1,200 kg) and 661 lbs (300 kg), respectively, and will rest on the seafloor for an area of approximately 21.5 $ft^2$ (2 $m^2$) per clump weight. The chain would be attached to the underside of the hull. Due to the mooring design, which includes a rubber cord section, there will be no anchor chain sweep associated with the long-term operation of the Wave and Met Buoy. Total area of mooring resting on the seafloor, inclusive of both clump weights, chains and wire ropes, would be approximately 62.4 $ft^2$ (5.8 $m^2$). Vertical penetration of the primary and secondary anchor chain for the Wave and Met Buoy into the seabed is anticipated to be approximately 1.5 ft and 0.5 ft (0.5 m to 0.2 m), respectively. The discrepancy between water depths reported in Table 2-8 and those presented on Figure 2-2 is negligible in light of the mooring design configuration. All clump weights will be fully recovered.

The Wave and Met Buoy instrumentation will be powered by 6 x 110 Amp-hour Victron Gel batteries, charged by 6 x 100-Watt solar panels. A regulator in the Power Management Unit protects the batteries from being damaged by overcharging. When fully charged the batteries have enough reserve capacity to power the buoy in a standard sampling routine for up to two months without being charged. The acoustic release is powered by an alkaline or lithium battery pack that has a life of at least a year.

The Wave and Met Buoy is instrumented with the following sensors to provide in-situ monitoring and analysis of wave and meteorological activity:

- Datawell MOSE-G Waves Sensor;
- WindSonic Wind Sensor;
- A Gill WindObservor II Wind Sensor;
- Pyrosales RTD Air Temperature Sensor;
- A Vaisala HMP 155 Relative Humidity Sensor; and
- A Vaisala PTB110 Barometric Pressure Sensor.

Table 2-8 provides a list of the parameters measured by the Wave and Met Buoy, as well as the resolution and accuracy of the measurements.

**Table 2-8. Parameters Measured and Recorded by the Wave and Met Buoy**

| Parameter | Instrumentation | Range | Resolution | Accuracy |
|---|---|---|---|---|
| Wind Speed | WindSonic | 0 to 60 m $s^{-1}$ | 0.01 m $s^{-1}$ | ±4% |
| Wind Direction | WindSonic | 0 to 360˚ | 1˚ | ±3˚ |
| Wind Speed | WindObserver II | 0 to 65 m $s^{-1}$ | 0.01 m $s^{-1}$ | ±2% |
| Wind Direction | WindObserver II | 0 to 360˚ | 1˚ | ±2˚ |
| Air Temperature | Pyrosales RTD | -200 to 600 ˚C | 0.1 ˚C | ±0.05 ˚C |
| Relative Humidity (RH) | Vaisala HMP-155 | 0 to 100% | 0.025 % RH | ±1.0% at 20 °C |
| Barometric Pressure | Vaisala PTB-110A | 800 to 1060 hPa | 0.1 hPa | ±0.3 hPa at 20 ˚C |
| Waves | Datawell MOSE-G | 1 – 100s period | 1 mm | 2 cm |

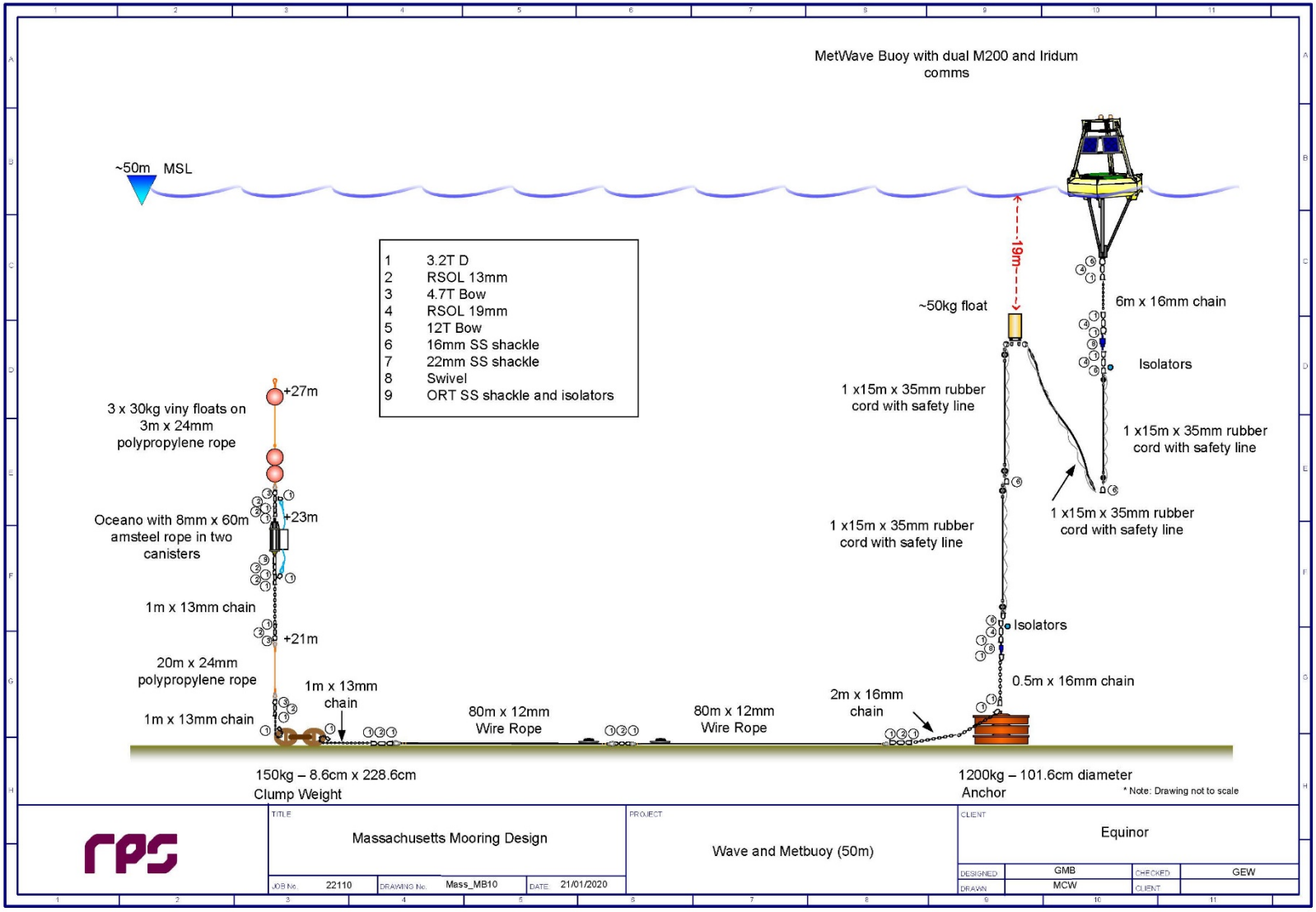
The data acquisition system will acquire and store data using the dual M200 loggers with 64 Gigabyte flashcards. Wave and met parameters, including 30-minute wave spectrum and 3 x 10 minute met parameter data, will be transmitted from both M200 units via Iridium/Short Burst Data every 30 minutes.

The following supporting systems for navigational aids, position tracking, and remote monitoring will also be installed on the Wave and Met Buoy:

- Two Global Star Tracking Beacons;
- Iridium moderns; and
- MOSE-G sensor.

Using the maintenance plan described in Section 5.2, equipment on the Wave and Met Buoy will have a minimum four-year operational lifespan.

**Figure 2-2. Wave and Metocean Mooring U-Design (Metocean Moorings 1 and 2)**



## 2.10 Current Meter CM/CT Mooring

The CM/CT mooring design will consist of a subsurface mooring design. The CM-04 Acoustic Current Meters/Seabird SBE37 CT loggers will be deployed as part of the subsea mooring. The CM-04 Acoustic Current Meters will be incorporated into the subsurface portion of the mooring line at 9.8 ft (3 m), 55.8 ft (17 m), and 88.6 ft (27 m) above the seafloor via chain and 9.5 mm TB wire segments on the top and bottom of the meters that connect to the mooring line (Figure 2-3). The CT loggers will be attached to the subsurface portion of the mooring line via plastic clamps at 4.9 ft (1.5 m), 62.3 ft (19 m), and 95.1 ft (29 m) above the seafloor. The remainder of the mooring is comprised of chain, wire rope, two amsteel rope dispensers with acoustic release and shackles and load rings that connects the subsurface portion of the mooring to a clump anchor on the sea floor as well as a pendant buoy that will sit approximately 16.4 ft (5 m) below the sea surface (Figure 2-3). When the acoustic release is activated, the amsteel rope dispensers release high strength Spectra rope that floats to the surface on the viny floats. The mooring has been designed to withstand the prevailing conditions and facilitates safe recovery of the CM/CT mooring.

The clump weight would weigh approximately 992 lbs (450 kg) and will rest on the seafloor for an area of approximately 21.5 $ft^2$ (2 $m^2$). Vertical penetration of the anchor chain for the Current Meter mooring into the seabed is anticipated to be approximately 0.5 ft to 1.5 ft (0.2 m to 0.5 m). The discrepancy between water depths reported in Table 2-8 and those presented on Figure 2-4 is negligible in light of the mooring design configuration. Clump weights will be fully recovered.

Each CM-04 Acoustic Current Meter and Seabird SBE37 CT logger is powered by 28 Amp-hour alkaline battery packs and 12 AA lithium batteries, respectively. The current meter batteries can last over a year but would be replaced during the 6-month maintenance trip (Section 5.2). The acoustic release is powered by an alkaline or lithium battery pack that has a life of at least a year.

The CM-04 Acoustic Current Meter is a self-contained instrument that can be moored to record ocean currents and water temperature. The CM-04 Acoustic Current Meter consists of four piezoelectric transducers, an acoustic mirror positioned to measure velocities in two axes, a flux-gate compass unit, and a temperature sensor. Recording intervals range from 0.5 second to 10 minutes. On this project, the data will be measured in 1-minute averages of the continuous 30 Hertz current data. Data is stored on an internal flash card and will be downloaded during 6-month maintenance trips.

The Seabird SBE37 CT logger is a high-accuracy conductivity and temperature recorder with internal battery and memory. The Seabird SBE37 CT logger's internal field conductivity cell, which measures conductivity, is unaffected by external fouling which ensures stability. The aged and pressure protected thermistor, used to measure temperature, has a long history of accuracy and stability. There are several user selectable sampling rates that range from 5-second to 9.1-hour intervals, polled sampling, or serial line sync. On this project, the conductivity and temperature sampling data will be measured at 5-minute intervals. Data is stored on an internal non-volatile FLASH memory card and will be downloaded during 6-month maintenance trips.

**Figure 2-3. Current Meter Moorings (1 and 2)**

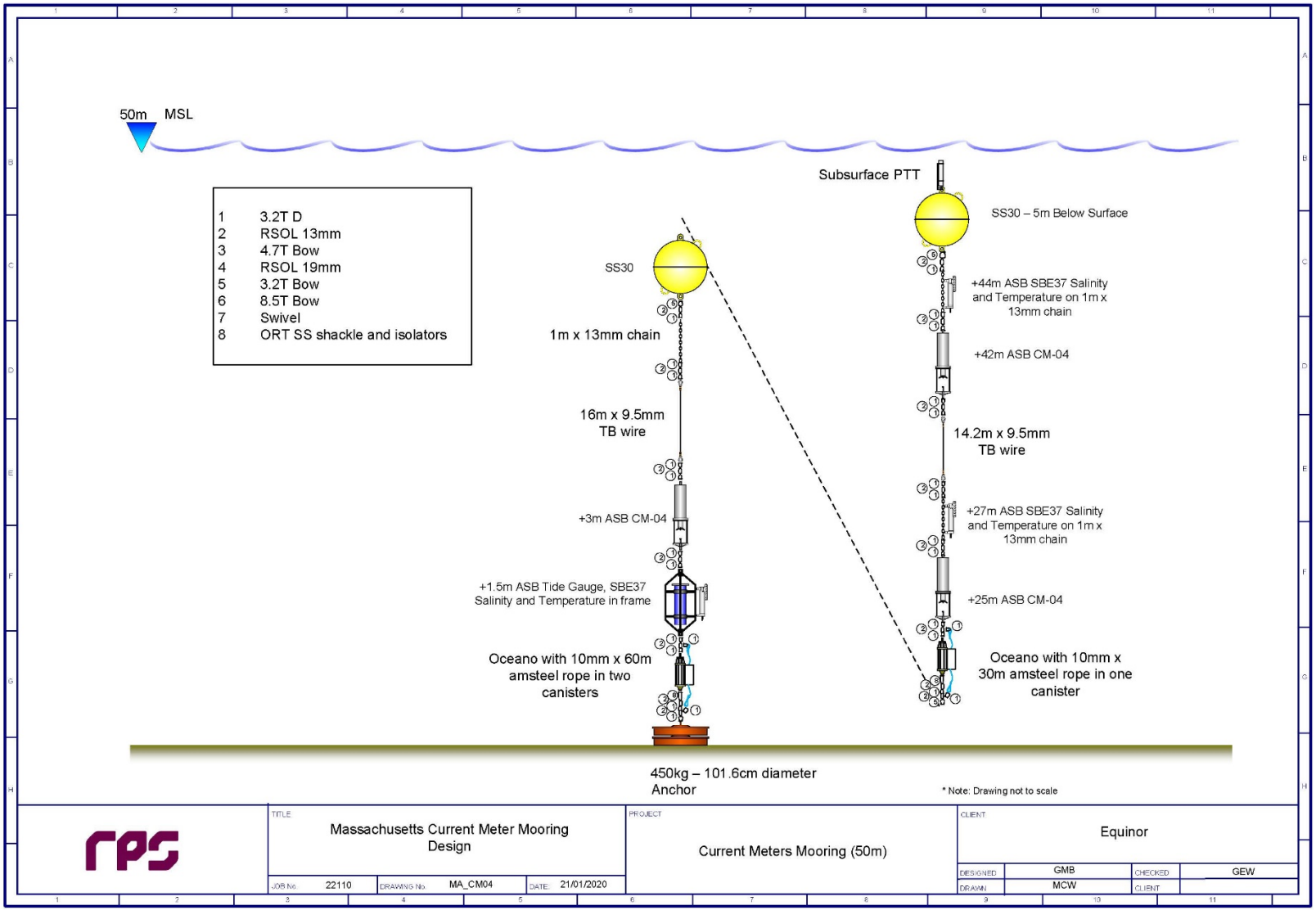


**Figure 2-4. CM-04 Acoustic Current Meter (Left) and Seabird SBE37 CT Logger (Right)**

Table 2-9 provides a list of the parameters measured by the CM 04 meter and the CT recorder, as well as the resolution and accuracy of the measurements.

**Table 2-9. Parameters Measured and Recorded by the CM 04 Meter and CT Recorder**

| Parameter | Instrumentation | Range | Resolution | Accuracy |
|---|---|---|---|---|
| Current Speed | CM-04 | 0 to ±400 $cms^{-1}$ | 0.01 $mms^{-1}$ | ±1 $cms^{-1}$ or ±1% |
| Current Direction | CM-04 | 0 to 360˚ | 1˚ | ±1˚ |
| Water Temperature | CM-04 | -3˚C to +37˚C | ±0.01˚C | ±0.2˚C |
| Water Conductivity | CT Logger | 0 – 7 S/m | 0.00001 S/m | 0.0003 S/m |
| Water Temperature | CT Logger | -5˚C to +38˚C | 0.0001 ˚C | 0.002 ˚C |

The CM-04 Acoustic Current Meter and Seabird SBE37 CT Logger will store data internally. Data will be downloaded every 6 months during maintenance of the equipment.

The CM/CT Mooring would also be equipped with a subsurface satellite transmitter PTT which would activate and send an alarm in the event that the subsea mooring has surfaced.

Using the maintenance plan described in Section 5.2, equipment on the CM/CT Mooring will have a minimum four-year operational lifespan.

## 2.11 Project Description, Design, Implementation 585.610 (a)(6)

Beacon Wind will collect and analyze meteorological data, inclusive of wind speed and direction at multiple heights, and information on other meteorological and metocean conditions as part of the site assessment activities of the Project within the Lease Area. As stated previously, Beacon Wind has proposed that the collection of this data will be performed using one RPS Floating LiDAR Buoy, two RPS Metocean and Wave Buoys, and two subsea Current Meter moorings. The proposed Metocean/Wave moorings represent state-of-the- art equipment that incorporates the best available technologies, mooring components and mooring designs to ensure reliable, quality data collection, robust mooring integrity, safety and minimal environmental impacts. Design drawings of the technology proposed are provided in Appendix B and Section 2.0. The equipment proposed for Massachusetts Lease Area 0520 is the same equipment that was approved and used in the New York Bight area under the determination of this BOEM FONSI.

The RPS Floating LiDAR Buoy will consist of instrumentation and supporting systems atop a floating moored buoy platform (Figure 2-1). Each floating platform consists of the toroidal shaped, dodecagon hull, mooring chain, clump weight anchors, floats and a pendant marker buoy. The hull consists of hot rolled HA1-grade steel with 10-millimeter (mm), 350-grade steel dividing plates. The hull is powder coated and has 12 zinc anodes installed to protect each hull segment from corrosion. The 5005-grade H34 aluminum superstructure is powder coated and measures 15.2 feet (ft) (4.63 meters [m]) in diameter. The vertical profile of RPS Floating LiDAR including instrumentation, will be approximately 15.8 ft (4.8 m) from the sea surface to the top of the D400 wind generators. The weight of the entire buoy including all electronics and keel is 9,480 lbs (4,300 kg)(4.3 metric tons).The submerged portion of the hull would measure approximately 13.8 ft (4.2 m) below the sea surface from the water line to the bottom of the buoy. The superstructure has also been designed with consideration for avian species. Landing areas have been minimized and anti-perching devices will be installed on the lights and mast. In addition, consideration has been given to potential icing issues and horizontal surfaces have been minimized to limit the potential ice/snow build up.

The RPS Wave and Met Buoys are 8.5 ft (2.6 m) round buoy that measures directional waves, meteorological conditions at sensor height and sea water temperature (Figure 2-2). Similar to the RPS Floating LiDAR, the buoy hull and superstructure are constructed from hot rolled HA1-grade steel and 5005-grade H34 aluminum, respectively. The Wave and Met Buoy is attached to the seabed using a U-shape mooring design. The vertical profile of the Wave and Met Buoy will be approximately 7.9 ft (2.4 m) from the sea surface to the top of the buoy. The submerged portion of the buoy hull would measure approximately 7.9 ft (2.4 m) below the sea surface from the waterline to the bottom of the buoy. The Wave and Met Buoy weighs 4,409 lbs (2,000 kg).

The CT/CM Moorings will be a subsurface inline mooring consisting of CM- 04 Acoustic Current Meters and Seabird SBE37 CT loggers. The CM-04 Acoustic Current Meter, which measures approximately 45 inches (1155 millimeters [mm]) long by 8 inches (195 mm) wide, is a self-contained instrument that can be moored to record ocean currents and water temperature. CM-04 Acoustic Current Meter is constructed from Type 2 Titanium. The CM-04 Acoustic Current Meter will be incorporated into the subsea mooring at 9.8 ft (3 m), 55.8 ft (17 m), and 88.6 ft (27 m) above the seabed. The Seabird SBE37 CT logger, which measures 22.2 inches (563.9 mm) long by 4 in (102.9 mm) wide, is a high-accuracy conductivity and temperature recorder with internal battery and memory. The Seabird SBE37 CT logger is constructed from titanium and other non-corroding materials and has been designed for moorings and other long duration, fixed- site deployments.). The Seabird SBE37 CT loggers will be attached to the subsurface portion of the mooring line via plastic clamps and cables at 4.9 ft (1.5 m), 62.3 ft (19 m), and 95 ft (29 m) above the seafloor (Figure 2-3).

In addition to the above equipment, Beacon Wind plans to install two avian telemetry tags. Avian recording will be installed on the Floating LiDAR buoy and one of the Met Buoys and will be carried out utilizing a CTT Sensor Station paired with an omni directional antenna. This unit will be configured to receive tags on the 434MHz system and will be powered by the buoy. Summary data for the 434MHz tags will be transmitted ashore daily via the dedicated Iridium link.

Beacon Wind plans to deploy the Metocean Facilities and the avian telemetry tags directly following the issuance of SAP approval and other relevant permits. The RPS Floating LiDAR Buoy is scheduled to be decommissioned at the end of the two-year operational life, and the Met and Wave Buoy and the CM/CT mooring will be decommissioned at the end of two years. The Metocean Facilities will be decommissioned at the end of the operational life as described in Section 5.

# 3.0 Deployment and Installation 585.610 (a)(7)

Installation of the Metocean Facilities may take up to seven days over three separate vessel trips including transit, barring weather delays. It is anticipated that the vessel activities will be staged out of New Bedford Harbor, Massachusetts.

## 3.1 Overview of Installation and Deployment Activities

Beacon Wind will notify BOEM, United States Fleet Forces (USFF) N46, the United States Army Corps of Engineers, and the United States Coast Guard (USCG) prior to mobilization to deploy the Metocean Facilities. Written notice via email will be provided to the appropriate contact at Fleet Forces Command prior to mobilization in order to avoid potential conflicts with military operations. Beacon Wind will update Fleet Forces Command on the installation schedule following approval of the SAP and detailed planning.

Beacon Wind will apply for a USCG Private Aids to Navigation (PATON) for the Metocean Facilities (see Table 2-1) and will submit a copy of the approved PATON to BOEM prior to buoy deployment. Additionally, Beacon Wind will notify mariners, fishermen, and other users of the area by submitting a request to the USCG for publication of a Local Notice to Mariners at least two weeks prior to the start of the in-water work. This notice will include the contact names for the installation vessels, local fisheries liaison officer, 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.

Within 30 days of completing the installation of the Metocean Facilities, Beacon Wind will prepare an Installation Report and provide a copy to BOEM to fulfill the requirements of 30 CFR 585.615(a). This report will include a description of the equipment and the installation, including final coordinates of the installation site and photo documentation of the equipment deployed, the results of all commissioning tests, the plans and schedule for upcoming inspections and maintenance, and any noted problems or issues to be addressed.

Beacon Wind will provide written notification to BOEM and the DoD of any proposal to add new sensors to the data collection buoy(s). Beacon Wind will include the technical specifications (manufacturer, model, spectrum requirements, etc.) for any proposed new sensors, specifically seismometers and hydrophones, in the notification. The notification will be provided to the contacts listed in the Lease, or updated contact information as provided by BOEM.

### 3.1.1 RPS Floating LiDAR, Wave and Met Buoy, and CM / CT Mooring Deployment

The installation of the Metocean Facilities will require one workboat, up to approximately 150 ft (46 m) in length, taking three separate round trips over a 6 to 7-day period. Installation of the Floating LiDAR will happen over a two-day period. The first day, the vessel will be loaded and prepared for deployment, and Floating LiDAR will be secured for transit and the transit will commence to the deployment location. On arrival at the Floating LiDAR deployment location in the Beacon Wind Lease Area, the chain will be laid out on the deck of the vessel in a manner that will prevent tangling or twisting while it is let out into the water. A quick release would be attached to the mooring chain, which would then be secured on deck. The mooring chain for Floating LiDAR will then be deployed. Floating LiDAR, inclusive of clump weights, chains, ropes, rope dispenser, acoustic release and lines, will be deployed from the work vessel by a crane.

Following deployment of Floating LiDAR, the vessel will return to shore, and the Metocean Facilities will be secured to the deck. The vessel will then transit to the deployment location, which will be located approximately 19km north and south from Floating LiDAR. The Metocean buoys will have mooring chain that will be laid out on the deck of the vessel in a manner that will prevent tangling or twisting while it is let out into the water. The Metocean Buoys will then be connected to the mooring system, the mooring will be streamed out, and the clump weight anchor will be released. Following deployment of the Metocean Buoys, the vessel will transit back to port.

Finally, the vessel will transit to the CM/CT Mooring deployment location, which will be located approximately 18 km north and south from Floating LiDAR. The CM/CT mooring chain will be laid out on the deck of the vessel in a manner that will prevent tangling or twisting while it is let out into the water. The CM/CT Mooring systems, inclusive of clump weights, chains, ropes and lines, will be deployed from

the work vessel by a crane. Following deployment of the CM/CT Moorings, the vessel will transit back to port. (NOTE: Final deployment procedures may be modified depending on the deployment vessel configuration). No vessel anchoring will take place during installation.

Personnel participating in the installation will attend a pre-installation briefing prior to mobilization (See Section 4.2).

## 3.2 Support Vessels

Beacon Wind will employ RPS to transport and deploy the Metocean Facilities. It is anticipated that the deployment of the Metocean Facilities will require the support of a single work boat. Beacon Wind is currently proposing to use the M/V *Rana Miller* or a similar vessel as the work boat. The Rana Miller is a multi-purpose offshore utility vessel with two Cummins KTA-38 main engines rated at 850 horsepower each. The M/V *Rana Miller* measures 150 ft (46 m) in length with a 36 ft (11 m) beam and 11.5 ft (4 m) draft. See Appendix B for vessel specifications.

## 3.3 Marine Trash and Debris Awareness and Elimination

Beacon Wind will 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 Lease and as described in the Bureau of Safety and Environmental Enforcement NTL No. 2015-G03 or any NTL that supersedes NTL 2015-G03.

### 3.3.1 Oil Spill Response

The Metocean Facilities will utilize renewable energy or lithium battery as its back up power source that does not contain oil; therefore, Oil Spill Response Measures are not required.

## 3.4 Health and Safety Including Accidents and Procedures

Beacon Wind will implement a project specific HSE Plan to ensure the health and safety of all personnel involved in the installation, operation, and maintenance, and decommissioning of the Metocean Facilities. The project-specific plan has been prepared in accordance with Beacon Wind's standard corporate HSE policies and procedures. The HSE Plan will also address emergency response and reporting requirements. The HSE plan is included as Appendix B to this SAP.

## 3.5 Mitigation Measures and Avoidance Plans 585.610 (a)(8)

All whales, dolphins, and porpoises in the northeast region are federally protected by the Marine Mammal Protection Act of 1972. In addition, many large whales in the area, as well as sea turtles, are further protected under the Endangered Species Act of 1973 (ESA).

The Lease contains specific stipulations to minimize risk to marine species that must be followed. Installation of the Metocean Facilities will not require pile-driving; accordingly, mitigations to reduce adverse impacts on protected species from pile driving do not apply to this installation. All activities associated with installation, operation and decommissioning of the Metocean Facilities will comply with the applicable Lease stipulations, summarized in Table 2-2 and Table 3-1.

**Table 3-1. Standard Operating Conditions in the Lease Area**

| Addendum "C" Stipulation | Vessel Operations Conditions |
|---|---|
| **Vessel Strike Avoidance Measures** | |
| 4.1.1 | The Lessee must ensure that vessels conducting activity in support of plan submittal, including those transiting to and from local ports and the lease area, comply with the vessel-strike avoidance measures specified in stipulations 4.1.1.1 through 4.1.1.8.3, except under extraordinary circumstances where complying with these requirements would put the safety of the vessel or crew at risk. |
| 4.1.1.1 | The Lessee must ensure that vessel operators and crews maintain a vigilant watch for marine mammals (whales, dolphins, porpoises, seals), sea turtles, and giant manta rays, and slow down or stop their vessel to avoid striking these protected species. |
| 4.1.1.2 | The Lessee must ensure that vessels 19.8 meters (m) (65 feet [ft]) in length or greater that operate between November 1 through July 31, operate at speeds of 10 knots (11.5 mph) or less. |
| 4.1.1.3 | The Lessee must ensure that vessel operators monitor NMFS North Atlantic Right Whale reporting systems (e.g., the Early Warning System, Sighting Advisory System, and Mandatory Ship Reporting System) from November 1 through July 31 and whenever a Dynamic Management Area (DMA) is established within any area vessels operate. |
| 4.1.1.4 | The Lessee must ensure that all vessel operators comply with 10 knot (18.5 kilometres per hour [km/hr]) speed restrictions in any DMA. |
| 4.1.1.5 | The Lessee must ensure that all vessel operators reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of marine mammals are observed near an underway vessel. |
| **4.1.1.6 North Atlantic Right Whales** | |
| 4.1.1.6.1 | 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 or unidentified large marine mammal. |
| 4.1.1.6.2 | The Lessee must ensure that the following avoidance measures are taken if a vessel comes within 500 m (1,640 ft} of any North Atlantic right whale: |
| 4.1.1.6.2.1 | If underway, any vessel must steer a course away from any North Atlantic right whale 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 4.1.1.6.2.2). |
| 4.1.1.6.2.2 | If a North Atlantic right whale is sighted within 100 m (328 ft} to an underway vessel, the vessel operator must immediately reduce speed and promptly shift the engine to neutral. The vessel operator must not engage the engines until the North Atlantic right whale has moved beyond 100 m (328 ft), at which point the Lessee must comply with 4.1.1.6.2.1. |
| 4.1.1.6.2.3 | If a vessel is stationary, the vessel must not engage engines until the North Atlantic right whale has moved beyond 100 m (328 ft), at which point the Lessee must comply with 4.1.1.6.2.1. |
| **4.1.1.7 Large Whales other than the North Atlantic Right Whale** | |
| 4.1.1.7.1 | The Lessee must ensure all vessels maintain a separation distance of 100 m (328 ft) or greater from any sighted Endangered Species Act (ESA)-listed whales or humpback whales. |
| 4.1.1.7.2 | The Lessee must ensure that the following avoidance measures are taken if a vessel comes within 100 m (328 ft) of whale: |
| 4.1.1.7.2.1 | If underway, the vessel must reduce speed and shift the engine to neutral and must not engage the engines until the whale has moved beyond 100 m (328 ft). |
| 4.1.1.7.2.2 | If stationary, the vessel must not engage engines until the whale has moved beyond 100 m (328 ft). |
| **4.1.1.8 Small Cetaceans (Dolphins and Porpoises), Seals, Giant Manta Rays, and Sea Turtles** | |
| 4.1.1.8.1 | The Lessee must ensure that all vessels underway do not divert to approach any small cetacean, seal, sea turtle, or giant manta ray. |
| 4.1.1.8.2 | The Lessee must ensure that all vessels maintain a separation distance of 50 meters (164 ft) or greater from any sighted small cetacean, seal, sea turtles, or giant manta ray, except when a small cetacean or seal approaches the vessel, in which case, the Lessee must follow 4.1.1.8.3 below. |
| 4.1.1.8.3 | If a small cetacean or seal approaches any vessel underway, the vessel underway must avoid excessive speed or abrupt changes in direction to avoid injury to the animal. |
| **4.1.4 Entanglement Avoidance** | |
| 4.1.4.1 | The Lessee must ensure that any structures or devices attached to the seafloor for continuous periods greater than 24 hours use the best available mooring systems for minimizing the risk of entanglement or entrainment of marine mammals, manta rays and sea turtles, while still |

| Addendum "C" Stipulation | Vessel Operations Conditions |
|---|---|
| | ensuring the safety and integrity of the structure or device. The best available mooring system may include, but is not limited to, vertical and float lines (chains, cables, or coated rope systems), swivels, shackles, and anchor designs. |
| 4.1.4.2 | All mooring lines and ancillary attachment lines must use one or more of the following measures to reduce entanglement risk: shortest practicable line length, rubber sleeves, weak-links, chains, cables or similar equipment types that prevent lines from looping or wrapping around animals, or entrapping protected species. |
| 4.1.4.3 | Any equipment must be attached by a line within a rubber sleeve for rigidity. The length of the line must be as short as necessary to meet its intended purpose. |
| 4.1.4.4 | If an entangled live or dead marine protected species is reported, the Lessee must provide any assistance to authorized stranding response personnel as requested by BOEM or NMFS. |

Note:
1. A Dynamic Management Area is defined in Section 1.2 of Lease Addendum C. Vessel operators may send a blank email to ne.rw.sightings@noaa.gov for an automatic response listing all current Dynamic Management Areas.

In addition to the above, all vessels, regardless of length, must observe a 10-knot speed restriction in specific areas designated by NMFS for the protection of North Atlantic right whales, the Block Island Sound SMA (in effect from November 1 through April 30); and any Dynamic Management Areas when in effect.

## 3.6 Reporting Procedures for Injured or Dead Protected Species

During all phases of marine activities, sightings of any injured or dead protected species (marine mammals, sea turtles, giant manta ray or sturgeon) will be reported within 24 hours, regardless of whether the injury or death was caused by a vessel as specified in Stipulation 4.4.4 of the Lease. All marine activities will be suspended immediately, and the circumstances reported as specified below if a dead or injured right whale is found. The Lease stipulations summarized in Table 3-2 below apply and must also be adhered to.

**Table 3-2. Protected Species Reporting Requirements in the Lease Area**

| Lease Stipulation | Lease Requirement |
|---|---|
| 4.4.4 Reporting Injured or Dead Protected Species | The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals, sea turtles, giant manta ray or sturgeon) are reported to the Lessor, NMFS, and the NMFS Greater Atlantic (Northeast) Region's Stranding Hotline (866-755-6622 or current) within 24 hours of sighting, regardless of whether the injury or death is caused by a vessel.<br>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 incident within 24 hours. The Lessee must use the form provided in Appendix A to ADDENDUM "C" to report the sighting or incident. 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. |
| **Reporting Observed Impacts to Protected Species Addendum C** | |
| 4.4.5.2 Reporting Requirements Observed Impacts | The Lessee must record any observed injuries or mortalities using the form provided in Appendix A to ADDENDUM "C". |

# 4.0 Operations and Maintenance 585.610 (a)(7)

## 4.1 Data Collection and Operations for Wind and Metocean Data

The Metocean Facilities will remain moored in position and transmit wind data and metocean measurements autonomously via Iridium Broadband, or 4G, if available. The RPS Floating LiDAR Buoy will transmit motion reference data, heading data and charge/discharge once a day, and 10-minute average wind speed and direction profiles, as well as system voltage information and charge discharge rates will be transmitted every 10 minutes The Metocean Buoys will transmit wave and met parameters, including 30-minute wave spectrum and 3 x 10-minute met parameter data, every 30 minutes. Equipment on the CM/CT Mooring will store data internally to be downloaded every six months during maintenance trips.

## 4.2 Maintenance Activities

Planned on-site maintenance for the RPS Floating LiDAR Buoy is scheduled at 6-month intervals and will be completed by a vessel comparable to the work boat used for installation. Planned maintenance activities will include service of sensors, data retrieval, inspection of mooring components and replacement where appropriate, and cleaning of solar panels and wind turbines. A detailed service, which will include all 6- month activities, as well as replacement of the mooring system, will be performed at 12-month intervals.

Planned on-site maintenance for the Wave and Met Buoys is scheduled every 6 months and will be completed by a vessel comparable to the work boat used for installation. Planned maintenance activities at the first 6-month interval would include cleaning of the buoy dome and hull if necessary, as well as visual inspection of the mooring system and replacement of parts where appropriate. At 12 months the mooring will be recovered to deck and replaced.

Planned on-site maintenance for the CM/CT Moorings is scheduled every 6 months and will be completed by a vessel comparable to the work boat used for installation. Planned maintenance activities include changing out batteries, downloading data, and visual inspection of the mooring system. At 12 months the mooring will be replaced. Beacon Wind will incorporate planned maintenance activities into a comprehensive annual Self-Inspection Plan pursuant to 30 CFR 585.824(a).

In addition to the planned 6-month maintenance activities, in exceptional circumstances an unscheduled visit to a deployment location may be required if there is evidence of damage (such as partial or total loss of data transmissions), or if transmitted GPS data indicated that a buoy had drifted significantly outside the “watch circle,” which allows for buoy movement inside a roughly 100-meter radius from the recorded deployment coordinates. Examples of events that could cause such damage or buoy displacement include, but are not limited to, hurricane-strength tropical or "nor'easter" storms, heavy snow accumulation, or heavy icing in the event of extremely low temperatures. It has been assumed that up to one unscheduled round trip per year may be needed to visit a buoy site.

## 4.3 Reporting

Per Lease stipulation 2.2.1, Beacon Wind will submit a semi-annual progress report to BOEM every six months for the duration of the site assessment term. The semi-annual progress report will provide a brief narrative of overall progress since the previous semi-annual progress report (or since the effective date for the first semi-annual progress report). The progress report will include updated survey plans to account for modifications in schedule, as necessary. In addition to the semi-annual progress reports, Beacon Wind will prepare and submit a Self-Inspection Report, an Annual Report, and a Certification of Compliance to BOEM no later than November 1 of each year for the duration of the site assessment term. See Table 4-1 for a description of the content of each report and the associated regulatory citation.

**Table 4-1. Reporting Requirements**

| Report Name | Content | Regulatory Citation |
|---|---|---|
| Self-Inspection Report | The Self-Inspection Report will be based on the comprehensive Self-Inspection Plan that Beacon Wind will develop pursuant to 30 CFR 585.824(a). | 30 CFR 585.824(b) |
| Annual Report | The Annual Report will provide a summary of site assessment activities and the results of those activities. | 30 CFR 585.615(b) |
| Certification of Compliance | Together with the certification, Beacon Wind will submit:<br>▪ Summary reports that demonstrate compliance with the terms and conditions that require certification; and<br>▪ • A statement identifying and describing any mitigation measures and monitoring methods that have been taken, as well as their effectiveness. If Beacon Wind identifies measures that are not effective, we will make recommendations for substitute mitigations measures and monitoring methods and explain why we believe they would be effective. | 30 CFR 585.615(c) |

## 4.4 Potential Faults and Failures

The Metocean Facilities will be remotely monitored for the duration of operations. This monitoring will include a range of key indicators such as power level, buoy location, and data quality to provide an insight to the 'health' of the buoy and payload. Unplanned maintenance activities may be required in the event of a power supply failure, 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 RPS Floating LiDAR Buoy is capable of operating at full capacity without renewable power supply to the batteries for up to seven days. The RPS Wave and Met Buoy has enough reserve power to operate in a standard sampling routine for up to three months without being recharged.

# 5.0 Decommissioning and Site Clearance Procedures 585.610 (a)(11)

BOEM requires decommissioning of facilities described in the SAP in accordance with § 585.901. Beacon Wind will submit a decommissioning application to BOEM as required by § 585.902(b) prior to decommissioning of the Metocean Facilities. Following BOEM approval of the decommissioning application, Beacon Wind will submit a decommissioning notice to BOEM at least 60 days prior to vessel deployment as required by § 585.908.

## 5.1 Overview of Decommissioning Activities

Upon completion of SAP activities, the Metocean Facilities 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 Metocean Facilities would be used for decommissioning. The work vessel would position itself on-site to attach the chain to the crane or A-frame of the work vessel and the mooring would be recovered to deck. The Buoy would then be detached from the mooring and attached to the work vessel. The Metocean Facilities would then be towed off site.

## 5.2 Site Clearance Survey

The operation of the Metocean Facilities is not expected to result in any trash or bottom debris. However, Beacon Wind will ensure that the seafloor has been cleared of all obstructions created by activities on the Lease as required in § 585.902(a)(2). This will be accomplished via photo documentation of all deployed and retrieved equipment. As stated in Section 4.1, Beacon Wind will provide an Installation Report that will contain the final coordinates and photo documentation of the equipment that was deployed. At the completion of decommissioning, similar documentation will be provided to BOEM. Additionally, to confirm that all equipment was retrieved from the site, Beacon Wind will carry out one of the following: photographic bottom survey, high resolution sidescan or sector-scanning sonar survey.

## 5.3 Report

As specified in the Lease, Addendum C, Section 2.2, Beacon Wind will submit semi-annual progress reports to BOEM throughout the duration of activities covered by the SAP. At the conclusion of the site assessment activities a Decommissioning Report will be prepared in accordance with §§ 585.900-913 and provided to BOEM with the semi-annual progress reports, or upon request. This report will include a description of the process and equipment used for decommissioning the Metocean Facilities and confirmation of site clearance.

# 6.0 Affected Environment, Potential Impacts, and Mitigation 585.611 (b)

The following sections describe the affected environment, impacts and proposed mitigation measures for benthic resources, archaeological resources, and geophysical conditions which have been developed through site surveys and analysis that were conducted in August 2020 through September 2020 in support of the SAP. 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 5, 2020.

The analysis focuses on the maximum area of potential disturbance associated with the installation, operation, and decommissioning of the Metocean Facilities including a buffer area, identified as the Geophysical Survey Area of approximately 200 m by 200 m.

## 6.1 Geological Investigation 585.610 585.610 (b)(4), 585.611 (b)(1) and Coastal Habitats/Shallow Hazards 585.610 (b)(2), 585.611 (b)(1)

The following section summarizes results of the HRG survey that was conducted in August 2020. The survey was conducted in accordance with the SAP Survey Plan, as approved by BOEM on August 5, 2020. The full site characterization report is provided in Appendix C.

Surveys were conducted with gridded survey lines at a spacing of approximately 98 ft. by 98 ft. (30 m by 30 m). The following HRG survey and sampling activities were carried out:

- Depth sounding (multibeam echosounder) to determine site bathymetry and elevations;
- Magnetic intensity measurements (gradiometer) for detecting local variations in the regional magnetic field from geological strata and potential ferrous objects on and below the bottom;
- Seafloor imaging (sidescan sonar survey) for seabed sediment classification purposes, to identify natural and man-made acoustic targets on the seabed, as well as any anomalous features;
- Shallow penetration sub-bottom profiler to map the near surface stratigraphy (top 0 m to 5 m) soils below seabed);
- Medium penetration sub-bottom profiler to map deeper subsurface stratigraphy as needed (soils down to 75-100 m below seabed) and
- Sediment grab samples to support interpretation of geophysical data to characterize surficial sediment conditions and benthic habitat.

Data from the HRG and sampling program, along with information from publicly available databases, were compiled and reviewed to describe the surface and subsurface geologic conditions in the Installation Areas. Table 6-1 summarizes the water depth, surficial seafloor sediment, and side scan features or magnetometer contacts related to seafloor hazards identified within the Buoy Deployment Areas.

Sediment information obtained from the sampling program indicate the surficial geology comprises SAND and fine sediments (SAND dominated) and trawl marks are present. Sample S01, S03, S04 and S05 are according to CMECS substrate group Muddy SAND. Duplicate sample S01d and S02 are substrate group SAND and substrate subgroup Fine/Very Fine Sand. The shallow geology shows a surficial unit of SAND and fine sediments (SAND dominated) draped over a coarser SAND dominated sediment. In Site 05 paleo channels are interpreted below the upper and lower base unit at a depth of 3.3 to 4.2 m below seabed.

Physiographic features on the shelf in this region are the result of the advance and retreat of the Laurentide Ice Sheet during the Pleistocene era between 25,000 and 12,000 years before present. Much of the shelf was exposed during maximum ice sheet advance and then, as the ice retreated, sea levels began to rise, inundating the shelf. Bedrock underlying the surficial sediments in the Lease Area consists of metamorphic and igneous rocks of varying age and origin. The surface of the bedrock generally slopes toward the southeast from roughly sea level on the shore of Buzzards Bay to approximately 1,804 ft. (550 m) below sea level approximately 10 km (6.2 miles) south of Nantucket (Oldale 1992). The bedrock surface is irregular, with valleys and basins filled with varying thicknesses of sediment. The HRG datasets were analyzed for seafloor and sub-seafloor hazards, which could pose a potential risk to the installation, operation, and maintenance of the Metocean facilities.

The HRG datasets were used to determine the presence or absence of geological hazards (see Table 6-1). The side scan 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.

No areas of acoustic whiteouts or other significant 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 interpretation of the side-scan 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.

Based on the Geophysical Site Investigation Site Characterization Reports for Site Acquisition Plan (Appendix C), the site conditions are suitable for the installation of the Metocean Facilities and associated mooring equipment in each of the five Buoy Deployment Areas (BDAs). No notable hazards were identified which would preclude installation at these locations. The low-relief bedforms on areas of the seabed may indicate minor seabed currents, but no larger scour-related features, such as deep moats, nor evidence of large-scale migrating bedforms are present in the seabed and shallow subsurface datasets. Due to the absence of these more significant features, seabed currents are inferred to be modest and seabed scour due to bottom currents is not anticipated to be an issue for the mooring systems. No sub-seafloor features including Paleo-channels were observed and, therefore, do not represent a hazard to the mooring systems.

**Table 6-1. Seafloor and Sub-Seafloor Hazards**

| Hazard | Definition | Identification and Description |
|---|---|---|
| **Seafloor** | | |
| Scarp | An exposed face of soil above the head of a landslide. | None identified on bathymetry or side scan sonar data. |
| Channels | The deepest portion of a body of water through which the main volume or current of water flows. | None identified on bathymetry or side scan sonar data |
| Ridges | A relatively narrow elevation which is prominent on account of steep angle at which it rises. | None identified on bathymetry or side scan sonar data. |
| 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. | Low-relief bedforms are noted, which suggesting minor continuous or episodic seabed currents, but are not anticipated to present a hazard. |
| Exposed Rocky Area | Surface expression of bedrock outcropping on seafloor. | None identified on bathymetry, side scan sonar, or sub-bottom profiler datasets. |
| Boulders | Glacial erratics (boulders) greater than 12 inches in diameter; outcropping coarse till/drift or lag deposit. | None identified on the sub-bottom profiler datasets |
| Buried Boulders | Glacial erratics (boulders) greater than 12 inches in diameter; subsurface coarse till/drift or lag deposits. | None identified on the sub-bottom profiler datasets. |
| Pock Marks / Depressions | Craters in the seabed caused by fluids (gas and liquids) erupting /streaming through the seabed sediments. | None identified on bathymetry, side scan sonar, or sub-bottom profiler datasets. |
| Seabed Scars / Ice Scour / Drag Marks | Incisions or cuts into the seafloor may be associated with glacial advances/retreats or bottom fishing activity. | None identified on bathymetry or side scan sonar data. |

| Hazard | Definition | Identification and Description |
|---|---|---|
| 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 identified from shallow or medium penetration sonar. |
| Submarine Canyons | Steep-sided valley cut into the seafloor of the continental slope, sometimes extending well onto the continental shelf. | None identified on bathymetry data. |
| River Channel | Outline of a path of relatively shallow and narrow body of fluid. | None identified on bathymetry or side scan sonar data. |
| 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 identified on bathymetry, side scan sonar, or sub-bottom profiler datasets. |
| 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 identified on the sub-bottom profiler datasets. |
| Gas Hydrates | Subsurface gas deposits that were formed at or near the seafloor in association with hydrocarbon seeps. | None identified on the sub-bottom profiler datasets. |
| 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 identified on bathymetry, side scan sonar, or sub-bottom profiler datasets. |
| Diapiric Structure Expressions | The extrusion of more mobile and ductile-deformable material forced onto the seafloor from pressure below. | None identified on the sub-bottom profiler datasets. |
| Karst Areas | Landscape formed from the dissolution of soluble rocks. | None identified on the sub-bottom profiler datasets. |
| Faults, Faulting Expression, Fault Activity | Physiographic feature (surface expression) related to fracture, fault, or fracture zone along which there has displacement of the sides relative to one another. | None identified on bathymetry, side scan sonar, or sub-bottom profiler datasets. |
| 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 identified on bathymetry, side scan sonar, or sub-bottom profiler datasets. |
| 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 identified on bathymetry, side scan sonar, or sub-bottom profiler datasets. |
| Scour/Erosion Features | Erosion of material due to water flow. Often associated with erosion adjacent to larger natural and man-made structures. | No significant scour-related features are identified on the seabed or near interpreted boulder features. |
| Sensitive Benthic Habitats (chemosynthetic communities, submerged aquatic vegetation) | Shallow water habitats of submerged aquatic vegetation including macroalgae and sea grasses. | None identified on bathymetry, side scan sonar, or sub-bottom profiler datasets. |
| Manmade Features | Anthropogenic debris caused by offshore activities. | Several elongated trawl marks were present in the area of the Floating LiDAR buoy location. |

The geophysical survey included MBES, SSS, SBP and gradiometer. Water depth ranges between 42.3 m (Site 01) and 62 m (Site 05) NAVD88 and the slope is very gentle at maximum 0.4°. The surficial geology comprises silty SAND and trawl marks are present. All sites are free of SSS contacts and magnetic anomalies. The shallow geology shows a surficial unit of fine sediments draped over a coarser SAND dominated seabed. The images of the seabed showed a seabed characterized by soft bottom substrate composed primarily of fine slit and clay fractions, at all sites.

**Site S01: Metocean/Wave Buoy #2**
Water depths in the area survey had minimum depth of 42.3 meters (m) with a maximum depth of 42.9 m, and a maximum slope of 0.2 degrees. Sidescan sonar results indicated that surficial sediments were comprised of SAND and fine sediments (SAND dominated) with substrate group Muddy Sand. No sonar contacts were detected within the area surveyed. The base of a drape of SAND and fine sediments (SAND dominated) was observed to 1.5 m and the base of coarser SAND dominated sediments to 3.0 m was observed in the SBP Isopach chirp. No magnetic anomalies were identified.

**Site S02: Current Meter Mooring #2**
Water depths in the area survey had minimum depth of 42.7 m with a maximum depth of 43.6 m, and a maximum slope of 0.4 degrees. Sidescan sonar results indicated that the area was comprised of SAND and fine sediments (SAND dominated) with substrate group SAND and substrate subgroup fine/very fine sand. No sonar contacts were detected within the area surveyed. The base of a drape of SAND and fine sediments (SAND dominated) was observed to 1.5 m and the base of coarser SAND dominated sediments was observed to 3.5 m in the SBP Isopach chirp. No magnetic anomalies were identified.

**Site S03: Floating LiDAR Buoy**
Water depths in the area survey had minimum depth of 53.3 m with a maximum depth of 54 m, and a maximum slope of 0.2 degrees. Sidescan sonar results indicated that the area was comprised of SAND and fine sediments (SAND dominated) with substrate group Muddy Sand. No sonar contacts were detected and fishing trawl marks were present within the area surveyed. The base of a drape of SAND and fine sediment (SAND dominated) was observed to 1.5 m and the base of coarser SAND dominated sediments was observed to 2.5 m in the SBP Isopach chirp. No magnetic anomalies were identified.

**Site S04: Metocean/Wave Buoy #1**
Water depths in the area survey had minimum depth of 60.5 m with a maximum depth of 60.9 m, and a maximum slope of 0.2 degrees. Sidescan sonar results indicated that the area was comprised of SAND and fine sediments (SAND dominated) with substrate group Muddy Sand, no sonar contacts were detected. The base of a drape of SAND and fine sediments (SAND dominated) was observed to 2.0 m and the base of coarser SAND dominated sediments was observed to 4.0 m in the SBP Isopach chirp. No magnetic anomalies were identified.

**Site S05: Current Meter Mooring #1**
Water depths in the area survey had minimum depth of 61.4 m with a maximum depth of 62 m, and a maximum slope of 0.2 degrees. Sidescan sonar results indicated that the area was comprised of SAND and fine sediments (SAND dominated) with substrate group Muddy Sand. No sonar contacts were detected and fishing trawl marks were present within the area surveyed. The base of a drape of SAND and fine sediment (SAND dominated) was observed to 2.5 m and the base of coarser SAND dominated sediments was observed to 4.5 m in the SBP Isopach chirp. No magnetic anomalies were identified.

Geophysical Survey Results for the five mooring locations is provided within Appendix C.

## 6.2 Archaeological Resources 585.610 (b)(3), 585.611 (B)(1)(6)

The following section summarizes the analysis and findings described in the Marine Archaeological Resource Assessment Report (Appendix D). The Marine Archaeological Resource Assessment focused on the 300 m by 300 m Area of Potential Effect (APE) for S01-S04 and 300 m by 200 m APE for S05.

### 6.2.1 Affected Environment

BOEM requires that Lease holders verify that bottom disturbing activities, including the deployment of the Floating LiDAR and metocean/current buoys, avoid impacts to submerged archaeological resources. Potential prehistoric archaeological resources would include archaeological sites from the area's earliest inhabitants located on flooded prehistoric landforms (paleolandscape features). Having been previously exposed, the entire Lease Area was inundated by 10,000 Before Present (BP). There is potential for pre-contact archaeological sites associated with the Paleo-Indian (ca. 11,000 – 9,000 BP) and Early Archaic (ca. 9,000 – 8,000 BP) periods to be buried within the seabed sediments. Shoreline transgression has the

potential to result in the preservation of pre-contact archaeological sites which have been submerged and buried beneath marine sediments (BOEM, 2014). Historic Period (16th – 20th C) resources discovered within the Lease Area would be represented by evidence of maritime activities (i.e., shipping and transport, fishing, exploration, and colonial settlement). These resources would be represented by the oar, sail, and steam-powered craft that frequented the waters offshore Massachusetts during the nearly four centuries of Euro-American occupation.

Research included a review of shipwreck databases, including NOAA's (2016) Wrecks and Obstruction Database that sources information from the Electronic Navigational Chart layers and the Automated Wreck and Obstruction Information System; the Northern Maritime Research database (NMR 2002); the BOEM Mid-Atlantic Outer Continental Shelf (OCS) US Geological Survey (USGS) shipwreck database (2013); the TRC Environmental Corporation archaeological site inventory (2012), and relevant secondary sources (e.g., Berman 1972; Gentile 2002). Preliminary examination of the NMR database has revealed at least three named shipwrecks within the lease area. Historic navigation charts, available online from the Office of Coast Survey's Historical Map & Chart Collection (2016), will also be reviewed to identify charted shipwrecks and to maximize existing information on the probability of cultural resource occurrence. This archival research effort will be supported by the site-specific survey data analysis.

Installation of the Metocean Facilities has the potential to affect submerged archaeological resources that may relate to pre-contact and historic time periods. Documentary and field research show the submerged SAP Survey Areas to have potential for both pre-contact and historic submerged cultural resources. The potential for the existence of these sites is due to the historic maritime activity in the area and prehistoric occupation on the once exposed continental shelf. The preservation potential for archaeological resources within the Massachusetts Lease Area, however, is low. The low preservation potential results from two related factors: marine transgression and seafloor sedimentation. Sedimentation rates have been low along the continental margin within the last 10,000 years, and the seafloor has been exposed to erosional forces associated with both marine transgression and seabed currents. Consequently, relict channels of major rivers have the potential to be recognized in marine remote sensing datasets, but the identification of small-scale sites and landforms is limited.

MMT, Inc. (MMT) the geophysical survey contractor, collected data for archaeological assessment and AECOM performed on this analysis from the HRG survey data acquired in 2020 for the Project. To support this effort, AECOM maritime archaeologists, submerged paleoarchaeologists, and historians created a prehistoric and historic context for the region, assembled a geologic and environmental background, reviewed previous archaeological investigations conducted in the vicinity, and identified submerged cultural resources reported in the vicinity of the Massachusetts Lease Area to supplement and guide data analysis. This information, a discussion of survey and data processing technologies and methodologies, and the archaeological findings and recommendations are presented as the Marine Archaeological Resource Assessment Report for the Massachusetts Wind SAP survey (Appendix D).

The HRG survey utilized remote survey methods including marine gradiometer magnetometry, side scan sonar, subbottom profiler (shallow and medium penetration), and multibeam echosounder. Archaeological review of the survey data focused on the Buoy Deployment Areas, although bottom disturbing activity will be limited to the footprint of the clump weight anchors and mooring chain resting on the seafloor.

The qualified marine archaeologist from AECOM identified no magnetic anomalies and no side scan sonar contacts representing submerged cultural resources within the five buoy deployment areas (BDA). Sub-bottom profiler data was collected and analyzed to identify Paleo-landscape features. In Site 05, paleochannels are interpreted below the upper and lower base unit at a depth of 3.3 m to 4.2 m below seabed. This data indicated that no prominent seismic reflectors indicative of paleo-landforms were present that may preserve inundated archaeological sites that would be affected by the proposed Metocean Facilities.

Based upon the results of the 2020 marine archaeological assessment (Appendix D), no potential submerged cultural or archaeological resources were identified within BDAs, and as such, the installation and operation of the proposed Metocean Facilities would result in no impacts to marine archaeological resources. Due to the height of the Floating LiDAR (13.5 ft [4.1 m]) from the sea surface to the top of the hull mast) and the distance from shore, the installation and operation of the Metocean Facilities will not result in any visual impacts.

### 6.2.2 Potential Impacts and Proposed Mitigation Measures

Based upon the results of the Marine Archaeological Resources Assessment, no potential submerged

cultural or archaeological resources were identified within the SAP Survey Areas. As such, the installation, operation, maintenance, and decommissioning of the proposed Metocean Facilities would result in no impacts to marine archaeological resources. However, if potential archaeological resources are discovered, Beacon Wind will comply with measures included in 30 CFR 585.802 and Section 4.2 of the Lease. Beacon Wind will employ communication and outreach practices in order to maintain coordination with BOEM and identified tribal interests throughout the process of Metocean Facility use. Based on the small size of the proposed Metocean Facilities and the distance from shore, there will be no visual impacts to onshore associated with these site assessment activities.

## 6.3 Benthic Resources 585.611 (b)(3-5)

Data on the benthic resources located in the Lease Area were analyzed from several sources, including federal, state, and academic institutions (See Section 7.1). These datasets provided both general and detailed knowledge of the sediment and infaunal organisms of the area. On a broad scale, the sediment was characterized as primarily sand, as well as clay and silt (Northeast Ocean Data 2015; Poppe et al. 2014).

Benthic organisms commonly observed in a 2012 and 2013 University of Massachusetts Dartmouth video survey in the Lease Area were echinoderms (sand dollars and sea stars) and hydra/bryozoa; holes present indicate clams and/or polychaetes burrow into the sediment (Stokesbury 2014). The most abundant commercially important species observed were sea scallops, skates (seven species), hake (red and silver), and flounder (Stokesbury 2014). Between the two survey years, there was low similarity, which could be due to seasonal variation from natural cycles or fishing (Stokesbury 2014). Other benthic macroinvertebrates found in silty sand off of southern New England in water depths associated with the Lease Area, are polychaetes, bivalves, amphipod crustaceans, anemones, and sea cucumbers, all of which are important food sources to commercially important groundfish (Provincetown Center for Coastal Studies 2005). Other benthic fauna in this habitat area include surf clams, razor clams, gastropods, shrimp, crabs, sand dollars, brittle stars, and tunicates (Provincetown Center for Coastal Studies 2005).

The following section summarizes the results of the benthic habitat assessment that was conducted in August 2020. The survey was conducted in accordance with the plan approved by BOEM on August 5, 2020. The full benthic habitat assessment report is provided in Appendix E. A duplicate sample was obtained at Met Ocean Buoy #1. The duplicate sample is indicated by “d” in the name of the station (Station S01 and S01d).

The survey design consists of five sampling sites at fixed locations within the Beacon Wind lease area at the Metocean Facilities locations (Figure 1-1). The positional coordinates and water depths for the five Beacon Wind WP1 benthic sampling sites are provided in Table 2-6 and Appendix E. At each benthic sampling site, sediment samples were collected for assessment of apparent redox potential discontinuity (aRPD), analyses of sediment grain size and TOC, and identification of the faunal community. One field replicate was obtained at Station 01 for the previously mentioned parameters to provide a measure of variability assessment. Physicochemical and faunal samples were collected from a single grab by using a metal insert to partition the contents of the grab sampler. One portion of the partitioned sediment was used for sediment physicochemistry and the other portion for faunal analyses. The metal insert was positioned so that the resulting portion of sediment for faunal analysis had a surface area of approximately 0.04 m2, to align with BOEM’s Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM, 2019). To visually document the seabed in the survey area, videographic data was acquired at the five sampling locations with a grab-mounted high-definition camera system.

Seabed photographs and video were acquired at all sample sites, with two high-definition camera systems, a Williamson & Associates SOLO Series III autonomous high-definition (HD) camera and a GoPro Hero 8 HD camera. The SOLO Series camera was equipped with an underwater 5,000 lumens light emitting diode light. The camera systems were mounted onto the frame of the Smith McIntyre grab sampler and turned on prior to deployment providing continuous recording of visual data during the within-site deployment. The camera systems’ visual detection began at approximately 1 m above the seabed due to light penetration within the water column.

Samples from the five Metocean Facilities locations primarily consisted of grain size particles less than 0.25 mm and were categorized in substrate group SAND or Muddy SAND.. Samples from Stations S04 and S05, which were in the deepest portion of the Lease Area with 58% to 64% sand (southwestern area) and the three shallower locations in the northeastern portion of the Lease Area had had higher percentages of sand ranging between 80% to 92% of the total sediment texture consistency.

The sediment total organic carbon (TOC) was measured from sediment samples obtained at the five Metocean Facilities locations. The TOC measured from the sediment ranged from 0.47 to 1.23 with the lowest percentages in the shallower, sandy sediment and the highest amounts observed in sediment from the deeper locations.

### 6.3.1 Met Ocean Buoy #2 - Station S01 and S01d

Met Ocean Buoy #2 (Station S01 and S01d) were predominantly comprised of sand (89.4% and 92%, respectively) with a mud percentage of 9.9% and 7.9%, respectively. Total organic carbon was low with 0.48 and 0.47%, respectively. A total of 1,238 and 656 individuals were identified from S01 and S01d, which belonged to 4 Phyla and 56 and 51 different taxa, with Polychaeta being the dominant group. Both S01 stations had *Leptocheirus pinguis* as a dominant taxon. These amphipods (Crustacea) were found with 4,050 individuals from S01 and 1600 individuals from S01d, which led to the Coastal and Marine Ecological Classification Standard (CMECS) classification of these two locations as “Leptocheirus Bed”. Seafoor imagery from S01 and S01d was characterized by soft substrate with relatively dense coverage of bioturbation activity indicative of active infaunal organisms. Modified CMECS substrate and habitat classification are provided within Appendix E.

### 6.3.2 Current Meter Mooring #2 - Station S02

Current Meter Mooring #2 (Station 02) was comprised predominantly of sand (90.7%) with a mud percentage of 9.0%. Total organic carbon was low with 0.48%. A total of 1,318 individuals were identified from this station, which belonged to 4 Phyla and 54 different taxa, with Polychaeta being the dominant group. S02 had *Leptocheirus pinguis* as a dominant taxa. These amphipods (Crustacea) were found with 4,625 individuals, which led to the CMECS classification of this location as “Leptocheirus Bed”. Seafloor imagery from S02 was characterized by soft substrate with bioturbation indicative of active infaunal organisms. Modified CMECS substrate and habitat classification are provided within Appendix E.

### 6.3.3 Floating LiDAR - Station S03

Station 03 was comprised predominantly of sand (80.1%) with a mud percentage of 17.8%. Total organic carbon was low with 0.73%. A total of 387 individuals were identified from this station, which belonged to 4 Phyla and 21 different taxa, with Polychaeta being the dominant group. The CMECS classification of this location as “Small Surface-Burrowing Fauna”. Seafloor imagery from S03 was characterized by soft substrate with bioturbation and presence of infaunal tubes at the surface. Modified CMECS substrate and habitat classification are provided within Appendix E.

### 6.3.4 Met Ocean Buoy #1 - Station S04

Station 04 was comprised predominantly of sand (64.6%) with a mud percentage of 31.2%. Total organic carbon was low with 1.08%. A total of 587 individuals were identified from this station, which belonged to 4 Phyla and 37 different taxa, with Polychaeta being the dominant group. The CMECS classification of this location as “Small Surface-Burrowing Fauna”. Seafloor imagery from S04 was characterized by soft substrate with bioturbation and presence of infaunal tubes at the surface. Modified CMECS substrate and habitat classification are provided within Appendix E.

### 6.3.5 Current Meter Mooring #1 - Station S05

Station 05 was comprised predominantly of sand (58.7) with a mud percentage of 38.0%. Total organic carbon was low with 1.23%. A total of 270 individuals were identified from this station, which belonged to 4 Phyla and 23 different taxa, with Polychaeta being the dominant group. The CMECS classification of this location as “Small Surface-Burrowing Fauna”. Seafloor imagery from S05 was characterized by soft substrate with bioturbation and presence of infaunal tubes and a flocculent layer visible at the surface. Modified CMECS substrate and habitat classification are provided within Appendix E.

No evidence of protected or unique habitats was indicated by the seabed imagery or grab sampling from samples collected at the Metocean Facility locations. No benthic species listed under the ESA occurred at these locations, as well. No protected fish species were observed during the survey.

Methodology, results, and conclusions including graphics and figures for the benthic habitat assessment are provided within Appendix E.

## 6.4 Finfish, Essential Fish Habitat and Threatened and Endangered Species 585.611 (b) (3-5)

As demonstrated in Section 2, the equipment and methodologies proposed herein by Beacon Wind are consistent with the activity considered by BOEM in the Offshore EA (BOEM 2014). Section 4 of the revised EA describes the affected environment and potential impacts to fisheries that may result from site assessment activity. The information in BOEM (2014) is incorporated by reference and not repeated.

Critical habitat for the Atlantic sturgeon was designated in August 2017, after the Revised Offshore EA was released. However, no critical habitat was designated within the Lease Area (NOAA 2017a). BOEM's analysis is applicable and the determination that the proposed site assessment activity is not likely to adversely affect Atlantic sturgeon is appropriate. The oceanic whitetip shark (*Carcharhinus longimanus*) and the manta ray (*Manta birostris*) were listed as threatened under the ESA after the Revised Offshore EA was released (NMFS 2018a, and NMFS 2018b). These large mobile elasmobranchs will be assumed present in the Lease Area; they are expected to behave much like other more common sharks, skates, and rays by avoiding areas of human activity and noise. BMPs implemented for other fish, including Atlantic and shortnose sturgeon, would be protective of the whitetip shark and manta ray. The proposed site assessment activity would not adversely affect these proposed threatened species.

Beacon Wind has referenced the NOAA Essential Fish Habitat (EFH) mapper and found that no Habitat Areas of Particular Concern (HAPC) are identified within the Lease Area. Additionally, the EFH mapper identified 4 species removed since the BOEM EA and 7 species added since the BOEM EA.

Species removed since BOEM EA (2014)

- Cobia (*Rachycentron canadum*)
- King mackerel (*Scomberomorus cavalla*)
- Longbill spearfish (*Tetrapturus pfluegeri*)
- Spanish mackerel (*Scomberomorus maculatus*)

Species added since BOEM EA (2014):

- American plaice (*Hippoglossoides platessoides*)
    - EFH for eggs and larvae found in pelagic habitats in the project area (NOAA 2017b).
- Atlantic cod (*Gadus morhua*)
    - EFH for eggs, larvae, juveniles and adults found in the project area (NOAA 2017b).
- Atlantic wolffish (*Anarhichas lupus*)
    - EFH for all life stages are found within the project area. Adults can be found over sand and gravel substrates but not muddy substrates (NOAA 2017b).
- Barndoor skate (*Dipturus laevis*)
    - EFH located in Georges Bank and southern New England in substrates of mud, sand and gravel (NOAA 2017b).
- Common thresher shark (*Alopias vulpinus*)
    - EFH located from Georges Bank to Cape Lookout, NC, in coastal and oceanic waters (NOAA 2017b).
- Offshore hake (*Merluccius albidus*)
    - EFH for larvae found within the project area (NOAA 2017b).
- Smoothhound shark Atlantic stock (*Mustelus*)
    - EFH exclusive to smooth dogfish; found from Cape Cod Bay, MA, to South Carolina. (NOAA 2017b).

Impacting factors associated with the proposed buoy installation are minimal and of a short duration. Total seabed disturbance for the Metocean Facilities, inclusive of both clump weights, chains and wire ropes,

would be approximately 235.6 $ft^2$ (21.9 $m^2$). BMPs implemented for other fish, including Atlantic and shortnose sturgeon would also be protective of these species. Therefore, BOEM's analysis in the Revised Offshore EA still applies, as the site assessment activity would not adversely affect these additional EFH species.

Beacon Wind has committed to implementing all applicable lease conditions, which include implementing BMPs during installation, operation, and decommissioning of the Metocean Facilities to minimize impacts on fisheries, including species protected under the ESA.

Beacon Wind will comply with any additional stipulations as set forth in permits or approvals in support of the proposed site assessment activity.

## 6.5 Marine Mammals, Sea Turtles, and Threatened and Endangered Species 585.611 (b)(4)

As demonstrated in Section 2, the equipment and methodologies proposed herein by Beacon Wind are consistent with the activity considered by BOEM in the Offshore EA (BOEM 2014). Section 4.2.2 of the EA provides details on the species and seasonal occurrence of marine mammals and sea turtles that may be present during the proposed site assessment activity and is incorporated by reference and not repeated.

There are up to 38 marine mammal species (cetaceans and pinnipeds) that may occur (year-round or seasonally) in the Beacon Wind's Beacon Wind Lease Area, all of which are protected by the MMPA and some additionally under the ESA, Including five large whale species:

- Fin whale (*Balaenoptera physalus*);
- Sei whale (*Balaenoptera borealis*);
- Blue whale (*Balaenoptera musculus*);
- North Atlantic right whale (*Eubalaena glacialis*); and
- Sperm whale (*Physeter macrocephalus*)

Beacon Wind has reviewed publicly available literature and data published since the Offshore EA and Finding of No Significant Impact were issued (see Section 7.3). There is no substantive new information that would change BOEM's analysis and conclusion that the proposed activity is not anticipated to result in any significant or population-level effects to marine mammals or sea turtles.

BOEM's EA references NMFS biological opinion on assessment activities in the [Massachusetts Wind Lease Area] (NMFS, 2013), and states that, 'The potential for marine mammals to interact with the buoy and become entangled in the buoy or mooring system is extremely unlikely given the low probability of a marine mammal encountering one buoy or mooring system within the [Massachusetts Wind Lease Area], and the high tension of the chain which further reduces risk of entanglement". Appreciating the biological opinion relates to an all chain mooring, the key points to note are the extremely unlikely possibility of that contact occurring, in addition to the reduced risk from a line under tension, which would be applicable to the polypropylene line under tension.

The moorings used are previously approved by BOEM for the Empire Wind project. These moorings use the sample system of polypropylene rope in a taut and vertical section of the moorings is not deemed to be a significant entanglement risk, and alternative material such as chain or wire rope add risk to the safe and effective deployment and recovery procedures, while not necessarily adding any proportional value to mitigating extremely unlikely events. Other mitigation such as coating the rope section in plastic tubing have been explored but have also been deemed to add risk through potential wear and failure of the rope section, again at little or no proportional mitigating value.

Beacon Wind has committed to implementing all applicable lease conditions, which include BMPs for the installation, operation, and decommissioning of the Metocean Facilities in order to further reduce the potential for interactions with or impacts on marine wildlife. Beacon Wind will comply with any additional stipulations as set forth in permits or approvals in support of the proposed site assessment activity.

Five species of sea turtles designated under the Endangered Species Act (ESA) may occur in the North Atlantic waters within the Beacon Wind Lease Area. These ESA-listed species are leatherback (*Dermochelys coriacea*), loggerhead (Northwest Atlantic Ocean DPS, *Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), green (North Atlantic DPS, *Chelonia mydas*), and hawksbill (*Eretmochelys imbricata*). Among these species, four sea turtles are likely to occur in the Project Area and surrounding waters: leatherback, loggerhead (Northwest Atlantic Ocean DPS), Kemp's ridley, and green (North Atlantic DPS) sea turtles. Hawksbill sea turtles are rare in the area. Beacon Wind will implement all applicable Lease conditions, which include BMPs for the installation, operation, maintenance, and

decommissioning of the Metocean Facilities, in order to further reduce the potential for interactions with or impacts on marine wildlife. Pile driving activity is not required for met buoy installation and therefore there will be no acoustic harassment associated with met buoy installation and mitigation measures are not applicable.

## 6.6 Avian and Bat Resources

As demonstrated in Section 2, the equipment and methodologies proposed herein by Beacon Wind are consistent with the activity considered by BOEM in the Offshore EA (BOEM 2014). Literature reviewed for avian and bat resources is presented within Section 7.4. Sections 4.4.2.1 and 4.4.2.2 of the EA provide details on the species and seasonal occurrence of avian and bat resources that may be present during the proposed site assessment activity and is incorporated by reference and not repeated. Beacon Wind has reviewed currently available literature and data (see Section 7.4) regarding avian and bat resources in the region and has determined that there is no substantive new information that would change BOEM's analysis. The results of the EA and BOEM's analysis and conclusion that the proposed activity is not anticipated to result in any significant or population-level effects to avian and bat resources is applicable.

## 6.7 Water Quality 585.611(b)(2), 585.611 (b)(2)

As demonstrated in Section 2, the equipment and methodologies proposed herein by Beacon Wind are consistent with the activity considered by BOEM in the Offshore EA (BOEM 2014). Section 4.2.1.4 of the EA provide details on the potential impacts to water quality that result from the proposed site assessment activity and is incorporated by reference and not repeated.

Beacon Wind has reviewed currently available literature and data (see Section 7.5) regarding water quality in the region and has determined that there is no substantive new information that would change BOEM's analysis. The results of the EA and BOEM's analysis and conclusion that the proposed activity is not anticipated to result in any significant impact to water quality is applicable.

Beacon Wind has committed to implementing all applicable lease conditions, which include BMPs for the installation, operation, and decommissioning of the Metocean Facilities in order to further reduce the potential for impacts on water quality. Beacon Wind will comply with any additional stipulations as set forth in permits or approvals in support of the proposed site assessment activity.

## 6.8 Air Quality

The closest points of land to the proposed site assessment activity is approximately 20 miles northeast of the Lease Area on Nantucket, Massachusetts (Nantucket County). The geographic area included in a NAAQS designation is limited to areas that are either within a state or territory's actual area, or that are within 3 nautical miles of a state or territory's seaward boundary. The entire Lease Area is more than 3 nautical miles from the seaward boundary of Massachusetts. The vessel for Metocean Facilities deployment will transit from New Bedford Commercial Marine Terminal where this equipment is stored to the Beacon Wind Lease Area. Impacts to air quality are regulated under various federal laws including the Clean Air Act (CAA), OCSLA and NEPA; however, the Metocean Facilities have no engines that generate combustion and are not considered OCS sources of emissions and meet the General Conformity Regulations under 40 CFR Part 93.

The nearest point of land to the Lease Area is Cisco Beach on Nantucket Island in Massachusetts, located approximately 20 mi (30.8 km) northeast of the western-most corner of the Lease Area. Air monitoring for NAAQS compliance is not conducted on Nantucket Island but a monitoring station is located on Martha's Vineyard in Dukes County. Dukes County is presently designated as unclassifiable for attainment for criteria pollutants with the exception of ozone. Other relevant existing data can also include the ambient background concentrations of regulated air pollutants, as measured by continuous ambient monitoring stations in onshore locations near the Lease Area. However, data from ambient monitoring stations are generally only considered when conducting dispersion modeling of a project's air emissions and since the Metocean Facilities are powered by 100% renewable energy, there is no need for air emissions modeling. In addition, the U.S. Environmental Protection Agency (EPA) has designated Massachusetts as an unclassifiable/attainment area for the new one-hour nitrogen dioxide ($NO_2$) NAAQS, which was promulgated in 2010, pending the collection of additional monitoring data. A similar designation is expected for the one-hour sulfur dioxide ($SO_2$) NAAQS. Massachusetts is designated as unclassifiable or attainment for all other NAAQS. Finally, all of Massachusetts is within the Northeast Ozone Transport Region as designated by the Clean Air Act.

Potential emission sources for deployment of the Metocean Facilities would be limited to a single work boat and a support vessel. The vessel associated with these activities would emit criteria air pollutants (nitrogen oxide [NOx], CO, SO2, particulate matter less than 10 microns in diameter [PM10], particulate matter less than 2.5 microns in diameter [PM2.5]), and volatile organic compounds [VOCs]), hazardous air pollutants (HAPs) and greenhouse gasses [GHGs]). The vessel would emit pollutants both in state and federal waters while traveling to and from the Installation Areas throughout the operational lifecycle of the proposed buoy. Impacts from pollutant emissions associated with this vessel would likely be localized within the immediate vicinity of the site assessment activity.

It is anticipated that the installation and decommissioning of the buoy would each be completed over a period of up to seven days over three separate vessel trips. During the operations phase, Beacon Wind has assumed one separate round trip every six months to each of the three deployment sites (Floating LiDAR, metocean buoys, and CM/CT moorings) for a single work boat during the operational period. After accounting for the 2-year operational life of the Floating LiDAR buoy and the 2-year operational life of the metocean buoys and the CM/CT moorings, this results in a total of 20 round trips during the operations phase. A summary of the air emission estimates is presented in Table 6-5, and the detailed emission calculations and assumptions are presented in Appendix F, and currently reviewed literature is available in Section 7.8.

**Table 6-2. Beacon Wind Metocean Facilities Air Emissions Summary**

| Metocean Facilities Activity | VOC (tons) | $NO_x$ (tons) | CO (tons) | $PM/PM_{10}$ (tons) | $PM_{2.5}$ (tons) | $SO_2$ (tons) | HAPs (tons) | GHG (tons $CO_2e$) |
|---|---|---|---|---|---|---|---|---|
| Deployment Activities (Yr 1) | Deployment Activities (Yr 1) | 0.010 | 0.37 | 0.19 | 0.010 | 0.009 | 4.89E-05 | 0.002 |
| Maintenance Activities (Yrs 1-2) | Maintenance Activities (Yrs. 1-2) | 0.039 | 1.43 | 0.73 | 0.038 | 0.037 | 1.90E-04 | 0.008 |
| Unscheduled Visits (up to 1 per yr) | Unscheduled Visits (up to 1 per yr.) | 0.004 | 0.16 | 0.08 | 0.004 | 0.004 | 2.11E-05 | 0.001 |
| Decommissioning Activities (end of Yr 2) | Decommissioning Activities (end of Yr. 2) | 0.010 | 0.37 | 0.19 | 0.010 | 0.009 | 4.89E-05 | 0.002 |
| **Maximum Annual Emissions (tons)[1]** | **Maximum Annual Emissions (tons)1** | **0.041** | **1.48** | **0.76** | **0.039** | **0.038** | **1.97E-04** | **0.008** |
| **Total Project Lifetime Emissions (tons)** | **Total Project Lifetime Emissions (tons)** | **0.064** | **2.33** | **1.19** | **0.061** | **0.059** | **3.09E-04** | **0.013** |

Note[1]. The maximum annual emissions occur for Year 1 of the project, includes the initial deployment activities, maintenance for 18 months, and up to one unscheduled visit.

Emissions associated with the site assessment activity would be minor based on the estimate of less than 50 tons per year of NOx 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 Installation Areas and therefore would not affect local onshore air quality in Massachusetts. Additionally, since the buoy would not be considered an OCS source and the project emissions are associated with mobile sources, an OCS air permit for these activities will not be required.

## 6.9 Social and Economic Resources 585.611 (b) 7

As demonstrated in Section 2, the equipment and methodologies proposed herein by Beacon Wind are consistent with the activity considered by BOEM in the Offshore EA (BOEM 2014). Section 4.2.3 of the Massachusetts EA provides details on the affected environment and potential impacts to socioeconomic resources that may result from the proposed site assessment activity and is incorporated by reference and not repeated. In addition, currently available socioeconomic literature has been reviewed (See section 7.7).

BOEM (2014) considered impacts to demographics and employment, environmental justice, recreation and tourism, commercial and recreational fishing, and visual resources. BOEM's analysis in the EA concluded that impacts would be negligible (visual resources) or negligible to minor (demographics and employment, recreation and tourism, and commercial and recreational fishing), and also concluded that the proposed action would have no disproportionately high and adverse human health or environmental effects on minority or low-income populations (i.e., environmental justice impacts) (BOEM 2014).

Beacon Wind has reviewed currently available literature and data (See Section 7.2) regarding fisheries in and near the project area and has determined that no new substantive information has become available that warrants revision of the analysis in BOEM (2014). While stock assessments for fisheries resources are regularly updated, the description of species assemblages in the Revised Offshore EA are considered representative of current conditions.

Lease Stipulation 4.1.3 requires that Beacon Wind develop a publicly available Fisheries Communications Plan that describes the strategies that Beacon Wind intends to use for communicating with fisheries stakeholders prior to and during activities in support of the submission of a plan. The Fisheries Communications Plan presents Beacon Wind's proposed approach to outreach with the fishing industry in relation to the development of the Project. Information for mariners on the Beacon Wind survey activities is available online at https://www.equinor.com/en/what-we-do/beaconwind/for_mariners.html. Additionally, Beacon Wind has contracted with Sea Risk Solutions LLC to provide Fisheries Liaison Officer(s) to the Project. Sea Risk Solutions leverages experience, technology, innovation, and people skills to mitigate risks and serve as a bridge among marine sectors. The lead Fisheries Liaison Officer for the Project is:

Stephen Drew
Sea Risk Solutions LLC
sdrew@searisksolutions.com
Tel +1 908 339 7439

Beacon Wind has committed to implementing all applicable lease conditions, which include BMPs for the installation, operation, and decommissioning of the Metocean Facilities in order to further reduce the potential for impacts on social and economic resources. Beacon Wind will comply with any additional stipulations as set forth in permits or approvals in support of the proposed site assessment activity.

## 6.10 Coastal and Marine Uses 585.611 (B)(8)

As demonstrated in Section 2, the equipment and methodologies proposed herein by Beacon Wind are consistent with the activity considered by BOEM in the Offshore EA (BOEM 2014). Section 4 of the EA provides details on the affected environment and potential impacts to coastal and marine uses that may result from the proposed site assessment activity and is incorporated by reference.

Beacon Wind has reviewed currently available literature and data (see Section 7.8) regarding coastal and marine uses off the coast of Massachusetts and determined that there is no substantive new information that would change BOEM's analysis. The results of the EA and BOEM's analysis and conclusion that the proposed activity is not anticipated to result in any significant impact to coastal and marine uses is applicable.

Beacon Wind has committed to implementing all applicable lease conditions, which include BMPs for the installation, operation, and decommissioning of the Metocean Facilities in order to further reduce the potential for impacts on coastal and marine uses. Beacon Wind will comply with any additional stipulations as set forth in permits or approvals in support of the proposed site assessment activity

## 6.11 Meteorological and Oceanographic Hazards

As demonstrated in Section 2, the equipment and methodologies proposed herein by Beacon Wind are consistent with the activity considered by BOEM in the Offshore EA (BOEM 2014). Sections 4.3.2 of the EA provide details on the affected environment and potential impacts to meteorological and oceanographic hazards that may result from the proposed site assessment activity and is incorporated by reference.

Beacon Wind has reviewed currently available literature and data (see Section 7.9) regarding coastal and marine uses off the coast of Massachusetts and has determined that there is no substantive new information that would change BOEM's analysis. The results of the EA and BOEM's analysis and conclusion that the proposed activity is not anticipated to result in any significant impact to meteorological and oceanographic hazards is applicable.

Beacon Wind has committed to implementing all applicable lease conditions, which include BMPs for the installation, operation, and decommissioning of the Metocean Facilities in order to further reduce the potential for impacts on meteorological and oceanographic hazards. Beacon Wind will comply with any additional stipulations as set forth in permits or approvals in support of the proposed site assessment activity.

# 7.0 References 585.61 (a)(10)

## 7.1 General

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# 8.0 Appendices and Tables 585.605

| | |
|---|---|
| Appendix A | Agency Consultations |
| Appendix B Specifications | Equipment Specifications and Modelling Results, Health and Safety Plan, and Vessel (Contains Privileged or Confidential Information - Provided Under Separate Cover) |
| Appendix C | Site Characterization Report (Contains Privileged or Confidential Information - Provided Under Separate Cover) |
| Appendix D | Marine Archaeological Resource Assessment Report (Contains Privileged or Confidential Information - Provided Under Separate Cover) |
| Appendix E | Benthic Assessment (Contains Privileged or Confidential Information - Provided Under Separate Cover) |
| Appendix F | Air Quality Emissions Calculations |

# Appendix A

## Beacon Wind Agency Consultations

**Appendix A Contains:**

- Agency Consultation Table
- BOEM Approval of Preliminary Term Extension for Lease OCS-A 0520
- 2014 BOEM CZMA Consistency Determination for MA Wind Energy Area
- 2014 BOEM Letter Requesting Concurrence from Rhode Island on MA Wind Energy Area Consistency Determination
- Rhode Island Concurrence Letter for MA Wind Energy Area Consistency Determination
- 2014 BOEM Letter Requesting Concurrence from Massachusetts on MA Wind Energy Area Consistency Determination
- Massachusetts Concurrence Letter for MA Wind Energy Area Consistency Determination
- Beacon Wind USACE Self-Verification Notification Form
- USACE Notification of Receipt of Self-Verification Notification Form

# Appendix A

## Beacon Wind Agency Consultations

Agency Consultation Table

| Appendix A: Equinor 0520 Site Assessment Plan and Activities Communication Log | | | | | |
|---|---|---|---|---|---|
| Date | Federal | State | Other | Agency/Organization | Topic |
| 11/1/2019 | X | | | BOEM | Discussion of upcoming G&G Surveys for SAP studies with BOEM |
| 12/5/2019 | X | | | BOEM | Requested for meeting with BOEM to review wildlife surveys and resulting data. Also discuss upcoming G&G studies for SAP |
| 1/13/2020 | X | | | BOEM | Call to discuss upcoming G&G survey with submitall of survey plan for 2020 studies. This also included G&G work for SAP area. Also discussed cable landing options briefily to better understand stakeholder engagement proactively. |
| 1/16/2020 | X | | | BOEM | Regarding HRG survey for buoy deployment, BOEM was asked if they had concerns about amended equpment list on 1/6/2020 and responded on 1/16/2020 that they had no further concerns. |
| 1/27/2020 | X | | | BOEM | Equinor submitted Survey Plan to BOEM for 2020 HRG & benthic survey activities. |
| 2/26/2020 | X | | | BOEM | Pre-Survey G&G Meeting to review survey plan, discuss strategy for the field survey and deployment of SAP buoys. |
| 3/12/2020 | X | | | BOEM/Tribal | Certified letters of invitation to hold meeting mailed to five Tribal Nations (Shinnecock, Mashantucket Eastern Pequot, Mashpee and Aquinnah Wampanoag, and Narragansett) |
| 3/20/2020 | X | | | BOEM/Tribal | Follow up email and mail invitation sent to five Tribal Nations to participate in project overview call on 3/27/2020 |
| 3/24/2020 | X | | | BOEM | Equinor had a call with BOEM to discuss tribal outreach efforts underway - confirmed BOEM's approval with approach and the Pre-Survey Tribal Meeting scheduled for 3/27/20. |
| 3/27/2020 | X | | | BOEM/Tribal | Equinor hosts call with Tribal representatives from Mashpee Wampanoag, Aquinnah Wampanoag, and Mashantucket Eastern Pequot to present overview of projects and discuss future work Shinnecock and Narragansett Tribe did not respond. |
| 3/31/2020 | X | | | BOEM | Equinor submitted revised survey plan to BOEM and included updated list and resumes for PSOs. |
| 6/3/2020 | | | X | ENGO, CLF, NWF | Beth and Scott, NRDC, give them status on IHA and status of survey plan (CLF, NWF) |
| 6/13/2020 | | | X | Tribes | Tribal participation letters sent by certified mail to interest tribal contacts to participate in pre-survey meeting to review geotech work planned. |
| 6/30/2020 | | | X | Tribes | Tribal meeting held to discuss geotech survey plan with Mashpee and Aquinnah Wampanog Tribes, Mashantucket Pequot and Narragansett Tribes invited but did not attend |
| 8/5/2020 | X | | | BOEM | Geophysical survey plan is approved by BOEM. Email communication from BOEM to Scott. |
| 8/26/2020 | X | | | USACE | Equinorsubmitted USACE SVF for 10 benthic grabs at buoy locations, 35 CPTs and buoy installations. |
| 8/26/2020 | X | | | USACE | Equinor forwarded the USACE SVF submission to Christine Jacek |
| 8/27/2020 | X | | | USACE | Equinor received email confirmation from USACE that SVF was recieved. It is logged into USACE database and assigned it file number NAE-2020-02225 |

# Appendix A

## Beacon Wind Agency Consultations

BOEM Approval of Preliminary Term Extension for Lease OCS-A 0520

# United States Department of the Interior

BUREAU OF OCEAN ENERGY MANAGEMENT
WASHINGTON, DC 20240-0001

MAR 24 2020

Mr. Christer af Geijerstam
President
120 Long Ridge Road
Suite 3E01
Stamford, Connecticut 06902

Dear Mr. Geijerstam:

The Bureau of Ocean Energy Management (BOEM) received your request for a 12-month extension of the preliminary term for Lease OCS-A 0520 to April 1, 2021, pursuant to 30 C.F.R. Part 585.235(b). This request was made in order to allow for more time to collect and analyze data to deploy a metocean buoy pursuant to a Site Assessment Plan (SAP). It is noted that Equinor has already filed and finalized a SAP survey plan, and has submitted a new survey plan to further characterize the area, beginning April 2020, for the preparation of a Construction and Operations Plan (COP).

BOEM has reviewed your request and has determined an extension of the preliminary term is justified. We base our decision on the good faith effort by Equinor to assess the lease area and develop an appropriate COP. Equinor has also demonstrated due diligence in developing the lease by playing a role in the joint industry effort to align turbine layouts among this and adjacent leases. Therefore, pursuant to 30 C.F.R. Part 585.235(b), your request to extend the preliminary term of commercial lease OCS-A 0499 to April 1, 2021, is approved.

If you have any questions, please contact Mr. Joshua Gange at (703) 787-1121 or joshua.gange@boem.gov.

Sincerely,

James F. Bennett
Chief
Office of Renewable Energy Programs

# Appendix A

## Beacon Wind Agency Consultations

2014 BOEM CZMA Consistency Determination for MA Wind Energy Area

**U.S. Department of the Interior**
**Bureau of Ocean Energy Management**

# Coastal Zone Management Act, Consistency Determination (15 CFR 930.36(a))

## Wind Energy Area Offshore the Commonwealth of Massachusetts

The U.S. Department of the Interior (DOI), Bureau of Ocean Energy Management (BOEM) has prepared this Consistency Determination (CD) to determine whether issuing leases and approving site assessment activities (including the installation, operation and decommissioning of meteorological towers and buoys) within the Wind Energy Area (WEA) offshore Massachusetts (Figure 1) is consistent to the maximum extent practicable with the provisions identified as enforceable by the Coastal Management Programs (CMPs) of the Commonwealth of Massachusetts and State of Rhode Island. This document is provided pursuant to the requirements of 15 CFR 930.39(a) of the Coastal Zone Management Act (CZMA) Federal Consistency regulations.

Section 307(c) (1) of the CZMA, as amended, requires that each Federal agency activity within or outside the coastal zone affecting any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of federally-approved state management programs.

The Commonwealth of Massachusetts and State of Rhode Island share common coastal management issues and have similar enforceable policies as identified by their respective CMPs. Due to the proximity of the WEA to both states (Figure 1), and their shared impacts on environmental and socioeconomic resources and uses, BOEM has prepared a single CD for the Massachusetts WEA.

BOEM is proposing to issue commercial wind energy leases within the Massachusetts WEA (as illustrated in Figure 1 and described below) and approve site assessment activities that would be conducted to determine whether the leases are suitable for, and would support commercial-scale wind energy production. These leases would not authorize the lessee to construct or operate any wind energy project on the Outer Continental Shelf (OCS).

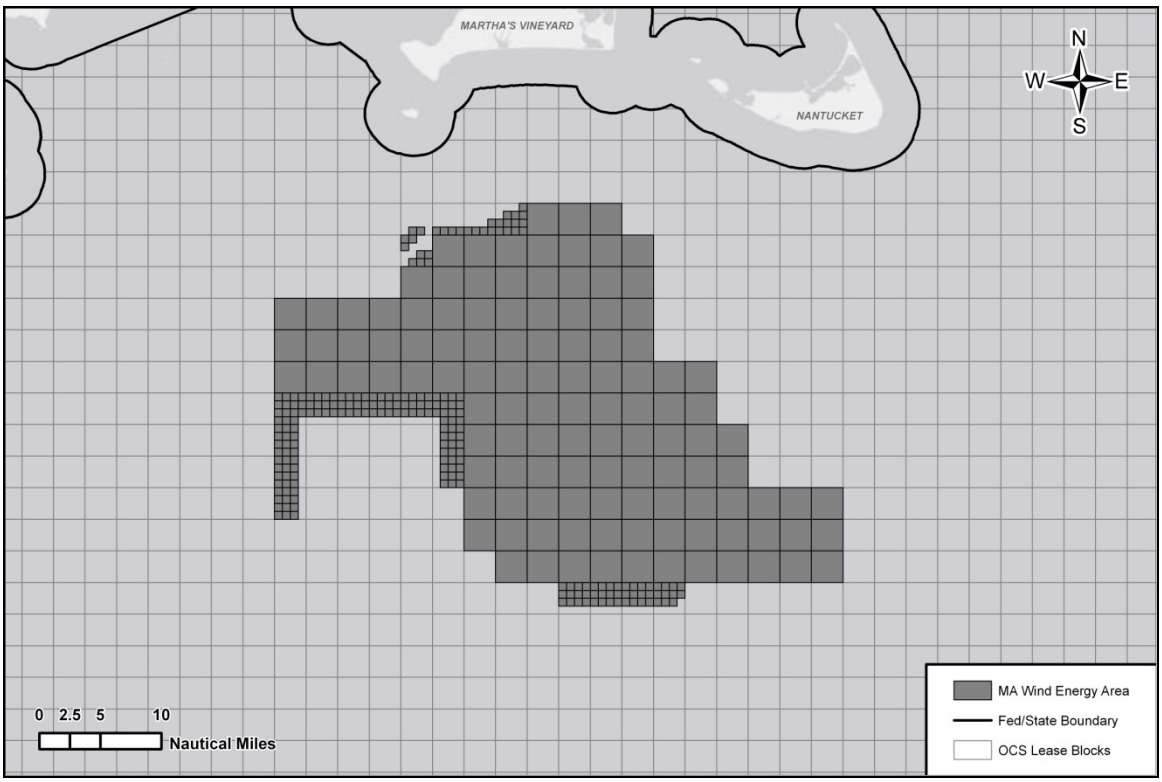


**Figure 1: Massachusetts Wind Energy Area**

In November 2009, BOEM established the Massachusetts Intergovernmental Renewable Energy Task Force and began working with the task force to develop an area offshore of Massachusetts to be considered for commercial wind leasing.

On December 29, 2010, BOEM published a Request for Interest (RFI) in the *Federal Register*. After considering public comments on the RFI and based on further consultation with the Task Force, the potential WEA was refined to avoid shipping lanes, traffic separation schemes, recommended routes, the Nantucket Lightship Habitat Closure Area and commercial fishing areas of interest (resulting in the removal of the eastern half of the RFI). On February 6, 2012, BOEM published the Call for Information and Nominations (77 FR 5820) and the Notice of Intent to prepare an Environmental Assessment (77 FR 5830) in the *Federal Register*.

On May 30, 2012, BOEM announced the Area Identification (Area ID) by designating the WEA offshore and Massachusetts as shown in Figure 1 and summarized in Table 1 (below).

**Table 1: Massachusetts Wind Energy Area**

| Wind Energy Area (WEA) | Official Protraction Diagrams | Size (sq nautical miles (nm)) | Distance to Shore (nm) | Minimum Water Depth (ft) | Maximum Water Depth (ft) |
|---|---|---|---|---|---|
| MA | Providence NK 19-07, Block Island Shelf NK 19-10, Hydrographer Canyon NK 19-11 | 877 | 12 | 108 | 207 |

Activities that would occur over the site assessment period of these leases (i.e. up to five years) include site characterization survey activities and site assessment activities involving the construction, operation, maintenance and decommissioning of meteorological towers and buoys. Site characterization surveys would inform a lessee about site specifics of a lease area in order to prepare for submission of either a Site Assessment Plan (SAP) or a Construction and Operations Plan (COP). The projected site characterization and site assessment activities which will occur within the WEA are discussed in detail in Section 2 and summarized in Table 2 (below).

**Table 2: Projected Site Characterization & Assessment Activities in the WEA**

| Potential Leaseholds | Site Characterization Activities | | | Site Assessment Activities | |
|---|---|---|---|---|---|
| | High Resolution Geophysical (HRG) Surveys (Total Trips) | Sub-bottom Sampling (Total Trips) | Avian and Fish Surveys | Installation of Met Towers (max) | Installation of Met Buoys (max) |
| Up to 5 | 1,500 | 668-2,700 | 420-600 | 5 | 10 |

# 1. BACKGROUND

BOEM is authorized to issue leases on the OCS for the purposes of wind energy development pursuant to Section 388 of the Energy Policy Act of 2005 (EPAct). On April 22, 2009, BOEM promulgated regulations implementing this authority at 30 CFR Part 585. The regulations establish a program to grant leases, easements and rights-of-way (ROWs) for orderly, safe and environmentally responsible renewable energy development activities, such as the siting and construction of offshore wind facilities on the OCS as well as other forms of renewable energy such as marine hydrokinetic (i.e., wave and current). The Minerals Management Service (MMS) prepared a programmatic Environmental Impact Statement (EIS) to evaluate the impact of establishing of a comprehensive, nationwide MMS Alternative Energy Program on the OCS (*Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Programmatic Environmental Impact Statement*, October, 2007 (Programmatic EIS.) The final rule and the Programmatic EIS can be reviewed for reference on the BOEM website at: http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/Index.aspx and: http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/Guide-To-EIS.aspx

On July 3, 2012, BOEM released the *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf (OCS) Offshore Massachusetts Revised Environmental Assessment* (EA) (enclosed) and available online at: http://www.boem.gov/Commercial-Wind-Leasing-Offshore-Massachusetts. The EA analyzes the reasonably foreseeable consequences associated with two distinct BOEM actions in the WEA:

(1) Lease issuance (including reasonably foreseeable consequences associated with shallow hazards, geological, geotechnical, archaeological resources, and biological surveys); and

(2) SAP approval (including reasonably foreseeable consequences associated with the installation of a meteorological tower(s) and meteorological buoys).

BOEM does not issue permits for shallow hazards, geological, geotechnical or archaeological resource surveys. However, since BOEM regulations require that a lessee include the results of these surveys in its application for SAP and COP approval, the EA treats the environmental consequences of these surveys as reasonably foreseeable consequences of issuing a lease.

# 2. PROPOSED ACTION DESCRIPTION

### Offshore Site Characterization Surveys

BOEM regulations require that a lessee provide the results of a number of surveys with both a SAP and a COP, including: a shallow hazards survey, a geological survey, biological surveys, a geotechnical survey, and an archaeological resource survey (30 CFR 585.626(a)(1) to (a)(5), respectively). BOEM refers to these surveys as "site characterization" activities.

Site characterization activities (e.g., locating shallow hazards, cultural resources and hard-bottom areas; evaluating installation feasibility; assisting in the selection of appropriate foundation system designs, and determining the variability of subsurface sediments) would necessitate using high-resolution geophysical (HRG) surveys and geotechnical exploration. The purpose of the HRG survey would be to acquire geophysical shallow hazards data and information pertaining to the presence or absence of archaeological resources and to conduct bathymetric charting. The purpose of geotechnical exploration would be to assess the suitability of shallow foundation soils for supporting a structure or transmission cable under any operational and environmental conditions that might be encountered (including extreme events) and to document soil characteristics necessary for the design and installation of all structures and cables. The results of geotechnical exploration allow for a thorough investigation of the stratigraphic and geo-engineering properties of the sediment that may affect the foundations or anchoring systems of a meteorological tower or buoy, which would be necessary for BOEM to consider in a SAP, or later a COP, for a given lease.

Site characterization activities would also necessitate vessel and/or aerial surveys to characterize three primary biological resources categories: (1) benthic habitats; (2) avian resources; and (3) marine fauna. BOEM does not anticipate lessees needing to conduct separate surveys to characterize the benthic habitats which could be affected by their potential future leasehold activities because the geological and geotechnical surveys would provide enough detailed information for BOEM to adequately assess potential impacts on benthic habitats in the area. For lessees to describe the state of the avian and marine fauna resources, resource surveys would generally involve simple visual observation, either from a vessel or aircraft. For avian and marine fauna surveys, multi-year assessment periods may be necessary to capture natural seasonal and inter-annual variability of marine fauna within the WEA and immediate surroundings if current data available is not sufficient to determine spatial and temporal distribution of species. It is generally envisioned that the fish, marine mammal, sea turtle, and bird aerial and shipboard surveys could be conducted simultaneously.

It is assumed that the site of a meteorological tower or buoy would be surveyed first to meet the similar data requirements for a lessee's SAP (30 CFR 585.610 and 585.611), and the site of a meteorological tower or buoy would not be resurveyed when the remainder of the leasehold is surveyed to meet the data requirements for a lessee's COP (30 CFR 585.626(a)).

**Meteorological Towers and Buoys**

A typical meteorological tower consists of a mast mounted on a foundation anchored to the seafloor. The mast may be either a monopole or a lattice (similar to a radio tower). The mast and data collection devices would be mounted on a fixed or pile-supported platform (monopile, jackets, or gravity bases) or floating platform (spar, semi-submersible or tension-leg). Once installed, the top of a meteorological tower would be 90-115 meters (295-377 feet) above mean sea level. Total installation time for one meteorological tower would take eight days to ten weeks depending on the type of structure installed, and the weather and ocean conditions. The foundation pile(s) for a fixed platform could range from either a single 10-foot (3-meter)-diameter monopile or a steel jacket with three to four 36-inch-diameter (91 cm-diameter) piles. The monopile or piles would be driven anywhere

from 25 to 100 feet (8 to 30 meters) into the seafloor. The area of ocean bottom affected by a meteorological tower would range from about 0.0046 acre (0.002 hectare), if supported by a monopile, to 0.046 acres (0.02 hectares) if supported by a jacket foundation. The final foundation selection would be included in a detailed SAP submitted to BOEM along with the results of SAP-related site characterization surveys prior to BOEM consideration for approval.

While a meteorological tower has been the traditional device for characterizing wind conditions, several companies have expressed their interest in installing one or two meteorological buoys per lease instead. Meteorological buoys can be used as an alternative to a meteorological tower in the offshore environment for collecting wind, wave, and current data. The EA assumes that, should a lessee choose to employ buoys instead of meteorological towers, it would install a maximum of two buoys per lease. These meteorological buoys would be anchored at fixed locations and regularly collect observations from many different atmospheric and oceanographic sensors. There are three primary types of buoys BOEM anticipates will be used for meteorological resource data collection: discus-shaped hull buoys; boat-shaped hull buoys; and spar-type buoys. Discus-shaped and boat-shaped buoys are typically towed or carried aboard a vessel to the installation location. A discus-type buoy would use a combination of chain, nylon and buoyant polypropylene materials, while a boat-shaped buoy would be moored using an all-chain mooring. Once at the location site, the buoy would be either lowered to the surface from the deck of the transport vessel or placed over the final location. Then the mooring anchor is dropped. Transport and installation vessel anchoring would typically require one day for these types of buoys. A spar-type buoy would require two distinct phases for installation with typically a total of 2-3 days to install. The total area of bottom disturbance associated with a spar-type buoy and installation vessel anchors would be roughly 785 square feet (73 square meters).

To obtain meteorological data, scientific measurement devices consisting of anemometers, vanes, barometers and temperature transmitters would be mounted either directly on a tower, buoy, or on instrument support arms. A meteorological tower or buoy also could accommodate environmental monitoring equipment, such as avian monitoring equipment (e.g., radar units, thermal imaging cameras), acoustic monitoring for marine mammals, data-logging computers, power supplies, visibility sensors, water measurements (e.g., temperature, salinity), communications equipment, material hoist, and storage containers.

To measure the speed and direction of ocean currents, Acoustic Doppler Current Profilers (ADCPs) would likely be installed on or near a meteorological tower or buoy. The ADCP is a remote-sensing technology which transmits sound waves at a constant frequency and measures the ricochet of the sound wave off fine particles or zooplanktons suspended in the water column. The ADCPs may be mounted independently on the seafloor, or to the legs of the platform, or attached to a buoy. A typical ADCP is about 1 to 2 feet tall (approximately 0.3 to 0.6 meters) and 1 to 2 feet wide (approximately 0.3 to 0.6 meters).

A SAP describes the activities (e.g., installation of meteorological towers and/or buoys) a lessee plans to perform for the assessment of the wind resources and ocean conditions at its commercial lease (30 CFR 585.605). No site assessment activities could take place on a

lease until BOEM has approved a lessee's SAP (30 CFR 585.600(a)). Once approved, the site assessment term for a commercial lease is five years from the date of SAP approval (30 CFR 585.235(a)(2)). It is assumed that each lessee would install some type of data-collection device (e.g., meteorological tower, buoy, or both) on its lease area to assess the wind resources and ocean conditions of the leasehold. This information would allow the lessee to determine whether the lease is suitable for wind energy development, where on the lease it would propose development, and what form of development to propose in a COP.

A lessee must submit a COP at least six months before the end of the site assessment term if the lessee intends to continue to the lease's operations term (30 CFR 585.601(c)). If the COP describes continued use of existing facilities, such as a meteorological tower or buoy approved in the SAP, a lessee may keep such facilities in place on their lease during BOEM review of the COP for approval (30 CFR 585.618(a)), which may take up to two years. If, after the technical and environmental review of a submitted COP, BOEM determines that such facilities may not remain in place throughout the operations term, a lessee must initiate the decommissioning process (30 CFR 585.618(c)). Depending on how long it takes to install a meteorological tower, whether a lessee submits a COP (or the lease expires) and/or how long subsequent COP approval would take, BOEM anticipates that a meteorological tower would be present for approximately five years before the agency decides whether to allow the tower to remain in place for the lease's operations term or whether the tower should be decommissioned immediately.

**Coastal Activity**

Specific ports used by lessees would be determined in the future and primarily by proximity to the lease blocks, capacity to handle the proposed activities, and/or established business relationships between port facilities and lessees. Existing ports or industrial areas which are likely to be used by lessees in support of the proposed action to occur in Massachusetts, Rhode Island, and Connecticut. Because these port facilities are adequate to support proposed action activities, expansion of port facilities to meet lessee needs is not anticipated, and, therefore, only existing facilities which can currently accommodate proposed site characterization and site assessment activities are considered.

Key determinants of where a lessee would choose to stage its operations include prior site assessment proposals, proximity to lease blocks, capacity to handle the proposed activities, and/or established business relationships between port facilities and lessees.

In order to survey all of the potential leases in the WEA, site characterization surveys would have to use multiple vessels and would likely take place over several years, considering there may be up to five leases awarded. Preferred vessels could accommodate all of the necessary survey equipment and could conduct as many surveys simultaneously. BOEM anticipates that 65 to 100 feet long vessels would be used, depending on availability. Vessels must be able to accommodate a crew for several days and be large enough to mount enough cable to tow instruments. Survey vessels would use existing ports and harbors for trip departures and returns and require a diesel refueling station. Vessels conducting HRG surveys and geotechnical exploration work can either depart from one of the ten major ports or from one of the 21 smaller ports identified in the EA. Because the survey vessels used for HRG

surveys and geotechnical exploration are smaller than most commercial ocean-going vessels and require a smaller navigation channel depth, survey vessels can use most existing commercial ports in the Massachusetts and Rhode Island coastal area. Because anticipated offshore site characterization work is generally smaller in scale than other activities within existing ports, port infrastructure requirements are also likely to be smaller. Because of their proximity to the WEA, the majority of onshore activities would be divided among existing commercial and/or smaller ports in Massachusetts and Rhode Island.

**Vessel Traffic**

Approximately 2,808 to 6,500 total vessel round trips are anticipated to occur as a result of the proposed action over a five year period. Approximately 2,588 to 4,800 of these vessel trips (round trips) would be associated with all site characterization surveys as a result of the proposed action over five years, from 2013 to 2018. The total vessel traffic estimated as a result of the installation, decommissioning, and routine maintenance of the meteorological towers and meteorological buoys that could be reasonably anticipated in connection with the proposed action would range from 220 to 1,700 round trips over a five-year period.

The total vessel traffic estimated as a result of the HRG surveys and geotechnical exploration work that could be reasonably anticipated in connection with the proposed action would range from about 2,168 to 4,200 round trips over five years and spread over existing and available port facilities in Rhode Island and Massachusetts. In addition, BOEM presumes 420 to 600 extra independent surveys conducted to characterize avian resources under the proposed action.

Should each potential lessee decide to install a meteorological tower on its leasehold, a total of 200 round trips are estimated for construction (40 trips per tower multiplied by 5 towers [see Table 3-6 of the EA]). These vessel trips may be spread over multiple construction seasons as a result of the various times at which lessees acquire their leases, weather and sea state conditions, the time to assess suitable site(s), the time to acquire the necessary permits, and the availability of vessels, workers, and tower components. Because the decommissioning process would basically be the reverse of construction, vessel usage during decommissioning would be similar to vessel usage during construction, so another 200 round trips are estimated for decommissioning of towers. Meteorological buoys would typically take 1 to 2 days to install by one vessel, and 1 to 2 days to decommission by one vessel. Maintenance trips to each meteorological tower may occur weekly to quarterly, and monthly to quarterly for each buoy. However, to provide for a conservative scenario, total maintenance vessel trip calculations are based on weekly trips for towers and monthly trips for buoys over the entire 5-year period (see Table 3-6 of the EA). The total vessel traffic estimated as a result of the installation, decommissioning, and routine maintenance of the meteorological towers/buoys that could be anticipated in connection with the proposed action is anticipated to be between 220 and 1,700 round trips over a 5-year period.

## 3. STATE ENFORCEABLE POLICIES

As part of this CD, BOEM has evaluated and documented in the enclosed table (Table 3), policies identified by Massachusetts and Rhode Island as enforceable, applicable offshore and coastal resources or uses, and CZMA "reasonably foreseeable coastal effects" that might be expected for activities conducted under the proposed action. While reviewing and making these determinations on the policies the states have identified as enforceable in this CD, BOEM has considered the common enforceable policies identified by each of the two states as enforceable in their CMP as listed in Table 3.

## 4. CONSISTENCY DETERMINATION

BOEM has evaluated all applicable enforceable policies of Massachusetts and Rhode Island and the potential activities resulting from the proposed action. This CD has examined whether the proposed action described in Section 1 is consistent to the maximum extent practicable with the policies and provisions identified as enforceable by the CMPs of Massachusetts and Rhode Island (see Table 3). Based on the preceding information and analyses, and the incorporated-by-reference Programmatic EIS and the EA, BOEM has determined the proposed action will be consistent to the maximum extent practicable with the policies that Massachusetts and Rhode Island have identified as enforceable.

| Table 3: Applicable Enforceable Policies for the Coastal Management Programs for Massachusetts and Rhode Island | | |
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| **CATEGORY** | **ENFORCEABLE POLICIES: APPLICABLE COASTAL ZONE MANAGEMENT RULES** | **REASONABLY FORESEEABLE COASTAL EFFECTS (CZMA COASTAL EFFECTS)** |
| **Coastal Hazards** | Coastal Hazards Policies #1 - 4 (MA)<br><br>Massachusetts Wetland Protection Act (M.G.L. c.131,§40) (MA)<br><br>Massachusetts General Law Chapter 91 (MA)<br><br>RI SAMP Section 1160.2.3 Areas of Particular Concern (RI)<br><br>RI SAMP Section 1160.3 - 4 Prohibitions and Areas Designated for Preservation (RI) | See Section 4.2.2.4 of the environmental assessment (EA) for additional information on impacts to coastal habitats and coastal wetland habitats and ecosystems.<br><br>For the proposed action, a maximum of approximately 6,500 vessel trips from site characterization and assessment activities are projected to occur over a 5-year period if the entire Wind Energy Area (WEA) were leased and the maximum number of site characterization surveys were conducted in the lease areas of the WEA. Indirect impacts from routine activities may occur from wake erosion caused by vessel traffic in support of the proposed action. These trips would be divided among New Bedford, Providence, Quonset Point, New London, and Groton, slightly increasing traffic in already heavily used waterways. If all ports are used equally, this would average 268 round trips per year to each of the ports in Massachusetts, Rhode Island, and Connecticut. Wake erosion and sedimentation effects would be limited to approach channels and the coastal areas near ports and bays used to conduct activities. Given the existing amount and nature of vessel traffic (including tanker ships, container ships, and other very large ships) into and out of the ports (see Section 4.2.3.8 of the EA), there would be a negligible, if any, increase to wake-induced erosion of associated channels based on the relatively small size and number of vessels associated with the proposed action. Moreover, all approach channels to these ports are armored, and speed limits would be enforced, which also helps to prevent most erosion.<br><br>Non-routine events such as spills can occur in a channel or bay from several activities, such as transit of WEA-related vessels to or from the ports, survey activities in the WEA, or installation, maintenance, and decommissioning of meteorological towers and buoys. Should a spill occur in a channel or bay and contact shore, the impacts on coastal habitats would depend on the type of material spilled, the size and location of the spill, the meteorological conditions at the time, and the speed with which cleanup plans and equipment could be employed. These impacts are expected to be minimal because vessels are expected to comply with USCG regulations at 33 CFR 151 relating to the prevention and control of oil spills. Based on the distance from shore where these activities would occur and the rapid evaporation and dissipation of diesel fuel, a spill occurring in the WEA |

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| | | would likely not contact shore. Collisions between vessels and allisions between vessels and meteorological towers and buoys are unlikely. However, if a vessel collision or allision were to occur, and in the unlikely event that a spill would result, the most likely pollutant to be discharged into the environment would be diesel fuel. Diesel dissipates very rapidly in the water column, then evaporates and biodegrades within a few days (MMS, 2007b), resulting in negligible, if detectable, impacts to the area of the spill.<br><br>Existing fabrication sites, staging areas, and ports in Massachusetts, Rhode Island, and Connecticut would support survey, construction, operation, and decommissioning activities as discussed in Section 3.1.4.4 of the EA. No expansion of these existing areas is anticipated in support of the proposed action. Existing channels could accommodate the vessels anticipated to be used, and no additional dredging would be required as a result of the proposed action. Impacts on coastal habitats could occur from an accidental diesel fuel spill and if this does occur, it is expected to be localized and temporary, and therefore negligible.<br><br>No dunes, beaches, coastal banks, marshes, or wetlands will be altered as a result of the proposed action. No proposed activities will remove, fill, dredge or alter any barrier beach or wetland resource area as defined under Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 and Massachusetts Coastal Management Program's (CMP) Coastal Hazards Policy #1. No installation or expansion of existing coastal infrastructure or of a coastal engineering structure, or a nonwater-dependent project, as defined under MA CMP Coastal Hazards Policy #1, is anticipated to occur as a result of the proposed action.<br><br>The proposed action will not interfere with water circulation or sediment transport processes, alter bottom topography, increase erosion, or impact littoral drift volumes, as defined in the MA CMP's Coastal Hazards Policy #2. No state or federally-funded public works projects, as defined in the MA CMP's Coastal Hazards Policy #3, will occur as a result of the proposed action. |
| **Energy** | Energy Policy #1 (MA) | The proposed action does not include the consideration or approval of any commercial wind energy facility. The purpose of the proposed action is to assess the wind resources in the lease area and characterize the environmental and socioeconomic resources and conditions so that a lessee can determine whether the site is suitable for future commercial development and, if so, submit a Construction and Operations Plan (COP) for BOEM review. Since no entity is currently in a position to submit a COP (as no entity has yet been awarded a lease or acquired the necessary leasehold information to formulate such a plan), and since the specific information contained in such a plan would be determined by the reasonably foreseeable environmental consequences associated with the development of any lease, no coastally dependent energy facilities are anticipated to be constructed as a result of the proposed action; and no wind power generation facilities will be part of the proposed activities. |

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| **Habitat** | Habitat Policy #1 – 2 (MA)<br><br>RI SAMP Section 1160.3 Prohibitions and Areas Designated for Preservation (RI) | The proposed action will not adversely impact coastal, estuarine, and marine habitats, nor will the proposed action interrupt the ecosystem services provided by these habitats, as defined in CMP's Habitat Policy #1. The proposed action is subject to oversight and regulation under the enforceable standards of the Massachusetts Ocean Management Plan as contained in Appendix 5 of the MA Office of Coastal Zone Management's October 2011 Policy Guide.<br><br>No potential adverse impacts to coastal, estuarine, and marine habitats, including designated Special, Sensitive and Unique Resources Areas under the MA Ocean Management Plan, are anticipated as a result of the proposed action and leases will engage in all feasible measures to avoid, minimize, and mitigate damage to any coastal, estuarine, and marine habitat, as described in CMP's Habitat Policy #2.<br><br>No impact to Areas Designated for Preservation within the RI Ocean Special Area Management Plan (SAMP), which are afforded additional protection than Areas of Particular Concern, are anticipated as a result of the proposed action. The proposed action does not include underwater cables within Areas Designated for Preservation, although underwater cables are exempt from existing prohibition of any Large-Scale Offshore Development, mining and extraction of minerals, or other development that has been found to be in conflict with the intent and purpose of an Area Designated for Preservation within the Ocean SAMP. No mining and extraction of minerals, including sand and gravel, from tidal waters and salt ponds would occur as a result of the proposed action. No impacts to Critical Habitat under the Endangered Species Act would occur as a result of the proposed action. In addition, the proposed action does not include the disposal of dredged material in the following Areas of Particular Concern: historic shipwrecks and archaeological or historic sites; offshore dive sites; navigation, military, and infrastructure areas; and moraines. All disposal of dredged material, as defined in and subjected to regulations of RI Coastal Resources Management Plan (CRMP) Section 300.9, will be conducted in accordance with the U.S. EPA and U.S. Army Corps of Engineers' manual, *Evaluation of Dredged Material Proposed for Ocean Disposal.*<br><br>Routine activities in the WEA (described in Section 3.1 of the EA) would not have direct impacts on coastal benthic resources and coastal benthic habitats because the proposed site assessment activities would take place at least 12 nautical miles (nmi) from the shore. Direct impacts from the proposed action on benthic habitats would be limited to short-term disturbance and only minimal removal of available benthic habitat in the long-term. Sensitive benthic areas such as coral reefs, hard-bottom areas, seagrass beds, and chemosynthetic communities would be avoided when placing meteorological towers and buoys. |

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| | | Section 4.2.2.4.2 of the EA, which describes the reasonably foreseeable impacts of the proposed action on wetland ecosystems, concludes that no direct impacts on wetlands or other coastal habitats would occur from routine activities in the WEA based on the distance of the WEA from shore. Additionally, existing ports or industrial areas in Massachusetts, Rhode Island, and Connecticut are expected to be used in support of the proposed project. No expansion of existing facilities is expected to occur as a result of the proposed action. Indirect impacts from routine activities may occur from wake erosion and associated added sediment caused by increased traffic in support of the proposed action. Given the volume and nature of existing vessel traffic in the area, a negligible increase of wake-induced erosion may occur. Should an incidental diesel fuel spill occur as a result of the proposed action, the impacts on coastal habitats are expected to be negligible. |
| **Ocean Resources** | | The proposed action will not adversely affect any state-regulated aquaculture, marine mineral resource extraction, or offshore sand and gravel extraction as described in CMP's Ocean Resources Policies #1, #2, and #3, respectively.<br><br>No hazardous impacts to commercial navigation are anticipated as a result of the proposed action, including the MA designated Areas of Concentrated Existing Water Dependent Uses. The MA WEA avoids Areas of High Intensity Commercial Marine Traffic, defined as having 50 or more vessel counts within a 1-km by 1-km grid, in RI state waters.<br><br>Buoys associated with the proposed action are not anticipated to result in significant environmental consequences when added to the existing buoys offshore of MA and RI. While approximately 2,808 to 6,500 round trips are expected for site characterization and assessment activities associated with the proposed action over a five-year period, this is relatively minor when compared with existing vessel traffic from commercial shipping, personal recreational vessels, passenger vessels, military vessels, and commercial/recreational fishing vessels (see Section 4.2.3.8 of the EA). |
| **Ports and Harbors** | Ports and Harbors Policy #1 – 4 (MA)<br><br>RI SAMP Section 1160.2 (1) and (2) Areas of Particular Concern (RI) | All vessels associated with the proposed action will use existing ports and facilities, including Designated Port Areas (DPAs) in Massachusetts. No new dredging is anticipated as a result of the proposed action. BOEM anticipates that all staging activities for meteorological tower construction and meteorological buoy deployment will occur at existing facilities (including DPAs in Massachusetts). BOEM does not anticipate the development or expansion of port facilities as a result of the proposed action.<br><br>No modifications or expansions to existing ports are anticipated as a result of the proposed action. The increase in activities associated with site characterization and the installation/operation of the meteorological towers and buoys would not measurably impact current or projected land use or coastal infrastructure for several reasons: existing large to small commercial ports and harbors or |

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| | | industrial areas comprising the coastal infrastructure in MA and/or RI are expected to be used when implementing the proposed action, and the few structures in the WEA would have a small footprint and would be dispersed over a wide area of ocean. Impacts on land use and coastal infrastructure for site characterization and assessment activities are expected to be very low. |
| **Protected Areas** | Protected Areas Policy #1 – 3 (MA)<br><br>RI SAMP Section 1160.2 Areas of Particular Concern (RI)<br><br>RI SAMP 1160.3 Prohibitions and Areas Designated for Preservation (RI) | HRG survey noise on marine fish and shellfish are generally expected to be limited to avoidance around the HRG survey activities and short-term changes in behavior. Thus, potential population-level impacts to fish resulting from HRG surveys are expected to be negligible.<br><br>Meteorological tower construction noise could disturb normal behaviors. As discussed in the analysis of HRG surveys, behavioral reaction may include avoidance of, or flight from, the sound source. Fish that do not flee the immediate action area during pile-driving procedures could be exposed to lethal SPLs. However, the SOCs (see Appendix B), including the implementation of a "soft start" procedure, will minimize the possibility of exposure to lethal sound levels. As a result of the small geotechnical exploration footprint, BOEM expects this activity would have negligible benthic effects that could affect fish species and their habitat, including EFH, which may occur in the WEA. Impacts related to meteorological tower/buoy installation, operation, and decommissioning are expected to be minor and are not expected to result in changes in local fish community assemblage and diversity.<br><br>Pursuant to Rhode Island's Federal Consistency List (Table 2, viii) a Federal consistency review must occur for "meteorological towers deployed in lease blocks within the Area of Mutual Interest (AMI area) between Rhode Island and Massachusetts where mobile gear fishing activity is prevalent (OCS lease blocks 6816, 6817, 6864, 6865, 6866, 6867, 6914, 6915, 6916, 6964, 6965, 6966, 6967, 6968, 7014, 7015, 7016, 7017, 7018, 7019, 7020, 7021, 7064, 7065, 7066, 7067, 7068, 7069, 7070, 7071, 7114, 7115, 7116, and 7117". However, the deployment of meteorological towers in lease blocks within the AMI area where mobile gear fishing is not prevalent (OCS lease blocks 6764, 6765, 6766, 6814, 6815, 6917, 6918, 6919, 6969, 6970, and 6971) is considered to have either no reasonably foreseeable coastal effect or insignificant effects and does not warrant federal consistency review.<br><br>Fish could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. The entanglement in or ingestion of OCS-related trash and debris by fish would not be expected during normal operations. Impacts on fish and their habitat, including EFH, from the discharge of waste materials or the accidental release of fuels are expected to be minor because of the small number of structures and vessels |

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| | | involved with construction, operation, and decommissioning. See Section 4.2.2.5 of the EA for additional information on Finfish, Shellfish, and Essential Fish Habitat.<br><br>No direct impacts on wetlands or other coastal habitats would occur from routine activities in the WEA based on the distance of the WEA from shore. Additionally, existing ports or industrial areas in Massachusetts, Rhode Island, and Connecticut are expected to be used in support of the proposed project. No expansion of existing facilities is expected to occur as a result of the proposed action. Indirect impacts from routine activities may occur from wake erosion and associated added sediment caused by increased traffic in support of the proposed action. Given the volume and nature of existing vessel traffic in the area, a negligible increase of wake-induced erosion may occur. Should an incidental diesel fuel spill occur as a result of the proposed action, the impacts on coastal habitats are expected to be negligible. See Section 4.2.2.4 of the EA for additional information on Coastal Habitats.<br><br>Meteorological towers installed under the proposed action would likely not be visible from shore based on the narrow profile of the structure; distance from shore; and earth curvature, waves, and atmosphere. While lighting on meteorological towers may be visible from several miles away at night, the tower lighting would be faint and difficult to distinguish from other lighting present (e.g., vessel traffic). Existing ports and other onshore infrastructure are capable of supporting site assessment activities with no expansion (see Section 3.1.2). Visual impacts to onshore cultural resources would be limited and temporary in nature and would consist predominately of vessel traffic, which most likely also would not be distinguishable from existing vessel traffic. Therefore, the likelihood of impacts on onshore cultural resources from meteorological structures and from construction vessel traffic also would be very low (see Appendix H). See Section 4.2.3.4 Recreation and Visual Resources of the EA for additional information on Aesthetics and Visual Impacts.<br><br>BOEM does not anticipate impacts to public recreation areas in MA and RI as a result of the proposed action. No new onshore coastal structures would be built if the proposed action is implemented, and the amount of associated vessel traffic is expected to be small, thereby limiting the number of potential spills. Additionally, because the WEA is proposed to be located more than 12 nm offshore, there would be no visual impacts on recreational resources. Impacts may occur as a result of the proposed from marine trash and debris. However, it is unlikely that this debris would be differentiated from other sources of trash in the area. See Section 4.2.3.4 of the EA for additional information on public recreation areas. |

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| | | BOEM does not anticipate any new coastal development as a result of the proposed action. Scenic rivers will not be impacted as a result of the proposed action.<br><br>The proposed action is not anticipated to impact historical resources physically, visually, audibly, or atmospherically. Meteorological towers installed under the proposed action would likely not be visible from shore based on the narrow profile of the structure; distance from shore; and earth curvature, waves, and atmosphere. While lighting on meteorological towers may be visible from several miles away at night, the tower lighting would be faint and difficult to distinguish from other lighting present (e.g., vessel traffic). Existing ports and other onshore infrastructure are capable of supporting site assessment activities with no expansion (see Section 3.1.2 of the EA). Visual impacts to onshore cultural resources would be limited and temporary in nature and would consist predominately of vessel traffic, which most likely also would not be distinguishable from existing vessel traffic.<br><br>Bottom-disturbing activities have the potential to affect pre-contact and cultural resources. However, existing regulatory measures, information generated for a lessee's initial site characterization activities, and the unanticipated discoveries requirement make the potential for bottom-disturbing activities (e.g., coring, anchoring, and installation of meteorological towers and buoys) to have an adverse effect (i.e., cause significant impact or damage) on cultural resources very low. See Section 4.2.3.1 of the EA for additional information on Cultural Resources. See the Historical Properties section below for additional information on Historic/archeological resources.<br><br>The MA WEA is located in water depths greater than 20 meters (65.6 ft.) and therefore is not located in a sea duck foraging habitat Area Designated for Preservation (RI Ocean SAMP 1160.3 1(i)). See Section 4.2.2.1 of the EA for additional information on birds. In addition, areas of high sea duck occurrence were removed from the MA Call Area during the Area Identification process. These areas have been excluded from leasing consideration. See Section 1.5.2 of the EA for additional information.<br><br>No modifications or expansions to existing ports are anticipated as a result of the proposed action. All vessels associated with the proposed action will use existing ports and facilities, including DPAs in Massachusetts. No dredging is anticipated as a result of the proposed action. BOEM anticipates that all staging activities for meteorological tower construction and meteorological buoy deployment will occur at existing facilities (including DPAs in Massachusetts). BOEM does not anticipate the development or expansion of port facilities as a result of the proposed action. |
| **Public Access** | Public Access Policy #1 (MA) | No direct impacts on wetlands or other coastal habitats would occur from routine activities in the WEA based on the distance of the WEA from shore. Additionally, existing ports or industrial areas |

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| | RI SAMP 1160.2 Areas of Particular Concern (RI) | in Massachusetts, Rhode Island, and Connecticut are expected to be used in support of the proposed project. No expansion of existing facilities is expected to occur as a result of the proposed action. Indirect impacts from routine activities may occur from wake erosion and associated added sediment caused by increased traffic in support of the proposed action. Given the volume and nature of existing vessel traffic in the area, a negligible increase of wake-induced erosion may occur. Should an incidental diesel fuel spill occur as a result of the proposed action, the impacts on coastal habitats are expected to be negligible. The proposed action is not anticipated to restrict public use and general enjoyment of the water's edge. See Section 4.2.2.4 of the EA for additional information on Coastal Habitats.<br><br>The proposed action is not anticipated to impact historical resources physically, visually, audibly, or atmospherically. Meteorological towers installed under the proposed action would likely not be visible from shore based on the narrow profile of the structure; distance from shore; and earth curvature, waves, and atmosphere. While lighting on meteorological towers may be visible from several miles away at night, the tower lighting would be faint and difficult to distinguish from other lighting present (e.g., vessel traffic). Existing ports and other onshore infrastructure are capable of supporting site assessment activities with no expansion (see Section 3.1.2 of the EA). Visual impacts to onshore cultural resources would be limited and temporary in nature and would consist predominately of vessel traffic, which most likely also would not be distinguishable from existing vessel traffic. See the Historical Properties section below for additional information on Historic/archeological resources.<br><br>BOEM does not anticipate impacts to public recreation areas in MA and RI as a result of the proposed action. No new onshore coastal structures would be built if the proposed action is implemented, and the amount of associated vessel traffic is expected to be small, thereby limiting the number of potential spills. Additionally, because the WEA is proposed to be located more than 12 nm offshore, there would be no visual impacts on recreational resources. Impacts may occur as a result of the proposed from marine trash and debris. However, it is unlikely that this debris would be differentiated from other sources of trash in the area. See Section 4.2.3.4 of the EA for additional information on public recreation areas.<br><br>The WEA is not located within the RI Area of Particular Concern for recreational boating and sailboat racing. The proposed action is not anticipated to have an adverse impact on recreational resources. |
| **Water Quality** | Water Quality Policy #1 (MA) (Point Source) | The routine activities associated with the proposed action whichwould impact coastal and marine water quality include vessel discharges (including bilge and ballast water and sanitary waste) and structure installation and removal. Additional information on water quality and impacts to coastal |

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| | Water Quality Policy #2 (MA) (Nonpoint Source)<br><br>Water Quality Policy #3 (MA) (Groundwater Discharges)<br><br>Section 401 of the Clean Water Act (33 U.S.C. 1251 et seq.) (MA, RI) | and marine water quality can be found in Section 4.2.1.4 of the EA.<br><br>The USEPA National Pollutant Discharge Elimination System (NPDES) storm water effluent limitation guidelines control storm water discharges from support facilities such as ports and harbors. Activities associated with staging and fabrication of the meteorological towers and buoys would account for a very small amount of activity at existing port facilities during staging, anticipated to take eight days to ten weeks (*see* "Installation" in Section 3.1.4.1 of the EA). The proposed action is not anticipated to increase runoff or onshore discharge into harbors, waterways, coastal areas, or the ocean environment.<br><br>No entrainment or impingement of marine organisms from once-through cooling or for process water is anticipated as a result of the proposed action.<br><br>Site characterization surveys are described in Section 3.1.3 of the EA and include HRG surveys, geotechnical surveys, and biological surveys. These surveys are performed during cruises where specialized instrumentation is typically attached to the survey vessel, either through the hull or in packages towed behind the vessel. Other instrumentation, such as dredges and grab samplers, Vibracores, and deep coring devices, are placed on the bottom to acquire data or samples. All of this instrumentation is self-contained with no discharges to affect the water quality in the WEA, including hydrography, nutrients, chlorophyll, DO, or trace metals. Survey vessels performing these characterization surveys may affect water quality both during the surveys in the WEA, as well as traveling to and from shore facilities. Vessels generate operational discharges that can include bilge and ballast water, trash and debris, and sanitary waste. Details of these waste discharges and the governing regulations are discussed in Section 3.1.3.5 of the EA. In the event of failure of the onboard equipment for treating such waste, water quality could be compromised, particularly in nearshore areas. However, in the WEA, coastal and oceanic circulation and the large volume of water would disperse, dilute, and biodegrade vessel discharges relatively quickly, and the water quality impact would be minor.<br><br>Meteorological and oceanographic data collection towers and buoys are described in Section 3.1.4 of the EA. The construction and deployment of such equipment would disturb the seabed via anchoring, pile driving, and placement of scour protection devices. However, because the equipment is compact, only small, local changes in water quality (turbidity) in the vicinity of the structures would occur. The small changes would likely affect only approximately to 30 to 40 square ft (3 to 4 square m) in the vicinity of the equipment, assuming the area of influence is approximately 3 ft (1 m) above the equipment with a radius of one to two length scales around the equipment. These small changes would cease to occur during operation of towers and buoys. |

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| | | Impacts on water quality as a result of the proposed action would be minor. The instrumentation used for site characterization is self-contained, so there would be no discharges to affect the water quality in the WEA. Although there would be operational discharges from vessels during site characterization surveys, the coastal and oceanic circulation and large water volume would disperse, dilute, and biodegrade vessel discharges, so impacts on water quality would be minor. The disturbance to the seabed during construction and deployment of towers and buoys would cause small, localized impacts on the water quality in the vicinity of the structures. However, these small, localized impacts would cease during operation of the towers and buoys.<br><br>Activities associated with the proposed action will follow Total Maximum Daily Load (TMDL) guidelines designed for specific watersheds within the WEA and will follow established state water quality standards for protecting public health and maintaining the designated beneficial uses of those waters. Vessels, generators, and pile-driving hammers used during site characterization and site assessment activities in the WEA and along potential transmission corridors comprise multiple sources of diesel fuel, lubricating oil, and hydraulic oil. Spills could occur during refueling or other fluid exchange or as the result of an allision or collision. A vessel allision with meteorological structures or collision with other vessels may result in a spill of diesel fuel, lubricating oil, or hydraulic oil. Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. Spills are not projected to have significant impacts due to the small size of a projected spill. A spill could occur while en route to and from the WEA, but this is considered unlikely. If a spill were to occur, either inside or outside of the WEA, the estimated spill size would be small. Vessel allision with a meteorological buoy containing a diesel-powered generator may also occur. It is estimated that a buoy generator could contain 240 gallons of diesel fuel (Fishermen's Energy of New Jersey, LLC 2011 *as cited in* USDOI, BOEM, OREP 2012). If a diesel spill of this size were to occur, it would be expected to dissipate very rapidly in the open ocean, then evaporate and biodegrade within a few days.<br><br>Impacts on coastal and marine waters from vessel discharges associated with the proposed action are expected to be of short duration and remain minimal and no significant impacts are expected. Sediment disturbance resulting from anchoring and coring would be short-term, temporarily impacting local turbidity and water clarity. As a result, sediment disturbance resulting from the proposed action is not anticipated to result in any significant impact on any area in Massachusetts or Rhode Island coastal waters. Since collisions and allisions occur infrequently and rarely result in oil spills, the risk of a spill would be small. In the unlikely event of a fuel, lubricating oil, or hydraulic oil spill, minimal impacts would be expected because the spill would very likely be small and would dissipate and biodegrade within a short time. As a result, if a spill occurred, the potential impacts on |

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| | | water quality are not expected to be significant. Moreover, storms may disturb surface waters and cause a faster dissipation of diesel if spilled, but impacts on water quality would be negligible and of a short duration. Therefore, impacts from vessel discharges, sediment disturbance, and potential spills associated with the proposed action on water quality of harbors, ports, coastal areas, and in the WEA are expected to be minor.<br><br>Vessel discharges may affect water quality when vessels are traveling to and from the WEA and during site characterization surveys and site assessment activities in the WEA. Vessel discharges include bilge and ballast water and sanitary waste. Bilge water discharges may occur in nearshore and offshore waters provided that the effluent is processed by an approved oily water separator and the oil content is less than 15 parts per million. In navigable waters of the United States, vessels may not discharge any effluent that contains oil that causes a sheen on the surface of the water or an emulsion beneath the water, which is a violation of 40 CFR 110. Bilge water that cannot be discharged in compliance with these standards must be retained onboard the vessel for subsequent discharge at an approved port reception facility per 33 CFR 151.10(f). Ballast water is used to maintain stability of the vessel and may be pumped from coastal or marine waters. Generally, the ballast water is pumped into and out of separate compartments and is not usually contaminated with oil; however, the same discharge criteria for bilge water apply to ballast water (33 CFR 151.10). Ballast water also may be subject to the USCG's Ballast Water Management Program to prevent the spread of aquatic nuisance species.<br><br>Vessels traveling through portions of the WEA that are outside the 12 nm- boundary could release bilge water and ballast water into the ocean. Gray water from vessels is not regulated outside state waters, and vessel operators may discharge gray water outside state waters. Since the WEA is outside state waters, it would be likely that vessels would discharge gray water while operating on the OCS. However, oceanic circulation and the volume of water increasingly serve to disperse, dilute, and biodegrade such contaminants, and while the discharge of bilge water, ballast water and gray water may affect the water quality locally and temporarily, the potential impacts from vessels associated with the proposed action, are expected to be minor. All vessels transiting in both MA and RI state waters would comply with boat sewage no discharge areas.<br><br>No development on barrier beaches is anticipated to occur as a result of the proposed action due to the use of existing facilities. No expansion of existing facilities is anticipated as a result of the proposed action.<br><br>The activities associated with the proposed action will not adversely affect the characteristics of Area of Critical Environmental Concern (ACEC) of the Commonwealth of Massachusetts (see |

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| | | Sections 4.2 and 4.7 of the EA for additional information). |
| **Historical Properties** | Protected Areas Policy #3 (MA)<br><br>Rhode Island Historical Preservation Act and Antiquities Act (RI)<br><br>RI SAMP Section 1160.1.12-17 Overall Regulatory Standards (RI)<br><br>RI SAMP Section 1160.2.3(i) Areas of Particular Concern (RI) | The potential impact of the proposed action on cultural and historic resources has been evaluated in accordance with the National Historic Preservation Act and Antiquities Act, and additional information on Recreation and Visual Resources is located in Section 4.2.3.4 of the EA. See Section 4.2.3.1of the EA for additional information on impacts to cultural resources.<br><br>The proposed action is not anticipated to impact historical resources physically, visually, audibly, or atmospherically. Meteorological towers installed under the proposed action would likely not be visible from shore based on the narrow profile of the structure; distance from shore; and earth curvature, waves, and atmosphere. Simulations were developed for the proposed action and assumed red flashing lighting would be implemented at the base and top of the towers; these simulations are provided in Appendix H of the EA. While lighting on meteorological towers may be visible from several miles away at night, the tower lighting would be faint and difficult to distinguish from other lighting present (e.g., vessel traffic). Weather conditions would also significantly limit the visibility; and fog, haze, clouds, or rough seas would likely prevent any potential visibility of the towers and lighting.<br><br>For site assessment activities, the proposed action considers the impacts of construction and operation of up to five meteorological towers and up to 10 meteorological buoys. Although the construction of meteorological towers and buoys impacts the bottom, the lessee's SAP must be submitted to and approved by BOEM prior to construction. To assist BOEM in complying with the National Historic Preservation Act (NHPA) (see Section 5.3.4 of the EA) and other relevant laws (30 CFR 585.611(a),(b)(6)), the SAP must contain a description of the archaeological resources that could be affected by the activities proposed in the plan. Under its Programmatic Agreement (Appendix G of the EA), BOEM will then consult to ensure potential effects to historic properties are avoided, minimized, or mitigated under Section 106 of the NHPA.<br><br>BOEM anticipates that bottom disturbance associated with the installation of meteorological towers and buoys would disturb the seafloor in a maximum radius of 1,500 ft (450 m) or 162 acres (65 hectares) around each bottom-founded structure. This includes all anchorages and appurtenances of the support vessels. Impacts on archaeological resources within 1,500 ft (450 m) of each meteorological tower and buoy would result from direct destruction or removal of archaeological resources from their primary context. Although this would be extremely unlikely given that site characterization surveys described above would be conducted prior to the installation of any structure (see e.g., 30 CFR 585.610 and 585.611), should contact between the activities associated with the proposed action and a historic or pre-contact site occur, there may be damage or loss to archaeological resources. |

| | | |
|---|---|---|
| | | Should the surveys reveal the possible presence of an archaeological resource in an area that may be affected by its planned activities, the applicant would have the option to demonstrate through additional investigations that an archaeological resource either does not exist or would not be adversely affected by the seafloor/bottom-disturbing activities (see 30 CFR 585.802(b) and the PA in Appendix G of the EA). Although site assessment activities have the potential to affect cultural resources either on or below the seabed or on land, existing regulatory measures, coupled with the information generated for a lessee's initial site characterization activities and presented in the lessee's SAP, make the potential for bottom-disturbing activities (e.g., anchoring, installation of meteorological buoys and/or towers) to damage to cultural resources very low.<br><br>Impacts (including physical, visual, audible, and atmospheric) to shore-based historic resources are not anticipated to occur as a result of the proposed action, either directly or indirectly, from any proposed development activity. All new development (i.e., meteorological towers and buoys) has been reviewed in consultation with the Massachusetts Historical Commission (MHC) and with other consulting parties. BOEM has prepared a PA to guide its Section 106 activities for these undertakings pursuant to 36 CFR 800.14(b) (see Appendix G). Consulting parties invited to be signatories to the PA included the SHPOs of Rhode Island and Massachusetts, the Mashpee Wampanoag Tribe, the Narragansett Indian Tribe, the Wampanoag Tribe of Gay Head (Aquinnah), and the ACHP. The PA provides for Section 106 consultation to continue through both the leasing process and BOEM's decision making process regarding the approval, approval with modification, or disapproval of lessees' SAPs and allows a phased identification and evaluation of historic properties. The PA also establishes a process for determining and documenting the areas of potential effect for each undertaking to further identify historic properties located within these areas. If a historic property is found to be listed in, or is eligible for listing in, the National Register of Historic Places this established process assesses potential adverse effects and helps to avoid, reduce, or resolve any potential adverse effects. Although not all parties invited to participate in the development of the PA chose to sign the agreement, the PA has been executed and is in effect. |

# Appendix A

## Beacon Wind Agency Consultations

2014 BOEM Letter Requesting Concurrence from Rhode Island on MA Wind Energy Area Consistency Determination

# United States Department of the Interior

BUREAU OF OCEAN ENERGY MANAGEMENT
WASHINGTON, DC 20240-0001

Mr. Grover Fugate
Executive Director
Coastal Resources Management Council
Stedman Office Building
4808 Tower Hill Road
Wakefield, Rhode Island 02879-1900

MAY 27 2014

Dear Mr. Fugate:

This document provides the State of Rhode Island with the Bureau of Ocean Energy Management's (BOEM) Consistency Determination (CD) for the Wind Energy Area (WEA) offshore the Commonwealth of Massachusetts, under the Coastal Zone Management Act (CZMA) Section 307 (c)(1) and 15 CFR Part 930 Subpart C. The information in this CD is provided pursuant to 15 CFR 930.36(a) and 930.39. The CD takes into consideration the reasonably foreseeable coastal effects of the proposed action and its consistency with the enforceable policies identified by Rhode Island's Coastal Zone Management Program. The proposed action includes:

- Lease issuance (including reasonably foreseeable consequences associated with shallow hazards, geological, geotechnical, archaeological resources, and biological surveys); and
- SAP approval (including reasonably foreseeable consequences associated with the installation of a meteorological tower(s) and meteorological buoys).

BOEM's analysis of the effects of the proposed action on land and water uses and/or natural resources can be found in the enclosed *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Massachusetts Revised Environmental Assessment* (EA). The Rhode Island Coastal Zone Management Program's applicable enforceable policies and reasonably foreseeable coastal effects are included in Table 3 (enclosed) for your review.

Based upon the above referenced information, data and analysis, BOEM finds the proposed action consistent to the maximum extent practicable with the enforceable policies of the Rhode Island Coastal Zone Management Program.

Pursuant to 15 CFR 930.41, the Rhode Island Coastal Zone Management Program has 60 days from the receipt of this letter in which to concur with or object to this CD, or request an extension under 15 CFR 930.41(b). Rhode Island's concurrence will be presumed if its response is not received by BOEM within 60 days of receipt of this determination. The State's response should be sent to:

Bureau of Ocean Energy Management
Office of Renewable Energy Programs
Environment Branch for Renewable Energy
Attn: Ms. Michelle Morin, Chief
381 Elden Street, HM 1328
Herndon, Virginia 20170-4817

We appreciate having a cooperative working relationship with the State of Rhode Island as we move forward with our review of potential offshore renewable energy activities.

Sincerely,

Maureen A. Bornholdt
Program Manager
Office of Renewable Energy Programs

Enclosures

# Appendix A

## Beacon Wind Agency Consultations

Rhode Island Concurrence Letter for MA Wind Energy Area Consistency Determination

State of Rhode Island and Providence Plantations
**Coastal Resources Management Council**
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 3
Wakefield, RI 02879-1900

(401) 783-3370
Fax (401) 783-3767

August 6, 2014



Ms. Maureen A. Bornholdt
Program Manager
Office of Renewable Energy Programs
United States Department of the Interior
Bureau of Ocean Energy Management
Washington, DC 20240-0001

RE: **CRMC File No. 2014-06-095** - Federal Consistency Determination for Lease issuance and Site Assessment Plan (SAP) approval associated with the Wind Energy Area (WEA) located offshore of the Commonwealth of Massachusetts.

Dear Ms Bornholdt:

In accordance with Title 15 of the Code of Federal Regulations, Part 930, Subpart C (Consistency for Federal Activities) and review your letter dated May 27, 2014 including the attached Federal Consistency Determination (received by this office on June 17, 2014); the Rhode Island Coastal Resources Management Council hereby concurs with the determination that the referenced project is consistent with the federally approved Rhode Island Coastal Resources Management Program and applicable regulations therein.

Please contact this office at (401) 783-3370 should you have any questions.

Sincerely,

Grover J. Fugate, Executive Director
Coastal Resources Management Council

/lat

# Appendix A

## Beacon Wind Agency Consultations

2014 BOEM Letter Requesting Concurrence from Massachusetts
on MA Wind Energy Area Consistency Determination

# United States Department of the Interior

BUREAU OF OCEAN ENERGY MANAGEMENT
WASHINGTON, DC 20240-0001

MAY 27 2014

Mr. Bruce Carlisle
Director
Office of Coastal Zone Management
Executive Office of Environmental Affairs
251 Causeway Street, Suite 800
Boston, Massachusetts 02114

Dear Mr. Carlisle:

This document provides the Commonwealth of Massachusetts with the Bureau of Ocean Energy Management's (BOEM) Consistency Determination (CD) for the Wind Energy Area (WEA) offshore the Commonwealth of Massachusetts under the Coastal Zone Management Act (CZMA) Section 307 (c)(1) and 15 CFR Part 930 Subpart C. The information in this CD is provided pursuant to 15 CFR 930.36(a) and 930.39. The CD takes into consideration the reasonably foreseeable coastal effects of the proposed action and its consistency with the enforceable policies identified by Massachusetts's Coastal Zone Management Program. The proposed action includes:

- Lease issuance (including reasonably foreseeable consequences associated with shallow hazards, geological, geotechnical, archaeological resources, and biological surveys); and
- SAP approval (including reasonably foreseeable consequences associated with the installation of a meteorological tower(s) and meteorological buoys).

BOEM's analysis of the effects of the proposed action on land and water uses and/or natural resources can be found in the enclosed *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Massachusetts Revised Environmental Assessment* (EA). The Commonwealth of Massachusetts's Coastal Zone Management Program's applicable enforceable policies and reasonably foreseeable coastal effects are included in Table 3 (enclosed) for your review.

Based upon the above referenced information, data and analysis, BOEM finds that proposed action is consistent to the maximum extent practicable with the enforceable policies of the Massachusetts Coastal Zone Management Program.

Pursuant to 15 CFR 930.41, the Massachusetts Coastal Zone Management Program has 60 days from the receipt of this letter in which to concur with or object to this CD, or to request an extension under 15 CFR 930.41(b). Massachusetts's concurrence will be presumed if its response is not received by BOEM within 60 days of receipt of this determination. The Commonwealth's response should be sent to:

Bureau of Ocean Energy Management
Office of Renewable Energy Programs
Environment Branch for Renewable Energy
Attn: Ms. Michelle Morin, Chief
381 Elden Street, HM 1328
Herndon, Virginia 20170-4817

We appreciate having a cooperative working relationship with the Commonwealth of Massachusetts as we move forward with our review of potential offshore renewable energy activities.

Sincerely,

Maureen A. Bornholdt
Program Manager
Office of Renewable Energy Programs

Enclosures

# Appendix A

## Beacon Wind Agency Consultations

Massachusetts Concurrence Letter for MA Wind Energy Area Consistency Determination

**THE COMMONWEALTH OF MASSACHUSETTS**
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

July 29, 2013

Maureen Bornholdt
U.S. Department of the Interior
Bureau of Ocean Energy Management
Washington, DC 20240-0001

Re: CZM Federal Consistency Review of the Revised Environmental Assessment For Commercial Wind Lease Issuance and Site Assessment Activities on the Outer Continental Shelf Offshore Massachusetts; Statewide.

Dear Ms. Bornholdt:

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the proposed commercial wind lease issuance and site assessment activities on the outer continental shelf offshore of Massachusetts

Based upon our review of applicable information, we concur with your finding that the proposed activity is not reasonably likely to directly or indirectly affect any of Massachusetts' coastal uses and resources and find that the activity's effects on resources and uses in Massachusetts coastal zone as proposed are consistent with the CZM enforceable program policies.

If the above-referenced project is modified in any manner, including any changes resulting from permit, license or certification revisions, including those ensuing from an appeal, or the project is noted to be having effects on coastal resources or uses that are different than originally proposed, it is incumbent upon the proponent to notify CZM, submit an explanation of the nature of the change pursuant to 15 CFR 930, and submit any modified state permits, licenses, or certifications. CZM will use this information to determine if further federal consistency review is required.

Thank you for your cooperation with CZM.

Sincerely,

Bruce K. Carlisle
Director

BKC/rlb
CZM# 14279

# Appendix A

## Beacon Wind Agency Consultations

Beacon Wind USACE Self-Verification Notification Form

US Army Corps of Engineers®
New England District

# V: Self-Verification Notification Form

(for all tidal and non-tidal projects subject to Corps jurisdiction)

Complete **all** fields (write "none" if applicable) below or use the fillable form at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit. Before work within Corps jurisdiction commences, and unless otherwise specified, email this form, a location map, and project plans drawn to scale and not larger than 11" x 17", to cenae-r@usace.army.mil, (978) 318-8303 (fax), or "Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751". The Corps will acknowledge receipt of this form in writing. Please call (978) 318-8338 with questions.

Permittee: Equinor Wind US LLC
Address, City, State & Zip: 1 Lincoln St Boston, MA 02111
Phone(s) and Email: Scott Lundin, sclu@equinor.com, 617 655 3077

Contractor (write none if same as permittee): Please see appendices for details
Address, City, State & Zip: _____
Phone(s) and Email: _____

Prior Corps File or Permit Numbers(s): None
Project Location (provide detailed description if necessary): Bureau of Ocean Energy Management wind energy Lease OCS-A 0520 and along potential Export Cable Route Areas (ECRAs), see Attachment A.
Address, City, State & Zip: None
Latitude/Longitude Coordinates (if address doesn't exist): See Attachment B and Attachment C.
Waterway Name: Atlantic Ocean

Work will be done under the following activity(s) in Section III, Eligible Activities (check all that apply):

| | | | | | |
|---|---|---|---|---|---|
| 1____ | 5____ | 9____ | 13____ | 17____ | 21____ |
| 2____ | 6____ | 10____ | 14____ | 18__X__ | 22____ |
| 3____ | 7____ | 11____ | 15____ | 19__X__ | 23____ |
| 4____ | 8____ | 12____ | 16____ | 20____ | |

Project Purpose: Equinor will install meteorological devices to collect wind speed data and metocean data within the lease area, see Attachment B. Benthic characterization surveys will be performed to characterize baseline existing conditions as well as to support siting decisions for the meteorological devices that will avoid or minimize potential impacts to sensitive biological communities. Geotechnical surveys will be carried out to collect sediment data to inform the engineering design of turbine foundations and substation foundations.

Work Description: Meteorological Devices: 1 Floating LiDAR buoy, 2 current moorings and 2 met/wave buoys.
Benthic Sampling: collect 10 benthic grabs at proposed buoy locations (Attachment D).
Geotech sampling: Cone Penetration Tests (CPTs) at 35 locations (Attachment E).

(continued on next page)

| | | | | |
|---|---|---|---|---|
| Aggregate total wetland impact area: | temporary | _____ | SF | permanent _____ SF |
| Aggregate total waterway impact area: | temporary | 10.76 | SF | permanent _____ SF |
| Aggregate total area of structures (e.g., floats, pile-supported structures) | temporary | 235.6 | SF | permanent _____ SF |

Does your project include any indirect or secondary impacts? (See General Condition 3.)
Yes_____ No X

If yes, describe here: None

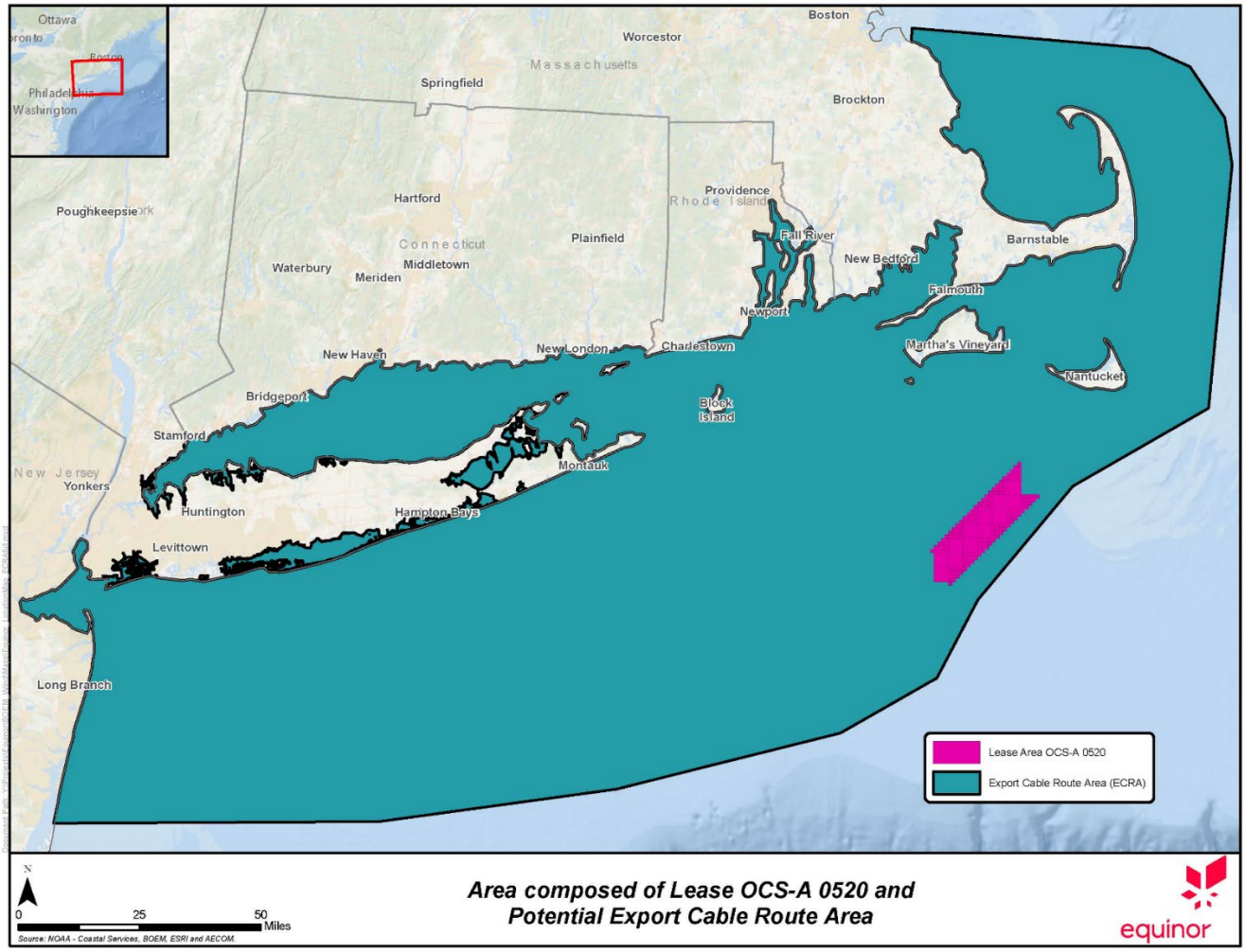
Proposed Work Dates: Start: August 26, 2020 Finish: September 1, 2021

**Your name/signature below, as permittee, confirms that: a) your project meets the self-verification criteria; and b) you accept and agree to comply with the applicable terms and conditions in the General Permits for Massachusetts.**

Permittee Printed Name: B Scott Lundin

Permittee Signature: _____ Date: _____

## Attachment A – Map of Project Area



## Attachment B – Geotechnical Sampling Locations

Equinor's turbines will be spaced 1 nautical mile (nm) apart in fixed east-to-west rows and north-to-south columns to create the 1 nm by 1 nm grid arrangement shown in Figure 1. A small subset of the total 157 locations will be sampled – coordinates are provided in Table 1 below.

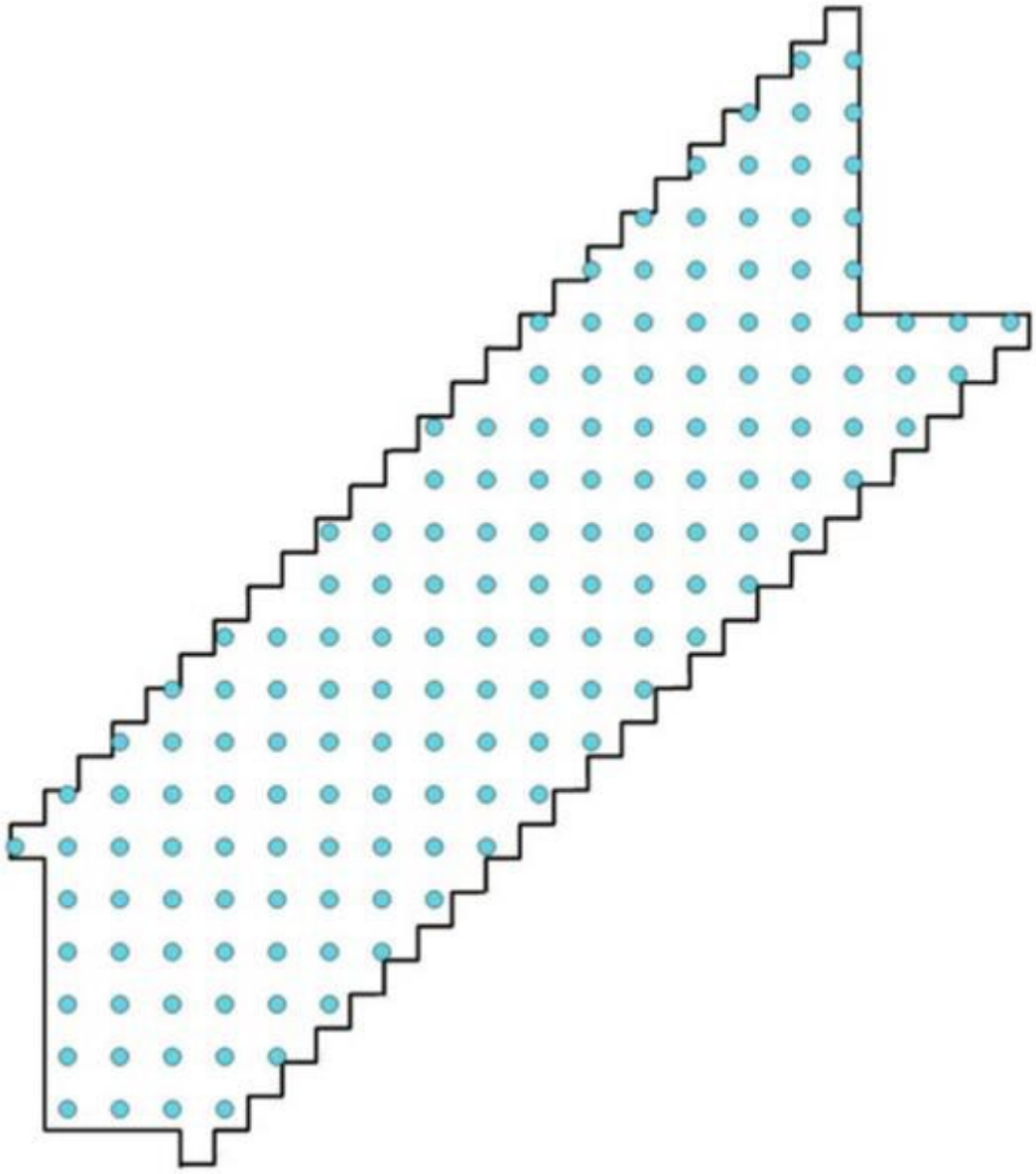


**Figure 1: Proposed sample locations based on 1nm x 1nm grid**

**Table 1: Sample Location Coordinates – Equinor Lease OCS-A 0520**

| OBJECTID | x_4326 | y_4326 | x_6348 | y_6348 |
|---|---|---|---|---|
| 1 | -70.3949 | 41.00441 | 382694 | 4540184 |
| 2 | -70.3729 | 41.00468 | 384546 | 4540184 |
| 3 | -70.4165 | 40.98747 | 380842 | 4538332 |
| 4 | -70.3945 | 40.98774 | 382694 | 4538332 |
| 5 | -70.3725 | 40.988 | 384546 | 4538332 |
| 6 | -70.4382 | 40.97052 | 378990 | 4536480 |
| 7 | -70.4162 | 40.97079 | 380842 | 4536480 |
| 8 | -70.3942 | 40.97106 | 382694 | 4536480 |
| 9 | -70.3722 | 40.97132 | 384546 | 4536480 |
| 10 | -70.4378 | 40.95384 | 378990 | 4534628 |
| 11 | -70.4158 | 40.95411 | 380842 | 4534628 |
| 12 | -70.3938 | 40.95438 | 382694 | 4534628 |
| 13 | -70.3718 | 40.95464 | 384546 | 4534628 |
| 14 | -70.4598 | 40.95356 | 377138 | 4534628 |
| 15 | -70.4375 | 40.93716 | 378990 | 4532776 |
| 16 | -70.4155 | 40.93743 | 380842 | 4532776 |
| 17 | -70.3935 | 40.9377 | 382694 | 4532776 |
| 18 | -70.3715 | 40.93796 | 384546 | 4532776 |
| 19 | -70.4595 | 40.93688 | 377138 | 4532776 |
| 20 | -70.4815 | 40.9366 | 375286 | 4532776 |
| 21 | -70.4371 | 40.92048 | 378990 | 4530924 |
| 22 | -70.4151 | 40.92075 | 380842 | 4530924 |

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| 24 | -70.3711 | 40.92129 | 384546 | 4530924 |
| 25 | -70.3492 | 40.92154 | 386398 | 4530924 |
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| 27 | -70.3052 | 40.92205 | 390102 | 4530924 |
| 28 | -70.4591 | 40.92021 | 377138 | 4530924 |
| 29 | -70.4811 | 40.91993 | 375286 | 4530924 |
| 30 | -70.5031 | 40.91964 | 373434 | 4530924 |
| 31 | -70.4367 | 40.9038 | 378990 | 4529072 |
| 32 | -70.4148 | 40.90408 | 380842 | 4529072 |
| 33 | -70.3928 | 40.90434 | 382694 | 4529072 |
| 34 | -70.3708 | 40.90461 | 384546 | 4529072 |
| 35 | -70.3488 | 40.90487 | 386398 | 4529072 |
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| 41 | -70.4144 | 40.8874 | 380842 | 4527220 |
| 42 | -70.3924 | 40.88766 | 382694 | 4527220 |
| 43 | -70.3705 | 40.88793 | 384546 | 4527220 |
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| 45 | -70.4584 | 40.88685 | 377138 | 4527220 |

| OBJECTID | x_4326 | y_4326 | x_6348 | y_6348 |
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| 47 | -70.5023 | 40.88629 | 373434 | 4527220 |
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| 51 | -70.4141 | 40.87072 | 380842 | 4525368 |
| 52 | -70.3921 | 40.87099 | 382694 | 4525368 |
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| 54 | -70.458 | 40.87017 | 377138 | 4525368 |
| 55 | -70.48 | 40.86989 | 375286 | 4525368 |
| 56 | -70.5019 | 40.86961 | 373434 | 4525368 |
| 57 | -70.5239 | 40.86932 | 371582 | 4525368 |
| 58 | -70.5459 | 40.86903 | 369730 | 4525368 |
| 59 | -70.4357 | 40.85377 | 378990 | 4523516 |
| 60 | -70.4137 | 40.85404 | 380842 | 4523516 |
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| 65 | -70.5235 | 40.85264 | 371582 | 4523516 |
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| 67 | -70.5675 | 40.85205 | 367878 | 4523516 |
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| 72 | -70.4792 | 40.83654 | 375286 | 4521664 |
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| 74 | -70.5231 | 40.83596 | 371582 | 4521664 |
| 75 | -70.5451 | 40.83567 | 369730 | 4521664 |
| 76 | -70.5671 | 40.83538 | 367878 | 4521664 |
| 77 | -70.589 | 40.83507 | 366026 | 4521664 |
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| 79 | -70.4569 | 40.82014 | 377138 | 4519812 |
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| 82 | -70.5228 | 40.81929 | 371582 | 4519812 |
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| 85 | -70.5886 | 40.8184 | 366026 | 4519812 |
| 86 | -70.6106 | 40.81809 | 364174 | 4519812 |
| 87 | -70.6325 | 40.81778 | 362322 | 4519812 |
| 88 | -70.4565 | 40.80346 | 377138 | 4517960 |
| 89 | -70.4785 | 40.80318 | 375286 | 4517960 |
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| 91 | -70.5224 | 40.80261 | 371582 | 4517960 |
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| 96 | -70.6321 | 40.80111 | 362322 | 4517960 |
| 97 | -70.6541 | 40.80079 | 360470 | 4517960 |
| 98 | -70.4781 | 40.7865 | 375286 | 4516108 |
| 99 | -70.5001 | 40.78622 | 373434 | 4516108 |
| 100 | -70.522 | 40.78593 | 371582 | 4516108 |
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| 104 | -70.6098 | 40.78474 | 364174 | 4516108 |
| 105 | -70.6317 | 40.78443 | 362322 | 4516108 |
| 106 | -70.6536 | 40.78412 | 360470 | 4516108 |
| 107 | -70.6756 | 40.7838 | 358618 | 4516108 |
| 108 | -70.4997 | 40.76954 | 373434 | 4514256 |
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| 111 | -70.5655 | 40.76866 | 367878 | 4514256 |
| 112 | -70.5874 | 40.76837 | 366026 | 4514256 |
| 113 | -70.6094 | 40.76806 | 364174 | 4514256 |
| 114 | -70.6313 | 40.76775 | 362322 | 4514256 |
| 115 | -70.6532 | 40.76744 | 360470 | 4514256 |
| 116 | -70.6752 | 40.76712 | 358618 | 4514256 |
| 117 | -70.6971 | 40.7668 | 356766 | 4514256 |

| OBJECTID | x_4326 | y_4326 | x_6348 | y_6348 |
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| 119 | -70.5432 | 40.75228 | 369730 | 4512404 |
| 120 | -70.5651 | 40.75199 | 367878 | 4512404 |
| 121 | -70.587 | 40.75169 | 366026 | 4512404 |
| 122 | -70.609 | 40.75138 | 364174 | 4512404 |
| 123 | -70.6309 | 40.75108 | 362322 | 4512404 |
| 124 | -70.6528 | 40.75076 | 360470 | 4512404 |
| 125 | -70.6748 | 40.75045 | 358618 | 4512404 |
| 126 | -70.6967 | 40.75013 | 356766 | 4512404 |
| 127 | -70.7186 | 40.7498 | 354914 | 4512404 |
| 128 | -70.5428 | 40.7356 | 369730 | 4510552 |
| 129 | -70.5647 | 40.73531 | 367878 | 4510552 |
| 130 | -70.5866 | 40.73501 | 366026 | 4510552 |
| 131 | -70.6086 | 40.73471 | 364174 | 4510552 |
| 132 | -70.6305 | 40.7344 | 362322 | 4510552 |
| 133 | -70.6524 | 40.73409 | 360470 | 4510552 |
| 134 | -70.6743 | 40.73377 | 358618 | 4510552 |
| 135 | -70.6963 | 40.73345 | 356766 | 4510552 |
| 136 | -70.5643 | 40.71863 | 367878 | 4508700 |
| 137 | -70.5862 | 40.71833 | 366026 | 4508700 |
| 138 | -70.6082 | 40.71803 | 364174 | 4508700 |
| 139 | -70.6301 | 40.71772 | 362322 | 4508700 |
| 140 | -70.652 | 40.71741 | 360470 | 4508700 |
| 141 | -70.6739 | 40.71709 | 358618 | 4508700 |

| OBJECTID | x_4326 | y_4326 | x_6348 | y_6348 |
|---|---|---|---|---|
| 142 | -70.6958 | 40.71677 | 356766 | 4508700 |
| 143 | -70.5858 | 40.70165 | 366026 | 4506848 |
| 144 | -70.6078 | 40.70135 | 364174 | 4506848 |
| 145 | -70.6297 | 40.70104 | 362322 | 4506848 |
| 146 | -70.6516 | 40.70073 | 360470 | 4506848 |
| 147 | -70.6735 | 40.70042 | 358618 | 4506848 |
| 148 | -70.6954 | 40.7001 | 356766 | 4506848 |
| 149 | -70.6074 | 40.68467 | 364174 | 4504996 |
| 150 | -70.6293 | 40.68437 | 362322 | 4504996 |
| 151 | -70.6512 | 40.68406 | 360470 | 4504996 |
| 152 | -70.6731 | 40.68374 | 358618 | 4504996 |
| 153 | -70.695 | 40.68342 | 356766 | 4504996 |
| 154 | -70.6289 | 40.66769 | 362322 | 4503144 |
| 155 | -70.6508 | 40.66738 | 360470 | 4503144 |
| 156 | -70.6727 | 40.66706 | 358618 | 4503144 |
| 157 | -70.6946 | 40.66674 | 356766 | 4503144 |

**Attachment C – Meteorological Devices**

Equinor plans to deploy the following equipment as shown in Figure 2.

- Floating Lidar Buoy (1)
  - Total seafloor impact: 67.8 $ft^2$
- Current Moorings (2)
  - Total seafloor impact: 43.0 $ft^2$
- Met/Wave Buoy (2)
  - Total seafloor impact: 124.8 $ft^2$

**Contractor:**

- RPS
  55 Village Square Dr South
  Kingstown, RI 02879
- Daniel Mendelson
  daniel.mendelsohn@rpsgroup.com
  +1 401 789 6224

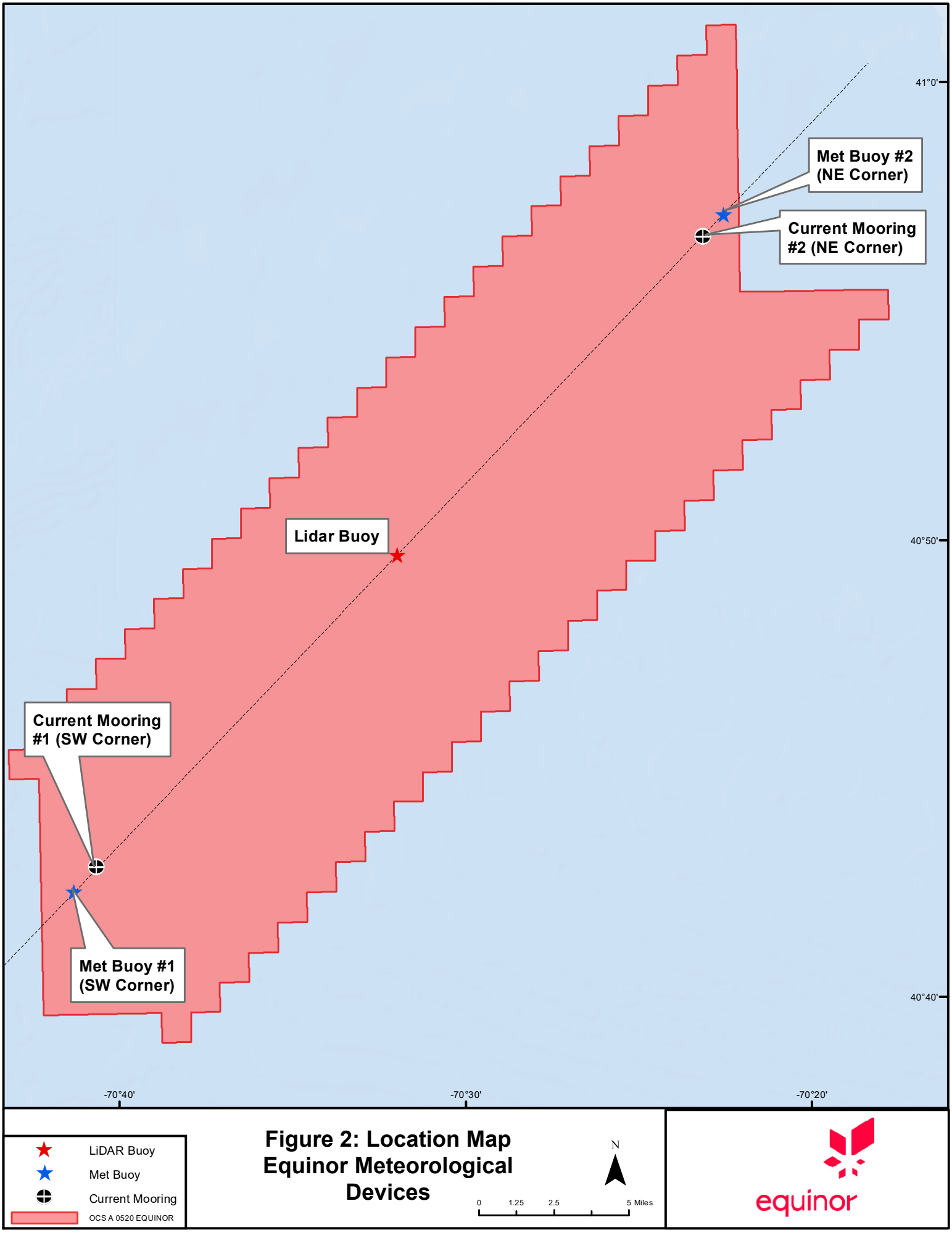


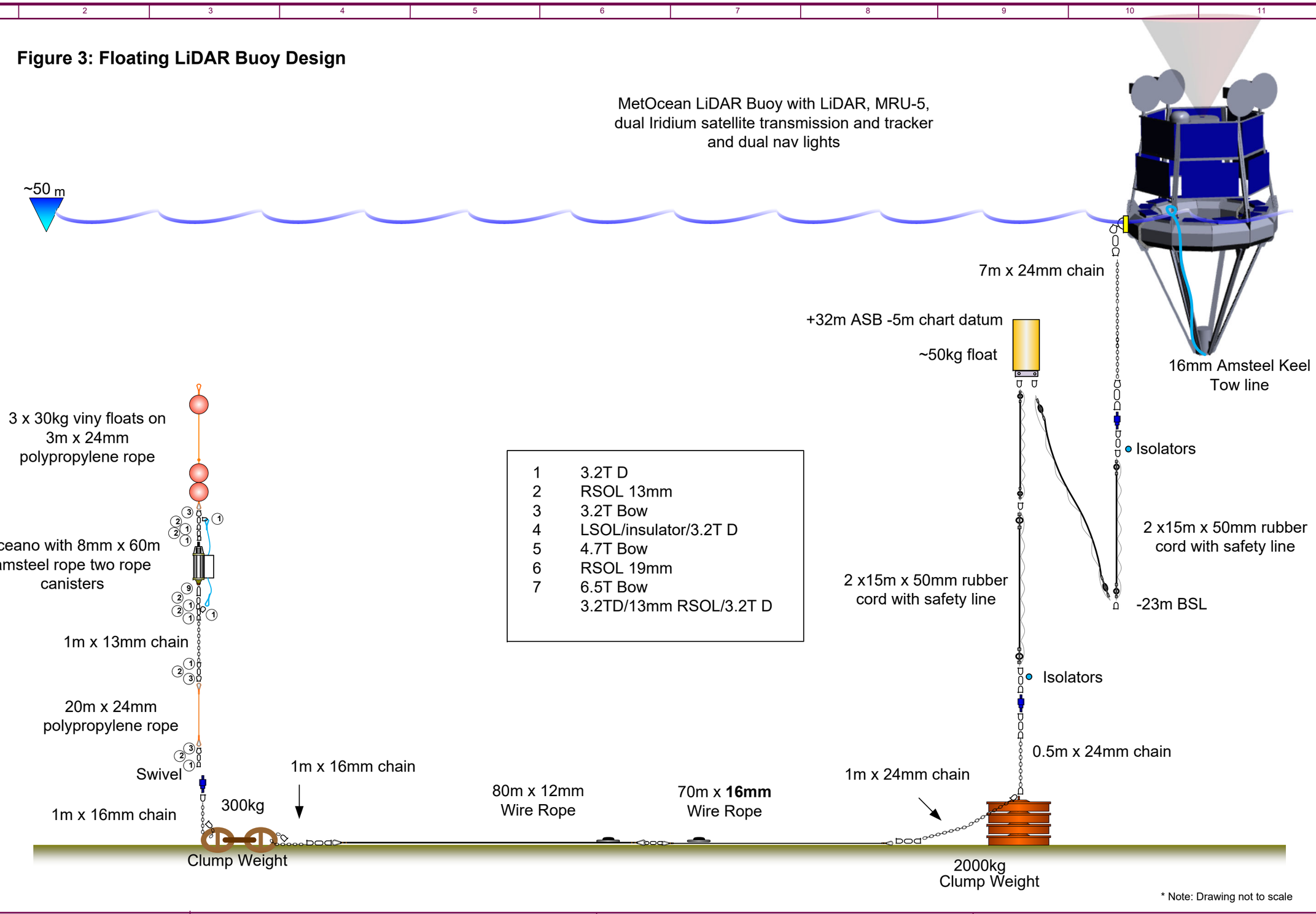

**Figure 2: Location Map Equinor Meteorological Devices**

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

**Floating Lidar Buoy**

The U-shaped mooring design is comprised of chain, polypropylene rope, wire rope, trawl floats, an amsteel rope dispenser with acoustic release and rubber cords that connect the RPS Floating LiDAR Buoy to both a primary and secondary clump anchor on the sea floor as well as three underwater vinyl floats that sit approximately 55.8 ft (17 m) above the seabed as part of the mooring recovery system as shown in Figure 3. The primary and secondary clump weights would weigh approximately 4,409 lbs (2,000 kg) and 660 lbs (300 kg), respectively and sit on the seabed for a total area of up to 21.5 $ft^2$ (2 square meters [$m^2$]) per clump weight. The chain would be attached to the side of the Floating LiDAR hull via the 12T bow shackle. Due to the use of rubber cords in the mooring design, there will be no anchor chain sweep associated with the long-term operation of the RPS Floating LiDAR Buoy. Total area of mooring resting on the seafloor, inclusive of both clump weights, chains and wire ropes, would be approximately 67.8 $ft^2$ (6.3 $m^2$).

## Figure 3: Floating LiDAR Buoy Design



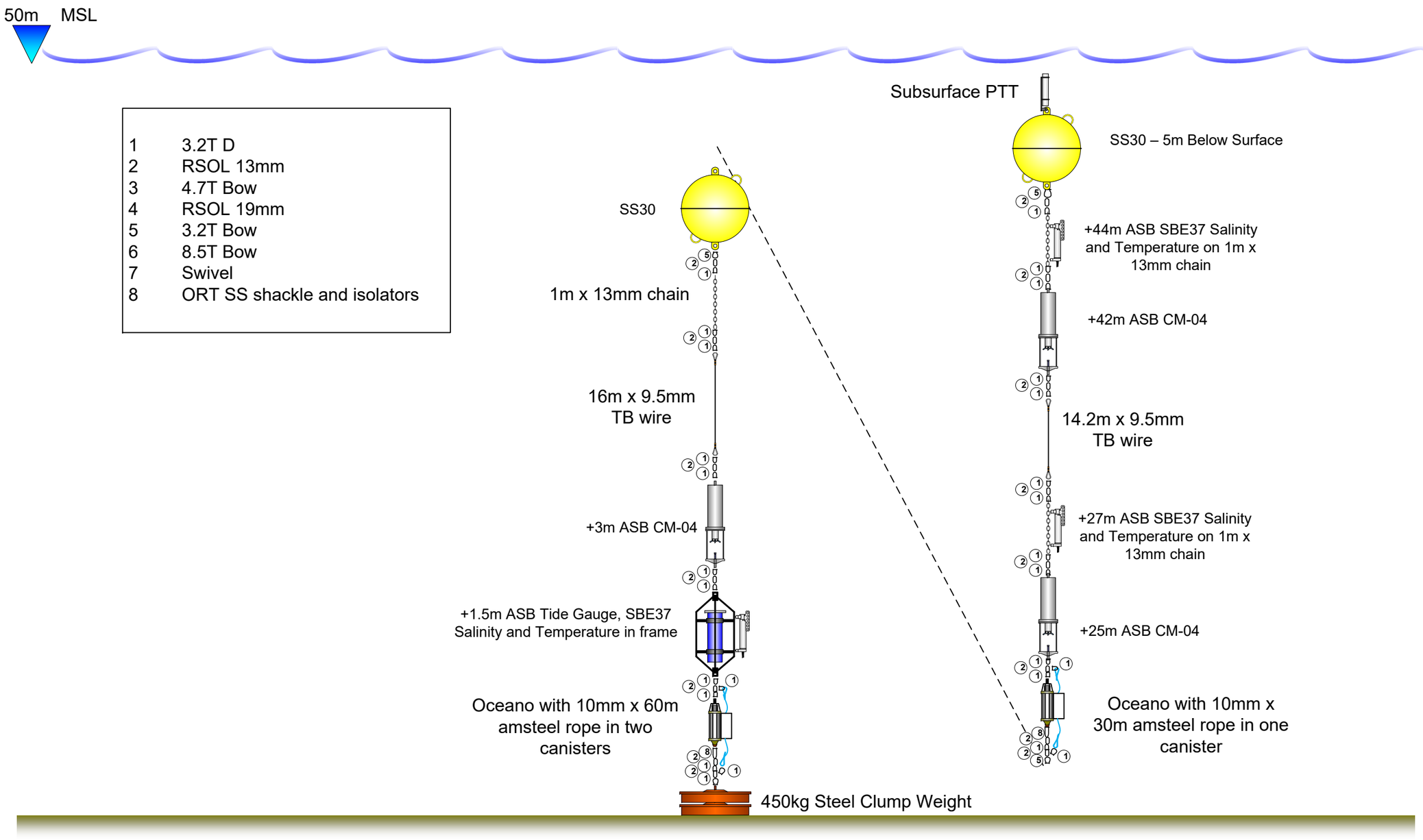

* Note: Drawing not to scale

| | | | |
|---|---|---|---|
| TITLE: Massachusetts Mooring Design | | PROJECT: Massachusetts Lidar buoy (50m) | CLIENT: Equinor |
| JOB No. MMF03330.000 | DRAWING No. MMF03330-000-00 | DATE: 22/07/2019 | |
| DESIGNED: GMB | CHECKED: GEW | | |
| DRAWN: MCW | CLIENT: | | |

**Current Moorings**

The current mooring will consist of a subsurface design as shown in Figure 4. The CM-04 Acoustic Current Meters/Seabird SBE37 CT loggers will be deployed as part of the subsea mooring. The CM-04 Acoustic Current Meters will be incorporated into the subsurface portion of the mooring line at 9.8 ft (3 m), 55.8 ft (17 m), and 88.6 ft (27 m) above the seafloor via chain and 10 mm galvanized wire segments on the top and bottom of the meters that connect to the mooring line. The CT loggers will be attached to the subsurface portion of the mooring line via plastic clamps at 4.9 ft (1.5 m), 62.3 ft (19 m), and 95.1 ft (29 m) above the seafloor. The remainder of the mooring is comprised of chain, wire rope, two amsteel rope dispensers with acoustic release and shackles and load rings that connects the subsurface portion of the mooring to a clump anchor on the sea floor as well as a pendant buoy that will sit approximately 16.4 ft (5 m) below the sea surface. The clump weight is approximately 992 lbs (450 kg) and will rest on the seafloor for an area of approximately 21.5 $ft^2$ (2 $m^2$).

## Figure 4: Current Mooring Design




* Note: Drawing not to scale

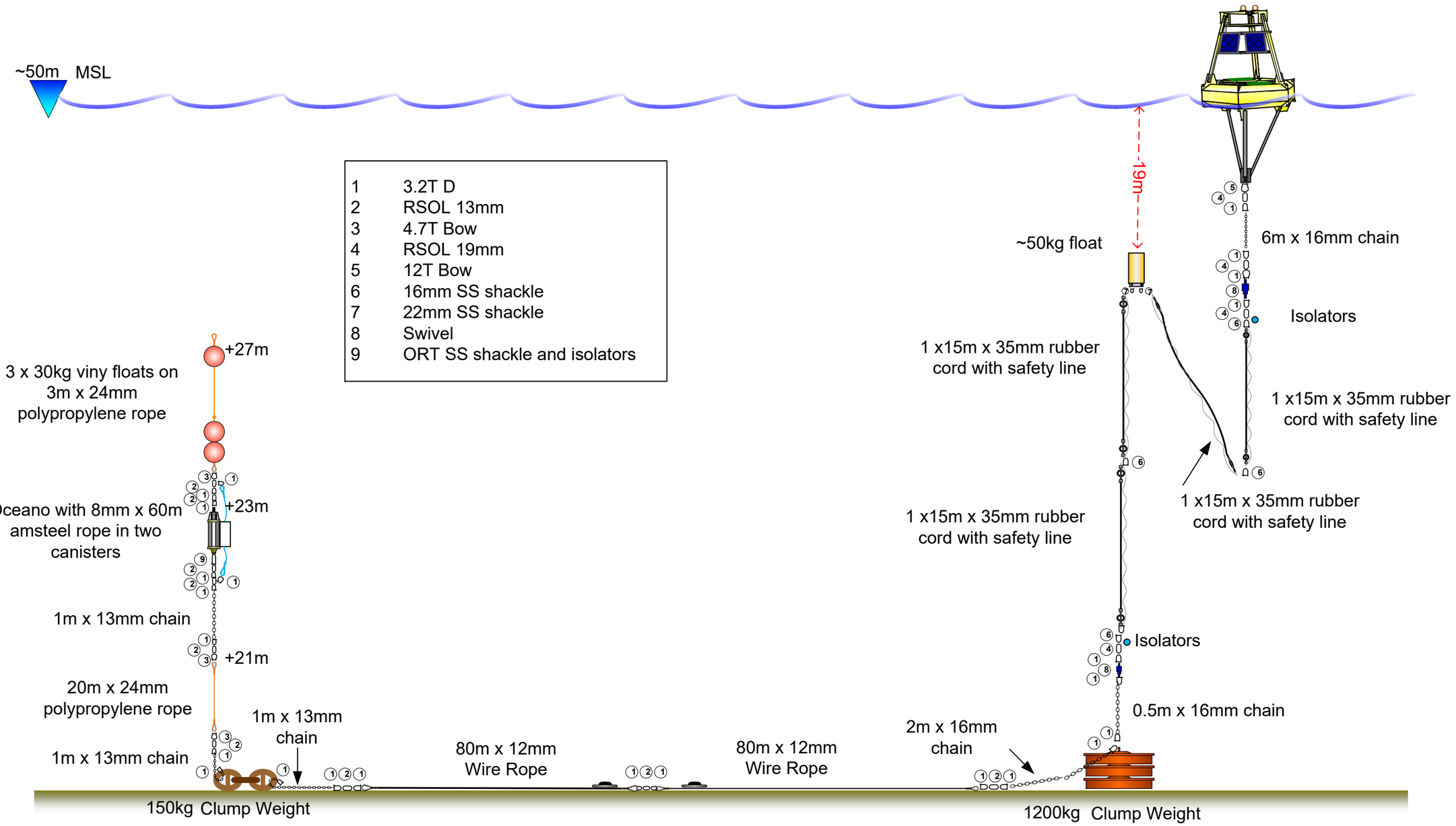
| | | | |
|---|---|---|---|
| TITLE: Massachusetts Current Meter Mooring Design | PROJECT: Current Meters Mooring (50m) | CLIENT: Equinor | |
| JOB No. 22110 | DRAWING No. MA_CM04 | DATE: 21/01/2020 | |
| | | DESIGNED: GMB | CHECKED: GEW |
| | | DRAWN: MCW | CLIENT: |

**Wave and Met Buoys**

The U-shaped mooring design is comprised of a chain, polypropylene rope, wire rope trawl floats and amsteel rope dispenser with acoustic release and rubber cord that connects the RPS Wave and Met Buoy to both a primary and secondary clump anchor on the sea floor as well as 3 underwater vinyl floats that sit approximately 55.8 ft (17 m) above the seabed as shown in Figure 5. The primary and secondary clump weights weigh approximately 2646 lbs (1,200 kg) and 661 lbs (300 kg), respectively, and will rest on the seafloor for an area of approximately 21.5 $ft^2$ (2 $m^2$) per clump weight. Total area of mooring resting on the seafloor, inclusive of both clump weights, chains and wire ropes, would be approximately 62.4 $ft^2$ (5.8 $m^2$).

## Figure 5: MetWave Buoy Design

MetWave Buoy with dual M200 and Iridum comms




| | |
|---|---|
| 1 | 3.2T D |
| 2 | RSOL 13mm |
| 3 | 4.7T Bow |
| 4 | RSOL 19mm |
| 5 | 12T Bow |
| 6 | 16mm SS shackle |
| 7 | 22mm SS shackle |
| 8 | Swivel |
| 9 | ORT SS shackle and isolators |

* Note: Drawing not to scale

| | | | |
|---|---|---|---|
| TITLE | Massachusetts Mooring Design | PROJECT | Wave and Metbuoy (50m) |
| CLIENT | Equinor | | |
| JOB No. 22110 | DRAWING No. Mass_MB10 | DATE: 21/01/2020 | |
| DESIGNED GMB | CHECKED GEW | DRAWN MCW | CLIENT |

**Attachment D – Benthic Sampling**

Equinor will collect benthic samples at the 5 meteorological device locations shown in Figure 2 (Attachment C). Each device location shall be investigated with one benthic sample and one replicate for a total of 10 benthic samples. The benthic sample locations will undergo archaeological clearance by a Qualified Marine Archaeologist in advance of initiating activities.

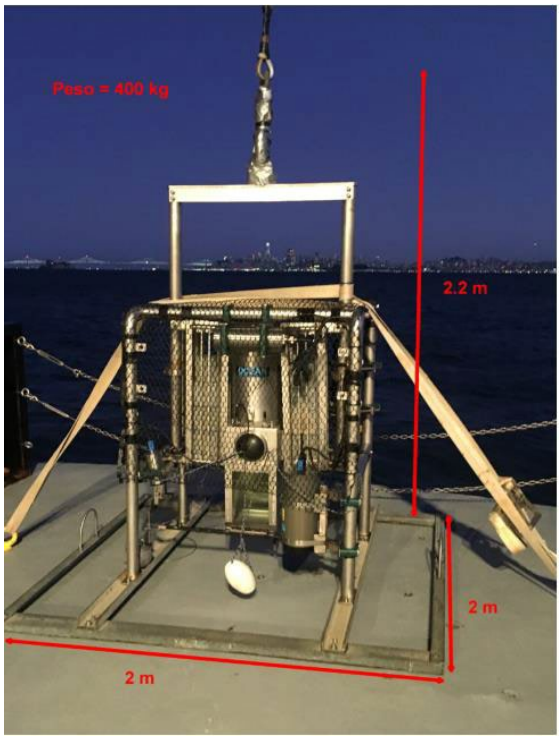
**Contractor:**

- MMT US Inc.
  160 Federal Street 9th floor
  Boston MA 02110
- Thomas Mennerdahl
  thomas.mennerdahl@mmt.se
  +46 70 750 54 10

**Benthic Grabs**

- 1 grab per Benthic Sample
- 1.076 $ft^2$ per grab
- Impact area for 10 grabs = 10.76 $ft^2$

**Sample Benthic Equipment**



**Attachment E – Geotechnical Sampling**

The scope of work involves up to 35 boreholes with continuous Cone Penetration Tests (CPT) or with a combination of sampling and downhole CPT testing, to a target depth of 40 - 70 meters below the seafloor. Preliminary Seabed CPTs might be performed at the same borehole locations (up to 35 locations) as a preliminary reconnaissance investigation (anticipated maximum of 25 m depth or until refusal). Testing locations will be limited to the 1nm x 1nm turbine locations shown in Attachment B. The CPT target locations will undergo archaeological clearance by a Qualified Marine Archaeologist in advance of initiating activities.

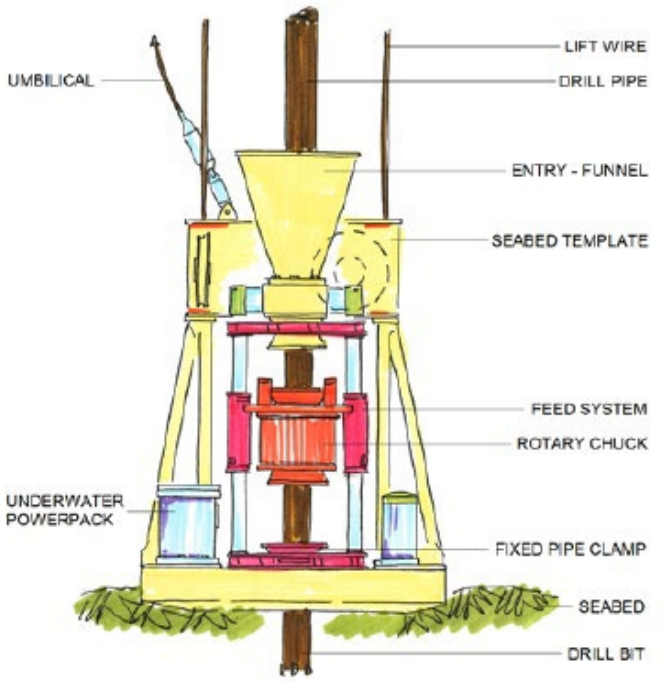
**Contractor:**

- Geoquip Marine
  Floor 6, Vintry Building
  Wine Street
  Bristol BS1 2BD
  United Kingdom

**Seafloor Impacts**

- **Total sample locations: ~35**
- **0.0162 $ft^2$ per CPT**
- **Impact area for 35 sample locations = 0.567 $ft^2$**

**Sample Equipment**



# Appendix A

## Beacon Wind Agency Consultations

USACE Notification of Receipt of Self-Verification Notification Form

**From:** Scott Lundin
**To:** Neubert, Pamela; Banks, Jen; Henderson, Nathan
**Cc:** Julia Lewis; Aaron Baltich-Schecter
**Subject:** [EXTERNAL] FW: NAE-2020-02225 SV.pdf
**Date:** Wednesday, September 2, 2020 1:41:18 PM
**Attachments:** NAE-2020-02225 SV.pdf

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FYI-

Scott Lundin
Head of Permitting - New England
Equinor Wind US
617 655 3077

-----Original Message-----
From: Chaisson, Bettina M CIV CENAE CENAD (USA) <Bettina.M.Chaisson@usace.army.mil>
Sent: Thursday, August 27, 2020 10:42 AM
To: Scott Lundin <SCLU@equinor.com>
Subject: NAE-2020-02225 SV.pdf

We received your Self-Verification Notification Form (SVNF) for the General Permits for Massachusetts (GPs for MA) indicating that you plan to conduct work in our jurisdiction. We have logged this into our database and assigned it file number NAE-2020-02225. Please reference this number in any future correspondence with us.

This confirmation that we have received the SVNF does not confirm that the work is authorized under the GPs for MA. By submitting the SVNF, you are self-verifying that your project is authorized under, and meets the terms and conditions of, the applicable GPs with no review by the Corps of Engineers. Activities that do not qualify for SV require a PCN to the Corps.

Please contact me with any questions,

Bettina Chaisson
Permits & Enforcement Branch
978-318-8058

# Appendix F

## Beacon Wind Air Emissions Calculations

BEACON WIND OFFSHORE WIND FARM
Air Emission Calculations
Marine Vessel Emissions - Floating Lidar Buoy Deployment (Rana Miller)

| Vessels/Equipment | No. of Engines per vessel | Dimensions (ft) length x breadth x draft | Emission Factor Used (see EFs worksheet) | Activity | Engine Rating (hp) | Fuel Type | Trips | Hrs/trip | Operating Days | Operating Hours (hrs/day) | Total Vessel Operating Hours (hrs) | Average load (%) | Fuel Usage Gallons | Total Emissions: VOC tons | $NO_x$ tons | CO tons | $PM_{10}$ tons | $PM_{2.5}$ tons | $SO_2$ tons | HAPs tons | $CO_2$ tons | $CH_4$ tons | $N_2O$ tons | $CO_2e$ tons |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work boat (Rana Miller or similar) | | 150' x 36' x 10' | | Deploying Floating Lidar 1 | | | | | | | | | | | | | | | | | | | | |
| - main engines | 2 | | 2 | | 850 | Diesel | 1 | 14 | 1 | 12 | 26 | 43% | 958.2 | 4.22E-03 | 0.15 | 0.08 | 4.03E-03 | 3.91E-03 | 2.03E-05 | 8.68E-04 | 10.78 | 1.41E-03 | 3.13E-04 | 10.91 |
| - aux. generator | 1 | | 2 | | 99 | Diesel | 1 | 14 | 1 | 12 | 26 | 43% | 55.8 | 2.46E-04 | 8.92E-03 | 4.55E-03 | 2.35E-04 | 2.28E-04 | 1.18E-06 | 5.05E-05 | 0.63 | 8.19E-05 | 1.82E-05 | 0.64 |
| bow thruster | 1 | | 2 | | 300 | Diesel | 0 | 0 | 1 | 12 | 12 | 43% | 78 | 3.44E-04 | 1.25E-02 | 6.36E-03 | 3.28E-04 | 3.19E-04 | 1.65E-06 | 7.07E-05 | 0.88 | 1.15E-04 | 2.55E-05 | 0.89 |
| - aux. engine | 1 | | 2 | | 99 | Diesel | 0 | 0 | 1 | 12 | 12 | 100% | 59.9 | 2.64E-04 | 9.57E-03 | 4.88E-03 | 2.52E-04 | 2.44E-04 | 1.27E-06 | 5.43E-05 | 0.67 | 8.79E-05 | 1.95E-05 | 0.68 |
| Work boat (Rana Miller or similar) | | 150' x 36' x 10' | | Deploy met buoy + subsea mooring | | | | | | | | | | | | | | | | | | | | |
| - main engines | 2 | | 2 | | 850 | Diesel | 1 | 14 | 1 | 12 | 26 | 43% | 958.2 | 4.22E-03 | 0.15 | 0.08 | 4.03E-03 | 3.91E-03 | 2.03E-05 | 8.68E-04 | 10.78 | 1.41E-03 | 3.13E-04 | 10.91 |
| - aux. generator | 1 | | 2 | | 99 | Diesel | 1 | 14 | 1 | 12 | 26 | 43% | 55.8 | 2.46E-04 | 8.92E-03 | 4.55E-03 | 2.35E-04 | 2.28E-04 | 1.18E-06 | 5.05E-05 | 0.63 | 8.19E-05 | 1.82E-05 | 0.64 |
| bow thruster | 1 | | 2 | | 300 | Diesel | 0 | 0 | 1 | 12 | 12 | 43% | 78 | 3.44E-04 | 1.25E-02 | 6.36E-03 | 3.28E-04 | 3.19E-04 | 1.65E-06 | 7.07E-05 | 0.88 | 1.15E-04 | 2.55E-05 | 0.89 |
| - aux. engine | 1 | | 2 | | 99 | Diesel | 0 | 0 | 1 | 12 | 12 | 100% | 59.9 | 2.64E-04 | 9.57E-03 | 4.88E-03 | 2.52E-04 | 2.44E-04 | 1.27E-06 | 5.43E-05 | 0.67 | 8.79E-05 | 1.95E-05 | 0.68 |
| Work boat (Rana Miller or similar) | | 150' x 36' x 10' | | 6-month maintenance (x3) | | | | | | | | | | | | | | | | | | | | |
| - main engines | 2 | | 2 | Floating Lidar 1 (Yrs. 1-2) | 850 | Diesel | 9 | 10 | 9 | 12 | 198 | 43% | 7297 | 3.21E-02 | 1.17 | 0.6 | 3.07E-02 | 2.98E-02 | 1.55E-04 | 6.61E-03 | 82.12 | 1.07E-02 | 2.38E-03 | 83.1 |
| - aux. generator | 1 | | 2 | met buoy (Yrs. 1-2) | 99 | Diesel | 9 | 10 | 9 | 12 | 198 | 43% | 424.9 | 1.87E-03 | 6.79E-02 | 3.47E-02 | 1.79E-03 | 1.73E-03 | 9.01E-06 | 3.85E-04 | 4.78 | 6.24E-04 | 1.39E-04 | 4.84 |
| bow thruster | 1 | | 2 | subsea mooring (Yrs. 1-2) | 300 | Diesel | 0 | 0 | 9 | 12 | 108 | 43% | 702.4 | 3.09E-03 | 1.12E-01 | 5.73E-02 | 2.96E-03 | 2.87E-03 | 1.49E-05 | 6.36E-04 | 7.9 | 1.03E-03 | 2.29E-04 | 8 |
| - aux. engine | 1 | | 2 | | 99 | Diesel | 0 | 0 | 9 | 12 | 108 | 100% | 539 | 2.37E-03 | 8.62E-02 | 4.40E-02 | 2.27E-03 | 2.20E-03 | 1.14E-05 | 4.88E-04 | 6.07 | 7.91E-04 | 1.76E-04 | 6.14 |
| Work boat (Rana Miller or similar) | | 150' x 36' x 10' | | Unscheduled buoy check | | | | | | | | | | | | | | | | | | | | |
| - main engines | 2 | | 2 | (assume up to 1 trip/yr in event | 850 | Diesel | 1 | 10 | 1 | 12 | 22 | 43% | 810.8 | 3.57E-03 | 0.13 | 0.07 | 3.41E-03 | 3.31E-03 | 1.72E-05 | 7.34E-04 | 9.12 | 1.19E-03 | 2.64E-04 | 9.23 |
| - aux. generator | 1 | | 2 | of damage or malfunction) | 99 | Diesel | 1 | 10 | 1 | 12 | 22 | 43% | 47.2 | 2.08E-04 | 7.55E-03 | 3.85E-03 | 1.99E-04 | 1.93E-04 | 1.00E-06 | 4.28E-05 | 0.53 | 6.93E-05 | 1.54E-05 | 0.54 |
| bow thruster | 1 | | 2 | | 300 | Diesel | 0 | 0 | 1 | 12 | 12 | 43% | 78 | 3.44E-04 | 1.25E-02 | 6.36E-03 | 3.28E-04 | 3.19E-04 | 1.65E-06 | 7.07E-05 | 0.88 | 1.15E-04 | 2.55E-05 | 0.89 |
| - aux. engine | 1 | | 2 | | 99 | Diesel | 0 | 0 | 1 | 12 | 12 | 100% | 59.9 | 2.64E-04 | 9.57E-03 | 4.88E-03 | 2.52E-04 | 2.44E-04 | 1.27E-06 | 5.43E-05 | 0.67 | 8.79E-05 | 1.95E-05 | 0.68 |
| Work boat (Rana Miller or similar) | | 150' x 36' x 10' | | Decommissioning Floating Lidar 1 | | | | | | | | | | | | | | | | | | | | |
| - main engines | 2 | | 2 | (end of Yr. 2) | 850 | Diesel | 1 | 14 | 1 | 12 | 26 | 43% | 958.2 | 4.22E-03 | 0.15 | 0.08 | 4.03E-03 | 3.91E-03 | 2.03E-05 | 8.68E-04 | 10.78 | 1.41E-03 | 3.13E-04 | 10.91 |
| - aux. generator | 1 | | 2 | | 99 | Diesel | 1 | 14 | 1 | 12 | 26 | 43% | 55.8 | 2.46E-04 | 8.92E-03 | 4.55E-03 | 2.35E-04 | 2.28E-04 | 1.18E-06 | 5.05E-05 | 0.63 | 8.19E-05 | 1.82E-05 | 0.64 |
| bow thruster | 1 | | 2 | | 300 | Diesel | 0 | 0 | 1 | 12 | 12 | 43% | 78 | 3.44E-04 | 1.25E-02 | 6.36E-03 | 3.28E-04 | 3.19E-04 | 1.65E-06 | 7.07E-05 | 0.88 | 1.15E-04 | 2.55E-05 | 0.89 |
| - aux. engine | 1 | | 2 | | 99 | Diesel | 0 | 0 | 1 | 12 | 12 | 100% | 59.9 | 1.97E-04 | 7.14E-03 | 3.64E-03 | 1.88E-04 | 1.82E-04 | 4.07E-06 | 1.63E-05 | 2.16 | 2.81E-04 | 6.26E-05 | 2.18 |
| Work boat (Rana Miller or similar) | | 150' x 36' x 10' | | Decomm. met buoy + subsea mooring | | | | | | | | | | | | | | | | | | | | |
| - main engines | 2 | | 2 | (end of Yr. 2) | 850 | Diesel | 1 | 14 | 1 | 12 | 26 | 43% | 958.2 | 4.22E-03 | 0.15 | 0.08 | 4.03E-03 | 3.91E-03 | 2.03E-05 | 8.68E-04 | 10.78 | 1.41E-03 | 3.13E-04 | 10.91 |
| - aux. generator | 1 | | 2 | | 99 | Diesel | 1 | 14 | 1 | 12 | 26 | 43% | 55.8 | 2.46E-04 | 8.92E-03 | 4.55E-03 | 2.35E-04 | 2.28E-04 | 1.18E-06 | 5.05E-05 | 0.63 | 8.19E-05 | 1.82E-05 | 0.64 |
| bow thruster | 1 | | 2 | | 300 | Diesel | 0 | 0 | 1 | 12 | 12 | 43% | 78 | 3.44E-04 | 1.25E-02 | 6.36E-03 | 3.28E-04 | 3.19E-04 | 1.65E-06 | 7.07E-05 | 0.88 | 1.15E-04 | 2.55E-05 | 0.89 |
| - aux. engine | 1 | | 2 | | 99 | Diesel | 0 | 0 | 1 | 12 | 12 | 100% | 59.9 | 2.64E-04 | 9.57E-03 | 4.88E-03 | 2.52E-04 | 2.44E-04 | 1.27E-06 | 5.43E-05 | 0.67 | 8.79E-05 | 1.95E-05 | 0.68 |
| | | | | | | | | | | | | | 14566.8 | 0.06 | 2.32 | 1.20 | 0.06 | 0.06 | 3.12E-04 | 1.32E-02 | 165.40 | 2.16E-02 | 4.80E-03 | 167.40 |

Notes:

1. Two separate round trips will be required for equipment deployment: one for Floating Lidar 1 and one for both the met buoy and subsea mooring.

2. Two separate round trips will be required for equipment decommissioning: one for Floating Lidar 1 and one for both the met buoy and subsea mooring.

3. Three separate round trips will be required for each 6-month maintenance period: one for Floating Lidar 1; one for the met buoy; and one for the subsea mooring.

4. 6-month maintenance activities will be performed at 6 months, 12months, and 18 months after the initial deployment of equipment.

5. It is also assumed that up to one unscheduled round trip per year may be needed to visit a buoy site if there is evidence of damage (such as partial or total loss of data transmissions), or if transmitted GPS data indicated that a buoy had drifted significantly outside the "watch circle," which allows for buoy movement inside a roughly 100-meter radius from the recorded deploymentcoordinates.

Examples of events that could cause such damage or buoy displacement include, but are not limited to, hurricane-strength tropical or "nor'easter" storms, heavy snow accumulation, or heavy icing in the event of extremely low temperatures. Trip time is based on travel to the farthest away buoy location (Floating Lidar 1).

6. Trip time constitutes the round trip transit time to and from the project site. The number of hours per trip were estimated based on an assumed transit speed of 4 knots when towing a buoy, and 8 knots when not towing a buoy.Round trip distances are estimated to be: 82 nm to the deployment location for Floating Lidar 1, the met buoy, and the subsea mooring.

7. Operating hours/day is the estimated time each vessel is at the deployment site performing its associated activities.

8. The auxiliary engine on the work boat powers the winch, crane, and A-frame, and will only operate in the immediate vicinity of each deployment site.

9. Emission calculations based on vessels traveling from launch site in New Bedford.

10. The engines utilized on each of the vessels are assumed to be Category 1 engines based on engine horsepower rating (<1,000 kW) and cylinder displacement (1-5 liters per cylinder).

11. Emission factors for marine vessel engines are from Table 3-8 in the ICF International report to the US EPA "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories", April 2009. (See emission factors summary page) Assumed all engines to be used are certified to meet EPA Tier 1 engine standards; therefore, the Tier 1 emission factors in Table 3-8 from the ICF International report was used to provide conservative estimate.

12. HAP emission factors for commercial marine vessels were determined using the methodology identified by US EPA for the 2011 National Emissions Inventory (NEI); i.e., they are calculated as percentages of the PM10, PM2.5, or VOC emissions from the CMVs. The HAP emisson for nonroad engines were based on EPA's AP-42 Volume 1, Chapters 3.3 and 3.4 for small and large diesel engines.(see HAP emission factor summary pages)

13. Average load factors were estimated based on load factors presented in Table 3-4 of the ICF International report.

BEACON WIND OFFSHORE WIND FARM

Emission Factor Summary

Commercial Marine Vessels (CMVs)

| | | Commercial Marine Vessel Emission Factors (g/hp-hr) /a | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Engine Type | VOC | $NO_x$ | CO | PM/ $PM_{10}$ /b, /c | $PM_{2.5}$ /b | $SO_2$ /c | $CO_2$ | $CH_4$ | $N_2O$ | Fuel Cons. (gal/hp-hr) /d |
| 1 | Category 2 engines | 0.37 | 7.3 | 3.73 | 0.46 | 0.45 | 0.001 | 515 | 0.067 | 0.015 | 0.05 |
| 2 | Category 1 engines ≤ 1000 kW | 0.2 | 7.3 | 3.73 | 0.19 | 0.19 | 0.001 | 515 | 0.067 | 0.015 | 0.05 |
| 3 | Category 3 engines (MSD using MDO) (>30L/cyl.) | 0.37 | 9.8 | 0.82 | 0.14 | 0.13 | 0.296 | 482 | 0.003 | 0.023 | 0.046 |
| 4 | All Categories aux. engines (MSD using MDO) | 0.3 | 10.4 | 0.82 | 0.14 | 0.13 | 0.316 | 515 | 0.003 | 0.023 | 0.049 |

/a Emission factors for Category 1 and 2 engines are from Table 3-8 from ICF International report to the US EPA "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories", April 2009 (converted from g/kW-hr to g/hp-hr by multiplying by 0.746 kW/hp). Assumed all Category 1 and 2 engines to be used are certified to meet EPA Tier 1 and 2 marine engine standards respectively (providing conservative estimate for Category 1 engines); therefore the Tier 1 and 2 emission factors in Table 3-8 from the ICF International report was used. Note, the CO emission factor for Category 1 Tier 2 engines is higher than what is provided for Tier 1 engines, thus the Tier 2 emission factor for CO was used to provide a conservative estimate.

/b All PM is assumed to less than 10 µm in diameter; therefore, PM emission factor is equivalent to $PM_{10}$ emission factor. $PM_{2.5}$ is estimated to be 97 % of $PM_{10}$ per EPA guidance in "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition," EPA420-R-10-018/NR-009d, July 2010.

/c Emission factors for Category 1 and 2 engines for $SO_2$ and $PM_{10}$ presented in Table 3-8 of the ICF report (ICF International 2009) are based on a fuel sulfur content of 1.5 percent. These factors were adjusted for the 15 ppmw sulfur content in ultra-low sulfur diesel fuel, by multiplying the emission factors by 0.001 and 0.86 for $SO_2$ and $PM_{10}$, respectively, following the approach used in Section 3.4.2 of the ICF Report.

/d Fuel consuption rate for Category 1 and 2 marine engines was estimated based on $CO_2$ emission factor (g/hp-hr) and the emission factor for the mass of $CO_2$ generated per gallon of fuel (10.21 kg $CO_2$/gal fuel) as presented in the Table 13.1 of the "2014 Climate Registry Default Emission Factors." Fuel consumption for Category 3 marine engines was based on the BSFC (g/kW-hr) in the ICF International report.

# BEACON WIND OFFSHORE WIND FARM

## EPA NEI HAP emission factors for Commercial Marine Vessels

HAP emission factors for commercial marine vessels were determined using the methodology identified by US EPA for the 2011 National Emissions Inventory (NEI); i.e., they are calculated as percentages of the PM10, PM2.5, or VOC emissions from the CMVs.

| CMV fuel type | | | Diesel (distillate) | | Residual | | | |
|---|---|---|---|---|---|---|---|---|
| Operating description | | | In Port | Underway | In Port | | Underway | |
| SCC code | | | 2280002100 | 2280002200 | 2280003100 | | 2280003200 | |
| Type | | | Maneuvering | Cruising | Manuevering | Hotelling | Cruising | Reduced Speed Zone |
| Type Code | | | M | C | M | H | C | Z |
| Pollutant | HAP?* | Fraction of | | | | | | |
| Ammonia | No | PM10 | 0.01 | 0.02 | 0.00238 | 0.0108 | 0.00477 | 0.00477 |
| Arsenic | Yes | PM10 | 0.0000175 | 0.00003 | 8.74E-05 | 0.0004 | 0.000174825 | 0.000174825 |
| Benzo[a]Pyrene | Yes | PM10 | 0.0000025 | 0.000005 | 4.37E-07 | 0.000002 | 8.74E-07 | 8.74E-07 |
| Benzo[b]Fluoranthene | Yes | PM10 | 0.000005 | 0.00001 | 8.74E-07 | 0.000004 | 1.75E-06 | 1.75E-06 |
| Benzo[k]Fluoranthene | Yes | PM10 | 0.0000025 | 0.000005 | 4.37E-07 | 0.000002 | 8.74E-07 | 8.74E-07 |
| Beryllium | Yes | PM10 | | | 0.000000546 | 0.000000546 | 0.000000546 | 0.000000546 |
| Cadmium | Yes | PM10 | 0.00000283 | 0.00000515 | 0.0000226 | 0.0000059 | 0.0000226 | 0.0000226 |
| Chromium (VI) | Yes | PM10 | 0.0000085 | 0.000017 | 0.00006528 | 0.000204 | 0.00006528 | 0.00006528 |
| Chromium III | Yes | PM10 | 0.0000165 | 0.000033 | 0.00012672 | 0.000396 | 0.00012672 | 0.00012672 |
| Cobalt | Yes | PM10 | | | 5.94E-05 | 0.000292 | 0.000153846 | 0.000153846 |
| Hexachlorobenzene | Yes | PM10 | 0.00000002 | 0.00000004 | 3.50E-09 | 0.000000016 | 6.99E-09 | 6.99E-09 |
| Indeno[1,2,3-c,d]Pyrene | Yes | PM10 | 0.000005 | 0.00001 | 8.74E-07 | 0.000004 | 1.75E-06 | 1.75E-06 |
| Lead | Yes | PM10 | 0.000075 | 0.00015 | 1.40E-05 | 0.00006 | 0.0000262 | 0.0000262 |
| Manganese | Yes | PM10 | 0.00000153 | 0.000001275 | 0.0000573 | 0.0000573 | 0.0000573 | 0.0000573 |
| Mercury | Yes | PM10 | 0.000000025 | 0.00000005 | 2.71E-07 | 0.0000014 | 5.24E-07 | 5.24E-07 |
| Nickel | Yes | PM10 | 0.0005 | 0.001 | 0.003250219 | 0.0154 | 0.00589 | 0.00589 |
| Phosphorus | Yes** | PM10 | | | 0.001787587 | 0.00438 | 0.005734266 | 0.005734266 |
| Polychlorinated Biphenyls | Yes | PM10 | 0.00000025 | 0.0000005 | 4.37E-08 | 0.0000002 | 8.74E-08 | 8.74E-08 |
| Selenium | Yes | PM10 | 2.83E-08 | 5.15E-08 | 1.91E-06 | 0.00000908 | 0.00000348 | 0.00000348 |
| Total HAP (ratioed to PM10) | | | 0.0006 | 0.0013 | 0.0055 | 0.0212 | 0.0123 | 0.0123 |
| Acenaphthene | Yes | PM2.5 | 0.000018 | 0.000015 | 0.00000034 | 0.00000034 | 0.00000034 | 0.00000034 |
| Acenaphthylene | Yes | PM2.5 | 0.00002775 | 0.000023125 | 0.000000525 | 0.000000525 | 0.000000525 | 0.000000525 |
| Anthracene | Yes | PM2.5 | 0.00002775 | 0.000023125 | 0.000000525 | 0.000000525 | 0.000000525 | 0.000000525 |
| Benz[a]Anthracene | Yes | PM2.5 | 0.00003 | 0.000025 | 0.000000567 | 0.000000567 | 0.000000567 | 0.000000567 |
| Benzo[g,h,i,]Perylene | Yes | PM2.5 | 0.00000675 | 0.000005625 | 0.000000128 | 0.000000128 | 0.000000128 | 0.000000128 |
| Chrysene | Yes | PM2.5 | 0.00000525 | 0.000004375 | 9.93E-08 | 9.93E-08 | 9.93E-08 | 9.93E-08 |
| Fluoranthene | Yes | PM2.5 | 0.0000165 | 0.00001375 | 0.000000312 | 0.000000312 | 0.000000312 | 0.000000312 |
| Fluorene | Yes | PM2.5 | 0.00003675 | 0.000030625 | 0.000000695 | 0.000000695 | 0.000000695 | 0.000000695 |
| Naphthalene | Yes | PM2.5 | 0.00105075 | 0.000875625 | 0.0000199 | 0.0000199 | 0.0000199 | 0.0000199 |
| Phenanthrene | Yes | PM2.5 | 0.000042 | 0.000035 | 0.000000794 | 0.000000794 | 0.000000794 | 0.000000794 |
| Pyrene | Yes | PM2.5 | 0.00002925 | 0.000024375 | 0.000000553 | 0.000000553 | 0.000000553 | 0.000000553 |
| Total HAP (ratioed to PM2.5) | | | 0.0013 | 0.0011 | 0.000024 | 0.000024 | 0.000024 | 0.000024 |
| 2,2,4-Trimethylpentane | Yes | VOC | 0.0003 | 0.00025 | NA | NA | NA | NA |
| Acetaldehyde | Yes | VOC | 0.0557235 | 0.04643625 | 0.000229 | 0.000229 | 0.000229 | 0.000229 |
| Acrolein | Yes | VOC | 0.002625 | 0.0021875 | NA | NA | NA | NA |
| Benzene | Yes | VOC | 0.015258 | 0.012715 | 0.0000098 | 0.0000098 | 0.0000098 | 0.0000098 |
| Ethyl Benzene | Yes | VOC | 0.0015 | 0.00125 | NA | NA | NA | NA |
| Formaldehyde | Yes | VOC | 0.1122 | 0.0935 | 0.00157 | 0.00157 | 0.00157 | 0.00157 |
| Hexane | Yes | VOC | 0.004125 | 0.0034375 | NA | NA | NA | NA |
| Propionaldehyde | Yes | VOC | 0.004575 | 0.0038125 | NA | NA | NA | NA |
| Styrene | Yes | VOC | 0.001575 | 0.0013125 | NA | NA | NA | NA |
| Toluene | Yes | VOC | 0.0024 | 0.002 | NA | NA | NA | NA |
| Xylenes (Mixed Isomers) | Yes | VOC | 0.0036 | 0.003 | NA | NA | NA | NA |
| Total HAP (ratioed to VOC) | | | 0.2039 | 0.1699 | 0.0018 | 0.0018 | 0.0018 | 0.0018 |

*For completeness, all of the pollutants in EPA's database are shown, but not all are HAP as defined in Section 112 of the Clean Air Act and as updated in 40 CFR 63 Subpart C.

**Only elemental phosphorus (CAS #7723140) is a HAP; phosphorus-containing compounds in general are not.

Reference: US EPA, "2011 National Emissions Inventory, version 1, Technical Support Document", draft, November 2013,available from http://www.epa.gov/ttn/chief/net/2011nei/2011_neiv1_tsd_draft.pdf; Table 104 on pp. 178-179 refers to the dataset "2011EPA_HAP- Augmentation" for HAP emissions, which is available from ftp://ftp.epa.gov/EmisInventory/2011/doc; the factors above are fromthat