OCS EIS/EA
BOEM 2014-668

Proposed Revisions to the Cape Wind Construction and Operations Plan for Offshore Wind Power Facility in Nantucket Sound, Offshore Massachusetts

Environmental Assessment

U.S. Department of the Interior
Bureau of Ocean Energy Management
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FINDING OF NO NEW SIGNIFICANT IMPACT

Approval of Proposed Revisions to the Cape Wind Construction and Operations Plan for Offshore Wind Power Facility in Nantucket Sound, Offshore Massachusetts

Introduction

On April 18, 2011, the Department of the Interior's (DOI) Bureau of Ocean Energy Management (BOEM) (formerly the Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE)) approved Cape Wind Associates' (CWA's) Construction and Operation Plan (COP), with modifications, to construct, operate, and eventually decommission a wind energy facility on Horseshoe Shoal in Nantucket Sound, on the Outer Continental Shelf (OCS) offshore Massachusetts. BOEM prepared an environmental assessment (EA) to determine if the COP presented substantial changes, new information or new circumstances in the proposed that were relevant to environmental concerns and bearing on the proposed action or its impacts. In the EA prepared in 2011, BOEM found that there were no substantial changes in the proposed action relevant to environmental concerns or no significant new circumstances or new information relevant to environmental concerns bearing on the proposed action or its impacts. BOEM concluded that a supplemental Environmental Impact Statement (SEIS) would not be required in order to make a fully informed decision to approve, approve with modifications, or disapprove CWA's application to construct, operate, and eventually decommission its proposed project as described in the Final Impact Statement (FEIS) that was prepared by BOEM in 2009 (US DOI MMS, 2009) and refined in the COP (US DOI BOEMRE, 2011a) (40 CFR 1502.9). BOEM published a Notice of Availability for the EA and a Finding of No New Significant Impact (FONNSI) for the Cape Wind Energy Project COP (76 FR 22719 and 23798). The decision to approve the 2011 COP was documented in a Record of Decision (2011 ROD) (US DOI BOEMRE, 2011b) on April 18, 2011. Under BOEM regulations, CWA was required to submit a Fabrication and Installation Report (FIR) (CWA, 2014a) and Facilities Design Report (FDR) (CWA, 2014b) to BOEM before installing facilities described in its approved COP (30 CFR 585.632), which CWA did on May 20, 2014. On July 18, 2014, BOEM determined that certain activities proposed in the FIR and FDR were not described in the 2011 COP and BOEM informed CWA that revisions to the 2011 COP were required pursuant to the regulations (30 CFR 585.634). On July 25, 2014, CWA submitted a several proposed revisions to the COP for BOEM's approval.

BOEM prepared the attached EA to determine whether BOEM was required to prepare a SEIS (40 CFR 1502.9) or if it could reach a FONNSI before deciding whether to approve, approve with modifications, or disapprove the proposed revisions to the COP. BOEM considers in the attached EA: 1) if the revisions to the COP described in Section 3 of this EA as identified by CWA are substantial changes in the proposed action that are relevant to environmental concerns; and, 2) if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, including activity and equipment details provided in the FIR and FDR. BOEM evaluated only topics for which new information has become available since the publication of the EA in 2011, and which could be material to the decision making process.

The Proposed Action
As detailed in the COP with the proposed revisions, the Proposed Action remains substantially the same as described in the FEIS (FEIS pp. 2-1 to 2-32), issued by the MMS in January, 2009, the EA/ROD prepared and issued in 2010, as well as the EA/ROD prepared and issued the 2011 ROD.

Approval of CWA's proposed revisions simply modifies CWA's existing COP which BOEM approved authorizing CWA to construct and operate a wind energy facility on Horseshoe Shoal in Nantucket Sound, on the OCS offshore Massachusetts. The Proposed Action calls for 130, 3.6 +/- MW wind turbine generators (WTGs), each with a maximum blade height of 440 feet (ft), to be constructed in a grid pattern on the OCS in Nantucket Sound offshore Cape Cod, Martha's Vineyard, and Nantucket Island, Massachusetts (Cape and Islands). With a maximum electric output of 468 MW and an average anticipated output of approximately 182 MW, the facility is projected to generate up to three-quarters of the Cape and Islands' annual electricity demand. Each of the 130 WTGs will generate electricity independently. Solid dielectric submarine inner-array cables (33 kilovolt) from each WTG will interconnect within the array and terminate on an electrical service platform, which will serve as the common interconnection point for all of the wind turbines. The proposed submarine transmission cable system (115 kilovolt) from the electric service platform to the landfall location in Yarmouth would be approximately 12.5 miles (mi.) in length (7.6 mi. of which would fall within Massachusetts' territory).

On July 25, 2014, CWA submitted several proposed revisions to the COP for BOEM's approval. BOEM decided that revisions to the COP were necessary based on its review of CWA's FIR and FDR. These minor revisions are identified below and considered in attached EA:

- Pile Driving Methodology (Section 3.1);
- Changes to Electrical Service Platform (Section 3.2);
- Lubricants and Adhesives Applied During WTG Installation (Section 3.3);
- Scour Protection Around Piles (Section 3.4);
- Pile Installation When Boulders Are Encountered (Section 3.5);
- Cable Configuration and Location (Section 3.6); and
- Construction of 130 Wind Turbine Generators Over Two Seasons (Section 3.7).

Summary of the Analysis of New Information and Changed Circumstances
Pile Driving Methodology: In the FIR, CWA describes the specific types of impact and vibratory hammers to be used for pile driving during the installation of turbine foundations and ESP jacket foundations. Analysis of the pile driving sound shows that the pile driving, including drilling associated with boulder mitigation, would conform to the CWA lease requirements and the marine mammal level A harassment under the Marine Mammal Protection Act (MMPA). In order to remain within sound levels predicted in the FEIS for the MMPA level B harassment threshold for both continuous (120 dB re 1 µPa (RMS)) and non-continuous underwater sound sources (160 dB re 1 µPa (RMS)), CWA has proposed, and BOEM would require through conditions of approval, the use of a pile driving noise abatement system. With the noise abatement system, BOEM has determined that the pile driving methodology identified in the proposed revisions to the COP, FIR, and FDR did not identify any substantial changes in the

Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

Changes to Electrical Service Platform: The proposed revisions to the COP, FIR, and FDR would change the overall ESP topside structure which reduced the size in area and volume and decreased the number of transformers which reduced the amount of oil on the ESP by 10, 000 gallons. Construction of the ESP would involve floating the ESP topside over the jackets rather than using jack-up barges to set it in place. The entire bottom area within the area of potential effect (APE) where the anchors are to be placed will have been surveyed prior to construction as required by the CWA lease and all historic resources must be avoided or subsequent studies undertaken, as directed by BOEM. .Therefore, the changes to the ESP identified in the proposed revisions to the COP, FIR, and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

Lubricants and Adhesives Applied During WTG Installation: As part of the FIR, CWA identified additional sealants, lubricants, and coatings that would be used during the fabrication and installation of the project. The chemical products are all used for multiple applications during the erection process on construction projects. These are all generic materials and are widely used on machinery and structures. Therefore, the additional lubricants and adhesives identified in the FIR and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

Scour Protection Around Piles: In the FEIS, CWA evaluated and requested the use of two engineered scour mitigation methods: scour mats and rock armor. BOEM determined that final consideration for scour protection would be based on an assessment of potential environmental impact and scour performance. In the CWA lease, BOEM required that CWA use scour mats unless BOEM made a determination that scour mats would not work at a specific WTG location. BOEM concurred with the project's certified verification agent's assessments that rock armor is more feasible for all piles. Since the FEIS also examined the use of rock armor as a scour protection for all piles as part of the initial analysis, there will be no change in the level of impacts and, therefore, the use of rock armor identified in the FIR did not constitute substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

Pile Installation When Boulders are Encountered: In the proposed revisions to the COP, FIR and FDR, CWA introduces two pieces of equipment that were not analyzed in previous EAs to mitigate seafloor and sub-bottom boulders encountered during the driving of a foundation pile. The methodologies involve the use of a clamshell dredge and drilling. To address the issue of possible acoustic impacts to protected species, BOEM assessed the sound source levels of the clamshell dredge and proposed drill and determined that they are well below both Level A and B harassment thresholds, as defined by NMFS, within the 750 m exclusion zone. Since these operations are not anticipated to increase the area of ensonification at levels that could cause injury, behavioral or avoidance reactions in sea turtles, marine mammals, or marine fish, the underwater sound introduced by boulder drilling and clamshell dredging will not cause any

impacts to sea turtles, marine mammals or marine fish. Therefore, the methodology for pile installation when boulders are encountered described in the proposed revisions to the COP, FIR and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

Cable Configuration and Location: The proposed revisions to the COP, FIR, and FDR proposed variations to the originally analyzed submarine cable configuration and location including installation of the export transmission cable system to commence at the landfall location and proceed toward termination at the ESP; a new layout of the inter array cable system, with a commensurate increase in cable length from 66.7 mi to 70 mi; and the use of a Tekmar®/Teklink® cable protection system (CPS) instead of the use of J-tubes for transitioning the inter array cables from the seabed into the foundations. The FEIS considered impacts for installation of submarine transmission cable, including cable protection at the transition from the turbine to the seabed, both for the purposes of export to onshore electric infrastructure and for inter array and determined that impacts from installation of submarine transmission were negligible to minor. Therefore, the changes in cable location and configuration presented in the proposed revisions to the COP, FIR and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

Construction of 130 Wind Turbine Generators Over Two Seasons: The FEIS and two subsequent EAs (2010 and 2011) considered impacts for 130 WTGs to be constructed at the same time. The proposed revisions to the COP, FIR, and FDR propose construction over two seasons, Season A installment of 101 WTGs and a later phase, Season B, for the remaining 29 WTGs. As explained in the proposed revisions to the COP, Season A would consist of installation of the entire infrastructure for full build-out of the project and the installation of the first 101 WTGs. The remaining 29 WTGs are scheduled to be installed in the following construction season (Season B). CWA anticipates that although construction would take place over multiple seasons, there would be no demobilization process or interim period during full build-out so there would not be an increase in impacts from demobilization and remobilization. In addition, no new financial information has been provided by CWA in the proposed revisions to the COP, FDR or FIR, so there is no change in National Environmental Policy Act (NEPA)-required economic impacts and Season A lighting is similar to the lighting that was analyzed in the FEIS. Therefore, construction of the 130 WTGs over two seasons presented in the proposed revisions to the COP, FIR and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

Supporting Documents

The following environmental documents are available upon request or at: http://www.boem.gov/Renewable-Energy-Program/Studies/Cape-Wind.aspx:

- Cape Wind Energy Project, Final Environmental Impact Statement, January 2009;
- Cape Wind Energy Project Environmental Assessment, April 2010;

- Record of Decision, Cape Wind Energy Project, Horseshoe Shoal, Nantucket Sound, April 2010;
- Cape Wind Energy Project Environmental Assessment, April 2011;
- Record of Decision, Cape Wind Energy Project, Horseshoe Shoal, Nantucket Sound, April 2011; and
- Cape Wind Energy Project Construction and Operations Plan February 2011.

Conclusion

Based on the analyses in the attached EA, no new significant impacts associated with the proposed revisions to the COP for the Cape Wind Energy Project were identified that were not already considered in the FEIS. Therefore the conclusions of the kinds, levels, or locations of impacts described in the FEIS and EAs prepared in 2010 and 2011 remain valid. As a result, BOEM has determined that a SEIS is not required, and is issuing this FONNSI.

Michelle V. Morin

Michelle V. Morin
Chief, Environment Branch of Renewable Energy
Office of Renewable Energy Programs

09/08/14

Date

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1. OBJECTIVE OF THE ENVIRONMENTAL ASSESSMENT

On April 18, 2011, the Department of the Interior's (DOI) Bureau of Ocean Energy Management (BOEM) (formerly the Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE)) approved Cape Wind Associates' (CWA's) Construction and Operation Plan (COP), with modifications, to construct, operate, and eventually decommission a wind energy facility on Horseshoe Shoal in Nantucket Sound, on the Outer Continental Shelf (OCS) offshore Massachusetts. BOEM prepared an environmental assessment (EA) to determine if the COP presented substantial changes, new information or new circumstances in the proposed that were relevant to environmental concerns and bearing on the proposed action or its impacts. In the EA prepared in 2011, BOEM found that there were no substantial changes in the proposed action relevant to environmental concerns or no significant new circumstances or new information relevant to environmental concerns bearing on the proposed action or its impacts. BOEM concluded that a supplemental Environmental Impact Statement (SEIS) would not be required in order to make a fully informed decision to approve, approve with modifications, or disapprove CWA's application to construct, operate, and eventually decommission its proposed project as described in the Final Impact Statement (FEIS) that was prepared by BOEM in 2009 (US DOI MMS, 2009) and refined in the COP (US DOI BOEMRE, 2011a) (40 CFR 1502.9). BOEM published a Notice of Availability for the EA and a Finding of No New Significant Impact (FONNSI) for the Cape Wind Energy Project (76 FR 22719 and 23798). The decision to approve the 2011 COP was documented in a Record of Decision (2011 ROD) (US DOI BOEMRE, 2011b) on April 18, 2011. Under BOEM regulations, CWA was required to submit a Fabrication and Installation Report (FIR) (CWA, 2014a) and Facilities Design Report (FDR) (CWA, 2014b) to BOEM before installing facilities described in its approved COP (30 CFR 585.632), which CWA did on May 20, 2014. On July 18, 2014, BOEM determined that certain activities proposed in the FIR and FDR were not described in the 2011 COP and BOEM informed CWA that revisions to the 2011 COP were required pursuant to the regulations (30 CFR 585.634). On July 25, 2014, CWA submitted a several proposed revisions to the COP for BOEM's approval.

BOEM prepared the attached EA to determine whether BOEM was required to prepare an SEIS (40 CFR 1502.9(c)) or if it could reach a FONNSI before deciding whether to approve, approve with modifications, or disapprove proposed revisions to the COP. BOEM considers in this EA: 1) if the revisions to the COP described in Section 3 of this EA as identified by CWA are substantial changes in the proposed action that are relevant to environmental concerns; and, 2) if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, including activity and equipment details provided in the FIR and FDR. BOEM evaluated only topics for which new information has become available since the publication of the EA in 2011, and which could be material to the decision making process.

As described in Section 5.3 of the 2011 EA, there has been extensive public involvement and notification throughout the environmental review of the Cape Wind Project. Consistent with 40 CFR 1501.4(e)(2)(ii), BOEM solicited comments on the 2010 EA and draft FONNSI (March 8, 2010, 75 FR 10500), which examined environmental impacts for the issuance of the Cape Wind lease since this was the first offshore commercial renewable energy lease, and was without

precedent. On May 4, 2010, BOEM notified the public of the availability of the 2010 EA and FONNSI (75 FR 23798). On February 22, 2011, BOEM provided an opportunity for public input (i.e., suggesting new issues or contributing information with regard to potential environmental effects) prior to completion of the 2011 EA and a decision by the responsible official (see http://www.boem.gov/uploadedFiles/BOEM/Renewable_Energy_Program/Studies/CapeWindNOI_022211.pdf). On April 22, 2011, BOEM notified the public of the availability of the 2011 EA, FONNSI, and ROD (76 FR 22719). BOEM did not conduct public scoping on this EA, as the issues to be considered were already clearly defined (revisions to the COP as described in Section 2.2 of this EA). As it did with the 2010 and 2011 EAs, BOEM will make this EA available to the public on its website at http://www.boem.gov/Renewable-Energy-Program/Studies/Cape-Wind.aspx. In addition, BOEM will notify interested stakeholders through email of the EA's availability pursuant to 40 CFR 1506.6(b)(3).

2. THE PROPOSED ACTION AND ALTERNATIVES

This section considers whether the revisions to the COP are substantial changes in the Proposed Action that are relevant to environmental concerns and if there are significant new circumstances or information relevant to environmental concerns and bearing on the Proposed Action or its impacts or the range of alternatives (see Figure 1).

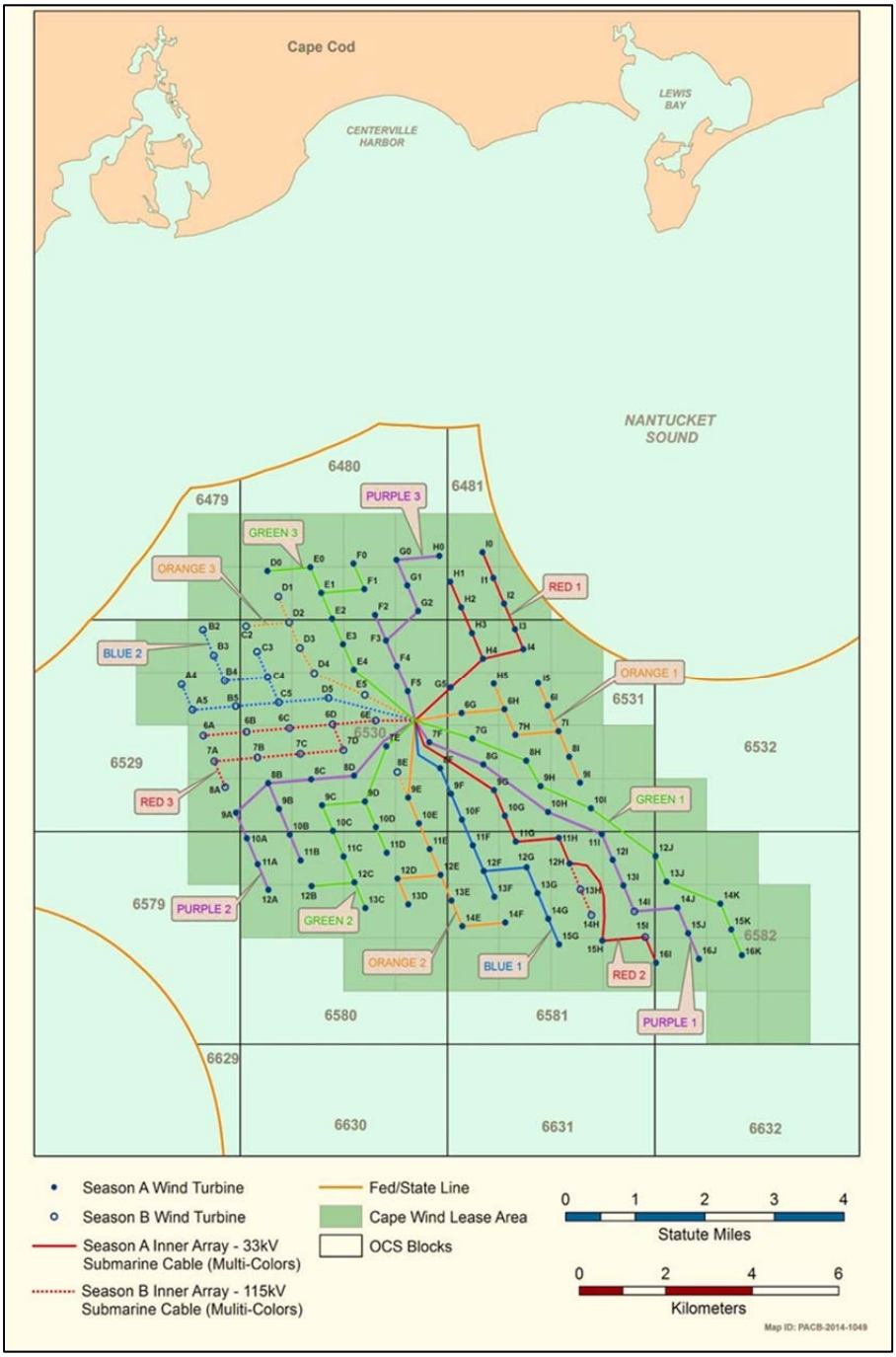

Figure 1. Cape Wind Project Area.

2.1. Background

In November 2001, CWA applied for a permit from the U.S. Army Corps of Engineers (USACE) under the Rivers and Harbors Act of 1899 to construct an offshore wind power facility on Horseshoe Shoal in Nantucket Sound off the coast of Massachusetts. The passage of the Energy Policy Act of 2005 (EPAct) amended the Outer Continental Shelf Lands Act (OCSLA), and granted the Department of the Interior (DOI) the authority to issue leases, easements, or rights-of-way for renewable energy projects on the OCS. Accordingly, CWA submitted its application to Minerals Management Service (MMS) (now BOEM) in 2005 to construct, operate, and eventually decommission an offshore wind power facility on Horseshoe Shoal in Nantucket Sound off the coast of Massachusetts.

BOEM published the Cape Wind Draft Environmental Impact Statement (DEIS) (73 FR 3482) on January 18, 2008; the FEIS (74 FR 3635) on January 21, 2009; the Notice of Availability of the 2010 EA on May 4, 2010 (75 FR 237980); and the Notice of Availability of a ROD authorizing the issuance of a lease to CWA on May 4, 2010 (75 FR 34152). On October 6, 2010, BOEM issued a lease (US DOI BOEMRE, 2010a) that granted CWA the right to conduct site characterization activities on the leasehold and the exclusive right to submit to BOEM a Construction and Operations Plan (COP) detailing the construction, operation, and decommissioning of its proposed project. CWA submitted its COP to BOEM on October 29, 2010 and submitted a revision for approval it on February 6, 2011 (CWA, 2011). In April 2011, BOEM prepared a second EA (2011 EA) and a ROD (2011 ROD) before deciding whether to approve, approve with modifications, or disapprove the COP. The 2011 ROD determined that after careful consideration of all the pertinent information and relevant factors in the environmental analysis, BOEM decided to approve CWA's COP subject to the modifications and conditions identified in Section 4.1 of the 2011 ROD. BOEM approved the COP on April 18, 2011. BOEM is now considering whether to approve, approve with modifications, or disapprove revisions to the 2011 COP, submitted on July 25, 2014 (CWA, 2014c).

2.2. The Proposed Action (Preferred Alternative)

Background: As detailed in the proposed revisions to the COP, the Proposed Action remains substantially the same as described in the FEIS (FEIS pp. 2-1 to 2-32), issued by the MMS in January, 2009, as well as, the 2010 EA, the 2010 ROD, the 2011 EA, the 2011 ROD, and the 2011 COP.

CWA's proposed revisions would modify CWA's existing approved COP, which authorized CWA to construct and operate a wind energy facility on Horseshoe Shoal in Nantucket Sound, on the OCS offshore Massachusetts. The Proposed Action calls for 130, 3.6 +/- MW wind turbine generators (WTGs), each with a maximum blade height of 440 feet (ft), to be constructed in a grid pattern on the OCS in Nantucket Sound offshore Cape Cod, Martha's Vineyard, and Nantucket Island, Massachusetts (Cape and Islands). With a maximum electric output of 468 MW and an average anticipated output of approximately 182 MW, the facility is projected to generate up to three-quarters of the Cape and Islands' annual electricity demand. Each of the 130 WTGs will generate electricity independently. Solid dielectric submarine inner-array cables (33 kilovolt) from each WTG will interconnect within the array and terminate on an electrical service platform, which will serve as the common interconnection point for all of the wind turbines. The proposed submarine transmission cable system (115 kilovolt) from the electric

service platform to the landfall location in Yarmouth would be approximately 12.5 miles (mi.) in length (7.6 mi. of which would fall within Massachusetts' territory).

New Information: On July 25, 2014, CWA submitted proposed revisions to the COP for BOEM's approval. The proposed revisions to the COP contained minor revisions to the Proposed Action that became apparent during BOEM's review of CWA's FIR and FDR. These minor revisions are identified below:

- Pile Driving Methodology (Section 3.1);
- Changes to Electrical Service Platform (Section 3.2);
- Lubricants and Adhesives Applied During WTG Installation (Section 3.3);
- Scour Protection Around Piles (Section 3.4);
- Pile Installation When Boulders Are Encountered (Section 3.5);
- Cable Configuration and Location (Section 3.6); and
- Construction of 130 Wind Turbine Generators Over Two Seasons (Section 3.7).

Conclusion: The proposed minor revisions to the COP have not changed BOEM's analysis of the level of impacts that were determined in the FEIS. The description of the Proposed Action in the FEIS adequately describes the project as presented including the proposed revisions to the COP. Pursuant to the discussion above and those contained in Section 3 of this document, BOEM has determined there have been no substantial changes to the description of the Proposed Action since the publication of the FEIS such that would require the preparation of an SEIS.

2.3. Alternative Considered

Background: In January 2009, MMS filed with the U.S. Environmental Protection Agency (USEPA) the FEIS that, in accordance with the National Environmental Policy Act (NEPA), evaluates reasonable alternatives to the Proposed Action, including a no action alternative. The alternatives to the Proposed Action were derived from the purpose and need statement. The purpose and need statement of the FEIS is as follows:

> The underlying purpose and need to which the agency is responding is to develop and operate an alternative energy facility that utilizes wind resources in waters offshore of New England employing a technology that is currently available, technically feasible, and economically viable, that can interconnect with and deliver electricity to the NEPOOL (New England Power Pool), and make a substantial contribution to enhancing the region's electrical reliability and regional renewable energy portfolio.

The FEIS evaluated nine geographic locations along the coast from Maine to Rhode Island, three non-geographic alternatives, the Proposed Action, and a no action alternative. In addition, BOEM considered onshore, nearshore and dispersed sites, a deepwater alternative located more than 22 mi. offshore, and other forms of renewable energy production.

As part of the alternatives analysis, BOEM included an economic exercise to compare the relative performance of the alternatives, included a multiple season construction schedule but did not evaluate the commercial viability of the proposed project because it is a privately funded project. After implementing a screening process (FEIS pp 3-2 to 3-6; 2010 EA pp 3-4), BOEM determined which alternatives to analyze in detail in the FEIS. BOEM reevaluated those

alternatives analyzed in the 2011 EA and ROD and found that there was no new information that would alter the conclusions that were made in the FEIS (2011 EA p 8; ROD pp 4-5).

Alternatives were excluded from the Final EIS after a combined technological/economic feasibility analysis (e.g., foundation needed for depth, distance to shore for export cable). For the economic viability criteria, the bureau did not evaluate the commercial viability of the proposed project. Rather the purpose of the economic analysis (see Appendix F in the Final EIS) was to rank the proposed and alternative sites according to relative economic performance. To the extent MMS considered economic feasibility in the FEIS, it was limited to determining whether potential alternatives to the proposed action were sufficiently economically viable to warrant detailed analysis as a reasonable alternative to the proposed action under NEPA. It was a comparative analysis, and did not offer specific opinions of the agency regarding whether particular proposals were economically feasible.

New Information: BOEM is not aware of any significant new circumstances and has not received any relevant new information regarding the economics or feasibility of previously excluded alternatives. Accordingly, there is no need to consider additional alternatives to minimize previously unanalyzed impacts.

Conclusion: The proposed revisions to the COP did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts or the range of alternatives.

3. EVALUATION OF NEW INFORMATION AND CHANGED CIRCUMSTANCES

3.1. Pile Driving Methodology

Background: The FEIS described methodologies for installing piles that are to support the WTGs and the Electrical Service Platform (ESP) as being a pile driving ram or vibratory hammer (FEIS Sections 2.3.2.2; 2.3.3; and 5.1.4.2). The noise level predictions for pile driving in the Project were developed from impact hammer sound source level data obtained from projects in Europe that have similar environmental conditions (FEIS Section 5.1.4.2). Underwater noise from the installation of the monopiles was modeled to be 178 decibel (dB) re 1 µPa at 500 m, 172 dB re 1 µPa at l kilometer (km) and 166 dB re 1 µPa at 2 km. For in-air sound from the impact hammers it was predicted to be 31 dB to 76 dB when the receiver is 1/3 mile (mi) to 1 mi (.5 to 1 km away during pile installation (FEIS Section 5.1.4.2). The FEIS concluded that the impacts due to noise during construction would be minor for marine mammals, fish, and sea turtles (FEIS Sections 5.3.2.6; 5.3.2.7; and Table E-1).

New Information: In the FIR, CWA describes the specific types of impact and vibratory hammers to be used for pile driving during the installation of turbine foundations and ESP jacket foundations (FIR Section 4.2). CWA also describes boulder mitigation methodologies and clarifies the extent to which a vibratory hammer would be used (Revised COP revision #5; FIR Section 2. 2.3.d). Since this equipment is different from that previously assessed (FEIS Appendix G), BOEM has analyzed these new methodologies.

Analysis and Conclusion: The sound source levels for the vibratory hammer and impact hammer proposed in the FIR and FDR were provided by CWA (Orr, T., July 23, 2014, email communication; *see* Table 1). In line with the impacts discussed in the FEIS (Section 5.3.2.7.1), this information suggests that although there may be some effects to marine fish, due to swimming away from pile driving noise, it is not expected that exposure to construction-related noise will result in any effects to marine fish that would impair essential life functions either individually or cumulatively. It is also evident that the use of the boulder mitigation equipment that is being proposed by CWA currently conforms with CWA lease requirements whereby the marine mammal harassment thresholds under the Marine Mammal Protection Act (MMPA) (i.e. level A harassment threshold of 180 dB re 1 micro Pascal (µPa) root mean square (RMS)) (190 dB re 1 µPa (RMS) for pinnipeds in water) falls within the 750 m exclusion zone (Revised COP revision #5) (Table 1). The interim marine fish noise criteria from the Fisheries Hydroacoustic Working Group (i.e., peak sound pressure level 206 dB re 1 µPa, SEL_{cum} 187 re 1 µPa (RMS), and 150 dB re 1 µPa (RMS)) are also not exceeded during boulder mitigation operations. However, the MMPA level B harassment threshold for both continuous (120 dB re 1 µPa (RMS)) and non-continuous underwater sound sources (160 dB re 1 µPa (RMS)) at 3.4 km are expected to be exceeded during pile driving (Table 1). As a result, CWA has proposed (Orr, T., July 23, 2014, email communication), and BOEM will require through a condition of approval, pile driving noise mitigation measures. One such proposed mitigation technique is a bubble curtain. A single bubble curtain is expected to result in a sound reduction of 8-14 dB (peak) (German Federal Agency for Nature Conservation, 2013). Assuming standard 20 log(R) spherical spreading (a reasonable assumption considering the relatively shallow depths and short

distances being discussed), a single bubble ring will result in the reduction of the Level B threshold (160 dB re 1 µPa (RMS)) area of ensonification from 3400 meters (m) to 680-1360 m, based on the expected 8-14 dB (peak) sound source level reductions. Similarly, marine fish are only expected to be exposed to injurious levels of noise within 22 m of the pile driving. However, the soft-start pile driving requirement will allow marine mammals, sea turtles, and marine fish to vacate areas disturbed by pile driving noise. The modeled sound source levels of 178 dB re 1 µPa (RMS) for the impact hammers and 147 dB re 1 µPa (RMS) for the vibratory hammer fall within the 750 m Level A (180 dB re 1 µPa (RMS)) exclusion zone. In addition to measures required of CWA, if sound source verification data from the installation of the first three foundations indicates these measures are not sufficient to abate pile driving noise to within 3.4 km, BOEM will require CWA to employ additional measures that are effective in achieving the required reductions.

Table 1. Updated and new sound source levels for equipment to be used during Cape Wind construction operations

Source	Range of noise levels used for projections	Received Sound Levels L_{RMS} (dB)			L_{peak} (dB)
		1m	750m	3400m	1m
Impact Hammer IHC S1800	20 m and 230 m, 320 m	235	178	164	241
Impact Hammer Menck 1900 S		235	178	165	241
Vibratory hammer	10m	204	147	134	220
Clamshell Dredge	1m	153	96	83	163
Drilling	1m	124	67	54	127

Regarding in-air noise levels, seals have an above water hearing frequency range of 75 Hz – 30 kHz. The in-air behavioral harassment threshold established by NMFS is 90 and 100 dB for harbor seals and gray seals, respectively. The approximate 3 dB increase in sound from the new pile driving hammers would increase the above water sound to 63-86 dB at 320 m from the pile (*see* Cape Wind Noise Report Number 4.1.2-1 Calculations (USACE 2004)). Important coastal habitat for gray and harbor seals exist in Nantucket Sound, but occur at relatively large distances from the proposed action area. Gray seal breeding and pupping grounds at Monomoy and Muskeget Islands occur approximately 19.5 km (12 mi) and 13 km (8 mi), respectively, from the proposed action area. Tuckernuck and Muskeget Islands are important haul out sites for harbor seals and are located approximately 15.7 km (9.8 mi) and 13 km (8 mi), respectively, from the proposed action area. Thus changes in the pile driving methodologies will have no change in impacts to gray and harbor seals.

Based on the analysis above BOEM has determined that the acoustic impacts of pile driving to large cetaceans and marine fish will result in negligible effects. Effects to small cetaceans, seals, and sea turtles are anticipated to be minor. Therefore, based on the analysis above, the pile

driving methodology identified in the proposed revisions to the COP, FIR, and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

3.2. Changes to Electrical Service Platform

Background: In the FEIS and COP, the ESP was described as a fixed template type platform consisting of a jacket frame with six 42-inch diameter (1.1m) driven piles to anchor the topside platform to the ocean floor. The topside would consist of a steel superstructure supporting a platform of 100 ft by 200 ft (30.5 m by 61 m) (FEIS Section 2.1.4; FEIS Figure 2.3.3-1; 2011 COP Section 4.1.5). An enclosed structure would be on the topside structure and would be 49 ft above the topside platform. The entire structure, including a helipad, would be 100 ft (3-0.5 m) above the waterline (FEIS Section 2.1.4). The ESP would have 4 oil cooled transformers each containing 10,000 gallons of cooling oil for a total of 40,000 gallons (FEIS Section 2.6.3; 2011 COP Oil Spill Response Plan Section 6.3.2).

In the FEIS and COP, the installation method was described as transporting a single jacket structure to the site on a jack-up transportation barge. According to the 2009 General Conformity Determination, the ESP was to be transported from the staging location of Quonset Point, Rhode Island (USDOI MMS, 2009). Bottom disturbance associated with securing up the jack-up barge at the installation site includes placement of up to six jack-up pads. The pads range from 10 to 20 ft (3 to 6 m) in length and width, respectively (FEIS Section 5.1.4.7). The jacket would then be lifted from the transportation barge in place using a crane mounted on a separate jack-up barge. The jacket would be sunk and leveled in preparation for piling and ballast water would be adjusted to accommodate raising the jack-up barge out of the water (FEIS Section 5.1.1.1). The six piles would then be driven through the piling sleeves to the design depth. Minimal disturbance of sand and sediment would take place as a result of pile driving activities (FEIS 5.1.4.7). The topside structure will be loaded on a transport barge and floated over the jacket. The barge would decrease draft by taking on ballast which would lower the topside structure onto the jacket. The topside structure would then be connected. An alternate installation method was described as installing the piles first without the jacket and then float the jacket over the piles on a barge. The COP stated that the design basis would be provided in the FDR (COP Section 4.1.5). All work vessels would be required to comply with mandatory ballast water management practices established by the US Coast Guard in order to avoid the inadvertent transport of invasive species (FEIS Section 2.3.2.3). The FEIS concluded that the impacts to water quality, non-ESA marine mammals, fisheries, EFH, threatened and endangered species, and cultural resources from construction activities ranged from negligible to minor (FEIS Table E-1).

New Information: According to the FDR, the ESP will have overall dimensions of 132 ft by 115 ft with the topside framing 35 ft above MLLW and rising 47 ft to the roof (FDR structural drawings 7.5.1 and 7.6.1). The ESP topside will be 25% smaller in surface area and 20% smaller in volume than the ESP platform described in the FEIS and COP (Revised COP revision #4). There will be three transformers (FDR Section 3.2.4 and 7.5.1) rather than four as stated in the 2011 COP. According the proposed revisions to the COP and FDR, the transformers will have a total of 30,000 gallons of dielectric oil which is 10,000 gallons less than identified in the COP (Revised COP revision #4; FDR Sections 3.2.4 and 7.5.1).

According to the proposed revisions to the COP, FIR and FDR, the ESP topside will be supported by two smaller double jacketed structures each with four piles for a total of eight piles. The diameter of the piles will be unchanged at 42 inches in diameter. The increase in the number of piles from six to eight will result in an increase of disturbance to the bottom of approximately 19 sq ft (Revised COP revision #4).

The proposed revisions to the COP and FIR describe the ESP installation process as transporting the two jacket structures from Rockland, Maine to the site on a transport barge. Rockland is in Knox County and is a maintenance area for 1997 8-hour ozone. General Conformity requirements apply in nonattainment and maintenance areas. The distance traveled from Maine to the project location will cause additional pollutant emissions that were not analyzed in the FEIS or EA prepared in 2011, however, a general conformity determination is not required for the state of Maine because pollutant emissions from the one vessel trip will not exceed the *de minimis* threshold of 50 tons per year of VOC or 100 tons per year of NOx emissions. In addition, the USEPA is in the process of revoking the 1997 8-hour ozone standard, so the conformity requirement may no longer be enforced. Knox County is compliant with the 2008 8-hour ozone standard (EPA, 2014).

Jack-up barges described in the FEIS (see above) will not be used. The transport barge will be anchored in place. A separate derrick crane barge will be anchored in place adjacent to the transport barge and will be used to set the first jacket and the piles. The derrick crane barge will then be moved to the second jacket location and install the remaining jacket and piles in a similar manner (Revised COP revision #4; FIR Section 4.4, FIR Section 4.4 Appendix F). The ESP topside structure will be transported to the site and installed using float-over procedures similar to that described in the FEIS (see above) (Revised COP revision #4; FIR Section 4.10). As part of the FIR, CWA included a description for ballasting and de-ballasting the float-over barge for the ESP (FIR Section 4.10). The entire bottom area within the area of potential effect (APE) where the anchors are to be placed will have been surveyed prior to construction as required by the CWA lease (CWA lease Addendum C Environmental Stipulation (1.)(II) and all historic resources are to be avoided or subsequent studies undertaken, as directed by BOEM (CWA lease Addendum C Environmental Stipulation (1.) (V).

Analysis and Conclusion: While anchored barges rather that jack-up barges will be used for setting the jackets and topside structure, the entire bottom area within the area of potential effect (APE) where the anchors are to be placed will have been surveyed prior to construction so all historic resources can be avoided or subsequent studies undertaken. There is a reduction in the number of ESP transformers from four to three, and the increase in the disturbed area from the additional two piles would be 19 sq. ft which is insignificant compared to the action area. A general conformity determination is not required for the State of Maine because pollutant emissions from the one vessel trip to transport the ESP from Rockland, Maine will not exceed the *de minimis* threshold. In addition, the impacts from the use of ballast water were analyzed as part of the water quality analysis and the impacts to water quality were determined to be minor (FEIS 5.1.1.1.1, FEIS Table E-1). Therefore, the information presented in the proposed revisions to the COP, FIR and FDR does not change the conclusion reached in the FEIS that the level of impacts for the proposed activities would range from negligible to minor to historic resources, water quality and air quality from installation of the ESP. The changes to the ESP identified in the proposed revisions to the COP, FIR, and FDR did not identify any substantial changes in the

Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

3.3. Lubricants and Adhesives Applied During WTG Installation

Background: The FEIS identified and analyzed chemicals substances that were proposed for use in the project (FEIS Section 2; FEIS Appendix E). This included analysis of coatings on the ESP piles and WTG transition pieces to prevent corrosion (FEIS 2.3.2.2 and 2.3.2.3). The FEIS determined that construction and decommissioning impacts to water quality would be minor and that impacts to water quality during project operation would be negligible (with the exception of spills) (FEIS Table E-1). As required by 30 CFR 585.285.626 (b) (6), the COP identified the general design of the WTGs and provided additional information about substances to be used in the project (COP Section 4.1.3.2). The prepared in 2011 EA analyzed these additional chemicals (2011 EA sections 3.9 and 3.10) that were proposed to be used.
New Information: As part of the FIR, CWA identified additional details on sealants and lubricants that would be used during the fabrication and installation of the project. The chemical products listed in Sections 4.5, 4.6 and 4.7 of the FIR are all used for multiple applications during the erection process on construction projects. These are all generic materials and are widely used on machinery and structure.

The FIR introduced zinc-based chemicals that were not addressed in the FEIS. The choice of zinc-based chemicals provided a safer alternative than the commonly used copper-based chemicals that CWA could have selected for use on machinery and structures needed during construction and operations for the proposed action (USEPA, 2011).

Within the FIR, CWA asserts that these chemical products, including those that are zinc-based, will not be exposed to the ocean environment and will be used in relatively nominal quantities consistent with typical construction requirements (Orr, T., June 26, 2014, email communication).

Analysis and Conclusion: Use of the sealants and lubricants identified in the FIR does not change the conclusion within the FEIS that impacts to water quality during construction and decommissioning would be minor and that impacts to water quality during project operation would be negligible because these chemicals would not be exposed to the ocean environment. The use of zinc-based products proposed in the FIR compared to copper-based chemicals does not change the overall effects to water quality previously identified in the FEIS for chemicals needed for project construction. Therefore, based on the analysis above, the additional lubricants and adhesives identified in the FIR and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

3.4. Scour Protection Around Piles

Background: CWA evaluated and requested the use of two engineered scour mitigation methods: scour mats and rock armor (FEIS, Section 5.3.1.1.1). BOEM determined that final consideration for scour protection would be based on an assessment of potential environmental impact and scour performance. In the CWA lease, BOEM required that CWA use scour mats unless BOEM made a determination that scour mats would not work at a specific WTG location. According to the analyses of scour protection design within the FEIS, CWS determined that the use of scour mats or rock armor would result in similar disturbance to the seafloor. Bottom

disturbances would be from maintenance or replacement of the selected scour protection on any foundations that appear to be experiencing scour, otherwise impacts to the seafloor and water quality would be negligible. These disturbances would be localized and infrequent but could result in disruption of nearby sediments (FEIS, Section 5.1.5.2), which would result in minor impacts to water quality.

New Information: In a letter dated May 6, 2014, to BOEM, ESS Group, on behalf of CWA, stated that although "CWA has utilized scour mats around the relatively small diameter (36") foundation piles of its meteorological test tower for several years with satisfactory test results, the manufacturer of the scour mats has less experience with large diameter piles (such as the 16.4 ft (5 meter) CWA foundation piles) and is unable to provide CWA with the long-term performance and/or durability guarantees that are required by contractors and financiers to make the use of the scour mats feasible for the project". In this letter, CWA requested permission from BOEM to use rock armor to provide scour protection for all of the WTGs and ESP monopiles. Additionally, in a letter to BOEM dated May 6, 2014, DNV-GL, in its capacity as a certified verification agent for the project, provided its analysis of the sole use of rock armoring within the scour protection design for the project. DNV-GL concurred with CWA's request to use rock armor instead of scour mats at all wind turbine locations. DNV-GL cited the successful use of rock armor on over a thousand wind turbine monopile installations and stated that rock armor performed satisfactorily in the vast majority of locations where it had been installed. Furthermore, the CVA asserted that "the offshore wind industry has immensely more experience with rock armor than it does with frond [scour] mats".

According to the FIR (FIR Section 8), prior to either filter or armor stone placement, a multi-beam survey will be performed to create a baseline for quality control of layer thickness/position and for As-Built documentation. Real time surveying of the rock placing work will be performed utilizing multi-beam sonar equipment during placing operations as a quality control measure to ensure the rock is placed in the correct location and thickness. Once the quality control surveys have shown the scour design parameters have been met, a final survey of both the filter and armor layers will be performed to be incorporated as the As-Built documentation.

Analysis and Conclusion: The use of rock armor for scour protection for all wind turbine locations was assessed in the FEIS. The use of rock armor as the preferred scour protection method results in no change in anticipated disturbance of the seafloor, and impacts to water quality during project operations would continue to be negligible, as assessed previously in the FEIS. Any bottom disturbances originating from work on scour protection and mitigation for foundations that appeared to be experiencing scour with existing rock armor scour protection would be localized and infrequent and would result in minor impacts to water quality, as previously identified within the FEIS (Section 5.1.5.2). BOEM concurred with the CWA and DNV-GL assessments that rock armor is more feasible for all monopile installation and maintenance. Therefore, since the FEIS examined the use of rock armor as a scour protection for all piles as part of the initial analysis, there will be no change in the level of impacts anticipated for the FIR.

It is expected that geophysical surveys will be conducted with short-term, focal inspections before, during, and after rock armor installation. The multi-channel multi-beam depth sounder

operates at frequencies between 200-400 kHz (ESS, 2012). Most mysticetes are believed to have reduced sensitivity above 30 kHz (NOAA, NMFS, 2013). Odontocetes and pinnipeds typically have their best sensitivity between 10 kHz and 120 kHz (estimated by a reduced sensitivity of greater than 20 dB from the audiograms in Figure 8.1 Richardson *et al*., 1995). Most marine mammals (even high frequency species) are not believed to hear above approximately 180 kHz, but even if they do, it is with a very reduced sensitivity level (e.g., greater than 40 dB less sensitive than for their best frequencies) (NOAA, NMFS, 2013; Richardson *et al.*, 1995). Data on sea turtle hearing is very limited, but their hearing is generally thought to range between 100 Hz and 2 kHz. Hearing range and sensitivity varies considerably among fish species, but for most species, sensitivity to sound occurs from below 100 Hz to several hundred Hz, or several thousand hertz in a few species (Popper *et al*., 2014). The multi-beam depth sounders, therefore, operate at frequencies above the hearing abilities of fish, marine mammals and sea turtles and these inspection surveys are therefore not anticipated to cause any impacts to protected species.

Therefore, the use of rock armor identified in the FIR did not constitute substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

3.5. Pile Installation When Boulders Are Encountered

Background: The FEIS identified the potential for boulders in some areas of the project area (FEIS Section 4.2.5.2 and Figure 4.2.2-1). The 2010 EA (p. 3) states that projects utilizing monopile technology are typically located in areas that allow installation by vibratory hammer or driving ram. Seabed substrate that contains bedrock or excessively hard substrate would prevent the installation of monopiles. Noise and vibration were impacts caused by the WTG installation using vibratory and impact hammers (FEIS section 5.1.4.2). With respect to protected species, the introduction of acute and chronic sound sources into the marine environment may impact fish, sea turtles and marine mammals through masking of sounds of the natural environment and conspecifics, through physical sound pressure related impacts and habitat avoidance. The principal noise producing factor associated with the proposed action is pile driving. The impacts from noise were determined to be minor during construction and negligible during operations (FEIS Table E-1). The FEIS determined that there would be minimal disturbance of sand and sediment and from pile driving activities and that the impacts to water quality from all construction activities would be minor (FEIS Section 5.1.4.7 and Table E-1).

New Information: Within the FIR (Section 2.3), CWA evaluates several strategies to mitigate impacts if a boulder is encountered during monopile installation. CWA has proposed the use of impact and vibratory hammers to drive through boulders as well as drilling through boulders as methodologies if they are encountered during installation (Revised COP revision #5). Foundation monopiles are designed to be driven to full penetration with a hydraulic impact hammer. If a boulder is encountered during driving, the selected hammer may drive through the boulder, depending on the size and nature of the boulder composition. Given the large diameter of the monopiles, clamshells may be employed to extract the boulder from inside the monopile. CWA evaluates this as the fastest method but its effectiveness depends on site-specific conditions. CWA states that fatigue analysis has shown that using the vibratory hammer is within the foundation design standards and will allow multiple attempts of re-driving the pile. A pile that is partially driven and encounters refusal due to a boulder could be extracted by the vibratory hammer and moved to a new location. Drills that fit closely inside the monopile may

be used to drill through a boulder; this option has proven feasible but may be time-consuming. Options such as vibratory hammers require a decision in advance of pile driving. CWA intends to further evaluate and present the preferred option to the Certified Verification Agent (CVA) for review before the beginning of the installation phase of the project (FIR, Section 2.3).

The addition of the methodologies, other than impact and vibratory hammer use (*see* Section 3.2), to mitigate bottom boulders introduces two pieces of equipment that were not included in previous consultations, i.e. clamshell dredge and drilling. To address the issue of possible acoustic impacts to protected species, caused by the additional boulder mitigation methodologies, CWA submitted sound source levels for the drill and clamshell dredge that may be used to clear the turbine foundation site (Orr, T., July 23, 2014, email communication; *see* Table 1).

Analysis and Conclusion: Given that the distribution of sub-surface boulders is expected to resemble the distribution of boulders on the surface, the Fugro Site Characterization Report (FDR Section 4.4.6) reveals that there should be ample room to install the monopile foundations without encountering boulders. Out of the options presented by CWA for boulder mitigation, vibratory hammers would have the most impact on water quality. Water quality would be affected by the suspended material from the impact of vibratory hammers to boulders during monopile installation. As concluded in the FEIS, the effects of sediment disturbance during project construction would be temporary and localized, and overall effects to water quality would be minor.

The sound source levels provided by CWA for the clamshell dredge and drilling are well below both Level A and B harassment thresholds, as defined by NMFS, within the 750 m exclusion zone. The clamshell dredge and the drilling sound would be audible to sea turtles, but both are below 160 dB re 1 µPa (RMS) at the source (1 m) and thus well within the required 750 m exclusion zone for foundation construction. According to McCauley et al. (2000) source levels of 166 dB re 1 µPa (RMS) are required to evoke behavioral reactions from captive sea turtles. The interim marine fish noise criteria from the Fisheries Hydroacoustic Working Group (i.e., peak sound pressure level 206 dB re 1 µPa, SELcum 187 re 1 µPa (RMS), and 150 dB re 1 µPa (RMS)) are also not exceeded during boulder mitigation operations. Protected Species Observers (PSO) will monitor the 750 m exclusion zone during the intermittent use of this boulder mitigation equipment. Since these operations are not anticipated to increase the area of ensonification at levels that could cause injury, behavioral or avoidance reactions in sea turtles, marine mammals, or marine fish the underwater sound introduced by boulder drilling and clamshell dredging will not cause any impacts to sea turtles, marine mammals or marine fish. Therefore, the impact levels for the use of clamshells for boulder extraction or the use of drilling through boulders will not change the impact level for noise that was determined to be minor during construction and negligible during operations (FEIS Table E-1). Based on the analysis above, the methodology for pile installation when boulders are encountered described in the proposed revisions to the COP, FIR and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

3.6. Cable Configuration and Location

Background: The FEIS and two subsequent EAs considered impacts for installation of submarine transmission cable both for the purposes of export to onshore electric infrastructure and for inter array transmission. The FEIS analyzed the laying of the export transmission cable system using the proposed emplacement equipment and exact methodology to commence at the ESP and end at the landfall location. Additionally, the FEIS also depicted specific layout locations for the then-proposed 66.7-mile length of the inter array cable. Finally, the FEIS analyzed the use of J-tubes for transitioning the cables from the seabed into the foundation termination points (FEIS Section 2.0). The FEIS determined that impacts from installation of submarine transmission cables (both inter array and export) on 27 categories of resources are negligible to minor (FEIS Table E-1, Section 5.1.4).

Changed Circumstance: The proposed revisions to the COP, FIR, and FDR propose the following variations to the originally analyzed submarine cable configuration and location:

- installation of the export transmission cable system to commence at the landfall location and proceed toward termination at the ESP;
- new layout of the inter array cable system, with a commensurate increase in cable length from 66.7 mi to 70 mi; and
- use of a Tekmar®/Teklink® cable protection system (CPS) instead of the use of J-tubes for transitioning the inter array cables from the seabed into the foundations.

The FEIS and two subsequent EAs analyzed the impacts of the use of proposed primary installation/cable embedment equipment, including hydroplow cable burial machine, installation barge, anchor handling tugs, six- and four-point mooring systems, cable burial support system (pumps, hydroplow accessories, etc.), cable laying support system (cable machines, etc.), auxiliary trencher pulling barge, and other auxiliary vessels. Additionally, the FEIS analyzed the impacts of the proposed methodology for embedding the submarine cables via jet plow embedment, as well as for securing the landfall transition to onshore cabling via the use of horizontal directional drilling at a transition manhole/transmission cable splicing vault. The change in proposed direction of embedment (originally from ESP landward and now from the landfall location to the ESP) does not involve alteration of any proposed equipment or methodology for cable laying and landfall transition activities and thus will have no differing impact on the resources analyzed.

The COP included a location plat depicting the inter array cable routing that was analyzed in the EA prepared in 2011. As a result of subsequent engineering evaluation and design, the inter array cable routes have been modified in the proposed revisions to the COP, FIR, and FDR. The original extent of the cable route was 66.7 mi whereas the total length of the new route is approximately 70 mi, an increase of 3.3 mi. The revised inter array cable system alignment will be located entirely within an area surveyed for potentially impacted resources, such as sensitive benthic habitat and archaeological resources and that these resources will be avoided by a sufficient buffer as determined by BOEM, or subjected to additional study. Specifically, conditions on BOEM's approval of the original COP, as detailed in its ROD, reiterates that Section 1(V)(a)(i) and (ii) require CWA to either study potential cultural resources or "avoid [them] with a buffer distance determined by the Lessor" and that the Lessor (BOEM) reserves the right to determine an appropriate buffer at the appropriate time. This will occur as a result of

BOEM's review of archaeological resources survey and historic properties identification reports yet to be provided to BOEM. Once BOEM receives and reviews these reports, it will determine an appropriate avoidance buffer or, if the Lessor chooses to undertake them, establish requirements for additional study of potential archaeological resources that will provide sufficient information for the resolution of any possible adverse effects. Provided these conditions of approval on the COP are maintained and enforced, the change in proposed location of the inter array cable and the addition of 3.3 mi of cable route will have no differing impact on the resources analyzed.

The COP proposed the use of J-tubes for transitioning the cables from the seabed into the foundation termination points for all turbines and the ESP. The proposed design retains J-tubes on the ESP, but removes them from the transition pieces on those turbines where water depths allow for cable entry directly into the monopile. In the proposed revisions to the COP, FIR, and FDR, the cable will enter the monopole and travel through the interior of the monopole to the transition piece. The area from where the cable exits the seabed to the point at which it enters the monopole or J-tube will utilize the Tekmar®/Teklink® CPS, which will provide protection to the cable.

The proposed use of the Tekmar®/Teklink® CPS is based on lessons learned and the development of standard practice in monopole foundation design in European offshore wind projects since the original COP was filed. The Tekmar®/Teklink® CPS acts as a protective conduit fitting over the cable and maintains the cable within its design parameters. In addition, the removal of J-tubes from the WTG foundations reduces overall loading on the foundations and allows for less complicated transportation, fabrication, and installation of each transition piece.

The CPS will be preinstalled on the cables following the installation of the scour protection filter layer and foundation but prior to the installation of the final rock armor scour protection system being positioned between the filter and rock armor layer. The cable installer will then use the CPS to pull the cable through and into the foundation. As discussed in the FEIS, the normal construction sequence may be altered for various reasons, e.g., to accommodate water depths, post-lease/pre-construction bathymetric data, and the uncertainties of operating in the marine environment. Thus, the addition of a preinstalled CPS between scour protection filter and before final rock armor laying will not vary the originally analyzed impacts. The proposed installation description provided in the proposed revisions to the COP, FDR, and FIR will result in no differing impact on the resources analyzed in the original FEIS.

Analysis and Conclusion: The FEIS and two subsequent EAs considered impacts for installation of submarine transmission cable both for the purposes of export to onshore electric infrastructure and for inter array transmission (FEIS Section 2.0). The FEIS determined that impacts from installation of submarine transmission cables (both inter array and export) on 27 categories of resources are negligible to minor (FEIS Table E-1, Section 5.1.4). After consideration of variations to the originally analyzed submarine cable configuration and location, no new information has been provided by CWA in the proposed revisions to the COP, FDR, or FIR that would cause any major changes in the analysis conducted. Therefore, the information presented in the proposed revisions to the COP, FIR and FDR do not change the conclusions of the FEIS, to those in the EAs prepared in 2010 or 2011. The changes in cable location and configuration

presented in the proposed revisions to the COP, FIR and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

3.7. Construction of 130 Wind Turbine Generators Over Two Seasons

Background: The FEIS and two subsequent EAs considered impacts for 130 WTGs to be constructed at the same time (FEIS Section 2.0). Although the FEIS did not analyze construction in multiple seasons, as one of the alternatives analyzed, the FEIS considered a phased project in which 65 WTGs would be built during the first phase and the remaining 65 WTGs would be built later during a subsequent re-mobilization. The second phase would be scheduled within a timeframe of 5 to 10 years. An ESP would be built with each phase (FEIS Section 3.3.6.2). The FEIS determined that in 18 of the 28 impact categories the impacts from phased construction would not change at all. For the other 10 categories, impacts during operations were similar to that of the proposed action during operation. Impacts would be greater during construction and decommissioning. Specifically, impacts to air quality, water quality impacts, avifauna, subtidal offshore resources, non-ESA marine mammals, fish and fisheries, essential fish habitat, visual resources, recreation and tourism, and threatened and endangered species would also be increased from multiple mobilizations and demobilizations which would include multiple anchoring activities, increased construction vessel trips, additional staging area activities (FEIS Section 3.3.6.2.2, Section 3.3.6.2.3, Table 3.3.5-1).

In the 2011 COP, CWA proposed Aids to Navigation and Aviation Hazard (ATON) to conform to the FAA's Determination of No Hazard to Air Navigation, issued on May 17, 2010 (2011 COP Section 5.9.4.5). The lighting scheme included 50 perimeter WTG nacelles and the 8 WTGs located adjacent to the ESP to be lighted at night. All of the ATONs will be red synchronized flashing lights with the flash rate of 20 flashes per minute.

Changed Circumstance: The proposed revisions to the COP, FIR, and FDR propose construction over two seasons, Season A installment of 101 WTGs and a later phase, Season B, for the remaining 29 WTGs. The proposed revisions to the COP explains that Season A would consist of installation of the entire infrastructure for full build-out of the project and the installation of the first 101 WTGs. The reduction in the number of foundations to be built (130 to 101) in the first season may result in a 22% reduction in seasonal construction noise, resulting in less overall impacts to protected species. The remaining 29 WTGs are scheduled to be installed in the following construction season (Season B). CWA anticipates that although construction will take place over multiple seasons, there will be no demobilization process or interim period during full build-out. CWA recognizes that there is the potential for an unexpected interim period that could occur between the activities of season A and Season B. In such case, CWA would pursue the Season B WTG installations in the following construction season (COP Revision No.1, July 25, 2014).

Analysis of Impact on Economics: NEPA directs federal agencies to "identify and develop methods and procedures.which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations." As the DOI Secretary and BOEM stated in the 2010 when issuing the ROD (2010 ROD p. 7), they did not evaluate the commercial viability of the proposed project, which as a privately funded project is appropriate. Instead the economic exercise was used to

compare the relative performance of the alternatives, included a multiple season construction schedule. BOEM is not aware of any new financial information bearing on the economic exercise as described in the FEIS, provided by CWA, contained the COP or revisions to the COP, the FDR or FIR that would require an SEIS.

Analysis of Impact on Protected Species: The construction schedule included a 5-9 month construction window, which implied construction occurring over two spring-summer seasons. According to the COP revision (COP Revision No.1, July 25, 2014) there could be a season or two between construction activities, however, the season of construction, primarily spring and summer, is not changing. This seasonal construction approach proposed by CWA may result in an extended construction window, but will still occur in a single mobilization process and the total number of foundations has not increased. The timing of the construction activity is therefore not anticipated to result in additional construction vessel traffic or noise impacts to protected species and is not expected to result in any additional impacts not already considered in the FEIS (FEIS Section 3.3.6.2.2).

Analysis of Visual Impacts: On May 23, 2014, FAA issued a Marking and Lighting Change to assure that the requirements of FAA Advisory Circular 70/7460-1, K Change 2, are met for the first construction season (Season A) if there is an unexpected interim period between the first and second construction. Based on this plan, there will be 1 additional perimeter light and 5 additional interior lights.

Conclusion: Although the FEIS did not analyze construction in multiple seasons, BOEM examined a phased project as one of the alternatives in the FEIS. The FEIS determined that impacts during operations would be similar to the impacts of the proposed action during operation. Impacts would be greater during construction and decommissioning due to multiple mobilizations and demobilizations (FEIS Section 3.3.6.2.2, Section 3.3.6.2.3, Table 3.3.5-1). However, as identified in the proposed revisions to the COP (COP Revision No.1, July 25, 2014), CWA does not anticipate demobilization and remobilization between the construction of Season A and Season B and, therefore, there will not be an increase in impacts from demobilization and remobilization. With respect to economics, based on the information that was available for the ROD decision making process, no new financial information has been provided by CWA in the proposed revisions to the COP, FDR or FIR, so there is no change in NEPA-required economic impacts. The reduction in the number of foundations to be built (130 to 101) in the first season may result in a 22% reduction in seasonal construction noise, resulting in less overall impacts to protected species. With regard to visual impacts, there will be no change in the impacts levels from the interim lighting plan because the Season A lighting is similar to the lighting that was analyzed in the FEIS because the additional lights will be indistinguishable from the other lights on the WTGs. Therefore, construction of the 130 WTGs over two seasons presented in the proposed revisions to the COP, FIR and FDR did not identify any substantial changes in the Proposed Action, significant new circumstances, or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

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