Finding of Adverse Effect for the Vineyard Wind Project Construction and Operations Plan

Revised June 20, 2019

The Bureau of Ocean Energy Management (BOEM) has made a Finding of Adverse Effect (Finding) for the Vineyard Wind Construction and Operations Plan (COP) on the Gay Head Lighthouse, the Nantucket Island National Historic Landmark (Nantucket NHL), submerged paleolandforms as contributing elements to the Nantucket Sound Traditional Cultural Property (Nantucket Sound TCP), and the Chappaquiddick Traditional Cultural Property (Chappaquiddick TCP), pursuant to 36 CFR 800.5. Resolution of all adverse effects to historic properties will be codified in a Memorandum of Agreement (MOA), pursuant to 36 CFR 800.6(c).

1 Description of the Undertaking

On December 19, 2017, BOEM received a COP from Vineyard Wind, LLC (Vineyard Wind) proposing development of an 800-megawatt (MW) offshore wind energy project within Lease OCS-A 0501 offshore Massachusetts. If approved by BOEM, Vineyard Wind would be allowed to construct and operate wind turbine generators (WTGs), an export cable to shore, and associated facilities for a specified term. BOEM is now conducting its environmental and technical reviews of the COP and has published a Draft Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) for its decision regarding approval of the plan. The Draft EIS and information on the Vineyard Wind Project, including the COP are available at https://www.boem.gov/Vineyard-Wind/. The EIS considers reasonably foreseeable effects of the proposal, including impacts to historic resources.

BOEM has determined that approval, approval with modification, or disapproval of the Vineyard Wind COP constitutes an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA; 54 U.S.C. § 306108) and its implementing regulations (36 CFR 800), and that the activities proposed under the COP have the potential to affect historic properties.

1.1 Background

In 2014, BOEM prepared an environmental assessment to analyze the environmental impacts associated with issuing commercial wind leases and approving site assessment activities within the Massachusetts Wind Energy Area (WEA). Additionally in 2012, BOEM executed a Programmatic Agreement and concurrently conducted a Section 106 review of its decision to issue commercial leases within the Massachusetts WEA. On January 29, 2015, BOEM held a competitive lease sale for the WEA offshore Massachusetts and Vineyard Wind (formerly Offshore MW) was the winner of lease area OCS-A 0501. Subsequently, Vineyard Wind submitted a Site Assessment Plan for the installation of meteorological buoys, which BOEM reviewed under Section 106, resulting in the October 6, 2017 *Finding of No Historic Properties Affected*. See: https://www.boem.gov/Vinyard-Wind-106-Findings-and-Appendix-A-to-J.

1.2 Undertaking

Vineyard Wind is proposing to utilize a Project Design Envelope (PDE) in their COP, which represents a reasonable range of design parameters that may be used for the Project. In reviewing the PDE, BOEM is analyzing the maximum impacting scenario that could occur from any combination of the contemplated parameters. BOEM's analysis and review of the PDE may result in the approval of a Project that is constructed within that range or a subset of design parameters within the proposed range. Additional information on design envelopes is found in the draft guidance document at www.boem.gov/Draft-Design-Envelope-Guidance/.

Detailed information about the proposed wind energy facility, including the COP and its appendices, can be found on BOEM's website at: with https://www.boem.gov/Vineyard-Wind/. Confidential appendices to the COP referenced in this document were sent via courier to all consulting parties beginning October 16, 2018 through June 12, 2019. Both the COP, as well as its public and confidential appendices, are hereby incorporated by reference.

In its COP, Vineyard Wind is proposing the construction, operation, and eventual decommissioning of an 800-MW wind energy project consisting of offshore WTGs (each placed on a foundation support structure), electrical service platforms (ESPs), an onshore substation, offshore and onshore cabling, and onshore operations and maintenance facilities (see Figure 1). Vineyard Wind's COP proposes installing up to 100 WTGs, each with a capacity between 8 and 10 MW (see COP Figure 3.1-1). WTG foundations would be either all monopiles or mostly monopiles with up to only 10 jackets.[1] The proposed facility includes one to two ESPs and the foundations would be either jackets or monopiles. The potential export cable landfalls identified by Vineyard Wind include sites near the towns of Yarmouth (New Hampshire Avenue) and Barnstable (Covell's Beach) in the Commonwealth of Massachusetts (see COP Figure 2.2-1). Onshore construction and staging would take place at the New Bedford Marine Commerce Terminal facility or at the other ports listed in COP Volume I, Table 3.2-1. At its nearest point, the Project area is approximately 22.5 kilometers (km; 14 miles [mi]) from the southeast corner of Martha's Vineyard and a similar distance from the southwest side of Nantucket (COP Figure 2.1-1). Water depths where the WTGs would be located range from approximately 37 to 49.5 meters (m; approximately 121 to 161 feet [ft]). Although Vineyard Wind is seeking approval for 106 turbine locations, and would only install up to 100 turbines, BOEM's Preferred Alternative is 84 WTGs with the offshore cable making landfall at Covell's Beach. The proposed Project has a designed life span of 30 years; some installations and components may remain fit for continued service after this time.[2]

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[1] In a January 22, 2019 NGO agreement among Vineyard Wind, the Natural Resources Defense Council, the National Wildlife Federation, and the Conservation Law Foundation, Vineyard Wind made the commitment that no more than two jacket foundations will be installed. The agreement is available online at: https://www.nrdc.org/sites/default/files/vineyard-wind-whales-agreement-20190122.pdf

[2] Vineyard Wind's lease with BOEM (Lease OCS-A 0501) has an operations term of 25 years that would commence on the date of COP approval. (See https://www.boem.gov/Lease-OCS-A-0501/ at Addendum B; see also 30 CFR § 585.235(a)(3)). Vineyard Wind would need to request a renewal of its lease from BOEM in order to operate the proposed Project for 30 years. For purposes of the maximum-case scenario and to ensure NEPA coverage if BOEM grants such an extension; however, the EIS analyzed a 30-year operations period.

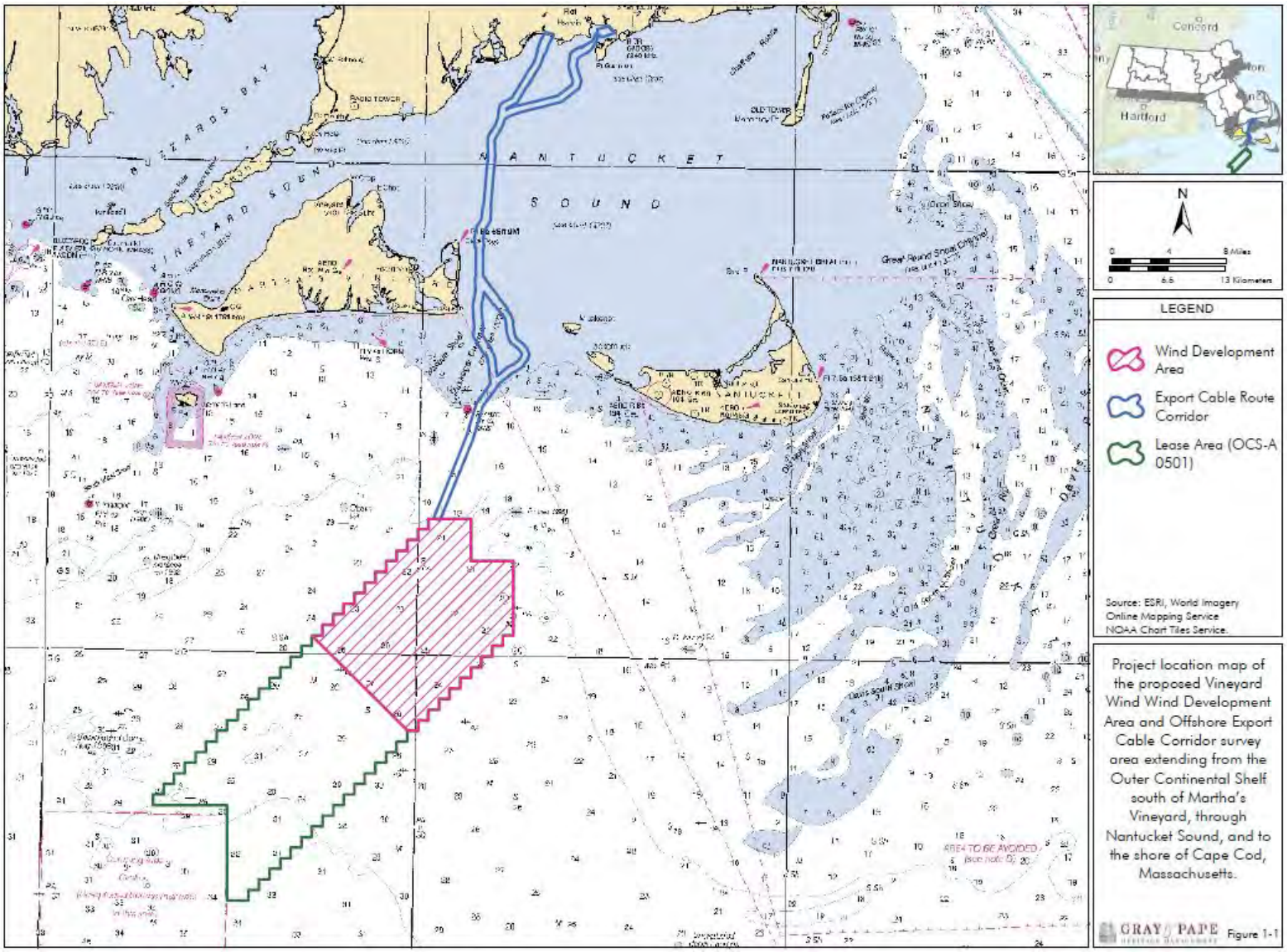

Figure 1. Representative Vineyard Wind Construction and Operations Plan proposed project elements (Tuttle et al. 2019).

1.3 Area of Potential Effect

BOEM defines the area of potential effect (APE) for approval of the COP to include the following geographic areas:

- The depth and breadth of the seabed potentially impacted by any bottom-disturbing activities, constituting the marine archaeological resources portion of the APE;
- The depth and breadth of terrestrial areas potentially impacted by any ground disturbing activities, constituting the terrestrial archaeological resources portion of the APE;
- The viewshed from which renewable energy structures, whether located offshore or onshore, would be visible, constituting the viewshed portion of the APE; and
- Any temporary or permanent construction or staging areas, both onshore and offshore, which may fall into any of the above portions of the APE.

These are described below in greater detail with respect to the proposed activities.

1.3.1 Marine Archaeological Resources APE

The depth and breadth of the seabed potentially impacted by any bottom-disturbing activities, constituting the marine archaeological resources portion of the APE, includes a conservative PDE that can accommodate a number of potential designs, whether monopile or jacketed foundations are used, installed by one or two heavy lift or jack-up vessel(s). This PDE includes a maximum expected vertical depth of disturbance for each WTG and/or ESP monopole structure of approximately 20 to 45 m (66 to 148 ft), with a diameter of approximately 7.5 to 10.3 m (25 to 34 ft). The seabed surface would have a scour protection radius of approximately 22 to 26 m (72 to 85 ft). A jacketed WTG structure would penetrate the seabed approximately 30 to 60 m (98 to 197 ft), have a footprint of approximately 18 to 35 m (59 to 148 ft), and the seabed surface would have a scour protection radius of approximately 20 to 24 m (65 to 79 ft). A jacketed ESP structure would penetrate the seabed approximately 30 to 75 m (98 to 246 ft), have a footprint of approximately 18 to 45 m (59 to 148 ft), and the seabed surface would have a scour protection radius of approximately 20 to 28 m (65 to 92 ft).

During construction of the WTGs and ESPs, jack-up vessels may be employed. The horizontal APE is a diameter around the implanted structure that may be disturbed that is projected to be between 180 and 250 m (590 and 820 ft). The vertical depth of disturbance is considered to be less than the monopole and jacketed foundation depth described above. Anchoring activities, if required, would be confined within the Offshore Export Cable Corridor (OECC), which is typically 810 m (2,657 ft) wide but ranges up to 1,000 m (3,280 ft) wide in some areas where more maneuverability may be required. The vertical disturbance to the seabed from vessel anchors is expected to be less than 3 m (10 ft). Many deep-water operations are anticipated to make use of dynamically positioned vessels with no anticipated seabed or subsurface impact. Figure 2 depicts the marine archaeological resources APE for activities within the Wind Development Area (WDA) portion of the lease area.

Cabling of the proposed Project is expected to use two or more methods with different bottom disturbances. The inter-array and export cables would likely be installed by jet plow. The primary vertical impact from the cable installation occurs over a 1-m-wide (3.3-ft) cable

installation trench projected to range between 1.5 and 2.5 m (5 and 8 ft) deep. Minor disturbance may occur from up to 1-2 m (3.3-6.6 ft) wide temporary disturbance zone from the tracks or skids of the cable installation equipment. A dredge/trenching device is expected to be necessary in some sections of the route and may excavate to 4.5 m (15 ft) in the vertical prior to cable installation and cast dredged material within the OECC. It is anticipated that dredging would occur along the OECC until the hopper was filled to an appropriate capacity, then the dredging device would sail several hundred meters away (while remaining within the 810 m [2,657 ft] corridor) and bottom dump the dredged material. In areas with difficult seabed conditions where full cable burial is hard to achieve, cable protection (such as concrete mattresses, rock placement or half-shell pipes [or similar]) may overlay the cable. The maximum dimensions of the protective covering is expected to be a 9-m (29.5-ft) swath, 4.5 m (15 ft) to each side of the cable. Figure 3 depicts the marine archaeological resources APE for activities within the cable route.

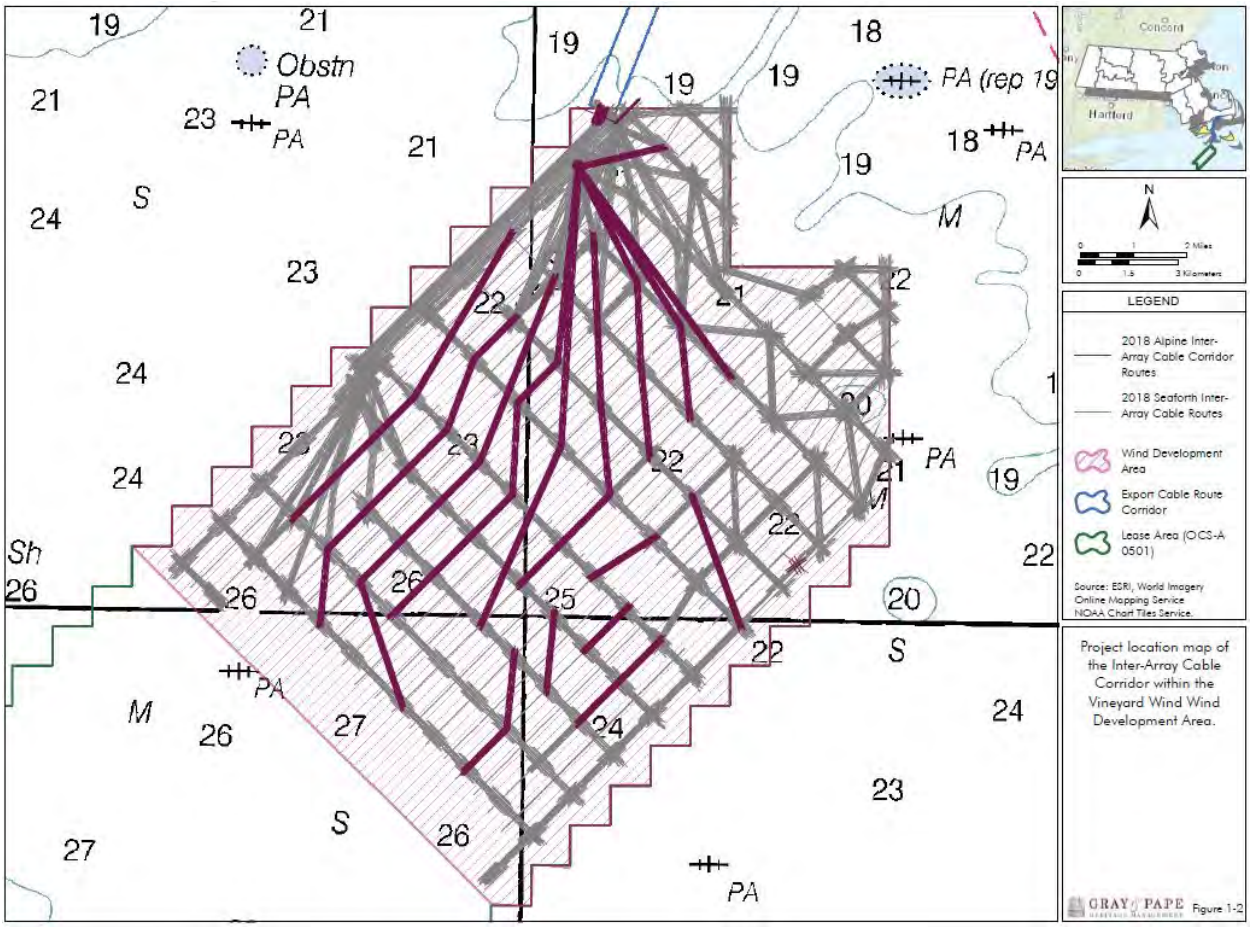

Figure 2. Marine archaeological resources APE for activities within the lease area (Tuttle et al. 2019).

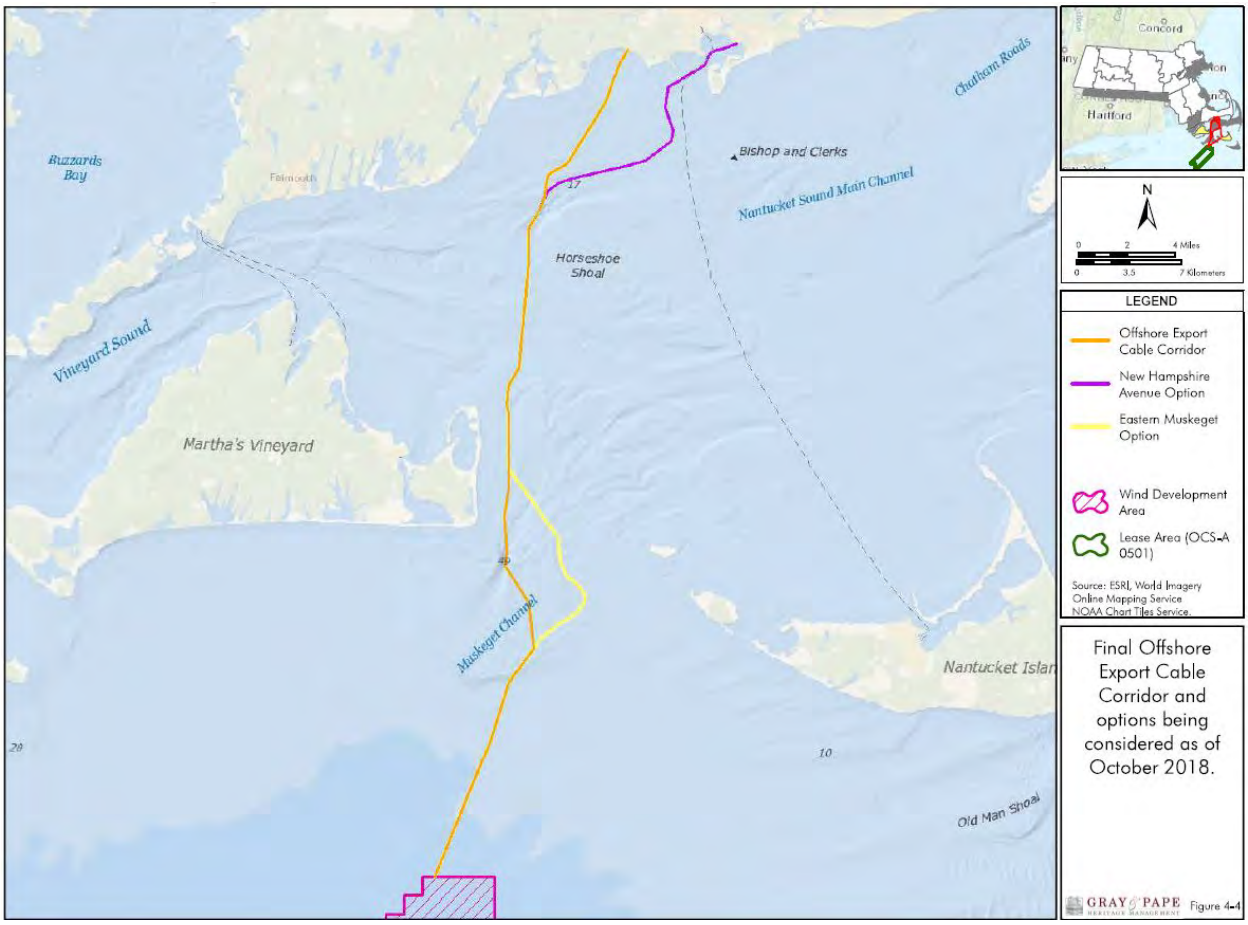

Figure 3. Marine archaeological resources APE for activities within the cable route (Tuttle et al. 2019).

1.3.2 Terrestrial Archaeological Resources APE

The APE for terrestrial archaeological resources includes areas potentially impacted by any ground disturbing activities associated with the construction and operation of the proposed Project. The APE is presented as a conservative PDE and includes the landfall sites, underground cable routes, the substation site, and equipment laydown areas. The depth and breadth of potential ground disturbing activities is described below for each location (Figure 4). The Preferred Alternative of the Covell's Beach landfall site and cable route are depicted in Figure 5; the Noticed Alternative of the New Hampshire Avenue landfall site and cable route are depicted in Figure 6. Figure 7 depicts the onshore substation site.

1.3.2.1 Landfall Site—Covell's Beach (Preferred Route)

The APE for the Covell's Beach landfall site is specified as follows. At the Covell's Beach landfall site, the horizontal directional drilling (HDD) rig and its supporting equipment would occupy approximately 0.8 acre of the paved staging area in the eastern end of the 2-acre Covell's Beach parking lot. The following Project elements would require excavation into the parking lot:

1. At the upper end of the parking lot, two transitional cable joint bays (one per landfall power cable), each approximately 6 m wide by 18.9 m long (20 ft wide by 62 ft long) by 2 m (6.5 ft) deep.

2. Immediately adjacent to each joint bay, two fiber optic cable vaults (one fiber optic cable per landfall power cable), each approximately 1.8 m (6 ft) long by 1.2 m (4 ft) wide by 1.5 m (5 ft) deep.
3. Approximately 9.1 m (30 ft) from the seaward edge of the parking lot, two HDD entry pits (one per landfall cable duct), each approximately 1.5 m (5 ft) wide by 1.5 m (5 ft) long by 1 m (3.3 ft) deep.
4. From each temporary HDD entry pit, a 46–76 centimeters (cm) (18 to 30 inches) diameter high-density polyethylene (HDPE) pipe with a ground-disturbance diameter of 91 cm (36 inches) would be installed via HDD for use in housing the export cables, which would intersect with the onshore cable route. HDPE conduits would run beneath the parking lot, beach, and intertidal zone, emerging at an exit point approximately 305 m (1,000 ft) offshore. The HDD conduit would be approximately 6.7 m (22 ft) beneath the middle of the beach, and at its deepest point, the conduit would be approximately 9.1 m (30 ft) below the seafloor.
5. Between the HDD entry pit and the joint bay, the two export cables would be installed in open trenches measuring approximately 1.8 m (6 ft) in depth, 1.2 m (4 ft) in width at the bottom and 2.4 m (8 ft) in width at the top.
6. After the export cables leave the two joint bays, they would be housed inside the proposed concrete encased duct bank of eight ducts in a 4 x 2 array (six for cables + two spares). Overall, concrete duct bank width would be 1.5 m (5 ft) and overall duct bank height would be 0.8 m (2.5 ft). The duct bank leaving Covell's Beach would be installed with 0.9 m (3 ft) of cover in an open trench with approximate trench depth of 1.7 m (5.5 ft) and approximate trench width (at the top) of 3 m (10 ft). The duct bank would leave the paved parking area, cross a short segment of unpaved area between Craigville Beach Road and the northwest corner of the parking lot. The duct bank would then follow roadways, and the dimensions would be as described below under the sections discussing the onshore cable routes (preferred and alternative).

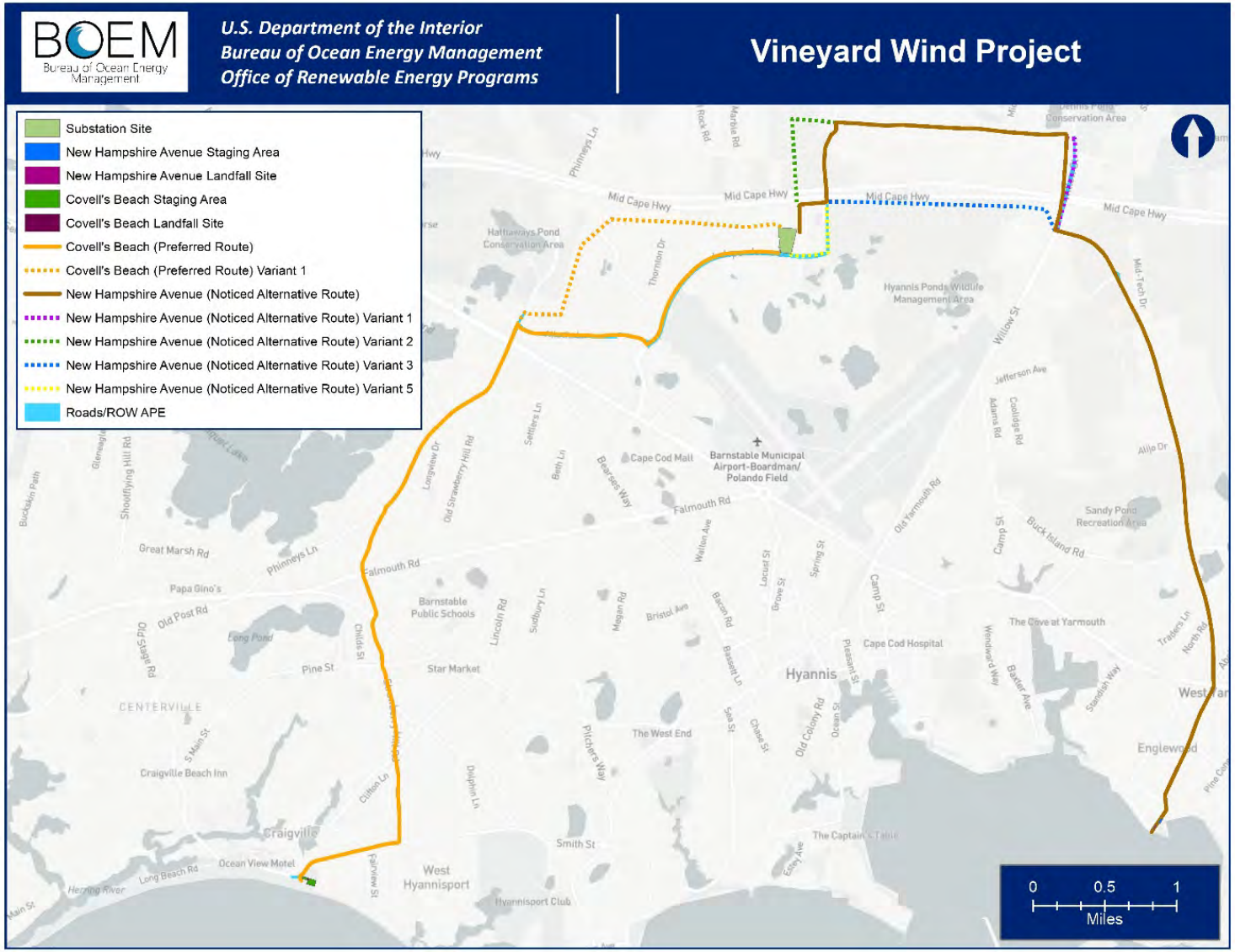

Figure 4. Overview of terrestrial archaeological resources APE.

Figure 5. Terrestrial archaeological resources APE for the Covell's Beach landfall site (Preferred Route).

Figure 6. Terrestrial archaeological resources APE for the New Hampshire Avenue landfall site (Noticed Alternative).

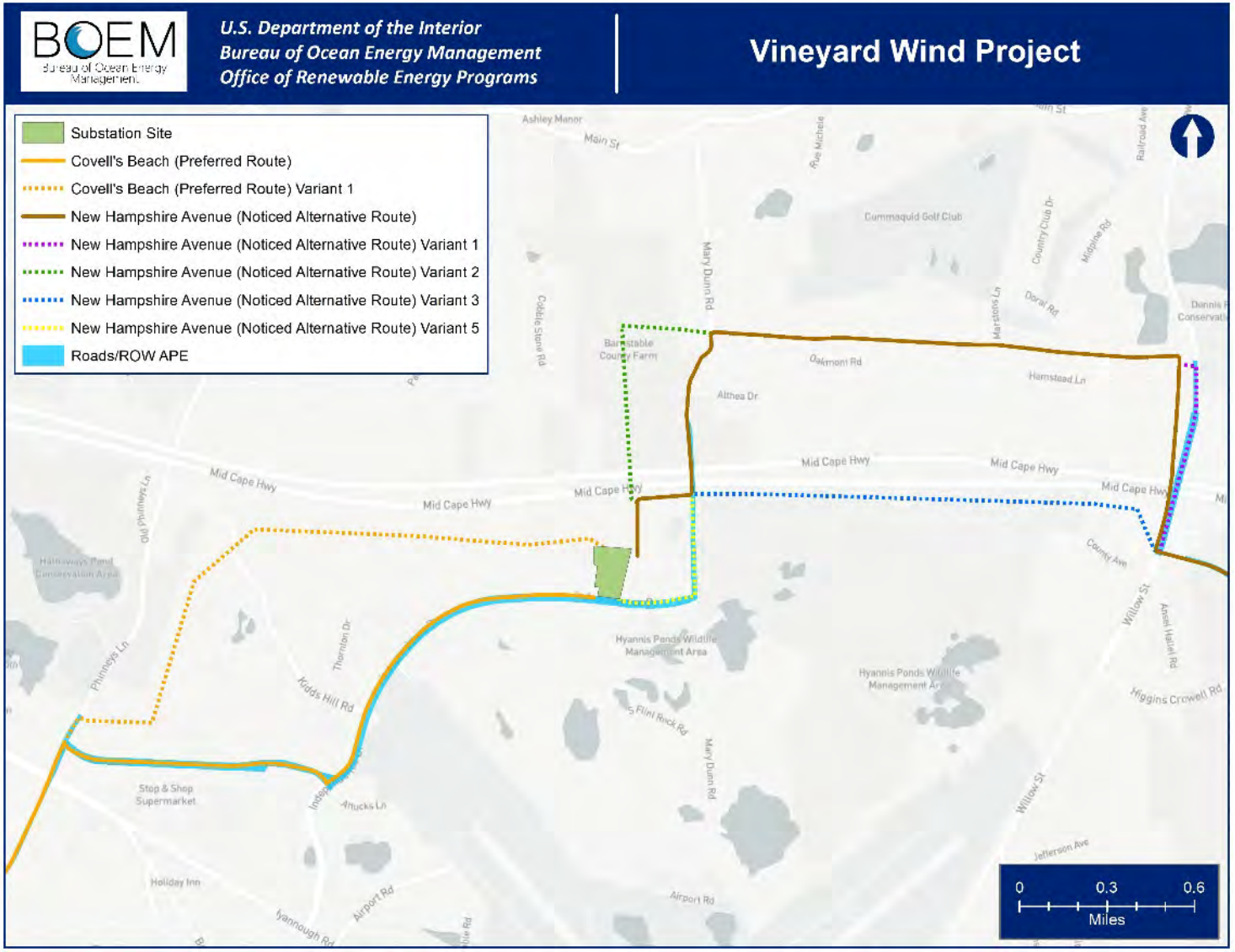

Figure 7. Terrestrial archaeological resources APE for the substation site.

1.3.2.2 Cable Route—Covell's Beach (Preferred Route)

The APE for the preferred onshore cable route associated with the Covell's Beach landfall site is the Town of Barnstable right-of-way (ROW) along the proposed onshore cable route. As described further below, the disturbance within the ROW would range from 3.4 m (11 ft) wide and 2.4 m (8 ft) deep for the typical trench width to install the duct bank, or up to 4.3 m (14 ft) wide and 3.7 m (12 ft) deep where splice vaults are necessary. Both the duct bank and the splice vaults may be installed anywhere within the Town of Barnstable ROW; therefore, the entire ROW along the onshore export cable route (OECR) is considered the APE, though only a portion of the ROW would actually be disturbed.

At either the Preferred Route or Noticed Alternative (described in the following section), the proposed underground cable routes would be installed within HDPE or polyvinyl chloride pipes or sleeves encased in concrete duct banks connecting from the selected Landfall site to the substation site. The proposed duct banks would be formed using cast-in-place concrete installed in open trenches measuring approximately 2.4 m (8 ft) in depth, 1.8 m (6 ft) in width at the bottom and 3.4 m (11 ft) in width at the top. Existing conditions within paved roadways would dictate the orientation of the duct bank, which would be either 0.8 m (2.5 ft) wide by 1.5 m (5 ft) deep or 1.5 m (5 ft) wide by 0.8 m (2.5 ft) deep. In locations where splice vaults are necessary, the excavated area would be larger, approximately 4.3 m (14 ft.) wide by 15.2 m (50 ft) long and 3.7 m (12 ft) deep, to accommodate pre-cast concrete splice vaults, which typically are 2.9 m (9.5 ft) wide by 10.8 m (35.5 ft) long and up to 2.9 m (9.5 ft) deep (outer dimensions). Thus, the maximum extent of disturbance within the APE (the Town of Barnstable ROW along the onshore cable route) is 4.3 m (14 ft) wide and 3.7 m (12 ft) deep.

The Preferred Route also includes Variant 1 along a utility ROW. This variant would include the same dimensions for the duct banks or the splice vaults that are described above. For the purposes of defining the APE, an area of potential ground disturbance measuring 3.7 m (12 ft) in depth and 4.3 m (14 ft) in width for the entirety of Variant 1 should be considered the APE.

1.3.2.3 Landfall Site—New Hampshire Avenue (Noticed Alternative Route)

Vineyard Wind is proposing open trenching at the New Hampshire Avenue landfall site, but is maintaining a short HDD as an alternative approach. Both options are described below.

At the New Hampshire Avenue landfall site, the in-water work area for open trenching would be enclosed with temporary sheet piling and is approximately 9.1 m (30 ft) wide and extends up to 61 m (200 ft) from shore, with a maximum depth of approximately 6.1 m (20 ft) mean sea level. A landfall transition vault would be located approximately 39.6 m (130 ft) from the landward edge of the sea wall; the vault's expected outer dimensions are 10.8 m (35.5 ft) long by 2.8 m (9.5 ft) wide by 2.9 m (9.5 ft) tall. Each landfall cable would be installed in a 46 to 76 cm (18 to 30 inch) HDPE conduit with a ground disturbance diameter of 91 cm (36 inches) that would be trenched in from the in-water work area to the landfall transition vault. The trench dimensions for these two transfer conduits would be about 2.4 m (8 ft) in depth, 1.2 m (4 ft) in width at the bottom and 2.4 m (8 ft) in width at the top. Landward of the transition vault, the dimensions for cable installation would be as described below under the sections discussing the onshore cable routes (preferred and alternative).

If HDD were to be used at the New Hampshire Avenue landfall site instead of open trenching, the HDD rig and its supporting equipment would be set up using an up to 0.25-acre staging area near the southernmost end of New Hampshire Avenue. The HDD would extend approximately 91.4 m (300 ft) offshore (total length of approximately 126 m [415 ft] long), with a 46 to 76 cm (18 to 30 inch) HDPE conduit with a ground disturbance diameter of 91 cm (36 inches) and a maximum depth of 4 m (13 ft) below mean sea level. A landfall transition vault (as described above) would be installed near the landward end of the HDD. Landward of the transition vault, the dimensions for cable installation would be as described below under the sections discussing the onshore cable routes (preferred and alternative).

1.3.2.4 Cable Route—New Hampshire Avenue (Noticed Alternative Route)

The APE for the alternative onshore cable route associated with the New Hampshire Avenue landfall site is the Town of Yarmouth and/or Town of Barnstable ROW along the proposed onshore cable route. As described in the previous section for Covell's Beach, the disturbance within the ROW would range from 3.4 m (11 ft) wide and 2.4 m (8 ft) deep for the typical trench width to install the duct bank, or up to 4.3 m (14 ft) wide and 3.7 m (12 ft) deep where splice vaults are necessary. Both the duct bank and the splice vaults may be installed anywhere within the Town of Yarmouth and/or Town of Barnstable ROW; therefore, the entire ROW along the OECR is considered the APE, though only a portion of the ROW would actually be disturbed.

The Noticed Alternative Route also includes portions that are unpaved or do not have a defined roadway ROW; and all or parts of Variants 2, 3, and 5 are either unpaved or do not have a defined roadway ROW. For the purposes of defining the APE for areas without a defined roadway ROW, an area of potential ground disturbance measuring 3.7 m (12 ft) in depth and 4.3 m (14 ft) in width is considered the APE.

1.3.2.5 Substation Site

The APE for the substation site is 5.9 acres of the total 6.4-acre site with a maximum ground disturbance of 4.6 m (15 ft) below the high peak of existing grade for the entirety of the roughly 5.9-acre area. The same substation site would be used regardless of the landfall site and onshore route chosen. Approximately 5.9 acres of the substation site would be cleared and graded; this proposed land clearing is limited only to what is needed to accommodate the substation. To complete finished site grades, and to balance earth cuts and fills, several retaining walls would be required and excavation for and construction of these walls would be required as part of completing the site grading effort.

Construction at the substation site would also require excavation of areas required for major component foundations/footings and full volume containment, excavation of the drainage swales and basins required for site drainage, and excavation of the trench for the portions of the duct bank within the substation site. Ground-disturbing activities would vary across the site and are anticipated to be a maximum of 4.6 m (15 ft) below the high peak of existing grade for the entirety of the roughly 5.9-acre area.

1.3.2.6 Equipment Laydown and Staging Areas – Covell's Beach Landfall Site to Substation (Preferred Route)

Equipment laydown and staging areas would be set up along the proposed routes. As mentioned previously, for the Covell's Beach landfall site, the HDD rig and its supporting elements would be set up using an approximately 0.8 acre staging area in the eastern end of the 2-acre paved Covell's Beach parking lot. Additional staging areas may be necessary along the OECR. Any additional staging areas would either be paved or, if unpaved, would be at previously established, well-known staging areas that are already used to support construction projects. Within these established staging areas, no excavation or vegetation clearing would be required. It is expected that if additional staging areas are used, they would temporarily store items such as typical roadway construction equipment (excavators, backhoes, dump trucks, etc.), lengths of pipe, framing/support materials, etc. Since any additional unpaved staging areas used would be existing, previously established staging areas that are used for multiple projects, these staging areas would not be considered part of the specific APE for the Project.

1.3.2.7 Equipment Laydown and Staging Areas—New Hampshire Avenue Landfall Site to Substation (Noticed Alternative Route)

As mentioned previously, for the New Hampshire Avenue landfall site, the HDD rig and its supporting elements would be set up using an up to 0.25-acre staging area near the southernmost end of New Hampshire Avenue. For existing paved areas such as those mentioned for the landfall sites, no ground disturbance is expected at equipment laydown and staging areas.

An equipment staging area with dimensions of approximately 0.22 acres (19.5 m [64 ft] wide by 45.7 m [150 ft] long by <0.3 m [1 ft] deep) is also proposed along the inactive extension of Higgins Crowell Road where a Massachusetts Department of Transportation bike path parking lot is proposed. Two additional staging areas are town-owned parcels within the Eversource ROW that, while partially disturbed from the existing utility line, are unpaved.

These areas are approximately 0.6 acre in size (Area 3 is approximately 22.9 m [75 ft] wide by 113 m [370 ft] long and Area 4 is approximately 30 m [100 ft] wide by 84 m [275 ft] long) and may require minimal grading for level storage of materials. For unpaved equipment areas, the depth of potential disturbance is expected to be a maximum of 0.3 to 0.9 m (1 to 3 ft).

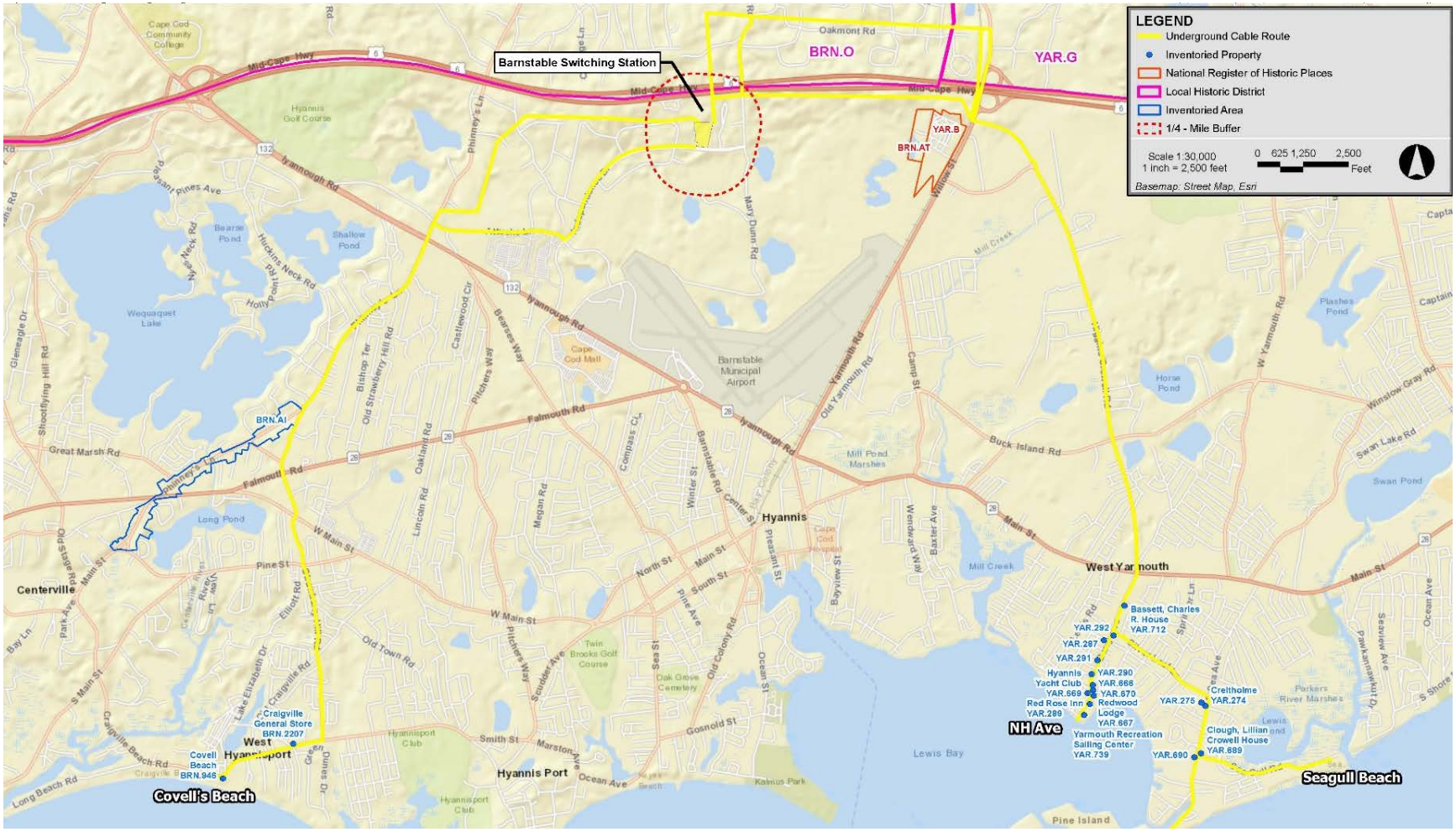

Figure 8. Map depicting the onshore viewshed APE, which includes a 0.25-mile boundary around the proposed onshore substation site.

1.3.3 Viewshed APE

The viewshed from which renewable energy structures—whether located offshore or onshore—would be visible, constitutes the viewshed portion of the APE. Onshore, the viewshed APE includes a 0.25-mile boundary around the proposed onshore substation site (Figure 8); all other elements would be underground and would not be visible.

Offshore, the viewshed APE includes a boundary of 56.8 km (35.3 mi) around the WDA, conservatively determined as the distance at which no part of the WTGs would be visible due to the Earth's curvature and horizon line. This was based on the maximum height of the blade tip of approximately 212 m (696 ft) and a 1.8-m (6-ft) observer height at the shoreline. At 56.8 km (35.3 miles), a target height of 212 m (696 ft) would be below the horizon line. At 1.8 m (6 ft) in height, an observer at the shoreline would perceive the horizon at 4,828 m (3 miles). With the height of 212 m (696 ft), a 56.8 km (35.3 miles) radius would ensure the entirety of the offshore structures would be below the horizon line. Environmental conditions such as wave height, fog, rain, haze, and other factors were not considered in this calculation, but would serve to further limit visibility. The more visually substantial elements of the assemblies would extend only to 121 m (397 ft); these elements would be entirely below the horizon line at a distance of approximately 44.1 km (27.4 miles) (Epsilon Associates, Inc. 2018).

The APE is further refined for island coastal areas through geographic information system analysis, and is shown on Figures 3-3 (a through c), 3-5, and 3-7 (a through c) in the historic resources report. "Within the 56.8 km (35.3 mi) radius from the [WDA] are numerous islands as well as Cape Cod; however, the first landmasses to be affected (Cuttyhunk Island, Martha's Vineyard, Nomans Land, Nantucket, Muskeget Island, and Tuckernuck Island) serve to provide a visual obstruction and buffer to areas within Buzzards Bay, Vineyard Sound, and Nantucket Sound. A narrow view corridor between Martha's Vineyard and Muskeget Island into Nantucket Sound allows for the potential visibility of the WDA from the Towns of Mashpee, Barnstable, and Yarmouth on Cape Cod at the end of the 56.8 km (35.3 mi) radius. Given the extreme distance and the numerous buildings and structures along the shorelines of Mashpee, Barnstable, and Yarmouth, only those areas directly along the shoreline are considered within the proposed APE. Although simulations show that the WTGs will not be visible from these distances, they are nevertheless included to be conservative" (Epsilon Associates, Inc. 2018) (Figure 9).

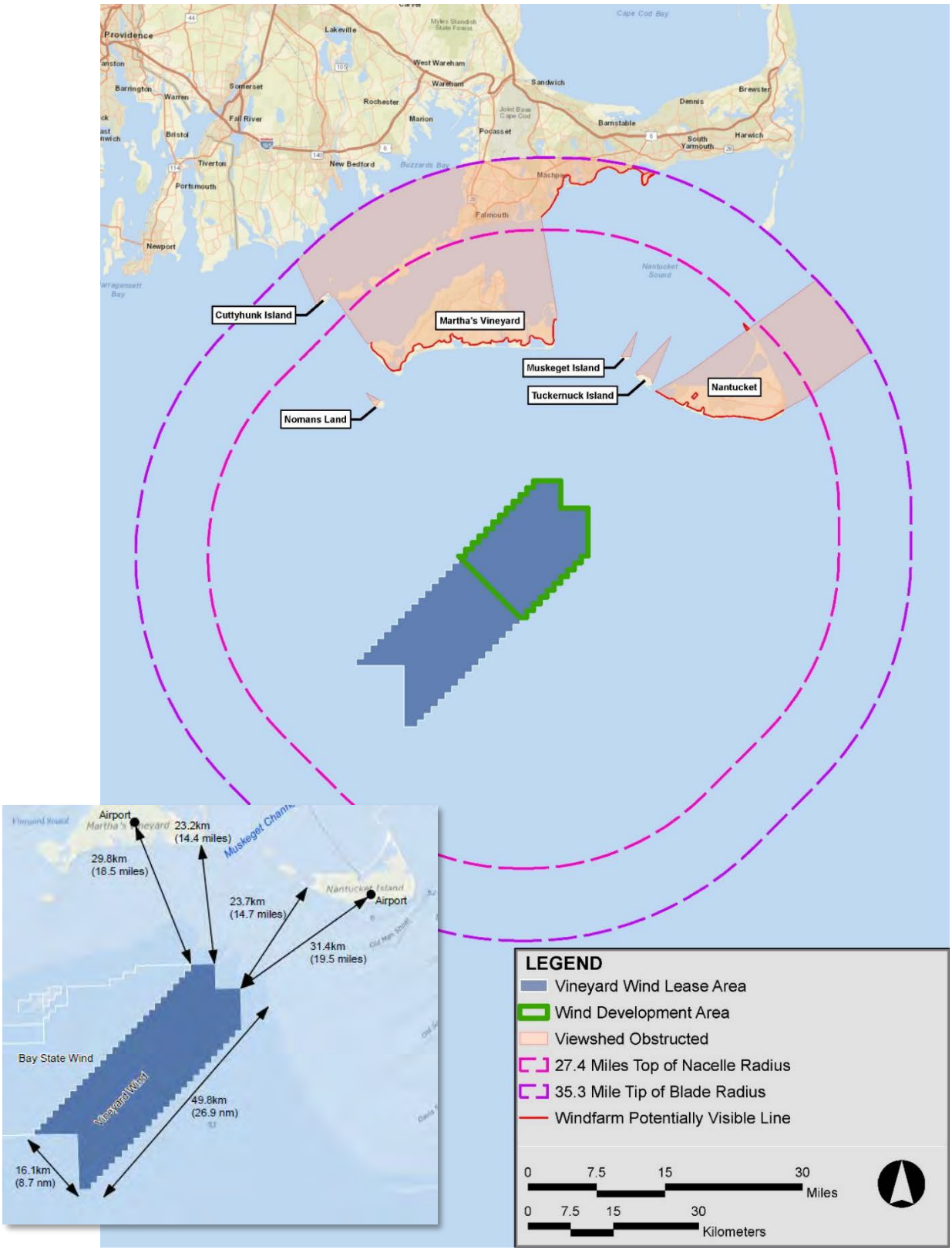

Figure 9. Map depicting the offshore viewshed APE, with inset depicting distance from various landmarks.

2 Steps Taken to Identify Historic Properties

2.1 Technical Reports

To support the identification of historic properties within the APE, Vineyard Wind has provided survey reports detailing the results of multiple cultural resource investigations within the terrestrial, marine, and viewshed portions of the APE. Table 1 provides a summary of these efforts to identify historic properties and the results/key findings of each investigation. BOEM has reviewed all of the reports summarized in Table 1 and found them to be sufficient. Collectively, BOEM finds that these reports represent a good faith effort to identify historic properties within the Project APE. As of June 12, 2019, all of the documents summarized in Table 1 have been shared with consulting parties and are hereby incorporated by reference.

BOEM has reviewed the reports summarized in Table 1 and has reached the following conclusions:

- The marine archaeological investigations include surveys of all areas of potential seafloor disturbance following BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585*. BOEM has reviewed the final marine archaeological survey report and has determined that the data are sufficient for identifying historic properties within the marine APE.
- BOEM has reviewed all of the terrestrial archaeological reports submitted to date and has determined that the investigations summarized in the reports are sufficient for identifying historic properties within the terrestrial APE.
- BOEM has reviewed the visual impact assessment with visual simulations and the assessment of visual effects to historic properties for the entire PDE and determined that the studies and reports are sufficient for identifying and assessing effects to historic properties within the visual APE. BOEM finds that the APE for potential visual effects analyzed is appropriate for the scale and scope of the undertaking. BOEM further finds that the inventory of historic properties is sufficient to consult on the undertaking, and represents a good faith effort to identify historic properties within the viewshed APE potentially affected by the undertaking, as defined at 36 CFR 800.4.

In addition to the conclusions summarized above, BOEM has found that the assessment of effects to historic properties within the terrestrial, marine, and viewshed portions of the APE contained within these reports is sufficient to apply the criteria of adverse effects and continue consultations for resolving adverse effects to historic properties.

Table 1. Summary of Cultural Resources Investigations Performed by Vineyard Wind in the Terrestrial, Marine, and Visual Portions of the APE

Portion of the APE	Report	Description	Key Findings / Recommendations
Onshore	Upland Cabling Routes Archaeological Due Diligence Report (PAL 2017).	A desktop study of known archaeological sites within 0.8 km (0.5 mi) of the Preferred and Notice Alternative upland cable routes, as well as six variants and one substation parcel, in Barnstable and Yarmouth.	Previous cultural resource investigations identified 29 pre-contact and two post-contact period archaeological sites within 0.8 km (0.5 mi) of the studied routes. One archaeological site was previously identified within and/or adjacent to the western routes; six archaeological were previously identified within and/or adjacent to the eastern routes.
Onshore	Archaeological Reconnaissance Survey: Vineyard Wind Upland Cabling Project (Ritchie 2018a).	A reconnaissance survey of the proposed Vineyard Wind upland cabling Preferred Route, the Noticed Alternative Route, four Preferred Route variants (Variants 1, 2, 3, and 5), one Noticed Alternative variant (Variant 1), and a substation.	The report identified zones of high archaeological sensitivity in the southern ends of the Preferred Route and of the Noticed Alternative Route in Barnstable and West Yarmouth. Vineyard Wind's cultural resources consultant recommended archaeological monitoring of Project construction activities within the identified zones of high and moderate archaeological sensitivity along existing roads in the Project area. The report recommended an intensive archaeological survey for the proposed substation at the Barnstable Switching Station.
Onshore	Intensive Archaeological Survey: Proposed Substation Vineyard Wind Upland Cabling Project (Ritchie 2018b).	An intensive archaeological survey within the proposed 6.4-acre substation.	The report presented two isolated finds: a small stemmed point of Late to Transitional Archaic (5000-2500 before present [B.P.]) or Early Woodland Period (2500-1600 B.P.) and a piece of quartz chipping debris. Sampling around these find spots did not yield any other pre-contact cultural material and the finds are not considered to be potentially significant cultural resources. No additional archaeological investigations of the proposed substation location is recommended. Massachusetts Historical Commission also reviewed the report and concurred with its conclusions.
Offshore	Marine Archaeological Services in Support of the Vineyard Wind Construction and Operations Plan (Tuttle, Donta, and Scholl 2018).	A desktop study/analysis and marine remote sensing surveys of portions of the WDA and OECCs.	The report documented that the submerged project area has potential for retaining evidence of human activity prior to sea level rise, and this potential is bound by time and distance from the present shoreline; the entire region was subaerial during the Paleoindian, with marine transgression rapidly covering the landscape during the Archaic and early Woodland periods. One shipwreck was found in the WDA that was recommended for avoidance as a potentially significant cultural resource.

Portion of the APE	Report	Description	Key Findings / Recommendations
Offshore	Marine Archaeological Services in Support of the Vineyard Wind Offshore Wind Energy Project Construction and Operations (Tuttle et al. 2019)	A report summarizing the results of high-resolution geophysical and geotechnical marine surveys of the Project WDA and OECC performed in 2016, 2017, and 2018.	The marine surveys identified two shipwrecks in the WDA and five additional debris scatters interpreted as potential shipwrecks along the OECC. The analysis of geophysical and geotechnical data indicated that there are submerged paleolandforms within the Project area that have the potential to contain pre-contact Native American archaeological resources. Avoidance of the wreck sites and debris fields is recommended. If avoidance is not possible, further investigations are recommended to determine their significance. Similarly, identified paleolandform features are archaeologically sensitive and avoidance is recommended. If avoidance is not possible, additional investigations are recommended to determine significance.
Offshore	Addendum to Volume II-C [of the COP]: Marine Archaeological Report (Epsilon Associates, Inc. 2019).	An addendum assessing potential dredge areas at a depth of 14.7-26.2 feet (4.5–8 meter); is a supplement to the previous analysis that assessed potential dredge areas to a depth of 14.7 feet (4.5 meters), so that the total APE depth reviewed in potential dredge areas is up to 26.2 feet (8 meters).	The addendum defines avoidance areas within the potential deeper dredge areas that are either below the ravinement surface (and thus may represent intact sediments) or are within interpreted paleolandform features. The avoidance areas associated with dredging or deeper cable installation to 26.2 feet (8 meters) are spatially connected to areas previously identified for avoidance.
Viewshed	Vineyard Wind Historic Properties Visual Impact Assessment (Epsilon Associates, Inc. 2018).	A study evaluating visual impacts to historic properties through a Geographic Information System-based computer simulation and field-based study. The study also assessed potential adverse effects to historic properties based on the view of the WDA from historic properties and landscapes on Martha's Vineyard and Nantucket.	The report identified a variety of historic properties that the proposed Project may affect. However, the report concluded no adverse visual impacts due to changes in their setting as a result of the Project due to the limited area within the properties' where the WDA will be visible as well as the limited visibility due to weather conditions.
Viewshed	Vineyard Wind Project: Visual Impact Assessment (Saratoga Associates 2018).	A report of visual impact assessment designed to identify potential visibility of the Project and objectively determine the difference in landscape quality with and without the Project in place.	The widest portion of the WTG (foundation and deck) would be substantially below the visual horizon and would not be visible for most WTGs from most KOPs. In addition, given the narrow width of the tower and rotor combined with the distance from the viewpoints, these elements of the WTG would be minimally discernible by the naked eye in the best visibility conditions (a clear, low humidity day) and not detectable in haze or fog typical of this marine landscape. Overall, visual impacts to onshore viewers of WTGs in daylight would be expected to be minor.

2.2 Consultation and Coordination with the Parties and Public

2.2.1 Early Coordination

Since 2009, BOEM has coordinated Outer Continental Shelf (OCS) renewable energy activities offshore Massachusetts with its federal, state, local, and tribal government partners through its Intergovernmental Renewable Energy Task Force. Additionally, BOEM has met regularly with federally recognized tribes that may be affected by renewable energy activities in the area since 2011, specifically during planning for the issuance of leases and review of site assessment activities. BOEM also hosts public information meetings to help keep interested stakeholders updated on major renewable energy milestones. Information pertaining to BOEM's Massachusetts Intergovernmental Renewable Energy Task Force meetings is available here: https://www.boem.gov/Massachusetts-Renewable-Energy-Task-Force-Meetings/ and information pertaining to BOEM's stakeholder engagement efforts is available: https://www.boem.gov/Renewable-Energy-Program/State-Activities/MA/Public-Information-Meetings.aspx.

2.2.2 NEPA Scoping and Public Hearings

On March 30, 2018, BOEM announced its Notice of Intent (NOI) to prepare an EIS for the Vineyard Wind COP. This purpose of the NOI was to solicit input on issues and potential alternatives for consideration in the Vineyard Wind COP EIS. Throughout the scoping process, federal agencies, state, tribal, and local governments, and the general public had the opportunity to help BOEM determine significant resources and issues, impact-producing factors, reasonable alternatives, and potential mitigation measures to be analyzed in the EIS, as well as provide additional information. BOEM also used the NEPA commenting process to allow for public involvement in the Section 106 consultation process under the NHPA (54 U.S.C. 300101 et seq.), as permitted by 36 CFR 800.2(d)(3). Through this notice, BOEM announced its intention to inform its Section 106 consultation using the NEPA commenting process, and invited public comment and input regarding the identification of historic properties or potential effects to historic properties from activities associated with approval of the Vineyard Wind COP.

Additionally, BOEM held public scoping meetings, which included specific opportunities for engaging on issues relative to Section 106 for the Vineyard Wind COP at the following places and dates:

- New Bedford, Massachusetts, Monday, April 16, 2018;
- Martha's Vineyard, Massachusetts, Tuesday, April 17, 2018;
- Nantucket, Massachusetts, Wednesday, April 18, 2018;
- Hyannis, Massachusetts, Wednesday, April 18, 2018; and
- Kingston, Rhode Island, Thursday, April 19, 2018.

Through this NEPA scoping process, BOEM received comments related to cultural, historic, archaeological, or tribal resources. These are presented in BOEM's EIS Scoping Report, available here: https://www.boem.gov/VW-EIS-Scoping-Report/ and are summarized as follows:

- Potential for visual impacts on Nantucket's economy and historic buildings, places, and districts, especially from Madaket Beach in the west to Sconset Beach in the east.

- Consultation with the Nantucket Historic District and the Nantucket Historical Commission should be performed due to the high cultural and historic sensitivity of the island.
- Coordination with the potentially affected tribes in determining whether any of the proposed lease areas are historically, culturally, or spiritually important.
- BOEM should document coordination pursuant to Executive Order 13175 in the EIS and that BOEM should work with federal agencies involved in the proposed Project to determine the lead agency for consultation for impacts from the proposed Project on land and the ocean.
- Tribes have requested the opportunity to participate when archaeology work is being conducted, as opposed to being invited to discuss results after fieldwork has been completed. The recommendation is for BOEM work to promote this level of coordination for the proposed Project.
- Strobing or blinking nighttime lighting systems, as are standardly installed on WTGs, are incongruous with Nantucket's lighting regulations and would negatively impact the Island's cultural identity of historic and environmental preservation.

On December 7, 2018, BOEM published a Notice of Availability for the Draft EIS for the COP submitted by Vineyard Wind. As part of this process, BOEM held public hearings from February 11-15, 2019 in Rhode Island and Massachusetts at the following places and dates:

- Nantucket, Massachusetts, Monday, February 11, 2019;
- Martha's Vineyard, Massachusetts, Tuesday, February 12, 2019;
- Hyannis, Massachusetts, Wednesday, February 13, 2019;
- New Bedford, Massachusetts, Thursday, February 14, 2019; and
- Narragansett, Rhode Island, Friday, February 15, 2019.

The public comment period closed on February 22, 2019. The input received via this process is being used to inform preparation of the Final EIS.

2.2.3 Section 106 Consultations

After receipt of the COP submission from Vineyard Wind, BOEM contacted 65 governments and organizations, providing information on the proposed Project and inviting them to be a consulting party to the Section 106 review of the COP (Appendix A-1). Entities that responded to BOEM's invitation or were subsequently made known to BOEM and added as consulting parties are listed in Appendix A-2. BOEM initiated Section 106 consultation with letters to these entities on June 7, 2018, and held an initial Section 106 consultation meeting by webinar on June 26, 2018. Additionally, BOEM held government-to-government consultation meetings with the Mashantucket Pequot Tribe, the Mohegan Tribe of Connecticut, and the Narragansett Indian Tribe on August 21 and 22, 2018. BOEM held a government-to-government consultation meeting with the Mashpee Wampanoag Tribe on February 14, 2019, and requested a government-to-government consultation meeting with the Wampanoag Tribe of Gay Head Aquinnah; a staff-level meeting was held on April 3, 2019. In these letters and consultation meetings, BOEM requested information from consulting parties on historic properties that may be potentially affected by the proposed undertaking.

On October 16, 2018, BOEM shared with consulting parties the preliminary terrestrial archaeological resources report, the preliminary marine archaeological resources report, the complete visual impact assessment and visual simulations report, and the complete report assessing effect to historic properties within the viewshed APE. BOEM additionally held a Section 106 consultation meeting on November 7, 2018, on the island of Nantucket, Massachusetts, to review the results of the visual effects assessment on historic properties.

BOEM held a subsequent Section 106 consultation meeting on April 2, 2019, in Hyannis, Massachusetts, to discuss options for resolving adverse effects to two historic properties, the Nantucket NHL and the Gay Head Lighthouse, and to discuss Project impacts to submerged paleolandforms identified within the marine APE that BOEM has now determined – in consultation – to be contributing elements to the Nantucket Sound TCP. At the conclusion of the April 2 meeting, the consulting parties requested additional time to provide proposals to mitigate adverse effects to the Nantucket NHL. BOEM agreed, and requested that interested consulting parties submit mitigation proposals for effects to the Nantucket NHL to BOEM by April 19, 2019, so they could be included on the agenda for a follow up discussion on April 30, 2019. In addition, the consulting Native American tribes at the April 2 meeting requested that BOEM organize a webinar for the tribes to discuss the submerged paleolandforms identified within the marine APE, and effects to them as contributing elements to the Nantucket Sound TCP. The tribes requested that during the webinar Vineyard Wind and their cultural resources consultants provide a more detailed review of the paleolandforms identified in the marine APE discuss how the project might adversely affect them.

On April 30, BOEM held a Section 106 webinar with consulting parties to discuss the proposals submitted by the consulting parties to mitigate adverse effects to the Nantucket NHL. During the April 30 webinar, BOEM and the consulting parties discussed the proposed mitigation measures for resolving adverse effects to the Nantucket NHL. The consulting parties were unable to reach an agreement on how to mitigate adverse visual effects to the Nantucket NHL.

On May 8, 2019, Vineyard Wind and BOEM held a Section 106 webinar with the consulting Federally-recognized tribes. During the May 8 webinar, Vineyard Wind and their consultants provided a detailed review of the paleolandforms identified during geotechnical and geophysical surveys of the marine APE and discussed those that could and could not be avoided. After the Vineyard Wind presentation, BOEM presented a proposal to mitigate adverse effects to submerged paleolandforms by using geotechnical cores collected by Vineyard Wind to develop a paleoenvironmental reconstruction of Nantucket Sound's Late Pleistocene/Early Holocene (ca. 20,000-6,000 years ago) landscape. BOEM intends to continue discussions with Federally recognized tribes about suitable mitigations for paleolandforms on June 26, 2019.

On June 10, 2019, BOEM held a conference call with the Chappaquiddick Wampanoag Tribe regarding their comments on the initial Finding, namely that Chappaquiddick Island should be treated as a historic property that may be adversely visually affected, as well as concerns over potential effects to salt ponds that could change their fish and shellfish production, which the Tribe considers a historic resource.

2.2.4 Consulting Parties' Comments on Initial Finding of Adverse Effect

On April 10, 2019, BOEM submitted an initial Finding of Adverse Effect for the Vineyard Wind COP on the Gay Head Lighthouse and the Nantucket NHL to the Section 106 consulting parties for review and comment and made this documentation available for public inspection on its website. The review and comment period for the initial Finding of Adverse Effect closed on May 15, 2019. Eighteen individual consulting parties or members of the public provided comments on the initial Finding of Adverse Effect. Table 2 provides a summary of comments provided by consulting parties. A more detailed summary of each consulting parties' comments can be found in Appendix B-1. Appendix B-2 contains the original comments BOEM had received prior to issuing the initial Finding.

In response to these comments, BOEM has made edits to the initial Finding. Namely, BOEM has revised its initial Finding of an indirect adverse visual effect on the Gay Head Lighthouse and the Nantucket NHL to be a direct adverse visual effect. See Sections 3.1 and 3.2, below. Secondly, based on information provided by the Chappaquiddick Wampanoag Tribe, a non-Federally recognized tribe that is a consulting party to the Section 106 review, BOEM has concluded that there would be direct adverse effects visual effects to multiple traditional cultural places comprising the Chappaquiddick Island TCP, a newly identified property potentially eligible for the National Register. *See* Section 3.3, below. Finally, based on BOEM's review of analysis provided in Epsilon Associates, Inc. 2018; Saratoga Associates 2018; Tuttle, Donata, and Scholl 2018; and Tuttle et al. 2019), and based on consultations conducted thus far, BOEM has concluded that there would not be an adverse *visual* effect to the Nantucket Sound TCP, but there would be adverse *physical* effects – including irreversible damage – to 19 submerged paleolandforms as contributing elements to the Nantucket Sound TCP that cannot be avoided. See Section 3.4, below. BOEM performed an analysis of alternatives and cumulative effects in its EIS, at https://www.boem.gov/Vineyard-Wind-EIS/, and refers interested parties to Sections 3.4.3 and Appendix C.

Finally, in accordance with comments from ACHP, BOEM will not make final determinations on proposed measures to avoid, minimize, and mitigate adverse effects until after the review period for the revised Finding has elapsed, and additional consultations have been conducted, in order that all steps in the Section 106 process for all portions of the APE are completed in a linear fashion. BOEM will continue consultations on appropriate means of resolving adverse effects during the 30-day review period for this Finding. At this time, BOEM has completed all steps for all portions of the APE pursuant to §§ 800.3, 800.4, and 800.5.

Table 2. Summary of Consulting Party and Public Comments on BOEM's Initial Finding of Adverse Effect on the Nantucket NHL and Gay Head Lighthouse

Commenter	Summary of Comments
Advisory Council on Historic Preservation (ACHP)	The ACHP provided written comments that focused on particular issues including the sequencing of consultation; how direct, indirect, and cumulative impacts were assessed, especially related to visual effects; National Historic Landmark responsibilities associated with National Park Service (NPS) guidelines; consideration of alternatives and modification to alternatives; meeting format and mitigation discussions with consulting parties; and time constraints associated with the consultation process.

Commenter	Summary of Comments
Chappaquiddick Tribe of the Wampanoag Nation	Although the Tribe agrees with certain portions of the Finding for Adverse Effect, they stated that Chappaquiddick Island should be treated as a historic property and assessed separately from Martha's Vineyard Island. The Tribe is concerned about potential effects to salt ponds that could change their fish and shellfish production, which the Tribe considers a historic resource.
Gay Head Lighthouse Advisory Board	The advisory board is pleased with the Section 106 Consultation process and the commitment to use Aircraft Detection Lighting Systems to reduce night-time lighting impacts.
Massachusetts Historical Commission (MHC)	MHC outlined a number of substantive comments concerning the draft Finding of Adverse Effect and the MOA. These comments focused on day and night visual impacts assessments; the proposed mitigation for the Gay Head Lighthouse; suitable mitigation for the Nantucket Historic District; the findings, mitigation, and potential research for the Nantucket Sound Traditional Cultural Property and marine archaeological resources; the potential need for additional terrestrial surveys for on-shore activities; and the development of a Post-Review Discoveries protocol.
Nantucket Conservation Foundation (NCF)	NCF described its change in leadership and inability to provide comments and proposals by the deadline established. They anticipate that proposals could be developed to mitigate effects to their properties. They voiced concern over the timing of the discussion of mitigating actions while the review was still under way. They also support the idea of a community "mitigation fund."
Nantucket Planning and Economic Development Commission	The Commission supports the comments submitted by the NPS and the Town of Nantucket and encourages BOEM to fulfill its mandate and protect the impacted NHL.
Nantucket Preservation Trust (NPT)	NPT agrees with BOEM's Finding of Adverse Effect and agrees that off-site mitigation is necessary. They are also concerned that many of the projects being proposed for mitigation are not focused on preservation and object to allocating mitigation funds for unidentified projects.
National Park Service	The NPS agrees with the Finding of Adverse Effect, but not with how BOEM characterized the effects to the NHL. The NPS does not consider the effects to be short-term, and seeks additional analyses of the cumulative effect of additional wind projects. NPS also seeks to review additional information on how blade movement visibility will minimize daytime visibility effects. They also seek to review other actions to minimize other types of nighttime lighting.
The Town and County of Nantucket, through its attorneys	Attorneys for the Town and County of Nantucket stated that BOEM is rushing the Vineyard Wind Project to completion and failing to address its immediate and long term adverse effects in a meaningful way. The firm asserted that BOEM (1) improperly issued the Finding of Adverse Effect , which is based upon unreliable and incomplete information; (2) required consulting parties, who are still commenting on adverse effects, to suggest resolution measures even before BOEM issued the Finding of Adverse Effect; (3) inadequately considered cumulative effects of the multiple offshore wind farms planned for neighboring lease areas; (4) failed to obtain sufficient input from other federal agencies that are obligated to fulfill statutory and regulatory duties on this Project; and (5) is not yet finished identifying historic and cultural properties potentially affected by the Project.
U.S. Army Corps of Engineers, Regulatory Division (USACE), New England District	The USACE concurs with the April 10, 2019, Finding of Adverse Effect; however, recognizes that additional determinations will be made and state that their concurrence is limited to the April 10 document.
Vineyard Power Cooperative	The Cooperative supports the Project and believes that it is imperative to the long-term survival of coastal areas in the region. It believes that Nantucket and its residents are engaging in delay tactics.
Vineyard Wind	The Project proponent provided suggested revisions, additions, clarifications, and comments including suggestions for updated figures, clarifications of text, and updates to images.

Commenter	Summary of Comments
Public Comment 1	The Nantucket Civic Leagues agrees with suggested physical mitigation measures for the turbines and believes that additional measures are required for anticipated economic impacts that will affect the island. In addition, the Civil League believes that additional simulations with varying conditions at different locations are needed.
Public Comment 2	Homeowner Cuck Wagner is concerned about the visual and environmental impacts of the Project. He requested the implementation of the proposed visual mitigations and that environmental impacts be studied and mitigated.
Public Comment 3	Wingate Companies Real Estate Firm in Newtown, Massachusetts expressed a general concern about negative impacts for Nantucket.
Public Comment 4	Homeowner Jocelyn Duffy is concerned about negative impacts to the area's resources and requested that the Project be diligently reviewed.
Public Comment 5	Alan Meinke Believes that the Project will have a permanent, damaging impact on Nantucket's economy and historic character and requested that the Project not be permitted to continue.
Public Comment 6	Residents Kathleen and Dan Knise are worried that Nantucket's unique viewshed will be negatively impacted by the Project and requested additional investigation of its impact.

3 Affected Historic Properties and Undertaking's Effects on Them

The identification of historic properties within the terrestrial, marine, and viewshed portions of the APE is complete. The following section documents the three affected historic properties within the viewshed portion of the APE; the 35 paleolandforms identified within the marine portion of the APE that are contributing elements to the Nantucket Sound TCP; and the 7 shipwrecks or potential shipwrecks identified within the marine portion of the APE, as well as the undertaking's effects upon them.

As mentioned above, residents, local government officials, and other consulting parties present at the various Section 106 consultation meetings BOEM hosted on the island of Nantucket; in Hyannis, MA; and via webinar have expressed that the view of the undeveloped ocean is integral to the character, setting, feeling, and association of the Nantucket NHL and Gay Head Lighthouse historic properties. During various Section 106 meetings, the consulting Federally recognized tribes have stated that submerged paleolandforms identified within the marine portion of the APE are culturally significant resources as the lands where their ancestors lived and the locations where events described in Tribal oral histories occurred and are potentially contributing elements to the Nantucket Sound TCP. Finally, the Chappaquiddick Wampanoag Tribe, a non-Federally recognized tribe that is a consulting party to the Section 106 review, has stated that there exist multiple traditional cultural places potentially affected by the undertaking on the island of Chappaquiddick. Each is treated below.

3.1 Gay Head Lighthouse, Martha's Vineyard

Gay Head Lighthouse is located on the southwestern most portion of the island of Martha's Vineyard marking Devil's Bridget rocks, the shoals of the south shore of the island, and the entrance to Vineyard Sound from Buzzard's Bay on the route to Boston Harbor from the South. It was listed on the National Register of Historic Places (NRHP) in 1987 as part of the Lighthouses of Massachusetts Thematic Resources Area and is significant under Criteria A and

C as a historic maritime structure and aid to navigation (DiStefano and Salzman 1981; Unnamed 2015; and Epsilon Associates, Inc. 2018).

Constructed in 1855-1856, the Gay Head Lighthouse was once one of the ten most important lights on the Atlantic Coast and originally contained one of the country's first Fresnel lenses. The brick and sandstone tower meets Criterion A for its association with the island's maritime history as an aid to navigation. The structure also meets Criterion C as an example of a 19th century maritime structure constructed of bricks utilizing the clay from the Gay Head Cliffs. The 1856 lighthouse, a brick tower 45 feet in height, is the only remaining structure at the site; the original brick Keeper's House was replaced by a wooden house in 1906 and was later torn down in 1961. Although the lighthouse was moved from its original location 150 feet east in 2015 and its setting and location are partially compromised, the structure retains integrity of design, material, workmanship, feeling, and association (DiStefano and Salzman 1981; Unnamed 2015; and Epsilon Associates, Inc. 2018).

The maritime setting of the Gay Head Lighthouse and its viewshed would be altered through the introduction of new elements out of character with the historic setting, feeling, and association, thereby diminishing its integrity. Existing power lines and other modern elements already within the foreground of portions of the view are not located on the ocean, the association and historic feeling of which is integral to this property's setting; thus, their existence does not serve to remove nor offset the effect on the property resulting from the introduction of new ocean-founded visual elements proposed in the Vineyard Wind COP. Additionally, while existing topography and mature tree growth to the southeast partially obstruct the ocean view, it is estimated that the ocean view from the Gay Head Lighthouse to the south and the west would be obstructed by the new ocean-founded visual elements proposed in the COP less than 76 percent of the time during daylight hours in a given year. The 76 percent estimate was calculated using average visibility of 16 km (10 mi) from the coast. Since the nearest proposed ocean-founded visual element is located 38.7 km (24 mi) from the Gay Head Lighthouse, BOEM anticipates that the proposed Project would be visible in a given year far less than the 76 percent estimate (Epsilon Associates, Inc. 2018).

On June 3, 2019, Vineyard Wind provided BOEM with additional analysis of the visibility of the project using the algorithm presented in OCS Study BOEM 2017-037 "Visualization Simulations for Offshore Massachusetts and Rhode Island Wind Energy Area - Meteorological Report." Based on Vineyard Wind's additional analysis, the project would be visible from the Gay Head Lighthouse, on average, 19% of the time (39% during the day and 0.1% at night, when using ADLS (discussed below; *see* Appendix C-1)).

According to 30 CFR Part 585 and other BOEM requirements, Vineyard Wind would be required to remove or decommission all installations and clear the seabed of all obstructions created by the proposed Project. All facilities would need to be removed 15 feet (4.6 meters) below the mudline (30 CFR § 585.910(a)). Absent permission from BOEM, Vineyard Wind would have to complete decommissioning within two years of termination of the lease and either reuse, recycle, or responsibly dispose of all materials removed.

3.2 Nantucket Historic District National Historic Landmark

Situated approximately 30 miles south of Cape Cod, Massachusetts, the Nantucket NHL comprises the entirety of the islands of Nantucket, Tuckernuck, and Muskeget. Combined, the three islands occupy approximately 28,000 acres, and contain 5,027 contributing resources, nearly half of the total number of resources (contributing and non-contributing) located within the property. In 1955, Nantucket became one of the first two local historic districts in Massachusetts and one of the earliest local historic districts in the nation through special legislation initiated by the town and passed by the Commonwealth of Massachusetts. It was listed on the NRHP in 1967, with several more recent updates, notably in 1975 and 2012 (Chase-Harrell and Pfeiffer 2012, Heintzelman 1975, and Epsilon Associates, Inc. 2018).

According to the 2012 Landmark nomination,

> "The 1966 National Historic Landmark nomination for Nantucket focused entirely on its association with the American whaling industry (NHL Criterion 1) and the remarkable survival of the architecture and ambiance of an early whaling port (NHL Criterion 4), and the period of significance ended with the decline of whaling on Nantucket. While whaling built Nantucket, other factors preserved it; tourism replaced whaling as the island's economic mainstay, and historic preservation took early root on the island. With the passage of time, the importance of these factors in preserving the island's character has become apparent, and it is the purpose of this update to establish the national significance of tourism and historic preservation as well as whaling on Nantucket and to extend the period of significance to 1975, when the last element of governmental protection of the island was set in place by the expansion of the National Historic Landmark District to include the entirety of the island. This expansion followed the 1971 expansion of the local historic district to encompass the entire island as well as the outlying islands of Tuckernuck and Muskeget. These updates also recognize Nantucket's Native American and African-American communities and the important roles that they played in the whaling industry and the social history of the island" (Chase-Harrell and Pfeiffer 2012).

The Nantucket NHL is significant under Criterion A for its association with the development of Nantucket and the whaling industry, Criterion C for architectural examples including Georgian, Federal, Greek Revival, Italianate, Shingle and Colonial Revival, and Criterion D for the potential archaeological remains associated with Native American pre- and post-contact use as well as historical archaeology. Despite modern construction and intrusions, it retains integrity of location, design, setting, material, workmanship, feeling and association (Chase-Harrell and Pfeiffer 2012, Heintzelman 1975, and Epsilon Associates, Inc. 2018). Additionally, residents, local government officials, and other consulting parties present at the Section 106 consultation meeting BOEM hosted on the island of Nantucket on November 7, 2018, explained the association of the islands and the ocean, their relative isolation, the extensive preservation of historic elements of the Landmark, and the role of these elements in forming and sustaining the cultural identity of community members. It is their position that the view of an undeveloped ocean is integral to the character, setting, feeling, and association of the resource.

The maritime setting of the resource and its viewshed would be altered through the introduction of new ocean-founded visual elements proposed in the Vineyard Wind COP that are out of

character with the historic setting, feeling, and association of the resource, thereby diminishing its integrity. Based on the data collected during the historic properties visual impact assessment, it is estimated that the new ocean-founded visual elements proposed in the COP would be visible in the ocean view from the Nantucket NHL less than 68 percent of the time during daylight hours in a given year. The 68 percent estimate was calculated using average visibility of 10 miles from the coast. Since the nearest proposed ocean-founded visual element is located 14.7 miles off the coast of Nantucket, BOEM anticipates that the proposed Project would be visible in a given year far less than the 68 percent estimate (Epsilon Associates, Inc. 2018).

On June 3, 2019, Vineyard Wind provided BOEM with additional analysis of the visibility of the project using the algorithm presented in OCS Study BOEM 2017-037 "Visualization Simulations for Offshore Massachusetts and Rhode Island Wind Energy Area - Meteorological Report." Based on Vineyard Wind's additional analysis, the project would be visible from the Nantucket NHL at its closest point, on average, 25% of the time (50% during the day, and 0.1% at night, when using ADLA (discussed below; *see* Appendix C-1)).

According to 30 CFR Part 585 and other BOEM requirements, Vineyard Wind would be required to remove or decommission all installations and clear the seabed of all obstructions created by the proposed Project. All facilities would need to be removed 15 feet (4.6 meters) below the mudline (30 CFR § 585.910(a)). Absent permission from BOEM, Vineyard Wind would have to complete decommissioning within two years of termination of the lease and either reuse, recycle, or responsibly dispose of all materials removed.

3.3 Chappaquiddick Island TCP

Based on information provided by the Chappaquiddick Wampanoag Tribe, a non-Federally recognized Tribe, on June 15, 2019, there exist multiple traditional cultural places that include (but are not limited to) ceremonial viewsheds associated with sunrise and sunset activities; morning and full moon ceremonies; and ceremonies for hunting of marine and land mammals (Appendix C-2). Other significant associations are for subsistence activities (berry picking, fishing, clamming) and sea mammal harvesting for whales and seals. Collecting sage, wild indigo, and herbs also played a role in identifying these properties as significant cultural resources.

Each of these places is located on Chappaquiddick Island, though there is no specific boundary provided by the Chappaquiddick. As described in the National Park Service Bulletin *Guidelines for Evaluating and Documenting Traditional Cultural Properties:*

> A traditional cultural property, then, can be defined generally as one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that a) are rooted in that community's history and b) are important in maintaining the continuing cultural identity of the community (National Park Service, Bulletin #33, 1998).

Collectively, and in accordance with the tribe's assertion that the entire island of Chappaquiddick is a historic property, BOEM considers these places to comprise contributing elements of the Chappaquiddick Island TCP, which would be a newly identified property potentially eligible for the National. Each of these properties is briefly listed below. The TCP would be significant

under Criterion A for its association with and importance in maintaining the continuing cultural identity of the community.

3.3.1 The Chappaquiddick Lots (North Neck)

The area is one of high ground that served multiple purposes for the tribal community, including 1) a burial site to ensure graves were not affected by winds or ocean tides; 2) as a lookout for travelers coming from the mainland or Martha's Vineyard; 3) as a place to watch for storms, fire, tides, stares, and whales; and 4) as a ceremonial place to honor ancestors, and the moon and sun. It is potentially eligible for the National Register on the basis of its association with cultural practices (ceremonial, subsistence) and possible burial sites. Although this area is not in the viewshed portion of the APE described in the original assessment of effects, it is included here because of the potential for panoramic views of Martha's Vineyard, Nantucket Sound, Muskeget Channel, and the Atlantic horizon. The traditional viewshed will be altered by the introduction of man-made structures where no structures have previously existed.

3.3.2 Chappaquiddick Lots (Town of Edgartown)

This area served as farmland, and as a protected area for swimming, canoeing, and fishing. It also served as a protected area for burials, as a lookout area, and as an alternate camping area during Nor-Easters and hurricanes. It is potentially eligible for the National Register on the basis of its association with cultural practices (ceremonial, subsistence, daily living activities) and possible burial sites. The area is on a southeast sloping hill on Katama Bay with an unobstructed view of Norton Point, to the Atlantic Ocean horizon; the proposed Project will introduce the view of man-made structures where none have previously existed during ceremonial events.

3.3.3 Cape Poge Light House

This structure is a lighthouse, constructed in 1893. It is listed individually on the National Register of Historic Places, and is located in the northwest corner of Chappaquiddick Island. The national register listing is based on the structure's role as an aid to navigation, its workmanship, and setting. The Chappaquiddick Wampanoag Tribe states that the grounds were once used for birding and rabbit hunting. **BOEM does not agree that the lighthouse is in the APE** for the proposed undertaking. It is located almost two miles north of the viewshed portion of the APE. Therefore, there will not be an effect to this property, based on the original viewshed analysis.

3.3.4 Katama Bay

Katama Bay forms the southwestern boundary of Chappaquiddick Island. It extends up to Edgartown to form the northwest boundary of the island with Martha's Vineyard. The bay was used for clamming, fishing, hunting and canoeing, and for ceremonial purposes. The bay is located entirely within the viewshed portion of the area of potential effect defined in the viewshed analysis. The proposed project will introduce the view of man-made structures where none have previously existed during morning and full moon ceremonies.

3.3.5 Norton Point

This is a spit of beach land forming the southern boundary of Katama Bay. The beach served as a walkway from Wasque point. Deer hunting, fishing and clamming were conducted along the way. Hunting ceremonies, along with sunrise and sunset rituals, will be impacted by the

presence of man-made structures in a viewshed that was previously undisturbed. The beach is entirely within the APE, based on the original viewshed analysis.

3.3.6 Poucha Pond

This salt pond is located on the southeastern corner of Chappaquiddick Island. This feature served as an area to congregate after berry picking, fishing, clamming, hunting, and whaling. Animals were processed at the site, while children swam and practiced canoeing. Sage, wild indigo, and herbs were collected at the site, and ceremonies for the sunrise and sea hunting were conducted. The southern half of the pond and its surrounding lands are located within the APE, based on the original viewshed analysis. The traditional views experienced here will be impacted by the presence of man-made structures, at least in a peripheral view.

3.3.7 Sampson Hill

This is another high point used as a possible burial ground, and as a lookout point, along with sun and moon ceremonies. It was used during WWII as a coastal watch station. This is one of the high points on the island, and its association with ceremonial rituals is important to the tribe. It may also have significance for its association with WWII history as a coastal watch station, and could contain burials. This high ground is located near the geographic center of the island, and is not located in the viewshed portion of the APE. **BOEM does not agree that this area is in the APE** for the proposed undertaking. Therefore, there will not be an effect, based on the original viewshed analysis.

3.3.8 Wasque Point

This bluff and beach area comprises the southeast corner of the island. This prominent feature served as a look out and launching point for marine mammal hunting. Ceremonies honoring both the hunters and the hunted, along with ancestors lost during the hunt, were performed before each event. Ceremonies offering prayers to ancestors and sunrise rituals will be in view of the proposed Project.

3.3.9 Effects to Traditional Uses from Sediment Plumes, Coastal Erosion, and Cable Installation

During consultations, the Chappaquiddick Wampanoag Tribe raised concern regarding sediment plumes, coastal erosion, and impacts from cable installation from the Vineyard Wind Project, in particular, concerns about potential increase in shoreline erosion along Chappaquiddick Island at the eastern end of Martha's Vineyard. These concerns are relevant to the Section 106 process because of the traditional cultural uses of hunting, fishing, and shellfishing that the tribe was concerned may be affected by the proposed Project.

Vineyard Wind examined the likelihood of its project to form sediment plumes, concluding that, given the site characteristics and the planned use of scour protection, surficial sediment plume formation is considered highly unlikely. Vineyard Wind also examined the likelihood of its project to contribute to coastal erosion, concluding that an offshore wind farm may alter wind-driven waves as they pass through the wind farm; however, such changes are likely to reduce wave energy and consequently are not expected to exacerbate shoreline erosion. Since the cable route is at least 1,900 m (6,230 ft) offshore from the shoreline, there also will be no change in the

water velocity that could affect beach erosion. (*See* Appendix C-3). These aspects are also analyzed under NEPA in the EIS.

3.4 Submerged Paleolandforms as Contributing Elements to the Nantucket Sound TCP

Documentary and field research conducted as part of the marine APE cultural resource investigations demonstrate that submerged portions of the Project area were subaerial during and immediately following the last glacial maximum when the earliest inhabitants of North America reached New England. The cultural resources investigations in the marine APE identified multiple paleolandform features (stream channel, lake, and estuarine landscape features) within the marine APE that have the potential to contain pre-contact Native American archaeological sites dating to the Paleoindian through Archaic periods (Tuttle et al. 2019; Figure 10). While the studies did not find any direct evidence of pre-contact Native American cultural materials, the paleolandforms are considered archaeologically sensitive due to the potential for undiscovered archaeological materials to be present.

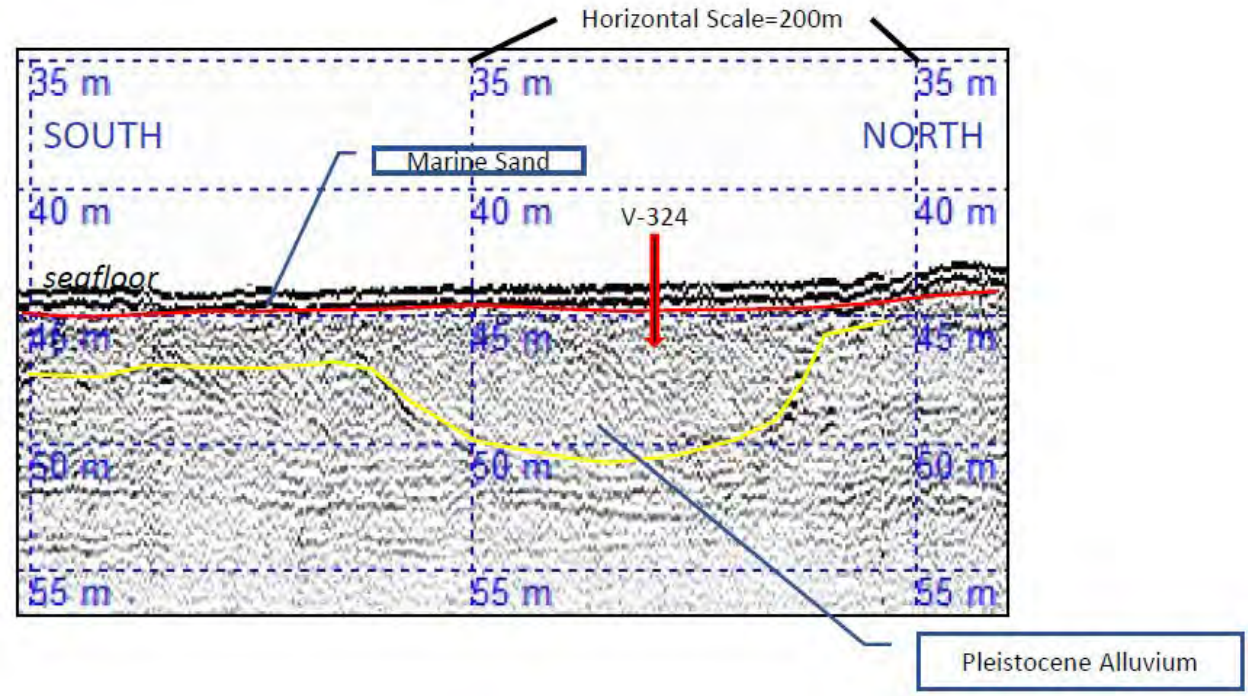

Figure 10: Example of an interpreted sub-bottom profile data from Channel Group 44 in the Wind Development Area. (See Tuttle et al. 2019 Appendix L for a location map.) Area below the red line is interpreted as a reflector representing an interface between two distinct surfaces or a ravinement surface. The yellow line represents the base of Pleistocene alluvium. The location of Vibracore 324 is also shown. Vertical and Horizontal Scales as shown (Tuttle et al. 2019).

If archaeological resources are present within the identified paleolandforms and they retain sufficient integrity, these resources could be eligible for listing on the NRHP under Criterion D. During the last glacial maximum, at around 24,000 before present (B.P.), sea levels dropped approximately 55 to 26 m (180 to 85 ft) below today's level. Sea level did not reach a near modern level until approximately 3,000 B.P. in the New England area. Consequently, a large amount of land on the OCS was exposed and existed as terrestrial land during the Paleoindian

and Archaic periods. Since people of the Paleoindian and Archaic periods are known to have occupied the New England region, over 160 km (86.89 nautical miles) inland from the coast at the time that the OCS was exposed, it is logical to assume that these people would have also occupied this, now-submerged, landscape (Tuttle et al. 2019). Due to current technological constraints, very little archaeological information has been recovered from Paleoindian and Archaic period archaeological sites on the OCS. As a result, very little is known about Paleoindian and Archaic period adaptations and lifeways of populations on the then coastal plain and coast. Any archaeological information preserved within these sites, if present, would likely yield significant information important in the pre-contact history of the region, making the sites eligible under Criterion D of the National Register Criteria for evaluating NRHP eligibility.

In addition to the archaeological potential of these resources, a number of the identified paleolandforms along the OECC are likely contributing elements to the Nantucket Sound TCP due to their cultural significance to Native American tribes. Nantucket Sound is eligible for listing in the National Register as a traditional cultural property and as an historic and archeological property associated with and that has yielded and has the potential to yield important information about the Native American exploration and settlement of Cape Cod and the Islands. Although the exact boundary is not precisely defined, the Keeper's determination indicated that the Sound is eligible as an integral, contributing feature of a larger district under: Criterion A for its associations with the ancient and historic period Native American exploration and settlement of Cape Cod and the Islands, and with the central events of the Wampanoags' stories of Maushop and Squant/Squannit; Criterion B for its association with Maushop and Squant/Squannit; Criterion C as a significant and distinguishable entity integral to Wampanoags' folklife traditions, practices, cosmology, religion, material culture, foodways, mentoring, and narratives; and, Criterion D for the important cultural, historical, and scientific information it has yielded and/or may be likely to yield through archeology, history, and ethnography about access to resources, patterns of settlement, mobility, and land use prior to and after 6,000 years ago as a result of the inundation of the Sound. It is also important for the significant information it provides and can provide about the cultural practices and traditions of the Native Americans of Cape Cod and the Islands in relationship with other peoples since ancient times.

The consulting Federally Recognized Tribes have stated that all of the paleolandform features identified within the marine APE, regardless of whether or not they contain archaeological data, are significant resources as vestiges of the landscape occupied by their ancestors and as the locations where events from Tribal oral histories occurred. As a result, the paleolandform features identified within the marine APE could be eligible for listing on the NRHP under Criterion A of the National Register Criteria due to their association with significant events, or series of events, significant to the cultural traditions and history of local Native American tribes.

Table 6-2 from Tuttle et al. 2019 presents the paleolandform features, with associated geotechnical tests that resulted in the identification of terrestrial soils, identified within the marine APE; the project is unable to avoid 19 paleolandform features within the APE. Tuttle et al. 2019 also presents a summary of the Nantucket Sound TCP.

Vineyard Wind has stated the proposed Project would be able to avoid all but 19 of the paleolandform features present within the marine archaeology APE. Vineyard Wind believes there is the potential for additional paleolandforms to be avoided as a result of ongoing routing and engineering studies. As currently designed, however, construction of the proposed Project

would result in direct physical effects to the 19 paleolandforms that cannot be avoided (Tuttle et al. 2019). Direct physical effects to these resources would threaten the viability of the affected portion of these resources as both potential repositories of archaeological information as well as the cultural significance of these landforms to local Native American tribes (Figure 11). The severity of effects would depend on the horizontal and vertical extent of effects relative to the size of the intact paleolandform. Due to the limited size of the offshore remote sensing survey areas in the OECC and WDA, the full extent or size of individual paleolandforms cannot be defined. However, based on available information, construction of the Project would result in the physical damage or destruction of all or part of the 19 paleolandforms that cannot be avoided.

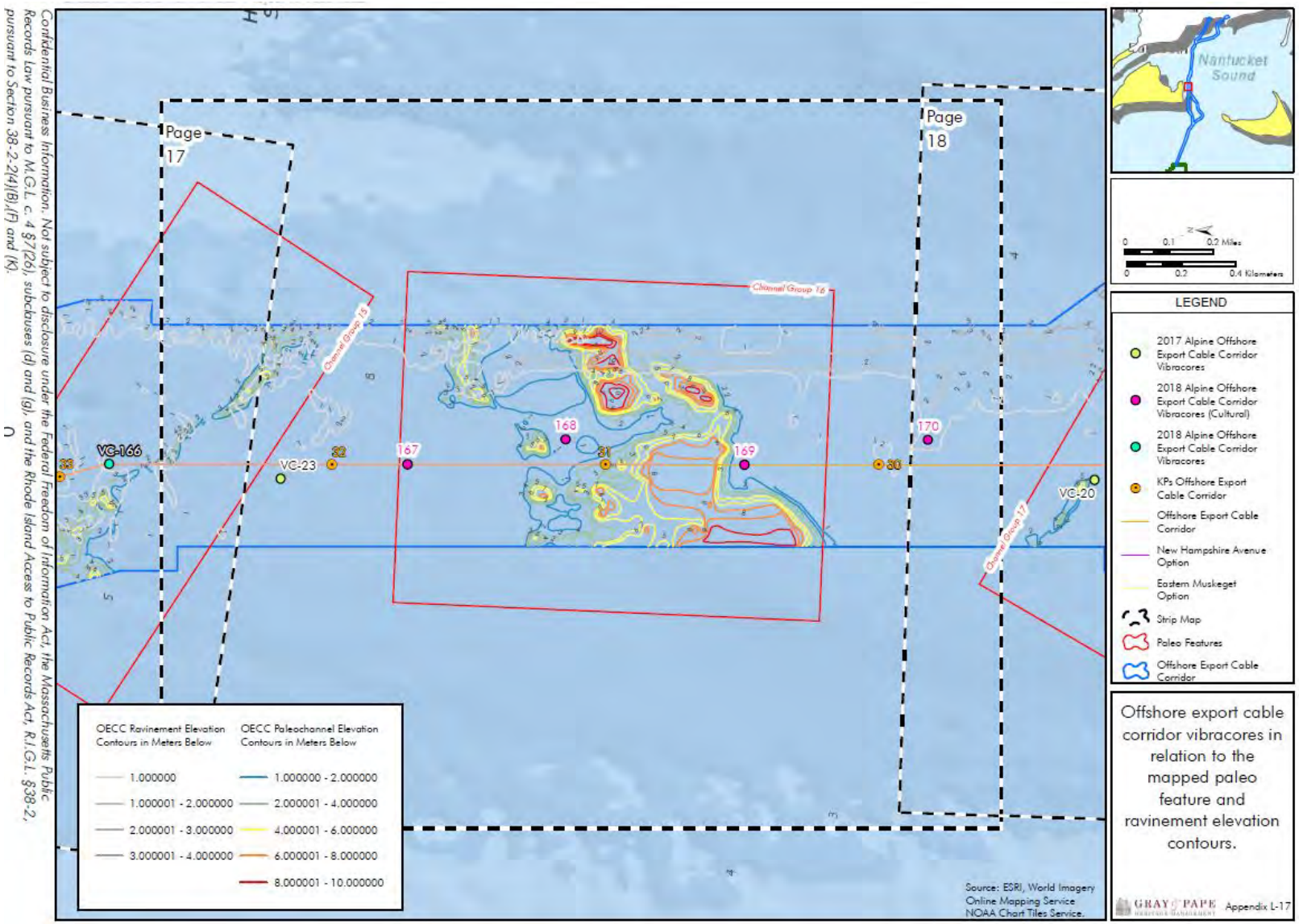

Figure 11: Example of a location where the Offshore Export Cable crosses a submerged paleolandform in Nantucket Sound (Tuttle et al. 2019)

3.5 Shipwrecks and Potential Shipwrecks

Tuttle et al. 2019 presents seven shipwrecks and potential shipwrecks identified within the marine archaeology portion of the APE. All seven will be avoided with sufficient buffers, by all proposed Project activities that are part of the undertaking, resulting in no effect to these potential historic properties.

4 Application of the Criteria of Adverse Effect

The Criteria of Adverse Effect under Section 106 [36 CFR 800.5(a)(1)] states that an undertaking has an adverse effect on a historic property:

…when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association…. Adverse Effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative (36 CFR 800.5(a)(1).

According to regulation, Adverse Effects on historic properties include, but are not limited to (36 CFR 800.5(a)(2)):

> (i) Physical destruction of or damage to all or part of the property;
>
> (ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's standards for the treatment of historic properties (36 CFR part 68) and applicable guidelines;
>
> (iii) Removal of the property from its historic location;
>
> (iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
>
> (v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;
>
> (vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
>
> (vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

4.1 Adverse Effects to the Nantucket NHL, Gay Head Lighthouse, and Chappaquiddick TCP

Based on the information BOEM has available from the completed identification of historic properties within the viewshed APE of the proposed Project, and the assessment of effects upon those properties determined in consultation with the consulting parties, BOEM has found that the proposed Project would have a direct adverse visual effect to the Gay Head Lighthouse, Nantucket NHL, and Chappaquiddick TCP. The undertaking would affect the character of the properties' setting that contributes to their historic significance; and the undertaking introduces visual elements that are out of character with the historic setting of the properties. Due to the distance and open viewshed, the integrity of the properties would not be so diminished as to disqualify any of them for NRHP eligibility.

The adverse effects to the viewshed of the above-ground historic properties would occupy the space for approximately 30 years, but they are unavoidable for reasons discussed in Section 4.3, below. This application of the criteria of adverse effect and determination that the effects are direct is based on pertinent National Register Bulletins, subsequent clarification and guidance by the National Park Service and Advisory Council on Historic Preservation, and other documentation, including professionally prepared viewshed assessments and computer-simulated photographs and video.

4.2 Adverse Effects to Submerged Paleolandforms as Contributing Elements to the Nantucket Sound TCP

Based on the information BOEM has available from the marine archaeological resources surveys of the marine APE and the assessment of effects upon those properties, BOEM has found that the proposed Project would result in direct adverse physical effects on the 19 submerged paleolandforms that cannot be avoided in the OECC and WDA. The undertaking would result in the permanent, physical destruction of or damage to all or part of each of the 19 paleolandforms. In addition, construction of the proposed Project would impact paleolandforms located in Nantucket Sound that are likely contributing elements to the Nantucket Sound TCP.

4.3 Conditions or Future Actions to Avoid, Minimize, or Mitigate Adverse Effects

Vineyard Wind has redesigned elements of the proposed undertaking to avoid direct physical impacts to a number of paleolandforms and to minimize visual impacts to the Nantucket NHL, the Gay Head Lighthouse, and the Chappaquiddick TCP to the extent feasible (Tuttle, Donta, and Scholl 2018; Tuttle et al. 2019; Epsilon Associates 2018, 2019; Saratoga Associates 2018). However, some recommendations raised by consulting parties to avoid adverse effects to the Nantucket NHL, Gay Head Lighthouse, and Chappaquiddick TCP are infeasible to implement:

- Removal or relocation of three rows of turbines nearest to the adversely affected Nantucket NHL is not possible without creating additional impacts to other resources and issues of concern, as analyzed under NEPA and presented in the EIS under Alternative C. The EIS found that impacts would be similar to the Proposed Action. However, the FEIS also noted that Alternative C would limit options for addressing other use conflict issues,

such as commercial fishing, avoidance of submerged paleolandforms, and areas with engineering challenges. In particular, as part of Vineyard Wind's Federal Consistency compliance, they committed to reduce the overall project footprint by at least 20 % in a letter submitted November 9, 2018 to the Rhode Island Coastal Resources Management Council. This eliminates many potential locations where turbines could be located, making removal of the majority of turbines nearest to the NHL infeasible.

- Deferring development of the closest turbines until an unspecified later date to avoid visual effects to the Nantucket NHL is not possible because the Project requires a sufficient number of turbines within the lease area to produce enough electricity by a certain timeframe in order to meet the commitments of its power purchase agreement.

To reduce visual effects:

1. Vineyard Wind has committed to building the largest turbines possible using currently available technologies, which may further reduce the number of turbines needed, but may not be a sufficient reduction or setback to entirely avoid adverse effects to the Nantucket NHL, the Gay Head Lighthouse, and the Chappaquiddick TCP.
2. Vineyard Wind has committed to excluding the three northwestern turbine placement locations closest to the Nantucket NHL, which will further reduce the adverse effect to the Nantucket NHL.
3. Vineyard Wind has committed to installing an Aircraft Detection and Lighting System (ADLS) to reduce nighttime lighting. The system would enable aviation warning lights only when an aircraft is in the vicinity of the WDA, reducing nighttime visibility of the project from adversely affected historic properties to an estimated less than four (4) hours annually, or 0.1% of annual nighttime hours.
4. Vineyard Wind has also agreed to paint the wind turbines light gray, RAL 7035, an off white/grey color that will reduce visibility during daylight hours.

To reduce physical effects:

1. Vineyard Wind has relocated or removed WTG locations to avoid certain locations due to archeological sensitivities;
2. Vineyard Wind has redesigned the inter-array cable system in the WDA, and redesigned portions of the OECC to avoid 15 of 34 submerged paleolandforms. The remaining 19 paleolandforms cannot be avoided due to design constraints (i.e. the paleolandform crosses the entire OECC), engineering, and/or environmental constraints.

Table 3. Measures to Avoid and Minimize Adverse Effects

Measure	Result	Historic Property
Build the largest turbines possible using currently available technologies	Reduce the number of turbines needed, thereby reducing the number of visual elements introduced into the viewshed APE and thus reducing the adverse visual effect	Nantucket NHL, Gay Head Lighthouse
Exclude the three northwestern turbine placement locations closest to the Nantucket NHL	Reduce the number of turbines nearest to the Nantucket NHL, thereby reducing the number of visual elements introduced into the viewshed APE nearest to the NHL, and thus reducing the adverse visual effect	Nantucket NHL
Install an Aircraft Detection and Lighting System	The system would enable aviation warning lights only when an aircraft is in the vicinity of the WDA**,** reducing nighttime visibility of the project from adversely affected historic properties to an estimated less than four (4) hours annually, or 0.1% of annual nighttime hours.	Nantucket NHL, Gay Head Lighthouse
Paint the wind turbines an off white/grey color	The off white / grey color would reduce daytime visibility of the project from adversely affected historic properties.	Nantucket NHL, Gay Head Lighthouse
Relocated or removed WTG locations, redesigned the inter-array cable system in the WDA, and redesigned portions of the OECC to avoid 15 of 34 submerged paleolandforms	Avoid direct adverse physical effects of destruction and loss of information from 15 of 34 submerged paleolandforms	Nantucket Sound TCP

BOEM has previously determined that additional measures are warranted to mitigate adverse to the Nantucket NHL, Gay Head Lighthouse, and the 19 submerged paleolandforms that may be contributing elements to the Nantucket Sound TCP that cannot be avoided. Vineyard Wind has stated that they are willing to fund mitigation projects that have a clear nexus to the historic preservation of the affected resources and provide public benefit. Discussions with consulting parties to identify appropriate measures to mitigate adverse effects, including those specified above, are ongoing. However, the consulting parties have previously reached agreement on suitable mitigation measures to mitigate the effects on the Gay Head Lighthouse, including $38,000 for lighthouse restoration, interpretive signage, and a smartphone app.

The Section 106 consultation process is ongoing for the Vineyard Wind Project, and will culminate in a final MOA spelling out those measures to which the signatories to the MOA agree and their final funding amounts. BOEM will continue to consult in good faith with the State Historic Preservation Officers and other consulting parties to resolve adverse effects.

5 Views of the Consulting Parties

While BOEM's Section 106 consultation is ongoing, summaries of views of the initial Finding of Adverse Effect provided by consulting parties and the public to-date are included as Appendix B-1; comments received by BOEM prior to the issuance of the initial Finding are included in Appendix B-2.

6 References

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2018b. Intensive Archaeological Survey Proposed Substation Vineyard Wind Upland Cabling Project, Barnstable, Massachusetts. Submitted by the Public Archaeology Laboratory, Inc. December 2018. PAL Report Number 3384.

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Unnamed. 2015. Technical Amendment to Gay Head Light National Register of Historic Places Nomination Form. Prepared for Vineyard Wind, LLC.

Appendix A-1: Entities Invited to be Consulting Parties

The following is a list of governments and organizations that BOEM contacted and invited to be a consulting party to the Section 106 review of the Vineyard Wind Project, between June and October 2018. During the consultations, additional parties were made known to BOEM and were added as they were identified (see Appendix B).

1. Advisory Council on Historic Preservation
2. Alliance to Protect Nantucket Sound
3. Barnstable County Board of Commissioners, Massachusetts
4. Cape Cod Commission
5. Charlestown Historical Society
6. City of Cranston, Rhode Island
7. City of East Providence, Rhode Island
8. City of New Bedford, Massachusetts
9. City of Pawtucket, Rhode Island
10. City of Providence, Rhode Island
11. City of Warwick, Rhode Island
12. County of Edgartown, Massachusetts
13. Dukes County Commission, Edgartown, Massachusetts
14. Maria Mitchell Association (Dark Skies Initiative)
15. Martha's Vineyard Commission
16. Martha's Vineyard Museum
17. Mashantucket Pequot Tribal Nation
18. Mashpee Wampanoag Tribe
19. Massachusetts Historical Commission
20. Massachusetts Historical Society
21. Mohegan Tribe of Indians of Connecticut
22. Museum of African American History, Boston
23. Museum of African American History, Nantucket
24. Nantucket Conservation Foundation
25. Nantucket Historic District Commission
26. Nantucket Historical Association
27. Nantucket Historical Commission
28. Nantucket Planning and Economic Development Commission
29. Nantucket Planning Board
30. Nantucket Preservation Trust
31. Narragansett Indian Tribe
32. National Park Service
33. Preservation Massachusetts
34. Rhode Island Historical Preservation & Heritage Commission
35. Rhode Island Historical Society
36. Shinnecock Indian Nation
37. South County Historical Center, Kingston, Rhode Island
38. Town of and County of Nantucket, Massachusetts
39. Town of Aquinnah, Massachusetts
40. Town of Barrington, Rhode Island
41. Town of Bristol, Rhode Island
42. Town of Charlestown, Rhode Island
43. Town of Chilmark, Massachusetts
44. Town of Dartmouth, Massachusetts
45. Town of East Greenwich, Rhode Island
46. Town of Gosnold, Cuttyhunk Island, Massachusetts
47. Town of Jamestown, Rhode Island
48. Town of Little Compton, Rhode Island
49. Town of Middletown, Rhode Island
50. Town of Narragansett, Rhode Island
51. Town of Oak Bluffs, Massachusetts
52. Town of Portsmouth, Rhode Island
53. Town of Shoreham, Block Island, Rhode Island
54. Town of South Kingston, Rhode Island
55. Town of South Kinston, Wakefield, Rhode Island
56. Town of Tisbury, Vineyard Haven, Massachusetts
57. Town of Tiverton, Rhode Island
58. Town of Warren, Rhode Island
59. Town of West Tisbury, Massachusetts
60. Town of Westerly, Rhode Island
61. Town of Westport, Massachusetts
62. US Army Corps of Engineers
63. Vineyard Power Cooperative
64. Vineyard Wind
65. Wampanoag Tribe of Gay Head (Aquinnah)

Appendix A-2: Consulting Parties to the Vineyard Wind Project

The following is a list of consulting parties to the Section 106 review of the Vineyard Wind Project, as of January 28, 2019.

Advisory Council on Historic Preservation
Alliance to Protect Nantucket Sound
Cape Cod Commission
Chappaquiddick Tribe of Wampanoag Nation
Gay Head Lighthouse Advisory Board
Historic District Commission
Maria Mitchell Association (Dark Skies Initiative)
Mashantuckett Pequot Tribal Nation
Mashpee Wampanoag Tribe
Massachusetts Commission on Indian Affairs
Massachusetts Historical Commission
Mohegan Tribe of Indians of Connecticut
Nantucket (NPEDC) Planning Commission
Nantucket Conservation Foundation
Nantucket Historical Association
Nantucket Historical Commission
Nantucket Preservation Trust
Narragansett Indian Tribe
National Park Service
Preservation Massachusetts
Rhode Island Historical Preservation & Heritage Commission
Shinnecock Indian Nation
Town and County of Nantucket
US Army Corps of Engineers
Vineyard Power Cooperative
Vineyard Wind
Wampanoag Tribe of Gay Head-Aquinnah

Appendix B-1: Summary of Public and Consulting Party Comments on the Initial Finding of Adverse Effect

Advisory Council on Historic Preservation (ACHP)	Submitted: May 15, 2019
Individual Comments from Correspondence	
• There seems to be confusion and concern expressed by the consulting parties over BOEM's sequencing of the Section 106 process. These concerns seem to stem from BOEM's earlier focus on identifying steps to mitigate adverse effects prior to completing the identification of historic properties and making a Finding of Adverse Effect. • It is problematic to engage on preliminary discussions of potential mitigation to resolve adverse effects prior to making a Finding of Adverse Effect. This approach did not allow for a complete understanding of how the undertaking would affect historic properties. • BOEM will be unable to conclude its resolution of adverse effects until it has completed its remaining identification efforts, assessed potential effects, and adjusted the effect finding as appropriate. At that point, BOEM would engage in further discussions with consulting parties on opportunities to avoid, minimize, and mitigate adverse effects. • BOEM has inaccurately characterized the undertaking's effect to the Nantucket Historic District NHL as "indirect adverse visual effects." "Directly" in Section 106 and 110(f) of the NHPA refer to causality, and not the physicality, of the effect, which means that if an effect comes from the undertaking at the same time and place without an intervening cause, that it is considered "direct" regardless of the specific type. ACHP advises BOEM to amend its current approach to assessing direct and indirect and to recognize that the visual effects of the undertaking may be direct adverse effects. • Consider NPS' and other recent consulting parties' comments regarding the assessment of indirect and cumulative effects that may be associated with the proposed undertaking. • BOEM's final analysis should consider indirect and cumulative effects from the proposed development that may affect historic properties. • BOEM should review Standard 4 of the guidance set forth in the NPS' Section 110 guidelines, which advises seeking "all prudent and feasible alternatives to avoid adverse effect" on a NHL. Alternatives that meet BOEM's goals but also avoid adverse effects to NHL should be given a higher level of consideration in the Section 106 process. • ACHP encourages BOEM and Vineyard Wind to respond to and document previous responses to comments and recommendations put forward by consulting parties on the modification of the existing undertaking, which could in turn result in avoiding and/or minimizing effects to the NHL. • Following a Finding of Adverse Effect, the agency must consult on the resolution of those effects, which includes consideration of possible alternatives and modifications to the undertaking that would seek to avoid or minimize those effects. • ACHP encourages BOEM to respond to our recommendations and comments and those of the consulting parties in a manner that can conclusively demonstrate that BOEM has considered reasonable ways to avoid and minimize the undertaking's adverse effects to historic properties. • ACHP recommends that BOEM highlight how its NEPA review has addressed historic preservation issues that have been raised by consulting parties. BOEM should respond to recent issues raised by consulting parties regarding the siting/configuration of alternatives for the proposed wind turbines and the lighting of the facility that were considered part of the analysis of alternatives included in the NEPA document. • Provide clarification of the parameters established for the analysis of alternatives, along with documentation of the analysis. • ACHP was concerned by the restrictive nature and format of the April 30, 2019 meeting, which aimed to discuss mitigation proposals for visual effects that have been submitted by consulting parties. The method used did not clearly seek to connect the proposals with the adverse effect to historic properties, resulting in a disjointed discussion. • ACHP recommends that BOEM take the lead on the assessment and responses to consulting parties comment and proposals with the material provided by BOEM as far in advance as possible. • ACHP recommends that BOEM prioritize addressing comments provided by consulting parties regarding alternatives and modifications to the undertaking that would avoid or minimize adverse effects. BOEM should then aim to respond to mitigation suggestions presented and document those actions it intends to bring forward as the agency works to develop an agreement document. This discussion should include BOEM's rationale for evaluating alternatives and potential mitigation options, and how these options were considered with regard to the nature of the adverse effect and significance of the affected historic properties, and how the concerns of the parties were addressed.	

Advisory Council on Historic Preservation (ACHP)	Submitted: May 15, 2019
Individual Comments from Correspondence	
• ACHP advises BOEM to continue informing the consulting parties proactively of its timeline while working with agency leadership to identify efficiencies in its internal administrative and legal review processes to provide additional time for consultation.	
Comment Summary	
The ACHP provided written comments that focused on particular issues including the sequencing of consultation; how direct, indirect, and cumulative impacts were assessed, especially related to visual effects; National Historic Landmark responsibilities associated with NPS guidelines; consideration of alternatives and modification to alternatives; meeting format and mitigation discussions with consulting parties; and time constraints associated with the consultation process.	

Chappaquiddick Tribe of the Wampanoag Nation	Submitted: May 8, 2019
Individual Comments from Correspondence	
• The Tribe concurred with the Finding of Adverse Effect for the Vineyard Wind COP on the Gay Head Lighthouse and the Nantucket Island National Historic Landmark. • The Tribe states that Chappaquiddick Island must be added as a historical district along [with] adverse effects findings for this location. They state that although Chappaquiddick Island has been treated as part of Martha's Vineyard Island, it should be treated as a separate island for the research phase of the Project. • The Tribe is concerned with impacts to the benthic zone (including biogenic habitat), stating that any impact to the seabed and terrestrial area of the island could cause breaks to the barriers of the salt water ponds affecting fish and shellfish production, which they consider a historical resource. • They state that the "moderate" impacts described in the EIS will cause great deterioration and change to the resources and character of Chappaquiddick Island and its use and features to the Chappaquiddick Wampanoag.	
Comment Summary	
Although the Tribe agrees with certain portions of the Finding for Adverse Effect, they state that Chappaquiddick Islands should be treated as a historical district and assessed separately from Martha's Vineyard Island. The Tribe is concerned about potential effects to salt ponds that could change their fish and shellfish production, which the Tribe considers a historic resource.	

Gay Head Lighthouse Advisory Board	Submitted: May 14, 2019
Individual Comments from Correspondence	
• The advisory board commended BOEM for the Section 106 Consultation process. • The advisory board is pleased that Vineyard Wind has committed to using the Aircraft Detection Lighting System, which will reduce night-time lighting impacts from the wind farm on their town and island community.	
Comment Summary	
The advisory board is pleased with the Section 106 Consultation process and the commitment to use Aircraft Detection Lighting Systems to reduce night-time lighting impacts.	

Massachusetts Historical Commission (MHC)	Submitted: May 9, 2019
Individual Comments from Correspondence	
• The MHC concurs with BOEM's determination of the Project area of potential effect for the PDE and BOEM's preliminary finding of adverse effect on Gay Head Lighthouse and Nantucket National Historic Landmark. • MHC disagrees that the adverse visual impacts are indirect, but are in fact direct impacts as defined by 36 CFR 800.5. • MHC states that the final preferred Project impact area is not yet defined and that identification efforts for significant historic and archeological resources are ongoing and looks forward to continuing the consultations once a revised effect finding is developed. • MHC requests that BOEM revise Section 5.1 of its April 2019 determination to describe how the Project has been redesigned to minimize visual impacts. MHC requests that BOEM specify the additional impacts associated with removal or relocation of the majority of the turbines. This revised Section 5.1 should explain why relocating structures further offshore within the lease area are not feasible to minimize adverse visual effects to significant historic properties. • MHC agrees with the mitigation measures to minimize adverse visual effects, but request additional information to describe the complete Project lighting scheme and how it will minimize adverse visual effects during the day and night.	

Massachusetts Historical Commission (MHC)	Submitted: May 9, 2019
Individual Comments from Correspondence	
• MHC holds a Preservation Restriction on the Gay Head Lighthouse. This document should be included as an appendix to the draft MOA. • MHC agrees that the proposed mitigation project for mitigating adverse effects to the Gay Head Lighthouse are suitable. • Multiple suitable mitigation measures for the Nantucket Historic District have been proposed, further consultation among the consulting parties should be conducted to define suitable, feasible mitigation measures. • Plans for the rehabilitation of historic properties, including the Maria Mitchell Observatory should be developed to be consistent with Secretary of the Interior Standards (36 CFR 67). • An opinion of no adverse effect on the Nantucket Sound Traditional Cultural Property for visual adverse effect has been provided in the visual assessment. The BOEM preliminary finding does not address visual adverse effects to the TCP. • The revised finding should describe the adverse effects to the TCP, including contributing marine archeological resources. • MHC agrees that the Project would assist to refine the cultural history of Massachusetts. The project should incorporate previous relevant research in paleoenvironmental reconstruction in Massachusetts and New England, including information in the MHC's files. The draft research design and methodology should be submitted to the MHC for review and comment. • The paleolandscape reconstruction project could include targeted systematic close-interval vibracoring for archeologically sensitive locations within the TCP to better define paleosol boundaries, stratigraphy and potential significance. Draft research design should be submitted to BOEM, MHC, Massachusetts Board of Underwater Archaeology, and tribal representatives. • A potential mitigation measure for cumulative adverse effects on the TCP could include the development and implementation of a phased Nantucket Sound paleolandscape survey as part of the overall paleoenvironmental reconstruction project. The survey would identify other paleolandscapes able to be preserved and protected elsewhere in Nantucket Sound within state or federal waters. • The draft MOA should include a stipulation to guide further consultation regarding alternatives that would avoid or mitigate adverse effects to significant terrestrial archaeological resources. • Additional intensive archaeological survey may be required for material storage and/or equipment staging areas outside the proposed terrestrial project APE, if previously disturbed areas cannot be used. • A written Post-review Discoveries protocol consistent with Massachusetts Unmarked Burial Law should be developed and implemented for the Project. This should be circulated for comment and included as an appendix in the MOA.	
Comment Summary	
MHC outlined a number of substantive comments concerning the draft Finding of Adverse Effect and the MOA. These comments focused on day and night visual impacts assessments; the proposed mitigation for the Gay Head Lighthouse; suitable mitigation for the Nantucket Historic District; the findings, mitigation, and potential research for the Nantucket Sound TCP and marine archaeological resources; the potential need for additional terrestrial surveys for on-shore activities; and the development of a Post-Review Discoveries protocol.	

Nantucket Conservation Foundation	Submitted: May 2, 2019
Individual Comments from Correspondence	
• The Foundation expressed that the discussion of mitigation measures is premature as the review is ongoing and impacts are still be assessed. • The Foundation supports the community "Mitigation Fund" approach as the most equitable and appropriate solution to funding local preservation projects to offset long-term impacts from the Vineyard Wind Project on the Nantucket NHL.	
Comment Summary	
The Foundation's comment did not discuss the Findings of Adverse Effect, but rather expressed concern over the timing related to identifying mitigation for impacts to the Nantucket NHL. In addition, they reiterated their support for the community "Mitigation Fund" approach.	
Nantucket Planning and Economic Development Commission	**Submitted: May 20, 2019**
Individual Comments from Correspondence	
• The Commission fully supports the comments submitted by the National Park Service on May 8, 2019, and the Town of Nantucket on May 10, 2019, in response to the Finding of Adverse Effect.	

Nantucket Conservation Foundation	Submitted: May 2, 2019
Individual Comments from Correspondence	
• The Commission emphasized that BOEM's responsibility is to exercise a higher standard of care when NHLs are directly and adversely impacted and to take action to minimize such impacts. The Commission encouraged BOEM to fulfill this responsibility.	
Comment Summary	
The Commission supports the comments submitted the National Park Service and the Town of Nantucket and encourages BOEM to fulfill its mandate and protect the impacted NHLs.	

Nantucket Preservation Trust (NPT)	Submitted: May 3, 2019
Individual Comments from Correspondence	
• NPT concurs with BOEM's Finding of Adverse Effect on the Nantucket Historic District NHL. • NPT also agrees that due to the distance and open viewshed, the integrity of the properties in the NHL would not be so diminished as to disqualify any of them from the National Register of Historic Places eligibility. • NPT concurs with BOEM's assessments that additional offsite mitigation is warranted. • NPT believes that several of the projects submitted for off-site mitigation are viable, important historic preservation projects. However, they are concerned that other projects do not have preservation as their focus. They appear to be more appropriate for other funding sources. • NPT believes that mitigation decisions on specific projects should be made by preservation authorities such as the NPS, MHC, and ACHP and local preservation entities. To allow mitigation funds to be used for unidentified projects would be a disservice to preservation efforts on Nantucket.	
Comment Summary	
NPT agrees with BOEM's Finding of Adverse Effect and agree that off-site mitigation is necessary. They are also concerned with Project being proposed for mitigation that is not focused on preservation and with allocating mitigation funds for unidentified projects.	

National Park Service (NPS)	Submitted: May 8, 2019
Individual Comments from Correspondence	
• NPS agrees with the finding of "adverse effect" for the proposed undertaking. • NPS disagrees with BOEM's characterization of the effects on the Nantucket National Historic District NHL as "indirect adverse visual effects" as described in the Finding of Adverse Effects. • NPS disagrees with BOEM's assessment that, due to the anticipated removal of the Project at the end of the 30-year lease, the adverse effect is temporary. • NPS is concerned about the potential for additional and cumulative adverse effects that could be anticipated with the future development of additional adjacent and nearby wind project lease areas. NPS seeks information or analysis that supports the conclusion on avoidance measures in Section 5.1. • It is difficult to judge the effectiveness of paint color as a minimization proposal to reduce daytime visibility of the ocean-based Project elements, particularly with regard to the effects of blade movement on the visibility of the Project from the NHL. • NPS would like to review any additional visual analyses or simulations that address blade movement. • Given the importance of dark skies to the NHL setting, NPS agrees that installation and use of an Automatic Detection and Lighting System is an important minimization for the FAA required lighting. NPS looks forward to seeing what is proposed to address other nighttime lighting issues with the Project.	
Comment Summary	
The NPS agrees with the Finding of Adverse Effect, but not with how BOEM characterized the effects to the NHL. The NPS does not consider the effects to be short-term, and seeks additional analyses of the cumulative effect of additional wind projects. NPS also seeks to review additional information on how blade movement visibility will minimize daytime visibility effects. They also seek to review other actions to minimize other types of nighttime lighting.	

Town and County of Nantucket via their Attorneys	Submitted: May 10, 2019
Individual Comments from Correspondence	
• BOEM is rushing through the Section 106 and related processes, giving insufficient time for meaningful community and stakeholder input. BOEM has expedited the process for no legitimate reasons. It appears that	

the process is being driven by a power purchase agreement that did not provide sufficient time for an adequate consideration of the Project's impacts.

- BOEM has required consulting parties to recommend appropriate resolution measures prior to its issuance of the Finding of Adverse Effect, notwithstanding the otherwise-applicable 30-day comment period. The Town of Nantucket never agreed to this less than 2-week curtailed deadline to review the Finding of Adverse Effect, consult with the State Historic Preservation Office and ACHP, and prepare comprehensive mitigation proposals.
- BOEM is taking the required Section 106 steps out of sequence. BOEM must go back and complete the Section 106 process steps in the correct order to comply with the NHPA.
- BOEM prematurely attempted to introduce discussions about how to resolve adverse effects before those adverse effects have been thoroughly identified; indeed BOEM intended to decide mitigation for adverse effects on the webinar held on April 30, 2019. It is inconsistent with both the letter and the intent of the NHPA to jump to mitigation when resource identification is incomplete and consulting parties have not finished commenting on adverse effects.
- The Town of Nantucket is a pre-eminent maritime and preservation tourism destination. The visual effects of the Vineyard Wind turbines promise to be substantial and are currently being inadequately and inaccurately characterized by Vineyard Wind and BOEM.
- The visual effect simulations are internally inconsistent and do not meet current standards developed by federal agencies with expertise in visual resource impacts analysis.
- Several uncertainties regarding Project design increase the challenge of making an accurate determination of visual effects for this Project. Vineyard wind is seeking approval for 106 turbine locations and would install up to 100, and the BOEM Preferred Alternative is 84 turbines (Finding of Adverse Effect).
- Additionally, visual simulations do not take into account the fact that several other wind energy projects are contemplated in partial view of Nantucket.
- While BOEM is characterizing these wind turbines as creating temporary impacts with an expected duration of its 30-year lease, it seems likely that this lease will be extended, due to the investment of time and resources in building this Project, the submarine cables' projected shelf-life of 50-80+ years, and the nation's growing interest in alternative energy.
- This Project represents the first step to a more industrialized horizon for this historic area, and future offshore wind energy projects can be reasonably be expected to present comparable visual impacts. BOEM has not satisfactorily accounted for cumulative effects of these developments.
- BOEM recognized the likely significance of visual impacts in 2014 when the agency developed a regional meteorological report and series of visual impacts simulations for the Massachusetts Wind Energy Area leases, including multiple visual effects analysis reports; however these were labelled as "hypothetical and not to be used to determine the effects of any specific project." Subsequent Project-specific visual effects assessments have been flawed in several ways: they have been inconsistent with previous work; the night-time simulations are insufficient and do not fully encompass elements of concern; the visual effects from marine vessels are not considered; and the impact analysis does not address all potential Project designs and outcomes.
- Comparing BOEM's 2014 analyses and those submitted by Vineyard Wind in the 2018 COP presents additional concerns with regard to the way the Vineyard Wind visual impacts assessments simulations have been created: (1) the focus on hazy conditions in the Saratoga Associate report minimizes the visual effect, but the meteorological report characterizes Nantucket and nearby areas as having high visibility; (2) a direct comparison between BOEM's visual impact analysis from 2014 and the Saratoga Associates Clear Day simulations shows that the Vineyard Wind simulations greatly reduces the presumed visual impact in a way that cannot be attributed to changes to turbine design; (3) BOEM's models are for towers substantially shorter than what is being proposed; (4) visual simulations should include views from various heights on Nantucket and should be expanded to include a wide representation of the effects of any potentially affected National Register properties; and (5) simulations should include back, front, and side lit conditions and each set should replicate lighting conditions over the course of a day.
- Appropriate mitigation cannot be adequately assessed until the differences between the original BOEM analysis and the Vineyard Wind submission are considered and the visual impact analysis methods are assessed.
- The simulations created to predict impact of the towers at dusk and overnight, when aviation obstruction lighting will be visible along the horizon, are deeply flawed. The sunset hour is important on Nantucket, as it is one of the few place on the East Coast where the sun sets over the ocean. No simulation has been done for this time of day.
- BOEM's simulations are only available as 24-hour time-lapse videos, which do not accurately characterize how the backlit towers will appear during the iconic sunset hour, nor the impact of the lighting system every time a plane is within range.

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- All of the simulations focus on viewshed from Nantucket to the wind farm and fail to consider visual effects toward the Nantucket Historic District and Nantucket Sound TCP. This oversight is significant because Nantucket is has been and continues to be a marine environment where travel by sea and marine activities are common ways of experiencing the landscape. Assessment of the visual effects of the Nantucket area should consider common paths of the marine travel and historically significant view of the island from sea vessels including such areas as the Nantucket Shoals and other historically significant views from the ocean.
- BOEM has a duty to avoid harm to the maximum extent possible to the NHL and TCP with sacred sites listed in the National Register of Historic Places.
- BOEM has failed to analyze adverse effects on the Nantucket Historic District as required by Section 110(f) of the NHPA. When an agency's undertaking directly adversely affects an NHL, the agency should consider all prudent and feasible alternatives to avoid an adverse effect on the NHL. By not considering how to minimize adverse effects on the NHL to and from the island within its viewshed and skipping steps in the Section 106 process, BOEM has failed to comply with the mandate of Section 110(f).
- We strongly disagree with BOEM's conclusion that visual effects have somehow been adequately minimized. BOEM has not undertaken all possible planning to avoid harm to the NHL as Section 110(f) requires, including the removal or relocation of select turbines.
- BOEM has a heightened duty because NHLs represent the most significant historic properties in the National Register of Historic Places. BOEM has not yet complied with this duty. BEM must revise its adverse effects analysis so as to find ways to minimize harm to the NHL in accordance with the heightened duty that Section 110(f) requires.
- BOEM has failed to consider adequately how to address adverse effects on the TCP, which should be considered in connection with the NHL because of the resource's immediate proximity to one another as well as their connections to each property's historic viewsheds and shorelines. BOEM has ignored these connections in the Section 106 process.
- Just as the Cape Wind project failed to consider adequately the adverse effects on the Nantucket Sound TCP, BOEM has done the same here by failing to analyze completely the adverse visual effects of the turbine field to and from the NHL and Nantucket's Sounds interconnected viewsheds. Vineyard Wind's proposed Project will introduce visual elements that are out of character with the area's historic properties and will change the character of the historic properties' setting in ways that inextricably contribute to their historic significance.
- BOEM does not yet understand how the nighttime illumination of the turbines immediately adjacent to the Sound and within close proximity to the Nantucket Historic District will affect the historic resources and the traditional cultural practices that support the Keeper's determination of eligibility of the TCP.
- The adverse effects stem from the partial obstruction of long-distance, open-to-the-horizon views historically associated with the Nantucket Historic District and TCP. These are adverse effects that cannot be avoided and cannot be satisfactorily mitigated. BOEM must take a step back in the Section 106 process and consider how all of the direct, indirect, and cumulative impacts of the Vineyard Wind's proposal will affect the NHL and TC and determine how to avoid them.
- BOEM has not adequately considered the cumulative effects of offshore wind farms planned for adjacent lease areas. The cumulative impact of seven neighboring wind farms in total would be far greater than adverse effects of the Vineyard Wind Project alone; while BOEM "need not speculate about all conceivable impacts" associated with the installation of a group of seven wind farms, the agency "must evaluate the reasonably foreseeable significant effects of the proposed action."
- Viewing Vineyard Wind's proposed wind farm as a standalone project is illogical and has no independent justification. Avoiding a thorough analysis of cumulative effects of the seven adjacent wind farms planned in and around Lease Area OCS-A 501 violates BOEM's responsibilities under NEPA by artificially segmenting a major federal undertaking into smaller components and ignoring the extent the proposed offshore wind projects will set a precedent for future large-scale wind farms in the United States.
- It appears that not all agencies with a permitting or consultation role have been consulted. The Town is deeply concerned that those agencies will not have sufficient time or information to provide meaningful feedback. In particular, BOEM must consult with the US Army Corps of Engineers (USACE), the ACHP, NPS, FAA, and the US Coast Guard (USCG).
- The plans and timing for the USACE involvement, and methods for its compliance with its review obligations, are unclear. The USACE must meet its own statutory obligations under the NHPA and has an independent legal obligation to ensure the requirements of Section 106 have been met by the lead agency before issuing a permit or signing a Memorandum of Agreement.
- The ACHP should have been involved at the earliest stages of BOEM's work. BOEM has clearly ignored the ACHP's guidelines designed to guide energy development within the historic preservation regulatory framework.
- ACHP has not yet satisfied its legal obligation, and BOEM has not adequately consulted with the ACHP on the Project.

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- BOEM has not made NPS consultation a priority. While NPS is listed as a Consulting Party, the Town has not seen documentation or evidence of meaningful consultation with NPS, other than its initial comments on adverse effects sent to BOEM on May 8, 2019.
- The FAA is not listed as a Consulting Party, nor is it listed as a signatory on the draft MOA. In short, we have no information regarding BOEM's consultation with FAA or Vineyard Wind's plans to apply for FAA permits or approvals.
- The USCG has an important role to play with respect to offshore wind farms, through participation in BOEM's state renewable task forces. USCG's consultation role is not clear from the available documents. BOEM should disclose information on how the USCG is involved.
- The recent focus on mitigation is premature considering the first step of Section 106 –identification of historic properties – is incomplete. This is a glaring gap in the process to-date. Our client cannot finalize a decision on mitigation without a complete inventory.
- The Town of Nantucket has not received copies of the draft archaeological reports submitted and shared with some consulting parties on October 16, 2018. Identification of properties should include not only archaeological eligible for the National Register, but also properties eligible as TCPs associated with local tribes.
- The COP does not clearly state whether any onshore facilities may have an effect on historic properties.
- It seems the agencies are conflating a Visual Effects Assessment with a cultural resource effects assessment. While the Vineyard Wind Project Historic Properties Visual Assessment refers to historic properties, the NHL-status historic district is the only property mentioned in the Nantucket Section, compared to the several individual properties call out on Martha's Vineyard. Greater care is necessary in listing and enumerating historic properties.
- The MOA section that refers to the implementation of a discovery plan is not sufficiently detailed, as they do not define whether consulting parties will be notified in the event of a discovery and whether adjustments to mitigation are possible.
- The MOA should address unanticipated impacts on visual, cultural, and historic resources, on tourism and otherwise, both during the projected 18 month construction period and during the length of the lease period.
- BOEM asks consulting parties to accept certain measures as mitigation that are in fact better defined as minimum best practices for off-shore wind farms.
- BOEM should implement best practices for the Vineyard Wind and adjacent projects. This Project will set a precedent for all future offshore wind projects.
- BOEM is rushing the parties toward a premature and arbitrary decision on mitigation. BOEM required consulting parties to provide appropriate resolution measures prior to its issuance of the Finding of Adverse Effect, consulting parties have not yet finished commenting on adverse effects, BOEM has failed to consider cumulative effects of multiple offshore wind farms planned for adjacent areas, BOEM has not obtained sufficient input from other federal agencies with statutory obligations, resource identification has not been completed.
- A full understanding of the adverse effects on the NHL is fundamental to any mitigation discussion, and mitigation for the NHL cannot be considered in isolation from other adverse effects on historic resources.
- Mitigation discussed during the April 30, 2019 meeting pales in comparison to mitigation paid in other comparable projects, indicating that BOEM and Vineyard Wind are taking advantage of consulting parties who are inexperienced in these matters.
- BOEM should not classify Automatic Detection and Lighting System as a mitigation because the Vineyard Wind Lease Area at its nearest point is only 12.2 nautical miles from the southeast corner of Martha's Vineyard and a similar distance to Nantucket Historic District. Because BOEM can require compliance with FAA advisory circular 70/7460-1L CHG1 on projects more than 12 nautical miles offshore, this measure should be a minimum standard for offshore wind projects rather than mitigation to lessen adverse effects.
- BOEM should explain the grounds for its rejection of a mitigation fund. Ongoing mitigation funding is appropriate for a project whose adverse effects will be long-term and cannot be reasonably minimized and whose impacts cannot be fully understood before Project construction.
- The Town continues to believe that a community mitigation fund is the most appropriate and equitable solution for funding local preservation projects to offset impacts to the NHL and TCP.
- BOEM has not explained why it changed position and rejected the proposal for a mitigation fund. BOEM's refusal to support an unspecified mitigation approach where parties agree to a dollar amount and parties subsequently select projects is shortsighted. BOEM and Vineyard Wind need to ensure that Nantucket will have the means to cope with the adverse effects the wind farm causes over the next 30-80 years or longer.
- The Town also request various documentation in the comment letter pg. 17.

Comment Summary

CHP states that BOEM is rushing the Vineyard Wind Project to completion and failing to address the immediate and long term adverse effects in a meaningful way. BOEM: (1) improperly issued the Finding of Adverse Effect,

Town and County of Nantucket via their Attorneys	Submitted: May 10, 2019
which is based upon unreliable and incomplete information; (2) required consulting parties, who are still commenting on adverse effects, to suggest resolution measures even before BOEM issued the Finding of Adverse Effect; (3) inadequately considered cumulative effects of the multiple offshore wind farms planned for neighboring lease areas; (4) failed to obtain sufficient input from other federal agencies that are obligated to fulfill statutory and regulatory duties on this project; and (5) is not yet finished identifying historic and cultural properties potentially affected by the Project.	

U.S. Army Corps of Engineers	Submitted: May 10, 2019
Individual Comments from Correspondence	
• The USACE concurs with BOEM's Finding of Adverse Effect for the Vineyard Wind Project on the Gay Head Lighthouse and the Nantucket Island National Historic Landmark. • It is the USACE understanding that the identification of additional historic properties is ongoing and additional effects determinations will be made for any historic properties identified in the APE. The USACE concurrence is based on the Finding of Adverse Effect dated April 10, 2019.	
Comment Summary	
The USACE concurs with the April 10, 2019 Finding of Adverse Effect; however recognizes that additional determinations will be made and state that their concurrence is limited to the April 10 document.	

Vineyard Power Cooperative	Submitted: May 15, 2019
Individual Comments from Correspondence	
• The Cooperative thanked BOEM for the time and effort it has put into the process of leasing the Outer Continental Shelf. • The Cooperative believes that the Project is imperative to counter the threat of increased carbon in the atmosphere. • The Cooperative highlighted that BOEM in response to public comments increased the allowed distance from the coast for wind farms from 9 nautical miles to 12. The Cooperative asserts that at a September 13, 2017 meeting, the Nantucket Select Board expressed support for this plan. • The Cooperative contends that over the last 8 years, the Town of Nantucket and its residents had the opportunity to participate in planning activities and failed to do so, and believes they are engaging in delay tactics. The Cooperative urges that the Section 106 Process proceed.	
Comment Summary	
The Cooperative supports the Project and believes that it is imperative to the long-term survival of coastal areas in the region. It believes that Nantucket and its residents are engaging in delay tactics.	

Vineyard Wind	Submitted: April 30, 2019
Individual Comments from Correspondence	
• The proponent suggested revisions, additions, clarification, changes, and comments to BOEM's April 10, 2019 Finding of Adverse Effect. • The suggestions included updated figures, clarifications of text, and updates to images.	
Comment Summary	
The proponent provided comments and suggested revisions to the April 10, 2019 Finding of Adverse Effect.	

Public: Alan Meinke	Submitted: May 6, 2019
Individual Comments from Correspondence	
• Mr. Meinke claims that the Project's negative impacts on Nantucket's tourist dependent economy are immeasurable and irreversible. • Mr. Meinke believes that the Project alters the historic character of Nantucket, in particular the navigable waters where the Project will be located. • Mr. Meinke requested that the Project not be approved.	
Comment Summary	

Mr. Meinke believes that the Project will have a permanent, damaging impact on Nantucket's economy and historic character and requested that the Project not be permitted to continue.
Public: Kathleen and Dan Knise | **Submitted: May 6, 2019**
Individual Comments from Correspondence
• The residents are concerned about the impacts on the natural resources of Nantucket and the viewshed. • The residents believe that the Project will negatively impact the historic nature of Nantucket. • The residents requested that impacts of the Project be further investigated and mitigation measures implemented, including removing the first few rows of turbines and limiting nighttime lighting.
Comment Summary
The residents are worried that Nantucket's unique viewshed will be negatively impacted by the Project and requested additional investigation of its impact.
Public: Nantucket Civic League | **Submitted: May 10, 2019**
Individual Comments from Correspondence
• The Civic League believes that that BOEM should require the following mitigation: 1) painting the turbine a "camouflaging" gray color; 2) installation of an Aircraft Detection Lighting System; and, 3) relocating or removing the first several rows of turbines closet to Nantucket. • The Civic League requests that the Project conduct visual simulations at different elevations and from different historic properties, at different times of day, and in varied weather conditions. It believes that the current simulations are an inadequate representation of the visual impacts, which impedes an informed mitigation process. • The Civic League requests mitigation measures to address the economic impact on the entire island.
Comment Summary
The Civic Leagues agrees with suggested physical mitigation measures for the turbines and believes that additional measures are required for anticipated economic impacts that will affect the island. In addition, the Civil League believes that additional simulations with varying conditions at different locations are needed.
Public: Clark Wagner, homeowner | **Submitted: May 10. 2019**
Individual Comments from Correspondence
• The homeowner is concerned about the negative visual impact on Nantucket. • The homeowner is requesting the implementation of proposed visual mitigations, including painting the turbines gray, installation of an Aircraft Detection Lighting System, and relocating the first few rows of turbines. • The homeowner is also concerned about the environmental impact of the windfarm and requested that environment impacts by studied and mitigated.
Comment Summary
The homeowner is concerned about the visual and environmental impacts of the Project. He requested the implementation of the proposed visual mitigations and that environmental impacts be studied and mitigated.
Public: Wingate Companies | **Submitted: May 8, 2019**
Individual Comments from Correspondence
• The firm asserts that the Project will create adverse impacts for Nantucket (no further details was provided).
Comment Summary
The firm expressed a general concern about negative impacts for Nantucket.
Public: Jocelyn Duffy | **Submitted: May 8, 2019**
Individual Comments from Correspondence
• The homeowner is concerned about potential negative impacts to the area's historic nature, land, water, and human and non-human inhabitants. • The homeowner requested diligence when reviewing the Project.
Comment Summary
The homeowner is concerned about negative impacts to the area's resources and requested that the Project be diligently reviewed.

Appendix B-2: Public and Consulting Party Comments Prior to the Initial Finding

December 19, 2017

Rachel Pachter
Vice President, Permitting Affairs
Vineyard Wind, LLC
700 Pleasant Street, Suite 510
New Bedford, MA 02740

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

RE: Vineyard Wind Offshore Wind Energy Project, Massachusetts, BOEM Lease Area OCS-A 0501, MHC # RC.62940

Dear Ms. Pachter:

Staff of the Massachusetts Historical Commission (MHC), office of the Massachusetts State Historic Preservation Officer, have reviewed the Project Notification Form (PNF), submitted by the PAL, Inc., for the Upland Cabling aspect of the project referenced above in Barnstable and Yarmouth.

The MHC will continue to review the project pursuant to the Programmatic Agreement with the Bureau of Ocean Energy Management (BOEM) for Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800). The MHC looks forward to consultation with the involved federal and state agencies. A copy of the Environmental Notification Form (ENF) should be submitted to the MHC for review and comment when it is filed with the MEPA office.

The MHC looks forward to reviewing additional project information, including scaled existing and proposed conditions project plans, sized no larger than 11" by 17" for the preferred project alternative to assist BOEM in determining what effect, if any, the proposed project may have on significant historic and archaeological resources. Project information should also be submitted by project planners concurrently to the Massachusetts Board of Underwater Archaeological Resources (MBUAR). Project plans should show all proposed terrestrial and marine project impact areas, including materials staging and equipment storage areas, intertidal horizontal directional drilling entrance and/or exit pits, cable routes, turbine foundation and associated vessel anchorage locations within state and/or federal waters.

The State Archaeologist's permit (950 CMR 70) has been issued to the PAL to conduct the terrestrial archaeological reconnaissance survey for the Upland Cabling aspect of the project. The marine archaeological reconnaissance survey for the Export Cable aspect of the project is being conducted by Gray & Pape, Inc., in consultation with the MHC and MBUAR. The draft technical archaeological reports for the terrestrial upland cabling and marine export cable aspects of the project should be submitted to the MHC for review and comment.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), Massachusetts General Laws Chapter 9, Sections 26-27C (950 CMR 70-71) and MEPA (301 CMR 11). If you have any questions concerning this review, please contact Jonathan K. Patton, at this office.

Sincerely,

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: Richard Warner, BOEM
Barbara Newman, USACOE-New England District
Kate Atwood, USACOE-New England District
Bettina Washington, Tribal Historic Preservation Officer, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Victor Mastone, MBUAR
Deborah C. Cox, PAL, Attn: Duncan Ritchie
Mike Tuttle, Gray & Pape, Inc.

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The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

November 21, 2018

Brandi Carrier
Deputy Federal Preservation Officer
Environmental Branch for Renewable Energy
Bureau of Ocean Energy Management,
Department of the Interior
760 Paseo Camarillo, Suite 102 (CM-102)
Camarillo, CA 93010

RE: Vineyard Wind Offshore Wind Energy Project, Massachusetts, BOEM Lease Area OCS-A 0501. MHC #RC.62490. EEA #15787.

Dear Ms. Carrier:

Staff of the Massachusetts Historical Commission (MHC), office of the Massachusetts State Historic Preservation Officer, have participated in a BOEM webinar on November 7, 2018 for the project referenced above. The MHC looks forward to receiving a copy of the webinar and meeting minutes from the November 7, 2018 presentation for review and comment. The MHC has also received a copy of the draft Construction and Operations Plan (COP) for the project on October 5, 2018. The MHC continues to coordinate the state and federal historic preservation reviews for the project. The project proponent should continue to submit Massachusetts Environmental Policy Act Environmental Impact Reports to the MHC for review and comment as they are developed.

Documents submitted by BOEM and reviewed by MHC include the Vineyard Wind Historic Properties Visual Impact Assessment prepared by Epsilon Associates, Inc., COP Appendix III-H.a, Vineyard Wind Project Visual Impact Assessment, COP Appendix III-G, Preliminary Terrestrial Archaeology Resource Report and Permit Application, and the archaeological report, *Marine Archaeological Services in Support of the Vineyard Wind Offshore Wind Energy Project Construction and Operations Plan OCS-A 0501 Lease Area and Export Cable Corridors Offshore Massachusetts*, prepared by Gray & Pape, Inc.

Information conveyed during the webinar indicates that BOEM intends to make a finding of adverse effect for the project for adverse visual effects to multiple historic properties within the project viewshed, including the Nantucket Historic District and the Gay Head Lighthouse. The MHC looks forward to reviewing BOEM's findings and determinations for the project's visual effects. The MHC recommends that BOEM continue to consult with the Nantucket Historic District Commission, Town of Aquinnah, Martha's Vineyard Museum and National Park Service regarding effects to these National Historic Landmarks. Please also continue to consult with the Tribal Historic Preservation Officers of the Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe regarding effects to Nantucket Sound and other Traditional Cultural Properties.

Identification efforts for archaeological resources have not yet been completed. Information conveyed during the webinar indicates that two historical period shipwrecks have been identified within the project area of potential effect. The marine archaeological report indicates that one shipwreck has been identified (report Figure 5-11; pg. 62), although the wreck size, location and opinion of potential significance is not included in the report text or Side Scan Sonar Contact Tables (report Appendix D).

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According to the marine archaeological report (pp. 70-71), two vibracore locations (VC-40, 41) contain intact peat layers characteristic of intact terrestrial deposits with radiocarbon dates corresponding to the Archaic Period (approximately 8,000 to 3,000 years ago). As the preferred project alternative is refined, project planners and archaeological consultants should continue to coordinate archaeological terrestrial and marine survey efforts. Previous relevant archaeological research, including information in the MHC's files such as recorded archaeological site records and cultural resource management survey reports within the middle Cape and Nantucket Sound related to the Nantucket Sound Traditional Cultural Property, should be incorporated into the draft marine archaeological report in order to provide preliminary opinions of significance. The results of the final BOEM Best Practices for Developing Protocols for Reconstructing Submerged Paleocultural Landscapes and Identifying Ancient Native American Archaeological Sites in Submerged Environments which is in preparation by the University of Rhode Island should also be reviewed and referenced.

Coordination of survey methodologies should ensure that any identified archaeological resources, including intact paleosols that may contain significant ancient Native American archaeological resources, are consistently evaluated and interpreted in appropriate historical contexts within the cultural history of Massachusetts. Draft marine archaeological survey reports should be submitted to the MHC for review and comment as they are developed. Avoidance of shipwrecks and intact paleosols is recommended where feasible. If avoidance is not feasible, then site examination methodologies, such as systematic vibracoring, may be required to define the horizontal and vertical extent of archaeological resources, site contents, and significance.

I have issued a State Archaeologist's permit (950 CMR 70) to the PAL, Inc., to conduct intensive (locational) archaeological survey and a program of archaeological monitoring for the upland cable aspect of the project in Barnstable and Yarmouth. The MHC looks forward to reviewing the draft archaeological report(s) for the upland cable aspect of the project, and to consult regarding alternatives that would avoid or mitigate adverse effects to significant archaeological resources. A written Post-Review Discoveries protocol should also be developed and implemented for the project consistent with the Massachusetts Unmarked Burial Law (Massachusetts General Laws, Chapter 38, Section 6; Chapter 9, Section 26A and 27C; and, Chapter 7, Section 38A; all as amended). Implementation of the protocol will facilitate any future consultation that may be required to avoid, minimize or mitigate adverse effects to any significant archaeological resources, including unmarked human burials, identified during project construction.

These comments are offered to assist in compliance with Sections 106 of the National Historic Preservation Act of 1966 (36 CFR 800) as amended. If you need information or have any questions concerning these comments, please contact Jonathan K. Patton of my staff.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: see attached

xc: Richard Warner, BOEM
Rachel Pachter, Vineyard Wind
Barbara Newman, USACOE-NED, Regulatory
Kate Atwood, USACOE-NED
Marc Paiva, USACOE-NED
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Bonnie Halda, NPS-National Historic Landmarks Program-Philadelphia
Reid Nelson, Advisory Council on Historic Preservation
Secretary Secretary Matthew A. Beaton, Executive Office of Energy & Environmental Affairs
Attn: Purvi Patel, MEPA Unit
Bruce K. Carlisle, Director, Massachusetts Coastal Zone Management
Victor T. Mastone, Massachusetts Board of Underwater Archaeological Resources
Lauren Sinatra, Town of Nantucket
Stephen Welch, Nantucket Historic District Commission
Peter Temple, Aquinnah Planning Board
Phil Wallis, Martha's Vineyard Museum
Deborah C. Cox, PAL, Attn: Duncan Ritchie
Mike Tuttle, Gray & Pape, Inc.

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

January 15, 2019

Secretary Matthew A. Beaton
Executive Office of Energy & Environmental Affairs
Attn: Purvi Patel, MEPA Unit
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: Vineyard Wind Offshore Wind Energy Project, Massachusetts, BOEM Lease Area OCS-A 0501. MHC #RC.62490. **EEA #15787.**

Dear Secretary Beaton:

Staff of the Massachusetts Historical Commission (MHC) have reviewed the Final Environmental Impact Report (FEIR) prepared and submitted by Epsilon Associates, Inc., for the project referenced above. The MHC received and reviewed the archaeological report, *Intensive Archaeological Survey Proposed Substation Vineyard Wind Upland Cabling Project, Barnstable, Massachusetts*, prepared and submitted by the PAL for a portion of the Upland Cable portion of the overall project. The FEIR indicates that the Covell's Beach Route in Barnstable has been selected as the preferred project cable landfall route. The FEIR includes a response to MHC comments on the SDEIR on page 6-47.

The Bureau of Ocean Energy Management (BOEM) is reviewing the Construction and Operations Plan (COP) for the project. The MHC expects to participate in further consultation under Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800) with BOEM to assist in determining project effects to significant historic and archaeological resources. The MHC has also received a copy of the federal National Environmental Policy Act Draft Environmental Impact Statement for the project.

Results of the archaeological survey conducted for the substation aspect of the project identified the Vineyard Wind Findspot 1 and 2 ancient Native American archaeological sites, consisting of a quartz Small Stemmed-style projectile point and a single piece of quartz by-product of stone tool maintenance and/or manufacture. No additional artifacts, features or soil deposits were identified during substantial close-interval archaeological testing. In the MHC's staff opinion, additional archaeological investigation within the substation aspect of the project is unlikely to contribute additional significant archaeological data. Because the information content of the findspots are limited, it is the opinion of MHC staff that the Vineyard Wind Findspots 1 and 2 do not meet the Criteria of Evaluation (36 CFR 60) for listing in the National Register of Historic Places due to a lack of research potential.

The MHC looks forward to reviewing the complete marine archaeological survey results, and the results of archaeological monitoring for the archaeologically sensitive portions of the upland cable route from Covell's Beach in Barnstable. A written Post-Review Discoveries protocol should also be developed and implemented for the project consistent with the Massachusetts Unmarked Burial Law (Massachusetts General Laws, Chapter 38, Section 6; Chapter 9, Section 26A and 27C; and, Chapter 7, Section 38A; all as amended). The draft protocol should be submitted to the MHC for review and comment. Implementation of the protocol will facilitate any future consultation that may be required to avoid, minimize or mitigate adverse effects to any significant archaeological resources, including unmarked human burials, identified during project construction.

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These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), M.G.L Chapter 9, Sections 26-27C (950 CMR 70-71) and MEPA (301 CMR 11). If you have any questions or require additional information, please contact Jonathan K. Patton at this office.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc:

Richard Warner, BOEM
Barbara Newman, USACOE-New England District
Kate Atwood, USACOE-New England District
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
David Weeden, Mashpee Wampanoag Tribe
Victor Mastone, MBUAR
Rachel Pachter, Vineyard Wind, LLC
Brian Lever, Epsilon Associates, Inc.
Deborah C. Cox, PAL, Attn: Duncan Ritchie
Mike Tuttle, Gray & Pape, Inc.

TOWN AND COUNTY OF NANTUCKET

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April 30, 2018

Bureau of Ocean Energy Management
Office of Renewable Energy Programs
45600 Woodland Road (VAM-OREP)
Sterling, Virginia 20166

INITIAL WRITTEN COMMENTS FROM THE TOWN OF NANTUCKET
RE: Public Scoping for the Draft Environmental Impact Statement for the Vineyard Wind Offshore Wind Energy Project

To Whom It May Concern:

The Town of Nantucket appreciates the opportunity to provide comments on the Vineyard Wind Offshore Wind Energy Project to the Bureau of Ocean Energy Management. As an island community, most vulnerable to the effects of climate change and rising sea levels, the Town of Nantucket supports viable, renewable energy projects—assessed to be competitive and reasonable, which support long-term price stability with the least economic impacts for local ratepayers.

In reviewing the Vineyard Wind Construction and Operations Plan, we have identified three topics of concern that could potentially impact our local community, economy, and environment, for which we offer the following comments:

1. **Nighttime Lighting System**
   In order to preserve and protect Nantucket's nighttime environment and our heritage of dark skies, we strongly urge the use of FAA-approved "Aircraft Detection Light Systems" (ADLS), as the most environmentally-responsible lighting option.

   In 2005, Nantucket adopted a lighting bylaw specifically "to preserve the rural nature of the countryside, enhance nighttime enjoyment of property, to protect property values by controlling light trespass, and to enhance the enjoyment of the night sky."

   Strobing or blinking nighttime lighting systems, as are standardly installed on wind turbine generators (WTGs), are incongruous with Nantucket's lighting regulations

and will negatively impact the Island's cultural identity of historic and environmental preservation.

In selecting nighttime lighting systems for the wind turbine generators, it is imperative to balance the need for safety with the importance of protecting the Island's dark sky qualities, which significantly contribute to Nantucket's unique historical character and astronomical heritage.

The ADLS is designed to mitigate the impact of nighttime lights by deploying a radar-based system around a wind farm, turning lights on only when low-flying aircraft are detected. This smart activation feature allows aviation lights to remain off for an average 98% of the time, which makes this type of system the safest, most effective, and appropriate nighttime lighting solution for the Vineyard Wind project.

2. Daytime Visual Impacts

Nantucket's economy is seasonal in nature and tourism driven. Not only are visitors attracted to the Island's preservation of historic buildings, places, and districts, but also to its world-class, public beaches.

We are therefore sensitive to any potential visual impacts to the ocean horizon and sunset views, especially from the Island's southern coastline: from Madaket Beach in the west to Sconset Beach in the east.

To minimize the daytime visual impacts of the multiple wind turbine generators, which may result in negative local impacts to the character of the Island, we urge the following considerations:

a. Reduce the development footprint by moving the first rows of turbines further from Nantucket's shore. In referencing the map of the "Wind Development Area for COP Review," we strongly advocate for the developer to relocate the closest thirteen WTGS from the first three rows, to the rear of the development area (see enclosed map markings). This design modification of essentially "pushing back" the closest, most visible WTGs from Nantucket, would minimize the local visual impact, without reducing the power output potential of the lease area.

b. Defer development of the closest WTGs to allow technological advancements that could lessen the visual impacts. Based on public feedback of the visual simulations, we understand that that the most negative reactions to the WTG visuals are primarily associated with the *number* of turbines visible from the coastline, and not necessarily the size of the turbines. With the prospect of larger turbines (10-12MW) being available to developers in the near future, a lesser number of turbines will soon be required in order to achieve the same power output. **We therefore strongly urge Vineyard Wind to defer the development of the lease area closest to Nantucket to allow for the future construction of fewer visible turbines.**

3. **Engagement of Nantucket Historical Review Boards in the Massachusetts Historical Commission Project Review**

   At over 30,000 acres, the Nantucket Historic District, which encompasses the entire island of Nantucket as well as the islands of Tuckernuck and Muskeget, is the largest conventional "National Historic Landmark District" by area in the contiguous United States. The Island's historic distinction is recognized in the National Register of Historic Places, the Massachusetts State Register of Historic Places, and the Inventory of Historic and Archaeological Assets of the Commonwealth.

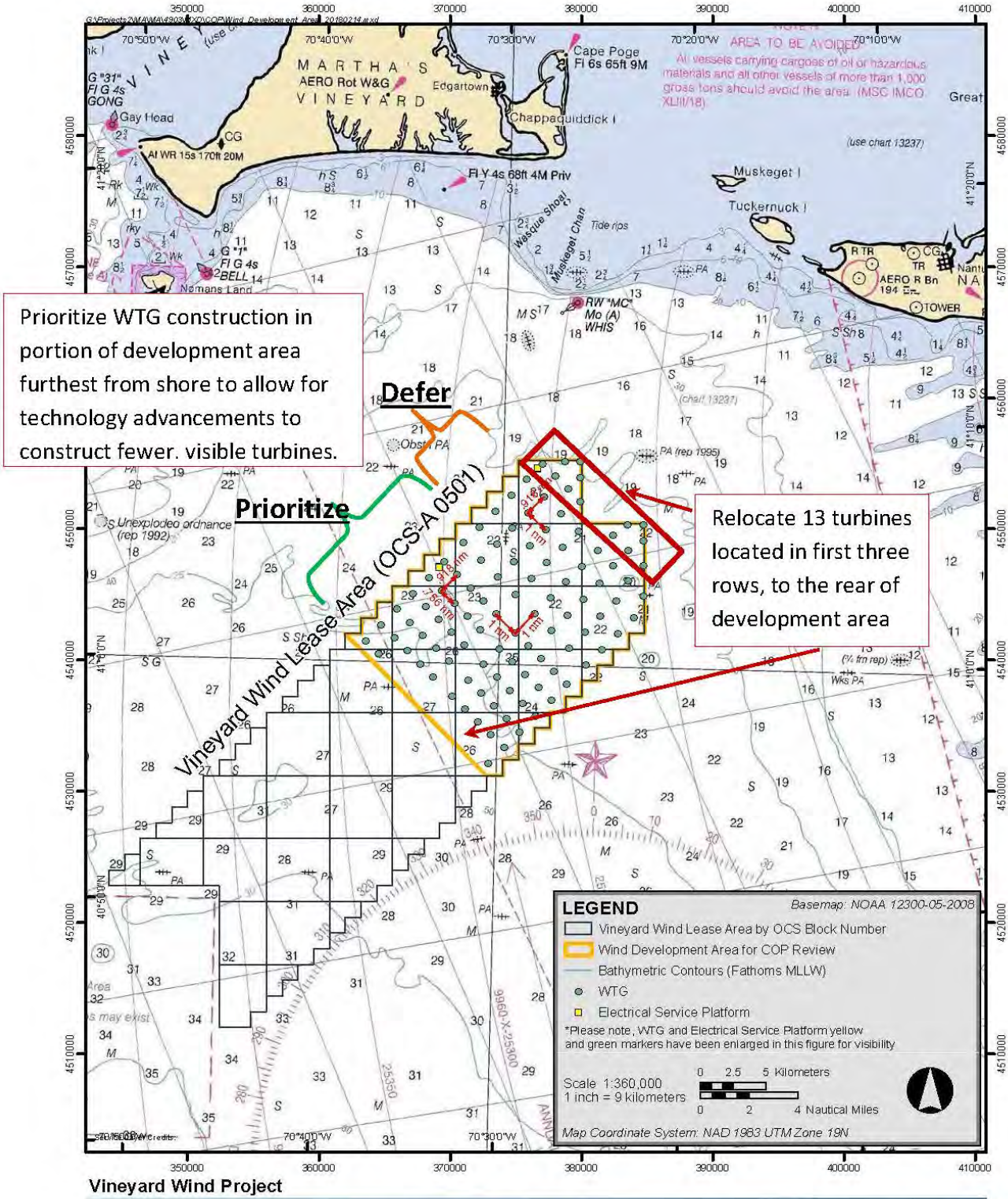
   Since 1955, the Nantucket Historic District Commission (HDC) has played a central role in the "preservation and protection of the Island's historic buildings, places and districts of historic interest through the development of an appropriate setting for these buildings, places and districts and through the benefits resulting to the economy of Nantucket in developing and maintaining its vacation-travel industry through the promotion of these historic associations."

   Due to the high cultural and historic sensitivity of the Island, and its proximity to the development site and cable routes, we strongly urge that Nantucket's historical and cultural review boards and stakeholders, such as the Nantucket HDC and the Nantucket Historical Commission, be consulted and engaged in any historic or archaeological review process of the Project.

We appreciate the opportunity to weigh in on this matter and look forward to engaging in productive efforts and discussions with Vineyard Wind, BOEM, and other stakeholders to help advance clean, affordable, resilient energy projects in the Commonwealth, which align with Nantucket's best interests.

Sincerely,

Jason Bridges, Chair
Nantucket Select Board



Vineyard Wind Project

VINEYARD WIND

Figure 3.1-2b

Wind Development Area for COP Review

Town and County of Nantucket
Select Board • County Commissioners

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C. Elizabeth Gibson
Town & County Manager

February 22, 2019

Program Manager
Office of Renewable Energy
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Dear Program Manager:

The Town of Nantucket appreciates the opportunity to provide comments to the Bureau of Ocean Energy Management (BOEM) in response to the Draft Environmental Impact Statement (DEIS) for Vineyard Wind's proposed Construction and Operations Plan (Lease Number OOCS-A-0501). These written comments supplement the oral comments presented by the Town of Nantucket's Energy Coordinator at the February 11, 2019 Public Hearing held in Nantucket.

The Town of Nantucket supports the responsible development of cost-effective offshore wind as an opportunity to help the Commonwealth meet its Greenhouse Gas (GHG) emission reduction mandate, address the retirement of aging power plants, provide economic development opportunities for Massachusetts businesses, and job creation for Massachusetts residents.

The Town of Nantucket acknowledges the important benefits that the Vineyard Wind project (the Project) may specifically provide, such as:

- Improved reliability of the regional power system,
- Electricity cost savings, and
- Reduced air emissions from fossil fuel fired plants

The following comments should only be construed as constructive, aimed at assisting BOEM with this important analysis. The Town appreciates the significance of getting this first project right, as it will serve as an important precedent for future projects. At this stage of development, it is vital that historic and ecological impacts are clearly recognized and mitigated to the fullest extent.

Notwithstanding the general support that the Town of Nantucket has for cleaner energy alternatives, we have identified, in close consultation with numerous local stakeholder groups, several areas of concern, which may adversely impact Nantucket's natural environment,

maritime economy, and rich cultural heritage. These concern, based on input from the community and reached in agreement with key local stakeholders, are as follows:

Requiring Higher Standards for Nighttime Lighting Systems
In order to preserve and protect Nantucket's nighttime environment and heritage of Dark Skies, we strongly urge for BOEM to formally require the utilization of FAA-approved "Aircraft Detection Light Systems" (ADLS), the most environmentally-responsible and locally appropriate lighting option available, as part of the COP approval.

In selecting nighttime lighting systems for the wind turbine generators (WTGs), it is imperative to balance the need for safety with the importance of protecting the Island's Dark Sky qualities, which significantly contribute to Nantucket's unique historical character and astronomical heritage. Strobing or blinking nighttime lighting systems, as are standardly installed on WTGs, are incongruous with Nantucket's lighting regulations and will negatively impact the Island's cultural identity of historic and environmental preservation.

Aircraft Detection Light Systems should become the new standard for all offshore wind developments, especially those sited within the viewsheds of historic landmarks.

Addressing the visual impacts on Nantucket, a National Historic Landmark
The Nantucket Historic District was designated a National Historic Landmark (NHL) by the Federal Department of the Interior on November 13, 1966, and it remains one of only 2,600 places in the nation with that distinction.[1] We are deeply concerned with the maintenance of the Island's character in this regard.

We disagree with the DEIS conclusion that the project's visual effects on Nantucket would be "minor," or adequately mitigated by paint color or ADLS lighting alone. The size and scale of the project within the viewshed of the Island (as illustrated by the photos in Appendix III-H-a of the COP) will negatively affect Nantucket's designation as a National Historic Landmark.

As was concluded in the "Findings of Adverse Effect" of the Cape Wind project on the Nantucket Historic District:

> "The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of the Nantucket Historic District NHL, a historic early settlement, maritime and premier whaling village, and summer resort. <u>These changes constitute an alteration of the historic character, setting, and viewsheds that make Nantucket nationally significant and eligible for conclusion in the National Register and a NHL</u>.[2]"

We note that the NHL for the Nantucket Historic Landmark District encompasses the entire island of Nantucket, as well as the islands of Tuckernuck and Muskeget, and the definition of a

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[1] National Historic Landmarks Program-nps.gov
[2] Cape Wind DEIS, Appendix 5.10-F, p. 42

National Historic Landmark "is a building, district, object, site or structure that is officially recognized by the United States government for its outstanding historical significance."[3]

To minimize the visual impacts of WTGs, the Town of Nantucket supports a reduction of the project's development footprint (Alternative E), in part by removing or relocating the northern-most rows of turbines, closest to Nantucket's shore (Alternative C).

The removal of *at least* the six closest WTGs from Nantucket would "reduce indirect (i.e., visual) impacts on the historic properties on Martha's Vineyard, the Nantucket Historic District, and Nantucket Sound, from which the proposed Project would be visible (see Section 3.4.3.3)."[4]

This design modification of essentially "pushing back" the closest, most visible WTGs from Nantucket, would minimize the adverse visual impacts upon the Nantucket Historic District, without reducing the power output potential of the lease area.[5]

Because of the large size and height of the Project's preferred 9.5MW MHI Vestas WTGs, the visual impact of the structures on the Nantucket viewshed is a significant environmental impact requiring careful assessment, minimization, and mitigation, above and beyond the limited scope of the Section 106 Review.

Failure to Assess the Project's Specific Impacts on the Unique History and History-Related Tourism of Nantucket

Tourism is the lifeblood of Nantucket's economy, with economic activity related to tourism accounting for over 70% of the Island economy.[6] Notwithstanding the European experience with windfarms, there are no relevant precedents in the U.S., and certainly none with the historical preservation and significance of Nantucket.

Nantucket's unique appeal is firmly rooted in its historic character and pristine environmental characteristics. The size and scale of the Project within the viewshed of the Island is a source of concern for the preservation of the Island's cultural character. The DEIS does not adequately address the impacts on Nantucket-specific tourism related to its historical significance, remote sense of place, natural preservation, or pristine setting of island beaches.

Furthermore, the DEIS fails to evaluate the viewshed impact on the quality of life for the residents of Nantucket. As evidenced by Figure 3.4.4-1[7], the Project will be visible from all vantage points on the southern coast of Nantucket, and neighboring islands such as Tuckernuck. Many local residents, such as those who live in Madaket, just 14.7 miles from the closest proposed WTGs, treasure the unobstructed ocean views, a resource that has remained unspoiled by industrial elements for thousands of years.[8]

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[3] National Historic Landmarks Program-nps.gov
[4] DEIS, p 3-143
[5] DEIS, p 2-14
[6] Monitoring the Nantucket Economy: An Update to the 1993 Nantucket Economic Base Study, June, 2002, Sponsored by the Nantucket Planning and Economic Development Commission and the Nantucket Island Chamber of Commerce, p 7 & 8
[7] DEIS, p 3-154
[8] Madaket Residents Association DEIS Comments, 22 February 2019.

As recognized in the DEIS, under the National Environmental Policy Act, care must be taken to avoid adverse impacts, and in particular "Irreversible commitments occur when the primary or secondary impacts from the use of a resource either destroy the resource or preclude it from other uses."[9] BOEM must carefully consider the impacts on Nantucket's unique character which we contend is a "resource" both to the Island's economy and under NEPA's definition.

These potential adverse effects must be further analyzed and quantified.

Inadequate Visual Simulations

The current simulations are incomplete and inadequate to show the actual impact of the WTGs, which is necessary to fairly assess adverse impacts and to determine appropriate minimization and mitigation measures. The DEIS does not include photosimulations showing the aesthetic impacts of the Project. Instead, these are contained in a separate document located on BOEM's Vineyard Wind webpage, in a format and quality impossible to accurately judge or interpret.[10] For certain vantage points, such as the Madaket Beach and Surfside Beach locations, the simulations were taken from the most advantageous beach-level elevations rather than on the bluffs or more elevated popular public-viewing locations along Nantucket's south shore, such as Sanford Farm. As a result, the visual simulations provide a "best case" representation of the Project's visual impact upon the Island's southern horizon, a key contributing element of Nantucket's nationally-significant maritime history.

Photosimulations during sunset—a well-known tourist and resident asset—remain missing. The video simulations simply do not capture the extraordinary experience of a Madaket Sunset. Additional simulations representing each season, with strict adherence to best practice guidelines and methodology, as identified by BOEM's Compendium Report for the New York Call Area, are necessary.

We also seek updated visual simulations that reflect any change in final WTG placement or layout, such as the scenarios presented in Alternative D.[11]

Export Cable in Nantucket Coastal Jurisdiction

One of the options included in the DEIS is an export cable route through Nantucket's coastal water jurisdiction ("Eastern Muskeget" route). The final report should identify, demonstrate, and enumerate what specific mitigation measures and benefits would accrue to Nantucket if this option is exercised, especially if this option is determined to disrupt fisheries and local commercial fishing activities. At this time, we recognize the numerous comments and recommendations provided by the Massachusetts Division of Marine Fisheries in their February 5, 2019 letter to the Nantucket Conservation Commission (Appendix A), which warrant further analysis and consideration. As stated in their letter, the Division of Marine Fisheries recognizes that the export cable route area is significant to many marine fisheries species and therefore requirements aimed at monitoring and restoration must be imposed.

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[9] DEIS, p. ES-5.

[10] https://www.boem.gov/Vineyard-Wind-Nantucket-Visuals/

[11] DEIS, p 2-11

Impacts to Commercial and Recreational Fishing Activities
Nantucket has a robust fishing industry which is threatened by the overall project and in particular the export cable route through Nantucket's coastal waters. The design of the wind farm conflicts with commercial fishing methods creating a safety hazard to both commercial fishermen and recreational boaters. Additionally, as stated above, there is potential damage to commercial fisheries, including those for squid, river herring, shad, sea herring, striped bass, lobster, Jonah crab, horseshoe crab, and conch, which have not been addressed in the DEIS.

Vessel Traffic
The DEIS indicates a planned maintenance schedule requiring 392 vessel trips in a typical year. This incremental vessel traffic, over 30 years, can have a material impact on Nantucket and its surrounding waters well beyond the 2-3-year proposed installation period. Vessel routes should be established in advance to minimize these impacts.

Need for Consistent Best Practices and Minimum Guidelines
Lastly, we are concerned over the lack of minimum guidelines and best practice standards established to date for US offshore wind projects, *especially* as relates to adverse visual impacts upon National Historic Landmarks. **This project, and how it is evaluated and permitted, will set the precedent for all future projects off our southern shore and along the entire Atlantic Coast.** We are concerned with this project serving as a "learning exercise" for all other offshore wind projects to follow and placing Nantucket in the unfortunate role of a guinea pig.

It is therefore essential that there be consistency in the criteria applied to this project and subsequent future sites. Due to the high cultural and historic sensitivity of the Island, and its close proximity to the development site and cable routes, we insist that best practice criteria be applied, however and wherever possible. These minimum standards would include:

- Clear guidelines for Visual Impact Assessments and Visual Simulations, such as:
    - Standards and methodology, as identified in the "Renewable Energy Viewshed Analysis and Visualization Simulation for the New York Outer Continental Shelf Call Area: **Compendium Report**"[12]
    - Panoramic Photomontages, such as Trueview Simulations
    - Single Frame simulations per season and during specific times of local concern (i.e. sunset), from nondeceptive angles or perspectives (i.e. beach level vs. bluff). The public should be able to easily compare the visual simulations from different developers "apples to apples" for projects within the same viewshed.
    - Use of 3D software that permits the viewer to create custom views, such as submitted in the 400-page visual simulation assessment within the DEIS for Deep Water Wind's Block Island Wind Farm.[13]
- Requiring the least impactful nighttime lighting, such as Aircraft Detection Lighting Systems, as part of the COP Approval Process.
- Requiring all windfarms in a specific region to use the same paint color, determined to be most effective in minimizing the visual impacts, per specific atmospheric/geographical conditions of the lease sites.

[12] https://www.boem.gov/Compendium-Report-Final/
[13] http://dwwind.com/wp-content/uploads/2014/08/Appx-S1-Visual-Impact-Assessment.pdf

- Establishing minimum set-back standards from land, with specific considerations for historic landmarks and areas with tourism-driven economies. The distance from Nantucket's shores is 14.7miles, which is arbitrary as a measure, and admittedly less than the "break even" point for social acceptability as analyzed by the University of Delaware.[14] We propose that 17.65 miles, or half of the 35.3-mile visual buffer (limit of WTG visibility) be considered as a more appropriate and reasonable initial benchmark for a minimum setback. The proposed 14.7 miles is too close a distance to a National Historic Landmark and sets a dangerous and irresponsible precedent for the industry.
- For communities with historical significance, BOEM should help ensure that local stakeholders receive fair and direct access to any state and federal agencies or resources, which may provide critical regulatory guidance on how best to avoid, minimize, and mitigate the local impacts of offshore windfarms. This support would be provided independent of the Section 106 process, and would, for example, identify and encourage dialogue between communities with their State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP), connections the Town has been unsuccessful in establishing to date.
- Requiring appropriate project mitigation measures to offset the impacts to communities, such as community benefit agreements, offshore wind mitigation trust funds, or other economic development arrangements, as are standard in the offshore wind industry. This is a critical juncture in the development of the U.S. offshore wind industry, and we believe the citizens and businesses of Nantucket are open minded, if not supportive, of a successful industry. For this to be the case, there must be a meaningful sharing of the benefits from this development. At present, unlike arrangements with Barnstable, Martha's Vineyard, and the Rhode Island Fishing Advisory Board, there are no proposed tangible benefits in terms of electric rates, grants or other mitigation measures to balance the impacts borne upon Nantucket.

The Town of Nantucket is supportive of the responsible development of wind energy as an alternative to traditional sources and means to achieve the State's clean energy goals, improve air quality and human health, reduce the need for additional fossil fuel power plants, and mitigate climate change.

We believe, however, that there are sufficient unknowns about the potentially permanent consequences of the Project to warrant a most cautious approach to permitting the largest such facility in the world, especially regarding viewshed impacts upon nationally historic properties.

We once again thank BOEM for this opportunity to comment.

Sincerely,

Jason Bridges, Chair
Nantucket Select Board

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[14] DEIS, p 3-153

APPENDIX A:

Commonwealth of Massachusetts
Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, Massachusetts 02114
(617)626-1520
fax (617)626-1509

David E. Pierce, Ph.D.
Director

Charles D. Baker
Governor
Karyn E. Polito
Lieutenant Governor
Matthew A. Beaton
Secretary
Ronald Amidon
Commissioner
Mary-Lee King
Deputy Commissioner

February 5, 2019

Nantucket Conservation Commission
Town Building Annex – 1st Floor
37 Washington Street
Nantucket, MA 02554

Dear Commissioners:

The Division of Marine Fisheries (MA DMF) has reviewed the Notice of Intent (NOI) by Vineyard Wind LLC for the Vineyard Wind Connector project for the portions of the offshore transmission that are in Nantucket waters, as part of a broader offshore wind project. Vineyard Wind identified a western and eastern option for the laying of two (2) offshore export cables situated within Muskeget Channel between Martha's Vineyard and Nantucket. This letter is to comment on the 3.1 mile portion of the "eastern" Offshore Export Cable Corridor (OECC) that travels through Nantucket's municipal waters. The two cables traversing Nantucket waters will most likely be jet-plowed approximately 330 feet apart and buried between 5 – 8 feet under the substrate. If cable protection is needed (approximately 10' across), a layer of rock, concrete mattresses, grout/sand bags, or half-shell pipes will be laid over the exposed cables. If the dredging of sand waves is necessary, jetting or trailer suction hopper dredging will be used. Construction methodologies have not been finalized. In our recommendations we attempt to identify the methodologies that minimize impact. If other methodologies are selected, additional conditions to avoid or minimize impacts may be necessary.

The project site lies adjacent to mapped shellfish habitat for surf clam (*Spisula solidissima*). Subtidal waters bordering the project site have habitat characteristics suitable for this species. Land containing shellfish is deemed significant to the interest of the Wetlands Protection Act (310 CMR 10.34) and the protection of marine fisheries.

This portion of the project is located in Muskeget Channel, one of 3 major channels of Nantucket Sound. This channel is utilized by many marine fisheries species, more notably squid, river herring, shad, sea herring, striped bass, lobster, Jonah crab, horseshoe crab, and conch. Muskeget Channel is known to be a major thoroughfare for many migratory fish and marine mammals, including endangered turtles (Leeney et al. 2010). In this high current area, there are many challenges with sampling for these animals, so there is little known about where and when they use the channel (Leeney et al. 2010). Unique benthic and hydrographic features in the channel may be used by marine resources for specific life history behaviors.

MA DMF offers the following comments for your consideration:

- MA DMF has requested in previous communications that all cable laying within Nantucket waters should avoid the spring season (April-June) due to high concentrations of fishing activities and natural resource events (spawning and egg laying). A meeting with Vineyard Wind on 1/31/2019 laid out a sequencing of cable-laying that results in fall cable laying in the northern part of the offshore export cable, alleviating our primary time of year concerns. However, the Muskeget Channel portion is planned to be laid in the spring (April-June) of 2021. Specific actions on the part of Vineyard Wind may be necessary to mitigate conflicts with vessels and fishing activities in Nantucket waters. There are ongoing conversations regarding both compensatory mitigation for fishermen as well as communication protocols during cable laying.
- Turbidity, particularly in the event of dredging, can impact both benthic and pelagic marine fisheries resources. High turbidity levels could affect migrations through Muskeget Channel and sedimentation could smother benthic organisms. We recommend methods be used that minimize turbidity (for example, controlled flow excavation) and habitat alteration.
- Closures around the cable laying vessel are expected per USCG regulations. It is conceivable that a cable laid on the seafloor is protected via a closure until it is buried. This could have adverse impacts on fishing access and depending on the specific time of year and the length of the closure these impacts could be severe. We strongly recommend simultaneous lay and burial to ensure minimal closure of the cable laying area to other activities.
- Some sections of the cable will pass over hard bottom, which may serve as lobster settlement habitat. We recommend the proponent monitor the presence of young of the year lobster in these areas before and after construction to assess impact.
- Once the cable is energized, a potential impact to marine fisheries resources is the electromagnetic field (EMF) emitted by the cable. Some marine fisheries resources are sensitive to these fields (e.g., flounders, see McCann, 2012). The planned burial of the cable to ~1.5-2.5 m will minimize the impact of EMF. We recommend burial of at least 1.5 m and monitoring cable burial continuously via temperature monitoring or other in-situ method. If continuous monitoring cannot be done, then geophysical surveys should occur at least annually (which is more frequently than is currently described in the Construction Operations Plan) and always after major storm events such as hurricanes and nor'easters.
- Some sections of the cable may need to be armored for long-term protection. We recommend using natural materials that mimic the surrounding seafloor. Mitigation for habitat conversion may be needed.
- A mechanism to compensate fishermen for lost gear during construction and operation has not been established but has been discussed.
- The Benthic Habitat Monitoring Plan submitted as part of this NOI is inadequate both in terms of sample sizes and collection methods to assess any potential changes to seafloor infauna or bathymetry following cable installation. Only 10 sites from five habitat types are proposed for assessment. It is unclear if any of these sites are in Nantucket waters.
- The Benthic Habitat Monitoring Plan is insufficient to assess project impacts to important food for wildlife (e.g. shallow submerged lands with high densities of polychaetes, mollusks, or macrophytic algae), distribution of sediment grain size, and changes in natural relief and elevation caused by cable laying. The samples taken to assess these impacts need to be taken at a relevant scale and with quantitative methods. As we have stated in other letters, the Benthic Habitat Monitoring Plan needs to be fully revised with guidance from the agencies. Some specific recommendations that we have made include:

- The benthic stations where infauna are being sampled should also be sampled for grain size.
- Sediment profile imaging (SPI) images should be taken pre- and post-construction.
- The entire cable pathway should be re-imaged with multibeam post-construction; those data should be incorporated in a post-construction impact analysis.
- Video surveys should use high resolution video and be georeferenced.
- The timeline of sampling, including the season, should be clarified.
- The benthic monitoring plan needs additional detail with respect to how change will actually be measured and may need additional sampling stations for a quantitative assessment.
- The plan should state the hypotheses being tested.
- The plan identifies reports as the primary product; we recommend all data be made available in regional database management systems and directly to requesting agencies.

Questions regarding this review may be directed to Eileen Feeney in our New Bedford office at (508) 742-9721.

Sincerely,

Eileen M. Feeney

Eileen M. Feeney
Fisheries Habitat Specialist

cc: Jack Vaccaro, Epsilon Associates, Inc.
Erich Stephens, Vineyard Wind LLC
JC Johnsen, Shellfish Constable
Sue Tuxbury, NMFS
Robert Boeri, CZM
Barbara Newman, ACOE
Derek Standish, David Wong, DEP
Richard Lehan, DFG
David Pierce, Kathryn Ford, Ryan Nuttall, DMF

KF/EF/jl/rn

References

MA DMF (2018) Recommended regional scale studies related to fisheries in Massachusetts and Rhode Island-Massachusetts offshore Wind Energy Areas. Report to the Massachusetts Fisheries Working Group. 57 pp.

Leeney RH, Nichols OC, Sette L, Wood LaFond S, Hughes PE (2010) Marine megavertebrates and fishery resources in the Nantucket Sound - Muskeget Channel area: ecology and effects of renewable energy installations. Report to Harris Miller Miller & Hanson Inc., September 2010. Provincetown Center for Coastal Studies, Provincetown, MA, USA. 88 pp.

McCann, J. (2012). Developing Environmental Protocols and Modeling Tools to Support Ocean Renewable Energy and Stewardship. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA., OCS Study BOEM 2012-082, 626 pp.

Appendix C-1: Memorandum from Vineyard Wind to BOEM regarding Visibility of Project Structures, June 3, 2019

MEMORANDUM

Date: June 3, 2019

To: Meredith Lilley, BOEM

From: Maria Hartnett, Epsilon

Subject: Vineyard Wind, Visibility and April 10, 2019 Finding of Adverse Effect

As we have discussed, BOEM's April 10, 2019 Finding of Adverse Effect for the Vineyard Wind Project Construction and Operations Plan ("the Finding") overstates the visibility of the project on the Nantucket Historic District National Historic Landmark and the Gay Head Lighthouse. This memo provides a more accurate interpretation of the visibility data contained in the Visual Impact Assessment (VIA) included as Appendix III-H.a of the Construction and Operations Plan (COP) and the effect of Vineyard Wind's proposed mitigation measures to substantially mitigate the visibility of the project.

Nantucket Historic District National Historic Landmark

Section 4.2 of the Finding states that elements will be visible at the Nantucket Historic District National Historic Landmark up to 68% of the time (all hours of the year). This overstates the conclusions of the VIA for the following reasons:

- The Finding appears to reference Table 2 of the VIA, which summarizes visibility measurements from the Nantucket Airport meteorological station. In those measurements, visibilities greater than 10 statute miles are still reported as 10 miles[1]. Therefore, given that the nearest shoreline vantage point is more than 14 statute miles away from the single nearest WTG, it is reasonable to conclude that the project will be obscured from coastal vantage points more frequently than identified in Table 2. [VIA Section 4.3]
- The on land visibility measurements do not account for wind and wave induced sea spray and salts. The presence of sea spray and salts in the air over the ocean affects visibility but is not accounted for in Table 2. Therefore, calculated visibilities should be considered conservative since they do not account for this light-reducing factor. [VIA Section 4.3]

[1] Airports provide visibility data for the benefit of pilots, who are only interested in whether visibility is limited to less than ten miles.

- The ocean elements of the Project can be visible from only a small fraction of the Nantucket Historic District National Historic Landmark. Views of Project ocean elements will be blocked by intervening terrain and vegetation for the vast majority of Nantucket, including the entirety of the historic harbor and town. Where visible, most ocean elements will be much farther than 14 miles away. [VIA Figure 5]

- At over 14 miles from shore there is no land-based vantage point that will view an entire Wind Turbine Generator (WTG). Some portion of each of the structures will always fall below the visible horizon, and the presence of waves further reduces the portion of structures visible. [VIA Section 4.2]

- Even when and where visible, the ocean elements of the Project will not affect the overall character of the resource. The perceived width of the WTG tower at over 14 miles distance would be roughly equivalent to viewing a pencil from 100 feet away. Similarly, the perceived width of the blade would be roughly equivalent to viewing a coffee straw at the same distance. [VIA Section 6.2]

Importantly, Vineyard Wind's proposed actions will substantially mitigate the visibility of the ocean elements.

- Subject to approval from BOEM and the FAA, Vineyard Wind will install and use an Automatic Detection and Lighting System (ADLS) to reduce nighttime lighting and thus minimize nighttime visibility of the ocean-based project elements. Such a lighting system will only be activated a tiny fraction of the time (estimated at less than 4 hours/year). Accordingly, nighttime lighting will be almost completely eliminated, and in the absence of lighting, the Project will not be visible from shore at night.

- Vineyard Wind will paint the WTGs using an off-white / grey color, to reduce contrast with the sea and sky and thus minimize daytime visibility of the ocean-based project elements. The conservative threshold for visibility as used in Table 2 of the VIA is "the greatest distance at which an observer can just see a **black** object viewed against the horizon sky". [VIA, Appendix C Section 4.2] The WTGs will not be black; instead, the neutral off-white color will be highly compatible with the hue, saturation and brightness of the background sky. [VIA Section 6.2] This lack of contrast between the structures and the background means that the percentage of the time the structures might be visible is greatly reduced.

Gay Head Lighthouse

Similarly, the Findings overstate the conclusions of the VIA regarding impacts to Gay Head Lighthouse on Martha's Vineyard. The Gay Head Lighthouse is located on the extreme western tip of Martha's Vineyard; it is approximately 24 statute miles from the nearest Project ocean element (a WTG on the western edge of the wind array). The Findings state "it is estimated that the ocean view from the Gay Head Lighthouse

to the south and the west will be obstructed by the new ocean-founded visual elements proposed in the COP up to 76% of the time." Notably:

- At no time will ocean view be "obstructed." The location of the WDA more than 23 km (14 miles) offshore eliminates all foreground, mid-ground, and even near background views from visually sensitive public resources and population centers. [VIA Section 8.0] Objects in the far background should not be characterized as obstructions.

- Gay Head Lighthouse is 24 statute miles from any Project ocean elements; basing visual impact conclusions on the frequency of 10-mile visibility greatly overestimates how often structures could be visible.

- As previously explained for Nantucket, visibility measurements do not account for sea spray and salts, some portion of the structures will always fall below the visible horizon, and the presence of waves further reduces the portion of structures visible.

- The use of ADLS will virtually eliminate nighttime visibility, and the lack of contrast between the structures and the background mean that the daytime percentage of the time the structures might be visible is greatly reduced.

Times Potentially Visible

During our call on Thursday afternoon May 30, you requested an update to the VIA Table 2 separating daytime and nighttime visibility. Table A below provides that update, with seasons and daytime hours as-defined in VIA Appendix C Section2.0.

Table A: Frequency of Reported Visibility Ranges from Martha's Vineyard and Nantucket Airports (Not Equivalent to Visibility of the Project from the Shoreline)

Percentage of Time Airport Visibility is 10 Statute Miles or Greater						
Location	Time	Winter	Spring	Summer	Fall	Annual
Martha's Vineyard Airport	Day	80%	82%	80%	84%	81%
	Night*	0%	0%	0%	0%	0%
	Total	40%	41%	40%	42%	41%
Nantucket Airport	Day	71%	71%	69%	76%	72%
	Night*	0%	0%	0%	0%	0%
	Total	35%	36%	35%	38%	36%

*Unlit objects will not be visible at >10 miles at night. The use of ADLS reduces expected nighttime lighting to less than 4 hours/year, which is <0.1% of annual nighttime hours and is rounded to 0% in this table.

However, for the reasons discussed above, the percentages in Table A should not be taken as times when project structures will be visible.

BOEM addressed one key limitation of the airport data – the fact that airports don't report visibility greater than 10 statute miles – in OCS Study BOEM 2017-037 "Visualization Simulations for Offshore Massachusetts and Rhode Island Wind Energy Area - Meteorological Report." In Section 4.2 of that study, BOEM presents a method to calculate visibility distances past 10 statute miles using relative humidity data. BOEM developed the method by performing a regression analysis of Martha's Vineyard visibility and relative humidity observations.

Table B below applies the methodology from the BOEM study to Martha's Vineyard and Nantucket airport data. For Martha's Vineyard, Table B shows the amount of time visibility is greater than 24 miles (the distance from Gay Head Lighthouse to the closest Project structures). For Nantucket, Table B shows the amount of time visibility is greater than 14.7 miles (the distance from the **closest** Nantucket locations to the closest Project structures – all other Nantucket locations are further away).

Table B: Visibility Estimates using Algorithm in BOEM 2017-037

Percentage of Time Visibility is 14.7 Statute Miles or Greater for Nantucket, 24 Statute Miles or Greater for Martha's Vineyard using BOEM Methodology						
Location	Time	Winter	Spring	Summer	Fall	Annual
Martha's Vineyard (Gay Head Lighthouse)	Day	46%	44%	28%	37%	39%
	Night*	0%	0%	0%	0%	0%
	Total	23%	22%	14%	19%	**19%**
Nantucket (Closest Point on Nantucket Historic District National Historic Landmark)	Day	60%	52%	36%	54%	50%
	Night*	0%	0%	0%	0%	0%
	Total	30%	26%	18%	27%	**25%**

*Unlit objects will not be visible at >10 miles at night. The use of ADLS reduces expected nighttime lighting to less than 4 hours/year, which is 0.1% of annual nighttime hours and is rounded to 0% in this table.

Table B shows that, on average for all conditions, project structures **might** be visible 19% of the time from Gay Head Lighthouse, and **might** be visible 25% of the time from the **closest** location on Nantucket. Again, because of sea spray, low-contrast paint color, and other factors, the actual amount of time structures would be visible is lower.

Conclusion and Request

Taking into consideration the fact that the visual impacts are less than what is stated in the Finding, and the proposed mitigation substantially reduces the visual impacts, we respectfully request that BOEM clarify that the structures will not be visible most of the time, and that the Project would result in minimal change to landscape conditions for viewers along the Martha's Vineyard and Nantucket coastlines [VIA, Section 8.0].

Appendix C-2: Memorandum from Chappaquiddick Wampanoag Tribe to BOEM, June 16, 2019

Alma Gordon
Alma Gordon, White Sky
Sonksq
Chappaquiddick Wampanoag Tribe

be Of The Wampanoag Nation
, MA 02539

To: Bureau of Ocean Energy Management

June 16, 2019

Brandi M. Carrier, MA RPA, Archaeologist, Deputy Preservation Officer
45600 Woodland Rd, Sterling, VA 20166

Chappaquiddick Island - Visual Impact Study

The following list details the traditional cultural properties for the prehistoric and historic time periods connected to the Chappaquiddick People. It is important to note that Chappaquiddick unlike Martha's Vineyard and Nantucket have a limited number of man-made structures and the majority of the water views of the Island have pristine views of the ocean, sound, or bay without man-made impacts. Even the islands residential properties are well regulated and homes typically have only one or two levels. When looking from most high elevations on the island you see very few homes or other man-made structures. So adding the windmills on the horizon will have more impact to the view than on the islands that have more man-made, multi-level structures like Martha's Vineyard and Nantucket.

Property	Property Notes	Visual Impact	Visual Notes	Impact
Cedar Forest - Cape Poge – Tom's Neck Pre-contact significance	Traditional ceremonies, collection of cedar for smudge, and area to lunch in the shade after clamming and fishing on the north shore of Poge and Nantucket Sound.	No	Northeast edge of Cape Poge. Low elevation views of Poge Bay & Gut, Shear Pin Pond, sand dunes, and Lighthouse	Not applicable
Chappaquiddick Lots – Sliver (Fynbo) North Neck Pre/post-contact significance	Highest ground would serve multiple purposes to the tribal community. 1) Burial sight to ensure graves were not affected by winds or ocean tides. 2) Lookout for travelers coming from the mainland or Noepe (Martha's Vineyard). 3) Storm, fire, star, whale, and tides watch. 4) Ceremonies to honor ancestors, moon, and sun.	Yes	Panoramic view of Martha's Vineyard, highest point on Island. Clear views of Nantucket Sound, Muskeget Channel and Atlantic Ocean horizon. Not listed on map as impact area, elevation must be considered	**Visibility Level 6 - Dominates the view.** The windmills will place a man-made structure on the horizon that has been seen by the Chappaquiddick People for over 10,000 years. 1) All ceremonies that offer prayers for our ancestors lost off of Wasque Point or further points on the Atlantic or Pacific (post-contact) on the hunt on the ocean will have the windmills directly in their views. 2) Any ceremonies that honor the rising sun will have the windmills to the South in their peripheral view, again this landscape has never had man-made structures in the view. 3) All photos of this formerly pristine untouched panorama will include the windmills in the view 4) Future generations will not know this view without the impact of the windmills on the horizon

Chappaquiddick Lots - (Town of Edgartown) Woodland Reservation Pre/post contact significance	Multiple purposes for tribal community. 1) Farming area without direct exposure to ocean winds or water. 2.) Protected area for swimming, canoeing, and fishing lessons for young tribal members 3) Lookout for travelers coming from the mainland or Noepe (Martha's Vineyard). 4.) Burial sight to ensure graves were not affected by winds or ocean tides. 5) Camp also used when Nor-Easters or hurricanes hit the Island and Tribal Clans to cover in the woodlands from North Neck's exposed elevation.	Yes	Southeast sloping hill on Katama Bay unobstructed view of Norton Point to Atlantic Ocean horizon.	**Visibility Level 6 - Dominates the view.** Again, ceremonies to the hunt of marine and land mammals will have the windmills front and center. Any photos taken will have views of the windmill again the view has no man-made structures. This property is on the Southeast slope and it's view will forever include windmills.
Chappaquiddick Indian Summer Camp/Burial Ground (2 North Neck Pre/post-contact significance	Multiple purposes for tribal community. 1) Summer camp grounds 2)Farming area without direct exposure to ocean winds or water. 3. Protected area for swim, canoe, and fishing lessons for young tribal members 4.) Burial sight to ensure graves were not affected by winds or ocean tides.	No	Mid-level elevation North-east slope view of Cape Poge Bay and Nantucket Sound, and north-east horizon.	Not applicable
Chappaquiddick Community Ctr/former School & Meeting House Three Ponds Post-contact	Farm lands pre-contact, post contact school and meeting house	No	Low level, mid-Island sight enclosed by Woodlands.	Not applicable
Cape Poge Light House National Historic Register: https://npgallery.nps.	Birding and rabbit hunting grounds for young hunters, pre-contact. Trustee property,tours are available to visit Cape Poge, Tom's Neck, and the Lighthouse.	Yes	Clear unobstructed panoramic views of Nantucket Sound, Muskeget Channel, and out to the Atlantic Ocean horizon.	**Visibility Level 4 - Plainly visible.** A formerly unobstructed view of the Atlantic Ocean horizon and all futures photos will include the windmills

gov/AssetDetail/NRIS/87002040 Cape Poge Post contact				
Cape Poge Refuge Cape Poge post - pre-contact	Birding and rabbit hunting grounds for young hunters, pre-contact.	No	Low elevation views of Poge Bay & Gut, Shear Pin Pond, sand dunes, and Lighthouse	Not applicable
East Beach post - pre-contact	Striper fishing	No	Clear unobstructed panoramic views of Nantucket Sound, Muskeget Channel, and eastern horizon.	Not applicable
Jeffer's Structures Three Pond pre & post-contact	Farm lands pre-contact	No	Low to mid level elevation, some views of Cape Poge & Gut and Nantucket Sound, mid-Island sight.	Not applicable
Katama Bay Pre-contact	Clamming, fishing, hunting, canoeing and kayaking.	Yes	Clear view past Norton's Point and Atlantic Ocean horizon	**Visibility Level 6 - Dominates the view.** All morning and full moon ceremonies for clamming will include views of the windmills on the horizon. Early morning sunrise and sunset activities include views of windmills with views of the Atlantic. Another pristine view with beach plums, bay or the ocean will be dominated by the windmills
Marshall Farm Three Ponds Post-contact	Farm lands, pre-contact	No	Low to mid level elevation, some views of Cape Poge & Gut and Nantucket Sound, mid-Island sight.	Not applicable

Meeting House North Neck Post-contact	Built on pre-contact Tribal lands. .	No	Mid-level elevation North-west slope view of Cape Poge & Gut and Nantucket Sound, and the mainland	Not applicable
Norton Point Katama Pre-contact	Walking path from Wasque to hunt deer on Katama, and fishing and clamming all the way to Great Pond.	Yes	Clear view Atlantic Ocean horizon	**Visibility Level 6 - Dominates the view.** Again, ceremonies to the hunt of marine and land mammals will have the windmills front and center and any photos taken will have views of the windmill again the view has no man-made structures. Early morning sunrise and sunset views of windmills with views of the Atlantic. Another pristine view of the Atlantic Ocean horizon, impacted
Poucha Pond Wasque Pre-contact	Area to congregate after berry picking, fishing, clamming hunting,whaling or sealing. The animals killed would be dressed and transported from the site. Children swam, practiced canoeing Ceremonies for sunrise, whale and seal hunt, and berry picking. Collection of sage, wild indigo, and healing herbs have always been collected from this area.	Yes	View from south-east side of pond, past Wasque Point, otherwise view can be obstructed by treeline	**Visibility Level 4 - Plainly visible.** All ceremonies that offer prayers for our ancestors lost off of Wasque Point or further points on the Atlantic or Pacific (post-contact) on the hunt on the ocean will have the windmills. Days spent on Poucha present day will after berry picking, fishing, and swimming or kayaking will include a peripheral view of the windmills. Visitors kayaking to the inlet will view the windmills.
Sampson Hill - Three Ponds Pre/Post contact significance	Another high point on the Island used as consistent with other high grounds. Ceremonies for planting on this high hill overlooking the farmland from this hill to Poge's high ground. Burial sight to ensure graves were not affected by winds or ocean tides. WWII, lookout sight for coastal watch	Yes	Elevated point, panoramic view. Clear views of Nantucket Sound, Muskeget Channel, and Atlantic Ocean horizon. Not listed on map as impact area, elevation must be considered	**Visibility level 3 - Visible** Adds windmills to the view, this sight does have homes in the surrounding area. 1) All ceremonies that offer prayers for our ancestors lost off of Wasque Point or further points on the Atlantic or Pacific (post-contact) on the hunt on the ocean will have the windmills directly in their views. 2) Any ceremonies that honor the rising sun will have the windmills to the South in their peripheral view 3) All photos of this area will include windmills
Wasque Point Wasque Pre-contact	Look out and launching point for marine mammals hunt. Ceremonies to honor Whalers/Sealers before the hunt, the whales and seals to be hunted, and those ancestors lost in the from the hunt honored before each hunt and present.	Yes	Clear view of the Atlantic's horizon	**Visibility Level 6 - Dominates the view.** All ceremonies that offer prayers for our ancestors lost off of Wasque Point or further points on the Atlantic or Pacific (post-contact) on the hunt on the ocean will have the windmills. Sunrise ceremonies, will include a peripheral view of the windmills, Visitors kayaking to the inlet will view the windmills.

William Martin House North Neck Pre/post-contact	Home of Black whaling captain, married to a Chappaquiddick women. Built on pre-contact Tribal lands	No	Mid-level elevation North-west slope view of Cape Poge Gut and Nantucket Sound, and the mainland	Not applicable

A statement from Penny Gamble Williams, Spiritual Leader, Tribal Council Member

We are The People of Tchepi Aquidenent, The Separate Land!

When we step foot on the land of our Ancestors, we are transformed! We know why we are there. We have a strong Spiritual relationship with our Sacred land. Just breathing the air, taking in the aroma of the salt water, the wild flowers in the summer, feeling the soil and sand connects us. This is Ceremony to us.

The Original Instructions were given to us by The Great Spirit to be the Keepers of the Land. At the turn of the Century many Chappaquiddick People were living in other places in order to make a living. These were difficult times for them because they did not want to leave. Through all of the generations we have found ways to live up to those duties and strengthen our People. Although it has been challenging we have in our own way made sure to follow the instructions.

In our Spiritual practices we honor the Seven Directions of Life and acknowledge the teachings. The East is the direction of the First Light of dawn, the place where the sun rises. The South represents the spirit of generosity, the place to learn and grow. The West is where we go within the darkness to the unknown to gain insight. The North is where we gain wisdom from past experiences. After facing the cardinal directions we gesture to the sky and send our prayers throughout the universe. We point to Ohke, our Mother Earth, and finally place our hands to our hearts recognizing ourselves. This completes the Prayer for the Seven Directions.

We remember our relatives from the beginning of time. As Chappaquiddick People, we know our story, and we know the land. We understand our connection to the natural elements that makes Tchipi Aquidnet the island that it is.

A statement from Alma Gordon, Sonksq

We are the keepers and defenders of the land. According to our Moshup legends, Chappaquiddick existed prior to Nantucket. Our people inhabited Chappaquiddick Island, Cape Pogue and Muskeget Island for thousands of years. Between 1692 and 1870, we filed numerous petitions with the Massachusetts Bay Colony and the State of Massachusetts to address encroachment and land disputes and delivered a petition to King George of Great Britain in 1772. In 1788, Chappaquiddick Island was divided between the settlers and our people. We were designated two reservations at that time. Based on available information, Chappaquiddick Island meets the criteria for eligibility for the National Register of Historic Places.

An Archaeological Reconnaissance Survey of the Town of Edgartown including Chappaquiddick Island was conducted in 2000 for the Martha's Vineyard Commission and Massachusetts Historical Commission. Chappaquiddick Island is designated as a location of high archaeological sensitivity for prehistoric and historic time periods. Due to the sensitive nature of this survey, it cannot be released. You can verify the existence of this survey with the Massachusetts Historical Commission.

It is interesting that an attempt was made to designate Chappaquiddick as a District of Critical Planning Concern in 2001 by the Martha's Vineyard Commission (MVC) shortly after the release of the Reconnaissance Survey due to special features and archaeological significance. State archaeologist, Brona Simon is quoted as follows:

"The cultural resources that contribute to the unique heritage of Chappaquiddick include archaeological sites of the pre-contact and historic periods, buildings, landscapes, burial grounds and Native American traditional sacred and cultural properties…Chappaquiddick's preserved open space reflects its rural heritage. Prior to European contact, Native Americans lived off the land, hunting, gathering, fishing and farming. Europeans settled in Edgartown in 1642, and for more than one hundred years they used the island primarily for grazing cattle and procuring wood…A recent reconnaissance survey of Edgartown recorded four known burial grounds on Chappaquiddick and two possible unmarked Euro-American burying grounds related to Native American habitation on the island. There may also be unmarked Euro-American burying grounds associated with a British camp and a smallpox hospital on Cape Poge Refuge. It is anticipated that additional unrecorded Euro-American family plots and unmarked Native American grave-sites will be located on the island. Native American burial grounds are considered properties of traditional religious and cultural importance. …."

Pahkehpunnassoo, the Chappaquiddick sachem born circa 1595, was critical of the relationship that Hiacoomes, the first Wampanoag convert to Christianity, had with the colonists. Pahkehpunnassoo later converted to Christianity after being rescued by a Native convert after nearly being struck by lightning. In 1651, Hiacoomes led the first Native Christian assembly.

With regard to the Chappaquiddick reservation period, there are 5 recorded archaeological sites. They include two burial grounds, the entire area that covers all the Chappaquiddick Wampanoag Cleared Lands Reservation, and two other sites related to our people. The lands that were our Woodlands Reservation have not been surveyed to date. There are also other archaeological sites on Chappaquiddick Island with post contact and pre-contact materials. Our people inhabited the entire island prior to first contact; the entire island is our ancestral homeland. Our tribe has viewed a sampling of the pre and post contact artifacts. They are being stored for the tribe by an archaeology firm until we have our own proper facilities for storage. We have a complete accounting of the materials being stored.

Two of our tribal members participated in an Archaeological Reconnaissance Survey in 2000. One of those individuals is Penny Gamble Williams, our Spiritual Leader and a Tribal Council Member. She was also a previous Sonksq. Penny Gamble Williams recalls responding to the archaeological firm's outreach to provide information about Chappaquiddick Island, and provided information about sacred sites, areas where ceremony is practiced. In the District of Critical Planning Concern document or Chappaquiddick, the state archaeologist mentions ….."

There are standing structures on Chappaquiddick Wampanoag traditional lands:

· There is a structure on North Neck from the 1700s that we believe to be used for religious meetings, and a location of pre contact settlement. The holder of this location is agreeable to having this location placed on the national historic register and having an archaeological study. It is perhaps the oldest structure on Chappaquiddick Island.

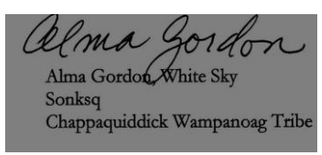
· The William Martin House; William Martin, a Black whaling captain was married to Sarah Brown, a Chappaquiddick Wampanoag. An application was submitted to record this structure in 2006. New owners purchased the property after the application was filed so the application has not moved forward. Based upon our historic maps, 1851 and 1869, this location was occupied by the Brown tribal family in 1851, perhaps earlier.
· Properties owned by the Jeffers family

The Martha's Vineyard Commission has also designated the Cape Poge District has a District of Critical Planning Concern. It encompasses Cape Poge, the peninsula leading to Wasque, and Norton Point. Most of which are areas that will have a view of the Vineyard Wind Project.

We conduct ceremonies on Chappaquiddick Island and continue to practice our cultural activities as our Ancestors have in the past. Our current view and that of our Ancestors from time immemorial has been of an open view of the Atlantic ocean. Therefore, future generations will be met with the imposing view of the wind farm, and our people will not experience the horizon to the South of the island. Large portions of Chappaquiddick Island contain conservation lands; our experiences in ceremony are our connection to our ancestors. The view of the largest wind farm off the coast of the United States will forever be looming to the South.

Our people will also be affected the placement of the cable as planned impacting archaeological pre contact settlements and possible desecration of remains within the predefined coastal boundaries of lands adjacent to Chappaquiddick. Since we were not included in the webinar with the Federally recognized tribes to discuss this facet of the project and mitigation, we ask that it be addressed separately with the us. Based on archaeological assumptions, the location of the placement and digging for the cable contain areas that were previously above water, and were possible dwelling places for the Wampanoag, People of the First Light. We ask to be formally included in any mitigation, research or community financial settlements, on the same level as our sister Wampanoag tribes to recognize the damages to our people from disturbance of paleo land forms. We are the closest tribe to the landshelf disturbance; it affects us that the possible destruction of ancient locations and disturbance of resting places of our ancestors will take place during our watch.

We have indigenous rights according to the United Nations Declaration on the Rights of Indigenous Peoples.



cc: Massachusetts Historical Commission

Appendix C-3: Memorandum from Vineyard Wind to BOEM regarding Sediment Plumes, Coastal Erosion, and Impacts from Cable Installation, June 18, 2019

Responses to Questions Regarding Sediment Plumes, Coastal Erosion, and Impacts from Cable Installation for the Vineyard Wind Project

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18 June 2019

1.0 Properties of Surface Sediment Plumes Generated by Wind Turbine Monopile Foundations

Surface sediment plumes have been observed down current from some wind turbine monopiles in the United Kingdom (UK), particularly at the Thanet and London Array wind farms in the Thames Estuary off the east coast of the UK. These plumes range from 30 to 150 m (100 to 500 ft) wide and can extend down current more than 2 km (1.2 mi) based on analyses of satellite observations (Vanhellemont and Ruddick, 2014). The plumes are embedded in the local current and therefore move with the tide (speed and direction). In other UK wind farm areas, e.g., the Humber and the offshore Irish Sea (Forster, 2018), plumes are absent or rare. Sediment plumes could arise in locations when the following three key criteria exist: shallow water, significant tidal current speed, and mobile sediments. As described further below and in the Project's Construction and Operations Plan (COP), the conditions necessary to create sediment plumes are largely absent at the Vineyard Wind Project site. In contrast to the Thames Estuary projects, the Vineyard Wind site has deeper water, slower currents, and very low sediment mobility, as well as being far from any riverine sediment load such as occurs in the Thames Estuary. In addition, Vineyard Wind is proposing to use scour protection around each monopile, which further diminishes the potential for sediment plumes to form (the Thames Estuary projects do not have scour protection at their monopile foundations). Thus, the Vineyard Wind Project does not have the characteristics to produce the sediment plumes seen at the Thames Estuary projects.

The hydrodynamic processes of flow around a stationary pile are complex. A vortex forms at the bottom of the upstream face that includes a rotational velocity next to the face that can erode the bottom sediments. Then horizontal pressure accelerates the flow (and the sediment) around the sides of the pile and lee wake vortices (eddies) form that may shed from the downstream portion of the pile. Each of these three processes generates random short-term motion known as turbulence which can mix the flow (and sediment) from the bottom of the pile upward. If conditions are such that the water depth is sufficiently shallow, the flow is sufficiently fast, the pile sufficiently large, and the sediment sufficiently mobile, it is possible to bring the sediment to the surface and form visible sediment plumes such as those seen at wind farms located in the Thames Estuary.

The Thanet wind farm located in the Thames River Estuary has been extensively studied. It has 100 turbines in water depths ranging from 20 to 25 m (66 to 82 ft) with tidal currents that vary up to 0.8 to 1+ m/s (1.5 to 2+ kn) (Vanhellemont and Ruddick, 2014 and Appendix III-K of the COP). The London Array is

also located in the Thames River Estuary with 175 turbines in water depths ranging from 0-25 m (Vanhellemont and Ruddick, 2014).

In contrast, the Vineyard Wind site located south of Martha's Vineyard is planned to have 84 turbines in water depths between 37 and 49.5 m (120 and 160 ft; see Section 2.1 of COP Volume I), 1.5-2 times the depths at Thanet and the London Array. In addition, tidal currents at the Vineyard Wind site are much lower at 0.3 m/s (0.6 kn; see Section 2.2.4 of COP Volume II), which is one third the current speed at Thanet and the London Array. As described in Appendix III-K of the COP, sediment mobility and transport is low given the low currents at the site. These key site characteristics are expected to dramatically reduce or eliminate altogether the potential for surficial sediment plumes to form.

Additionally, unlike the Thanet and London Array wind farms[1], the Vineyard Wind project will have scour protection extending around each wind turbine foundation with a radius of approximately 22-26 m (72-85 ft) that will further decrease the likelihood of sediment plume formation. The planned use of scour protection means that the major source of sediment that could give rise to a sediment plume, the local scour pit around the base of the monopile, is not available for the Vineyard Wind project as it is for the Thanet and London Array projects. For Vineyard Wind, only a much smaller edge scour area along the outer perimeter of the scour protection, much further away radially from the active horseshoe vortex, could potentially provide a smaller source, if any, for a potential surface sediment plume. Accordingly, given the site characteristics and the planned use of scour protection at Vineyard Wind, surficial sediment plume formation is considered highly unlikely.

2.0 Estimated Impacts of Changes in Wave Environment on Shoreline Change from the Vineyard Wind Project

An offshore wind farm may alter wind-driven waves as they pass through the wind farm; however, such changes are broadly expected to reduce wave energy and consequently are not expected to exacerbate shoreline erosion. As noted by Christensen et al. (2013), a wave field passing through an offshore wind farm can be altered by three processes: (1) the dissipation (reduction) of the waves due to drag resistance by the monopiles; (2) the reflection (bouncing back from the front of the monopile) and diffraction (bending around behind the monopile) of the wave energy around the monopiles; and (3) the reduced water surface friction of the winds on the waves within and on the lee (downwind) side of the wind farm caused by the turbines extracting energy and serving as obstacles to the wind.

Considering these processes, Christensen et al. (2014) developed a general assessment of effects from an offshore wind farm on the wave environment and subsequent shoreline change using a two-part computer modeling approach. The first model was a wind-wave model that explicitly included the second and third processes described above (reflection/diffraction and reduced water surface friction); however,

[1] Vanhellemont and Ruddick (2014) report that "scour protection is currently only installed for cable crossings and offshore sub-stations at the London Array, and for certain sections of the export cable at Thanet."

it was subsequently determined that the first process (dissipation) was the least influential process and it was therefore not included in the modeling.

The results from the wind-wave model were utilized in a second model to simulate the long-term change along a straight shoreline in response to changes in the wave field due to the wind farm. Calculations were made of wave characteristics as the wave field progressed from the lee of the wind farm to the shoreline including shoaling and breaking. Longshore wave-induced currents were then determined and a sand transport model calculated the resulting non-cohesive sand transport due to the combination of waves and currents. Shoreline evolution (erosion or accretion) was calculated based on the gradient of the longshore transport. The longshore sediment transport model was set up with a shoreline 45 km (28 mi) long. The median diameter of the shoreline sand was 0.14 mm (0.0055 in), which is characterized by Wentworth as fine sand. Three distances - 5, 10, and 20 km (3, 6, and 12 miles) - separating the lee of the wind farm and shore were modeled. Each model run extended for 100 years. Overall, it was predicted that a wind farm located 5, 10 or 20 km (3, 6, and 12 miles) away would have a positive but progressively smaller effect, respectively, on shoreline accretion.

While the generic model set up by Christensen et al., (2014) made some estimates about project and site characteristics (such as wind turbine spacing, water depths, fetch, shoreline length, and sand size on the shoreline) that may not be directly comparable to the Vineyard Wind project, the general principle shown by the modeling is that a wind farm at any distance from shore will serve to decrease wave energy, with effects expected to be similar to a breakwater. Accordingly, the Vineyard Wind project is not expected to exacerbate shoreline erosion and may potentially cause limited shoreline accretion.

3.0 Potential Water Velocity Changes at Chappaquiddick Island from Cable Burial Operations

Concern has been raised regarding a potential increase in shoreline erosion along Chappaquiddick Island at the eastern end of Martha's Vineyard resulting from proposed offshore export cable burial operations by the Vineyard Wind Project. The Project plans to bury the two offshore export cables approximately 1.9 km (1.2 mi) east and parallel to the shoreline in water depths between 3 and 15 m (9.8 and 49 ft). The cables will be buried using a jet plow tool, which typically has one or two arms, or booms, which extend into the seabed and discharge pressurized seawater as the tool moves along the cable route, fluidizing the sediment and allowing the cable to sink by its own weight to the appropriate depth or to be placed at depth by the tool. A minimal amount of sediment is suspended, which then quickly settles out of suspension, thereby backfilling the narrow trench when the cable is installed.

The forward speed of the jet plow burial equipment is a maximum of 300 m/hr (980 ft/hr) or 0.08 m/s (0.27 ft/s); the jet plow will typically travel at speeds significantly slower than the maximum. This speed compares to the maximum ambient tidal flow of 2.4 m/s (7.9 ft/s) in the Muskeget Channel, as described in the Project's Construction and Operations Plan (COP Volume II Section 2.3.3), just south of the area off Chappaquiddick Island. It is likely that the tidal velocity off the Island would be significantly less.

From a hydrodynamic perspective, the slower speed of the jet plow can be ignored (since it is 3% of the maximum tidal flow) and the jet plow can be assumed to be stationary in a tidal flow moving around it. When the tidal flow encounters the jet plow, the flow is forced to move around it. As it moves around the jet plow, the flow velocity will increase near the jet plow and the flow velocity will then diminish farther away from the jet plow back to ambient flow. This velocity disturbance is dependent on the ambient flow speed and the size of the jet plow. Since the ambient tidal flow is north/south coincident with the cable route, the jet plow equipment facing the flow is about 1 m (3.3 ft) wide. The resulting point of diminishment to zero of the increased velocity is approximately three times the width of the jet plow or 3 m (9.8 ft) (Koo et al., 2014). Since the cable route is at least 1,900 m (6,230 ft) offshore from the shoreline, there will be no change in the water velocity that could affect beach erosion. A lower ambient tidal flow would show a similar insignificant effect.

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