

# Historic Resources Visual Effects Analysis

## Revolution Wind Farm

*Prepared by:*

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D.P.C.**

**March 2023**

### INTRODUCTION

On behalf of Revolution Wind, LLC (the Applicant), Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C. (EDR) prepared a historic resources visual effects analysis (HRVEA) in support of the Construction and Operations Plan (COP) for the proposed Revolution Wind Farm (RWF, or the Project). The purpose of this HRVEA is to evaluate the Project's potential visual effects on the qualities that make above-ground historic properties eligible for listing in National Register of Historic Places (NRHP). Per 36 CFR Part 800, above-ground historic properties are defined as districts, buildings, structures, objects, or sites that are listed or determined eligible for listing in the NRHP or which have been designated as National Historic Landmarks (NHLs). The assessment was conducted to satisfy the federal regulatory requirements as outlined in the Bureau of Ocean Energy Management (BOEM) Offshore Renewable Energy Program's *Guidelines on Providing Archaeological and Historic Property Information*.

The Revolution Wind Farm (RWF) is a proposed wind-powered electric generating facility composed of up to 100<sup>1</sup> wind turbine generators (WTG) and associated foundations, two offshore substations, and an inter-array cable connecting the WTGs and the offshore substation. Additionally, the Revolution Wind Export Cable (RWEC), a submarine export cable located in both federal waters and Rhode Island State territorial waters, will connect the offshore substations to a transition vault in North Kingstown, Rhode Island. From the transition vault, an underground export cable will complete the connection to a new onshore substation (OnSS), located adjacent to the existing Davisville Substation in North Kingstown, Rhode Island. The visible offshore components of the operational Project, including the WTGs (and associated foundations) and the offshore substations (OSS), were the focus of the HRVEA.

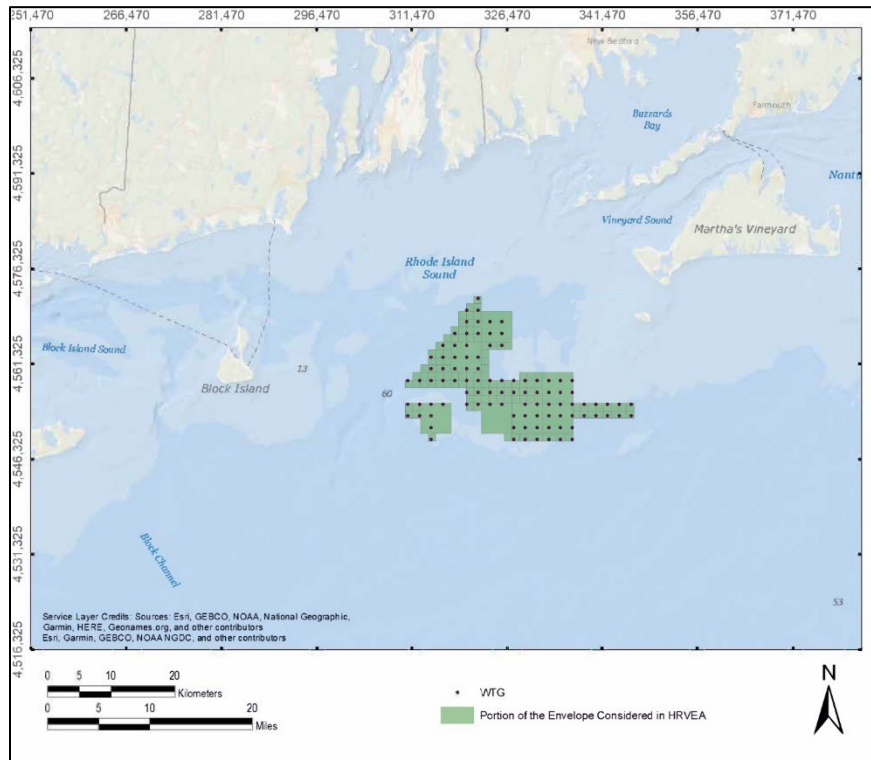
The U.S. Department of the Interior (DOI) is charged with managing the OCS under the Outer Continental Shelf Lands Act (43 U.S.C. 1337). DOI delegated certain responsibilities for regulation of renewable energy projects on the OCS to BOEM, in the Energy Policy Act of 2005 (Pub. L. 109-58). Federal statutes and regulations require BOEM to identify historic properties and other significant cultural resources that may be affected by renewable energy projects on the OCS and to consider project effects to these properties prior to project approval. These

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<sup>1</sup> The current Project Design Envelope (PDE) layout includes up to 100 WTG locations. However, for the purposes of this analysis a layout reflecting 98 WTG locations was assumed. Due to the similarities in the WTG positions, and the distance of the Project from representative onshore locations, the analysis herewith will accurately represent the potential visual impacts.

requirements are established in the National Historic Preservation Act of 1966, as amended (NHPA; 54 U.S.C. 300101 et seq.), and the applicable procedures are outlined in the NHPA’s implementing regulations (36 CFR § 800). The National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) and NEPA’s implementing regulations (40 CFR § 1500-1508) are also applicable. Section 110(f) of the NHPA further requires that BOEM, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to National Historic Landmarks that may be directly and adversely affected by a Project (see 36 CFR § 800.10(a)).

**Figure 1 – Project Location Map**



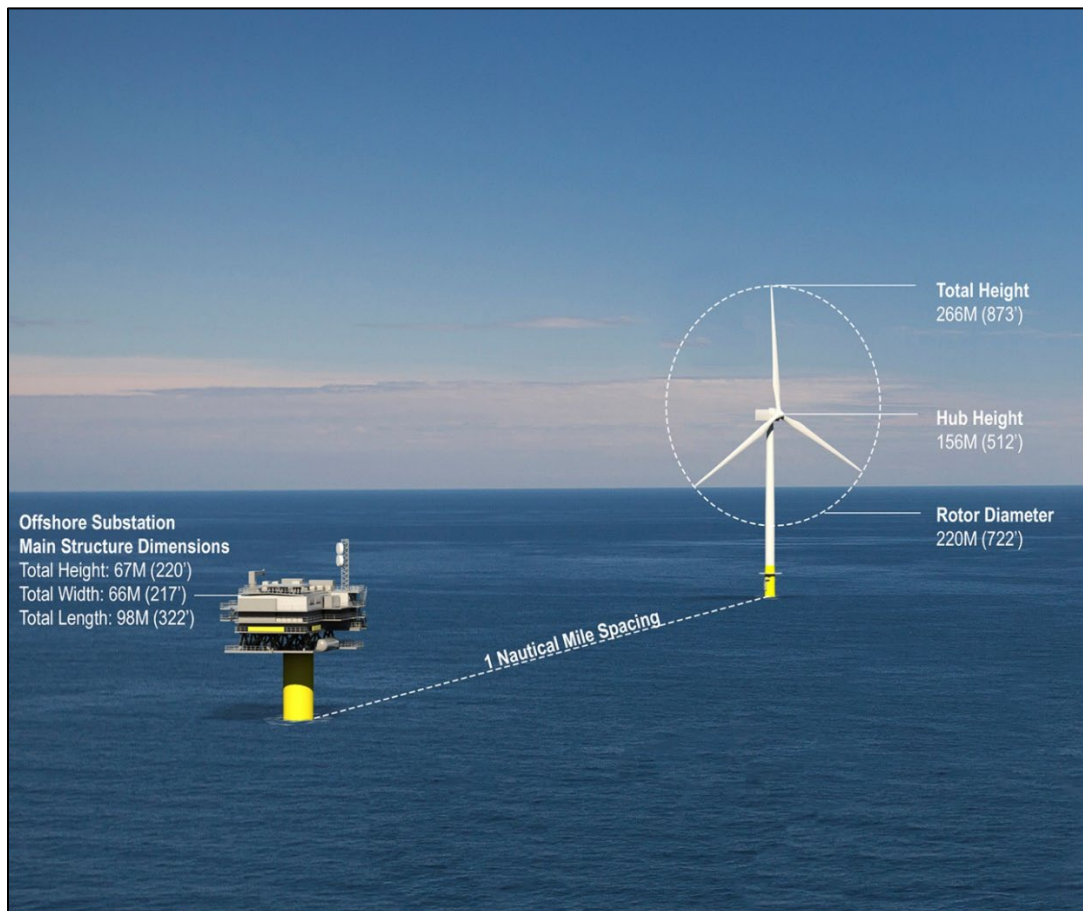
## VISUAL EFFECTS ASSESSMENT

The assessment of potential visual effects (“impacts”) caused by the Project to above-ground historic properties was completed in several stages. EDR completed Geographic Information Systems (GIS) viewshed and Project component visibility analyses, archival research, field investigations, review of visualizations (“photosimulations”) of the proposed Project, and detailed assessments of historic properties with potential views of the planned wind farm to assess the potential for adverse visual effects to occur. Each of these steps is summarized below.

### Viewshed Analyses

Based on the maximum height and proposed locations of wind turbine generators (WTGs) that could be constructed as part of the Project, EDR assessed the theoretical distances over which such components could be visible to the naked eye of a ground-level observer. The primary constraints on theoretical visibility are the curvature of the Earth, which will obscure some or all of the wind turbines at sufficient distances, human visual acuity, and the transparency of the atmosphere under assumed clear viewing conditions. The maximum theoretical viewing distance was then refined through a detailed analysis that considered existing topography as well as extant buildings, structures, and vegetation that could partially or completely screen views of the Project from locations within viewing distance of the WTGs. This analysis was conducted using high-resolution lidar data. Lidar is an acronym for light detecting and ranging technology that uses pulses of light and sensors to generate precise three-dimensional depictions of existing earth surface characteristics. The three-dimensional models of the earth surface and elements projecting above the ground surface were then analyzed within a Geographic Information System (GIS) to identify all areas within the theoretical viewing distance that could have views of one or more offshore Project components. The collective areas of potential Project visibility are called the Preliminary Area of Potential Effects (PAPE) and constitute the areas subject to detailed analyses for the HRVEA. In accordance with the requirements of the NHPA and its implementing regulations, BOEM will formally determine the Area of Potential Effects (APE) during the agency’s Section 106 consultations.

**Figure 2 – Computer Model of Project Components**



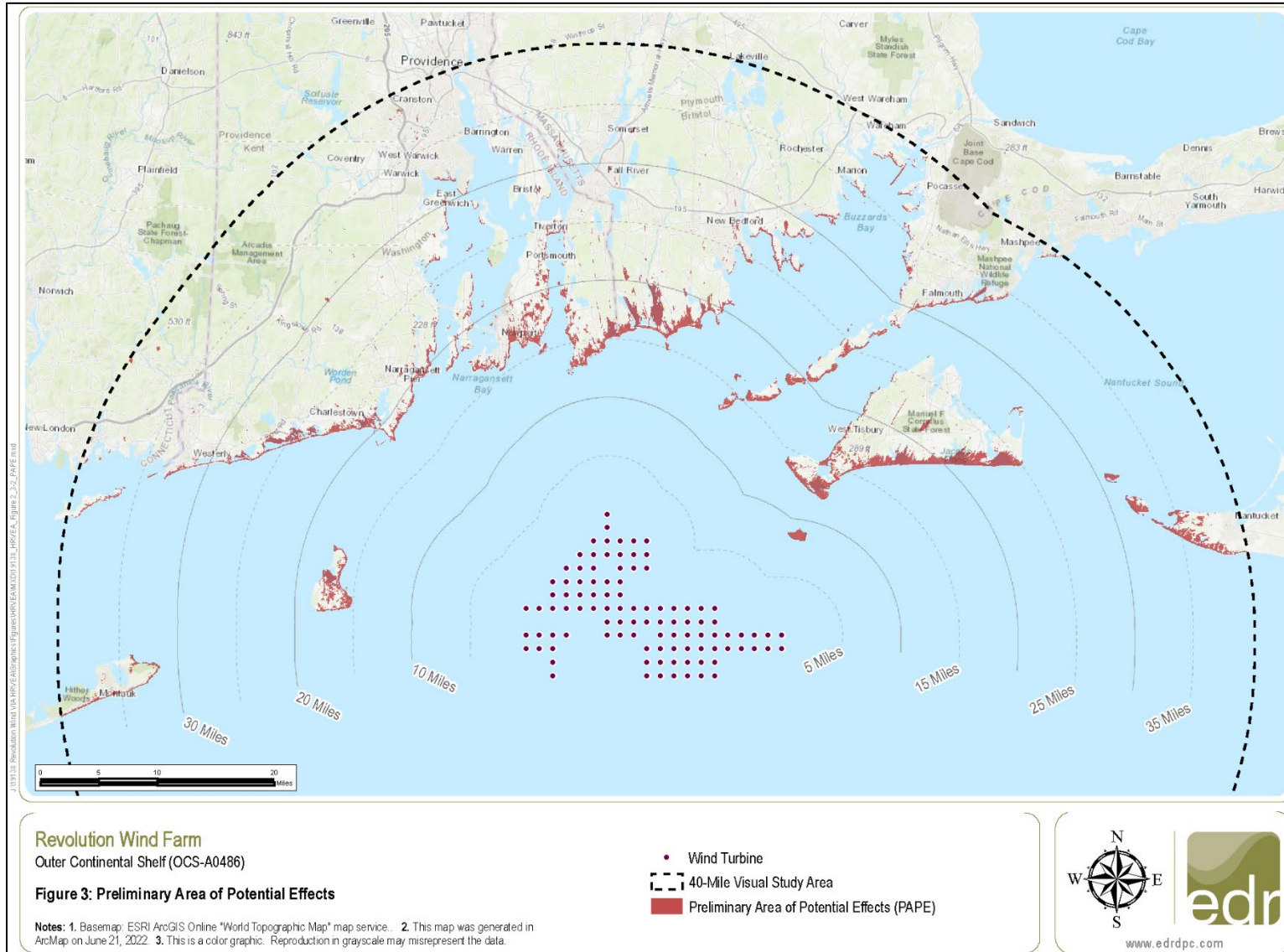
Based on the completed viewshed analyses, EDR determined the land areas within which historic properties could be adversely affected by the introduction of new visual elements to the existing seascape. Table 1 summarizes the total land area within theoretical viewing distance of the Project and total land area with potential views of the Project, as delineated by the PAPE. Potential visibility of the Project was further evaluated in the field between June 2017 and September 2019. The purpose of this exercise was to verify the existence of direct lines of sight to proposed turbine locations from areas indicated by viewshed analysis. Due the density of vegetation, topographic relief, small areas of habitable lands near the wind farm, and the complex shorelines in the region, the vast majority of lands within 40 miles of the nearest WTGs will have no views of the Project (Table 1, Figure 3). In general, views of the Project are concentrated along open shorelines, coastal bluffs, and open, elevated landforms in nearshore areas, with more limited or spatially constrained views possible along some roadways oriented towards the Project.

**Table 1 – Summary of Total Land Area and PAPE by Distance from Nearest WTGs**

Distance from Project Site	40-mile Radius Study Area		
	Total Land Area (sq. miles)	Land Area with Potential Visibility/PAPE (sq. miles)	Percent
0 to 10 Miles (0 to 16.1 km)	1.0	1.0	100
10 to 20 Miles (16.1 to 32.2 km)	149.3	24.3	16.3
20 to 30 Miles (32.2 km to 48.3 km)	475.4	11.8	2.5
30 to 40 Miles (48.3 km to 64.4 km)	862.3	7.8	0.9
<b>Total 40 Mile (64.4 km) Landward Study Area</b>	1,488.0	44.9	3.0

Even considering the relatively effective visual screening provided by existing topography, buildings, and vegetation, views of the Project will be available from nearly 45 square miles of shoreline and coastal settings in eastern Long Island, extreme portions of southeastern Connecticut, southern Rhode Island, Buzzards Bay and the coastal islands of Massachusetts and Rhode Island.





## Identification of Above-Ground Historic Properties

EDR conducted archival research to compile datasets of previously-reported or documented historic resources located in or adjacent to the PAPE. EDR completed a desktop review of the records of state and federal agencies, GIS databases, previous cultural resources surveys, municipal planning documents and inventories, and historical collections to develop an inventory of previously identified properties within the PAPE, inclusive of above-ground historic properties listed, or determined eligible for listing in, the NRHP, National Historic Landmarks, as well as other properties included in these inventories and repositories that may not have formal historic designations. Resources reviewed as part of this process included:

- The NYSOPRHP Cultural Resource Information System (CRIS) website (NYSOPRHP, 2021);
- The Massachusetts Historical Commission (MHC) online Massachusetts Cultural Resource Information System MACRIS, as well as additional MHC files made available by the Public Archaeology Laboratory (PAL)
- The Rhode Island Historical Preservation and Heritage Commission (RIHPHC);
- The Rhode Island Historical Cemetery Commission (RIHCC);
- Above-ground historic properties identified as part of studies conducted by BOEM in 2012 in order to prepare a GIS database of known cultural resources/historic properties that could be affected by the introduction of offshore energy facilities along the east coast of the United States.

Based on the results of archival research, EDR identified several thematic historic property types within PAPE, including: Native American sites and districts, historic buildings and districts, lighthouses and navigation aids, historic cemeteries and burial grounds, maritime safety and defense facilities, agricultural properties, recreational properties, estates and estate complexes, and historic battlefields.

**Table 2 – Summary of Above-Ground Historic Properties within PAPE by State**

Property Designation	Occurrences of Property Within The PAPE				
	NY	CT	MA	RI	Total
National Historic Landmark (NHL) properties and districts <sup>a</sup>	1	-	2	9	<b>12</b>
Above-Ground Historic Properties and Historic Districts Listed in the National Register of Historic Places <sup>a</sup>	3	2	28	53	<b>86</b>
Above-Ground Historic Properties Previously Determined Eligible for Listing in the National Register of Historic Places <sup>b</sup>	2	-	8	63	<b>73</b>
Recommended Eligible Above-Ground Historic Properties <sup>c</sup>	-	-	207	68	<b>275</b>
Local Historic Districts and Properties	-	-	1	4	<b>5</b>
<b>Total</b>	<b>6</b>	<b>2</b>	<b>246</b>	<b>197</b>	<b>451</b>

<sup>a</sup> As described above, historic districts within the PAPE were counted as a single property regardless of the number of contributing properties located within the PAPE in each district, as it was considered a conservative approach to address potential impacts to the entirety of the district rather than just select properties. Available documentation for NHL and NRHP-listed districts did not always indicate the total number of contributing properties, or which properties are considered to be contributing to the significance of a given district.

<sup>c</sup> The three TCPs identified in this HRVEA have been determined NRHP-Eligible and are included in these numbers.

<sup>b</sup> As described above, properties considered potentially NRHP-eligible include properties identified by RIHPHC, MHC, county-level local-level, or other municipal sources.

## Effects Assessment

Under the NHPA regulations, an adverse effect to a historic property occurs when a federally funded or licensed Project (“Undertaking”) may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for including the National Register of Historic Places in a manner that diminishes the integrity of the property’s location, design, setting, materials, workmanship, feeling or association (36 CFR § 800.5(a)(1)). No above-ground historic properties will be physically altered during construction or operation of the Project. The primary concern for adverse effects caused by the wind farm is a change in the settings of historic properties that could diminish their ability to express or convey their historic significance. Setting is defined as the physical environment surrounding a historic property.

EDR evaluated the characteristics of each historic property located within the PAPE to determine if open ocean views towards the Project were significant elements of the property’s historic setting. The association of some historic property types with ocean views is quite direct and obvious. For example, historic lighthouses were designed to be observed from, and to provide views towards, marine waters. Historic piers, ports, wharves and other maritime infrastructure are intimately associated with the harbors, bays, and inlets in which they were constructed. Historic estates which include formal landscape and architectural features designed to embrace ocean views may also have a strong connection to distant elements of the seascape. Other properties, including historic farmsteads and urban residential and commercial buildings may have weaker historical associations with open ocean views and maritime settings.

A further consideration in the analysis was the extent and specific nature of maritime settings associated with the historic properties. The PAPE encompasses complex shorelines along portions of the Block Island, Vineyard, and Rhode Island Sounds, Buzzards and Narragansett Bay, and numerous smaller embayments. Many historic properties located along the waterfronts of the region are oriented away from the Project and have a clear and immediate relationship with distinct waterbodies and marine viewsheds that would not be affected by the Project. EDR summarized the maritime settings, if present, along with the characteristics of each historic property qualifying that property for inclusion in the National Register of Historic Places as part of the analyses.

EDR used two primary methods to assess the extent of Project visibility from each historic property within the PAPE and to complete qualitative evaluations of potentially problematic visual impacts (adverse effects). The minimum distance to the nearest Project components, number of wind turbine generator (WTGs) blade tips, nacelles (“hubs”), towers, platforms and associated light sources potentially visible from each historic property were calculated in GIS. The proposed turbines are located between 13 miles (20.9 km) to 40 miles (64.4 km) away from the historic properties located within the PAPE. The total area encompassed by each historic property and the percentage of that area with potential views of the Project were also tabulated. These metrics supported the characterization of the magnitude of visual changes the Project would cause relative to existing conditions. Qualitative assessments of the visual effects were further supported by extensive and detailed visualizations of the Project from representative viewpoints (Key Observation Points) distributed within the PAPE. Visualizations included varying lighting and atmospheric conditions to better illustrate how visibility will be affected by commonly occurring conditions. The majority of photosimulations prepared for this assessment represent high visual contrast conditions, with strongly backlit, front-lit, or side-lit conditions that maximize the visual contrast between the Project components and the waters and sky surrounding them.

The scope and intensity of visual change related to the Project was assessed against the criteria for adverse effects under the NHPA regulations for each of the 451 historic properties located within the PAPE. Note that historic districts include multiple contributing resources (such as historic buildings) but our tabulated as single historic properties in these tables. Table 3 summarizes the results of the completed assessment.

Table 3 – Summary of Potentially Adversely Affected Above-Ground Historic Properties

Property Designation	Occurrences of Property Within The PAPE				
	NY	CT	MA	RI	Total
National Historic Landmark (NHL) properties and districts <sup>a</sup>	-	-	-	5	<b>5</b>
Above-Ground Historic Properties and Historic Districts Listed in the National Register of Historic Places <sup>a</sup>	-	-	9	23	<b>32</b>
Above-Ground Historic Properties Previously Determined Eligible for Listing in the National Register of Historic Places <sup>b</sup>	-	-	4	29	<b>33</b>
Recommended Eligible Above-Ground Historic Properties <sup>c</sup>	-	-	20	8	<b>28</b>
Local Historic Districts and Properties	-	-	1	2	<b>3</b>
<b>Total</b>	-	-	<b>34</b>	<b>67</b>	<b>101</b>

<sup>a</sup> As described above, historic districts within the PAPE were counted as a single property regardless of the number of contributing properties located within the PAPE in each district, as it was considered a conservative approach to address potential impacts to the entirety of the district rather than just select properties. Available documentation for NHL and NRHP-listed districts did not always indicate the total number of contributing properties, or which properties are considered to be contributing to the significance of a given district.

<sup>c</sup> The three TCPs identified in this HRVEA have been determined NRHP-Eligible and are included in these numbers.

<sup>b</sup> As described above, properties considered potentially NRHP-eligible include properties identified by RIHPHC, MHC, county-level local-level, or other municipal sources.

Potential adverse visual effects were identified for a broad range of historic properties within the PAPE, including, but not limited to, historic lighthouses (such as Gay Head Lighthouse and Block Island Southeast Lighthouse NHL), historic estates and districts in the City of Newport (such as The Breakers NHL, Bellevue Avenue NHL District, and Ocean Drive NHL District), historic seaside villages (such as Old Harbor Historic District on Block Island) and Traditional Cultural Properties associated with one or more Native American communities. In each case, the integrity of these historic properties would be diminished by the introduction of large, modern structures within a previously undeveloped or minimally developed portion of seascape that contributes to each property’s historical significance. Revolution Wind has proposed measures to avoid, minimize, and mitigate the anticipated adverse visual effects to historic properties. The final measures appropriate to resolve the effects of the Project to historic properties will be determined during the on-going BOEM-led Section 106 consultations and memorialized in a Memorandum of Agreement executed prior to the Record of Decision.

Additional details concerning the specifically-affected historic properties, Section 110(f) considerations for National Historic Landmarks, and proposed measures to resolve adverse effects is available in the Draft Environmental Impact Statement, Appendix J (<https://www.boem.gov/renewable-energy/revolutionwinddeisappjfoemoa>).