BOEM
Bureau of Ocean Energy Management

Cumulative Historic Resources Visual Effects Assessment

For the New England Wind Project under Section 106 of the National Historic Preservation Act

December 23, 2022

Project No.: 0600062

ERM

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Acronyms and Abbreviations

ADLS	aircraft detection lighting system
APE	area of potential effects
applicant	Park City Wind, LLC
assessment	Cumulative Historic Resources Visual Effects Assessment
BOEM	Bureau of Ocean Energy Management
COP	Construction and Operations Plan
DEM	digital elevation model
DSM	digital surface model
EIS	Environmental Impact Statement
ESP	electrical service platform
ft	feet
FAA	Federal Aviation Administration
m	meter
MLLW	mean lower low water
NHL	National Historic Landmark
NRHP	National Register of Historic Places
Project	New England Wind Project
RI/MA Lease Areas	Rhode Island and Massachusetts Lease Areas
TCP	traditional cultural property
HPVIA	Historic Properties Visual Impact Assessment
WTG	wind turbine generator

1 Introduction and Purpose

Park City Wind, LLC (applicant) proposes to construct, operate, and eventually decommission the New England Wind Project (proposed Project), which would consist of wind energy facilities generating at least 2,036 megawatts and up to 2,600 megawatts within Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area (Lease Area) OCS-A 0534 and a portion of Lease Area OCS-A 0501. The proposed Project would be offshore Martha's Vineyard and Nantucket, Massachusetts, and would be developed in two phases. Together, the two phases would include a maximum of 130 wind turbine generators (WTG) and electrical service platform (ESP) positions on foundation support structures. Five offshore export cables—two cables for Phase 1 and three cables for Phase 2—would transmit electricity from the WTGs and ESPs to shore.

The portion of the lease areas developed by the applicant, referred to as the Southern Wind Development Area, would occupy 101,590 to 111,939 acres, depending on whether unused WTG and ESP positions in Lease Area OCS-A 0501—currently assigned to the Vineyard Wind 1 Project (Vineyard Wind 1)—are reassigned to the proposed Project. As defined in the proposed Project design envelope for the proposed Project (Appendix C, Project Design Envelope and Maximum-Case Scenario, of the Draft Environmental Impact Statement [EIS] for the proposed Project; BOEM 2022), Phase 1, which would be constructed immediately adjacent to Vineyard Wind 1, would include 41 to 62 WTGs and 1 or 2 ESPs. As defined in the proposed Project design envelope, Phase 2 would be constructed immediately south of Phase 1 and could include up to 88 foundations supporting WTGs and up to 3 ESPs. The Southern Wind Development Area and other lease areas offshore of Rhode Island and Massachusetts (RI/MA Lease Areas) are depicted on Figure 1-1. Figure 1-2 shows the maximum dimensions of the WTGs constructed in both phases of the proposed Project.

This Cumulative Historic Resources Visual Effects Assessment (assessment) for the proposed Project is intended to assist BOEM and the Massachusetts Historical Commission (in its role as State Historic Preservation Office) in their responsibilities to review the proposed Project under Section 106 of the National Historic Preservation Act and the National Environmental Policy Act. This assessment considers the visual effects of the proposed Project in combination with the visual effects of other offshore wind projects in the RI/MA Lease Areas on historic properties.

BOEM conducted a thorough process to identify the possible extent of future offshore wind development on the Atlantic Outer Continental Shelf to determine what is likely or reasonably foreseeable for the purpose of assessing cumulative effects (BOEM 2019). In evaluating impacts on cultural resources, the planned activities scenario included in the Draft EIS for the proposed Project (Appendix E of the Draft EIS) considers all nine offshore wind projects in the RI/MA Lease Areas (Figure 1-1). Based on construction and operations plans (COP) submitted by project applicants, as well as announced electrical power offtake contracts, BOEM determined that 1,033 WTGs built within the RI/MA Lease Areas would represent the maximum-case scenario for potential impacts on visual resources. For the purpose of analyzing effects on cultural resources, the Draft EIS and this assessment assume that the proposed Project (upon completion of both phases) would consist of a maximum of 129 WTGs, each of which would measure up to 725 feet above mean lower low water (MLLW) to the top of the nacelle (the structure housing the WTG gearbox)—where required aviation lighting is mounted—and maximum vertical blade tip extension of up to 1,171 feet MLLW (Figure 1-2). Developers of the projects in the RI/MA Lease Areas have agreed to install WTGs and ESPs in an east-to-west, north-to-south grid pattern with 1.0 nautical mile (1.9 kilometers, 1.15 miles) × 1.0 nautical mile (1.9 kilometers, 1.15 miles) spacing between positions. These assumptions form the basis for analyzing potential resource-specific effects. Section 2.1.1 includes additional assumptions about WTG characteristics.

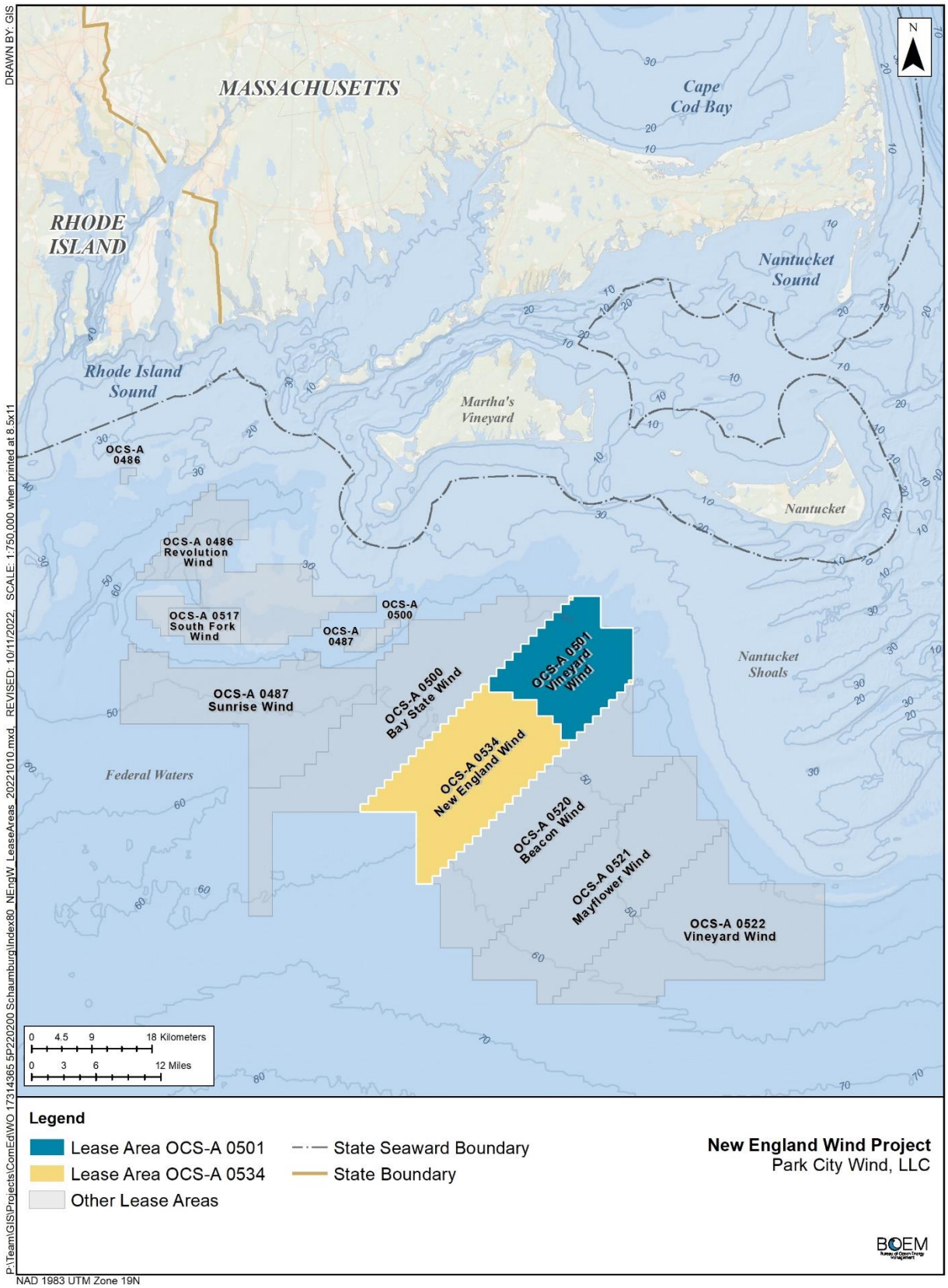
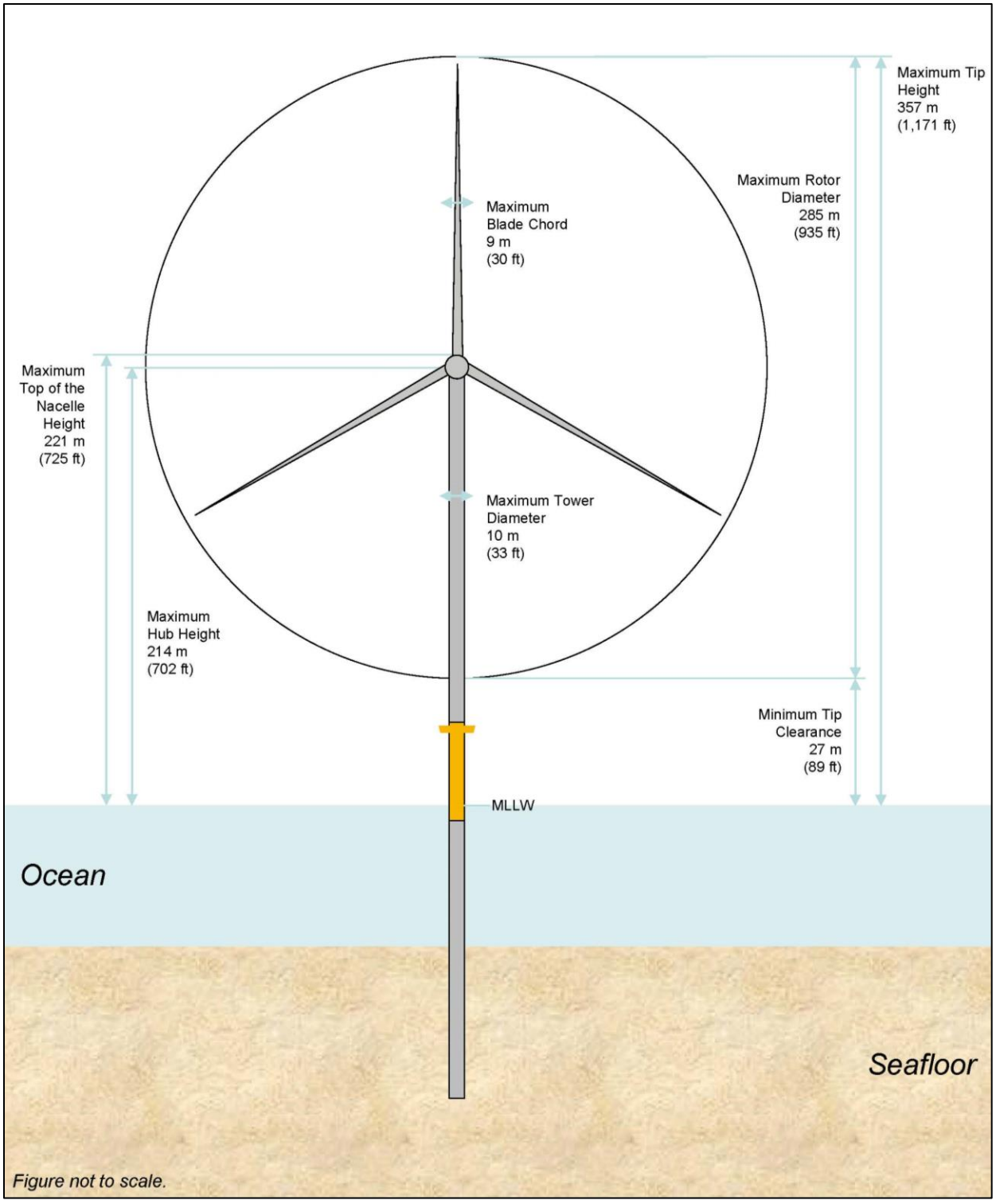


Figure 1-1: Location of Offshore Wind Energy Projects in the Rhode Island and Massachusetts Lease Areas



Source: COP Figure 3.2-1, Volume I; Epsilon 2022

ft = feet; m = meter; MLLW = mean lower low water

Figure 1-2: Proposed Project Maximum Wind Turbine Generator Size

The applicant prepared a Historic Properties Visual Impact Assessment (HPVIA) (COP Appendix III-H.b; Epsilon 2022), which determined that the proposed Project would adversely affect five historic properties on Martha's Vineyard: the Gay Head Lighthouse, Edwin Vanderhoop Homestead, Gay Head – Aquinnah Shops Area, the Vineyard Sound and Moshup's Bridge traditional cultural property (TCP), and the Chappaquiddick Island TCP. The proposed Project would not affect properties on mainland Cape Cod or adjacent islands due to the introduction of new, modern, and intrusive visual elements. The HPVIA also determined that the scale, extent, and intensity of visual effects would be partially mitigated by environmental and atmospheric factors, as well as the applicant's voluntary actions to reduce the extent, scale, and magnitude of visual effects. BOEM determined that, in addition to the five resources listed above, the proposed Project would also adversely affect the Nantucket Sound TCP on Martha's Vineyard, as well as the Nantucket Historic District National Historic Landmark (NHL). These properties all fall within the area of "intervisibility," defined as the geographic intersection of the viewshed from which structures from the proposed Project and other offshore wind projects in the RI/MA Lease Areas would be theoretically visible.

Due to the limited number of historic properties affected and environmental and geographic mitigating factors, overall visual effects on historic properties from the proposed Project and other offshore wind projects in the RI/MA Lease Areas would be geographically limited and low intensity, although effects on individual cultural resources would vary. Historic properties for which a sea view to the horizon is a contributing element to the property's National Register of Historic Places (NRHP) eligibility would be affected more than resources for which a sea view is not a contributing element. The applicant's HPVIA recommended that the sea view to the horizon and maritime setting are contributing elements to the NRHP eligibility of the Gay Head Lighthouse, the Chappaquiddick Island TCP, and the Nantucket Historic District NHL. In addition, BOEM finds that the sea view is also a contributing element of NRHP eligibility for the Aquinnah Cultural Center, the Aquinnah Shops Area, Vineyard Sound and Moshup's Bridge TCP, and Nantucket Sound TCP because these resources encompass areas of open water and adjacent shorelines (and/or views of open water and shorelines). As a result, construction of the proposed Project and other offshore wind projects would introduce new, modern visual elements out of character with the historic setting, which would have adverse effects on these seven cultural resources within the proposed Project's viewshed area of potential effects (APE).

This assessment presents an analysis of the combined visual effects of the proposed Project and other offshore wind projects in the RI/MA Lease Areas on the above-listed historic properties. Thus, by definition, this assessment is limited to analyzing cumulative effects on the historic properties that would be adversely affected by the proposed Project: the Gay Head Lighthouse, the Aquinnah Cultural Center, the Aquinnah Shops Area, the Chappaquiddick Island TCP, Nantucket Historic District NHL, the Vineyard Sound and Moshup's Bridge TCP, and the Nantucket Sound TCP.

2 Methods

This section summarizes the models used to evaluate cumulative visual effects of the proposed Project and other offshore wind projects in the RI/MA Lease Areas on historic properties, as well as the outputs of those models.

2.1 Models and Analysis

Models of the cumulative viewshed were developed to inform how the presence of WTGs associated with the proposed Project and other offshore wind projects would affect views from the above-listed historic properties on Martha's Vineyard and Nantucket. One set of models was based on the height of the WTG blade tip at the maximum vertical extension of the blade to calculate the theoretical viewshed for any part of the WTG. Another set of models used the height of the top of the WTG nacelle to calculate the theoretical viewshed for the aviation hazard lights required by the Federal Aviation Administration (FAA) (FAA 2020) to assess potential nighttime impacts. The theoretical viewshed is the area from which at least part of the WTG could be visible, based on the height of the WTG, topography, and the curvature of the earth. The models do not account for (and this analysis does not evaluate) other variables, including but not limited to, atmospheric and weather conditions, visual acuity of the observer, lighting angle, and wave/sea spray, all of which could interact to decrease actual visibility of WTGs and lighting from the historic property analyzed. In short, the models assume completely clear weather and atmospheric conditions, and the nacelle (nighttime) model is specifically intended to replicate cloudless nighttime conditions (i.e., the maximum-case for direct visibility of WTG lighting). Other viewing conditions (i.e., the presence of clouds) could produce different visual effects; however, BOEM determined that completely unobstructed viewing conditions would be the most impactful for the resources evaluated in this analysis.

As described above, two types of model (an initial quantitative viewshed model and a cumulative viewshed model) were prepared to quantify the total number of WTGs theoretically visible from the seven historic properties that would be adversely affected by the proposed Project—the Gay Head Lighthouse, the Aquinnah Cultural Center, the Aquinnah Shops Area, the Chappaquiddick Island TCP, the Nantucket Historic District NHL, the Vineyard Sound and Moshup's Bridge TCP, and the Nantucket Sound TCP—and to identify the specific WTGs theoretically visible from points within those properties. As stated above, the cumulative viewshed models quantify the number of WTGs theoretically visible based on the height of the WTG, topography, and the curvature of the earth. The cumulative viewshed models do not determine the level of impact or whether the presence of structures would result in a cumulative adverse effect on historic properties; however, viewshed models can be used to help interpret the potential visual impact on historic properties.

Viewshed models were developed using ESRI ArcGIS Pro 2.9.1 and were corrected for curvature of the earth and a default 0.13 refractivity coefficient, based on the Gaussian refraction coefficient (Brunner 1984). The cumulative viewshed models were developed using the steps described below.

2.1.1 Step 1: Determine Locations and Heights of Wind Turbine Generators

The developers of offshore wind projects in the RI/MA Lease Areas have agreed to install WTGs in a uniform 1.0 nautical mile (1.15 mile) × 1.0 nautical mile (1.15 mile), north-to-south/east-to-west grid. A total of 1,043 positions are available within this grid. Based on the COPs submitted to BOEM to date, along with published energy offtake agreements between developers and states, this assessment evaluates a maximum-case scenario in which 1,033 of these positions would be occupied by a WTG, with the remaining 10 occupied by ESPs (Figure 2-1). Actual development within each individual lease area could

differ from this scenario, and WTGs would be distributed based on the design considerations of each project and the respective COPs that would be submitted to BOEM.

For this assessment, 40 nautical miles (46 miles) was set as the limit for seaward views, and only WTG positions within 40 nautical miles of the above-referenced historic properties were used for this assessment (1,013 out of 1,033 WTG positions). While the blade tips of WTGs located beyond 40 nautical miles (46 miles) could theoretically be visible from some elevated locations, those blade tips would be positioned behind other WTGs and likely obscured by atmospheric conditions, weather, sea spray, and other factors. For these reasons, WTGs beyond 40 nautical miles are not anticipated to contribute to visual effects and are excluded from this analysis. Studies of onshore and offshore visibility suggest that the extinction point for views of WTGs and other structures is much less than 40 nautical miles (Sullivan et al. 2012, 2013). Out of an abundance of caution, given the effect of views on the seven historic properties being evaluated, 40 nautical miles is used here as an intentionally conservative outer limit for visibility.

Each developer of an offshore wind project in the RI/MA Lease Areas will select a WTG design for that project, based on economic and technical considerations. Table 2-1 provides assumptions for WTG characteristics. As stated in Chapter 1, Introduction and Purpose, this assessment assumes that the proposed Project would consist of up to 130 WTGs (COP Volume I; Epsilon 2022), and that other projects would install a total of 903 WTGs of varying maximum heights (of which 883 would be within 40 nautical miles [46 miles] of the historic properties).

Table 2-1: Wind Turbine Generator Capacity and Height Assumptions

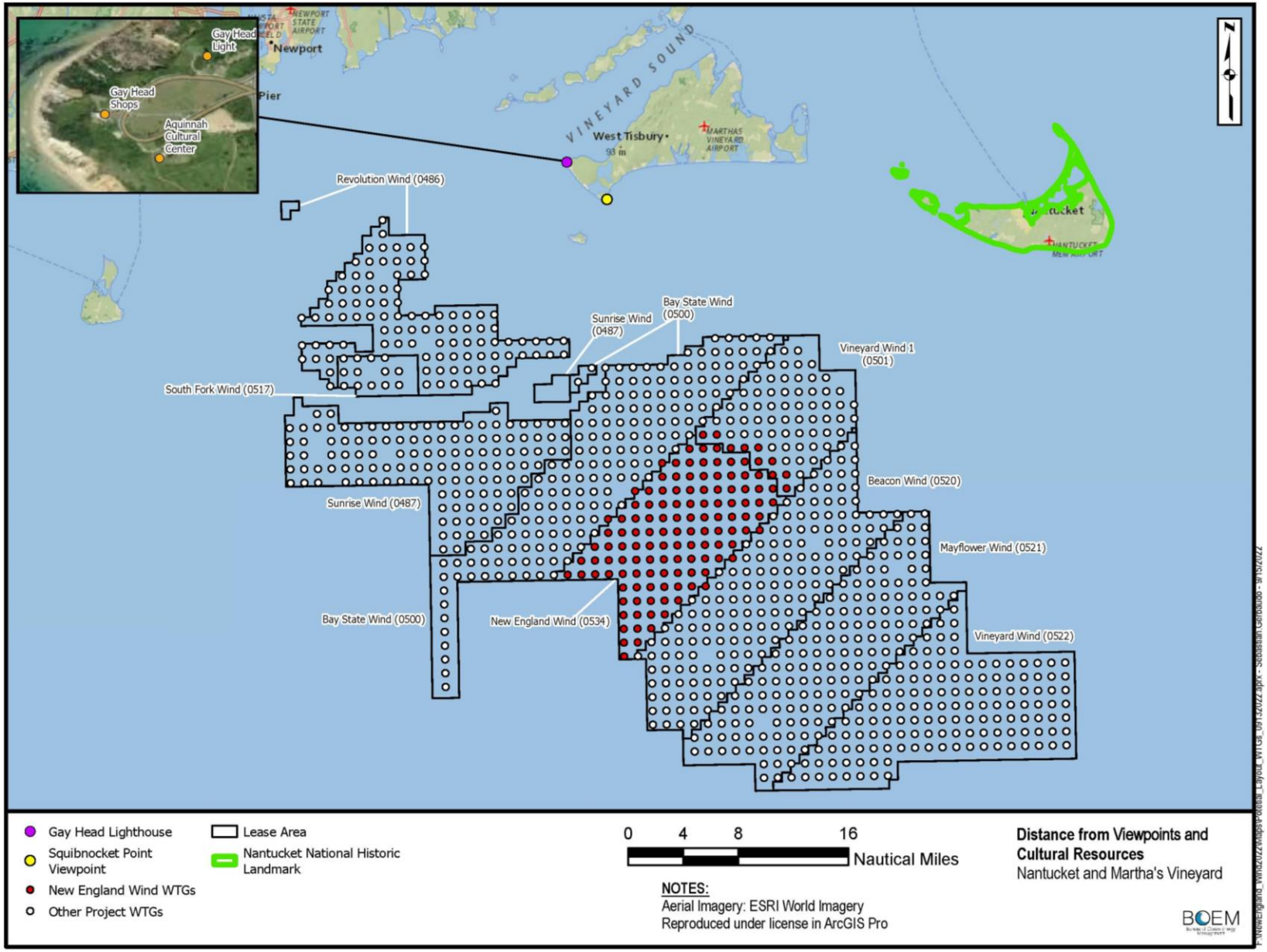
Project (Lease Area)	Blade Tip Height (Feet)[a]	Top of Nacelle Height (Feet)[a]	Total WTGs	WTGs within 40 Nautical Miles (46 Miles)
New England Wind, Phase 1 and 2 (OCS-A 0534)	1,171	725	130	130
Vineyard Wind 1 (OCS-A 0501)	812	451	62	62
South Fork Wind (OCS-A 0517)	840	482	15	15
Sunrise Wind (OCS-A 0486)	968	580	122	122
Revolution Wind (OCS-A 0517)	873	522	100	100
Mayflower Wind (OCS-A 0521)	1,066	720	147	135
Beacon Wind (OCS-A 0520)[b]	1,086	605	103	103
Bay State Wind (OCS-A 0500)	853	500	165	165
Vineyard Wind NE (OCS-A 0522)[b]	1,171	725	138	131
Remainder (OCS-A 0520)	1,086	605	51	50
Totals	—	—	1,033	1,013

WTG = wind turbine generator

[a] This reflects the elevation above mean sea level with blade at its maximum vertical extension.

[b] No COP had been submitted for these projects at the time that modeling was performed for this assessment. As a result, WTG blade tip and nacelle-top heights for these projects are assumed to match Mayflower Wind.

Figure 2-1 shows all WTG locations in the RI/MA Lease Areas. WTG positions labeled “Excluded due to distance” are more than 40 nautical miles (46 miles) from any of the historic properties listed above and were not included in modeling for this assessment.



WTG = wind turbine generator

Figure 2-1: Wind Turbine Generator Layout

2.1.2 Step 2: Develop Initial Quantitative Viewshed Model

A raster-based digital elevation model (DEM) was paired with digital surface models (DSM) to create an initial quantitative viewshed model to show the visibility of WTGs from the seven historic properties considered in this assessment. The DEM is a model of ground elevation, excluding vegetation and structures, while a DSM is a model of the surface elevation that includes objects extruded from the ground such as buildings and vegetation.[1] The DEMs were acquired from the U.S. Geological Survey and National Oceanic and Atmospheric Administration. Two light-detection and ranging DSM models were used: the 2013–2014 Post Hurricane Sandy Survey (OCM Partners 2022a) and the 2016 U.S. Geological Survey Coastal National Elevation Database Topobathymetric Model for the New England Region States of New York, Connecticut, Rhode Island, and Massachusetts (OCM Partners 2022b).

The WTGs from the proposed Project and other offshore wind projects were added directly to the DSM as extruded height pixels. This required two input DSMs—one with heights extruded to the nacelle heights and the other extruded to the tip of blade heights. DSMs and DEMs are typically applied to land areas. In this case, the areas of ocean in the model were assumed to be at sea level (a DSM value of zero). To accelerate processing, the viewshed excluded areas less than 60,000 feet from the WTGs (open ocean areas where no WTGs are proposed). All inputs were projected using the North American Datum of 1983, State Plane coordinate system for Massachusetts Islands (feet)[2], and were fit to the 9 by 9 pixels of the DSM.

The viewshed model provided outputs in a grid, with each grid square represented by a single pixel that covered a 9-foot by 9-foot area of the earth's surface. One run of this model calculated the number of WTGs blade tips that had a theoretical line of sight to each pixel within the historic properties, based solely on WTG characteristics, topography, and the curvature of the earth. A second run provided the same calculations for WTG nacelle tops to assess theoretical nighttime visibility. Model output was in the form of a "heat map" showing the number of WTGs theoretically visible from each pixel within each historic property. Based on this information, areas within each historic property were coded in terms of the number of WTGs theoretically visible. The initial model did not identify the specific WTGs with line of sight to each pixel.

2.1.3 Step 3: Select Points for Detailed Analysis

The location of the seven historic properties (identified in Chapter 1 and described in detail in Chapter 3, Analysis) were mapped in geographic information systems as points and polygons, based on data from the Massachusetts Historical Commission's Massachusetts Cultural Resource Information System. The Gay Head Lighthouse, Aquinnah Cultural Center, and Aquinnah Shops Area are in close proximity to each other and were represented by a point (the lighthouse itself) with a boundary of the property polygons, while the Chappaquiddick Island TCP, Nantucket Sound TCP, Nantucket Historic District NHL, and Vineyard Sound and Moshup's Bridge TCP sites were provided as polygons. Using the cumulative viewshed model developed in Step 2, points within these polygons selected for analysis were those with the largest number of theoretically visible WTGs. These points are listed in Table 2-2 and shown in Appendix A, Intervisibility Maps.

[1] Using the DSM alone would generate results for the highest part of an existing surface such as treetops or roofs that no viewer could reasonably access. Combination of the DSM with the DEM corrects this error, eliminating most buildings and trees from the model. The Gay Head Lighthouse is exempt from this correction as the viewer is assumed to be standing on the highest part of the lighthouse.
[2] The complete projection identification is NAD_1983_NSRS2007_StatePlane_Massachusetts_Isl_FIPS_2002.

Table 2-2: Detailed Analysis Points

Historic Property	Analysis Point
Gay Head Lighthouse, Aquinnah Cultural Center, Aquinnah Shops Area	• Top of the lighthouse • Ground next to lighthouse
Chappaquiddick Island TCP	• Analysis Point 1 • Analysis Point 2 • Analysis Point 3 • Analysis Point 4 • Analysis Point 5
Nantucket Sound TCP	• Analysis Point 6
Nantucket Historic District NHL	• Muskeget Beach • Tuckernuck Beach • Madaket Beach • Miacomet Beach • Tom Never Beach • Hill West (Nanahumas Neck) • Hill Center (Miacomet Road) • Prospect Hill Cemetery • Hill Northeast • Great Point • Sankaty Head Golf Club • Tom Nevers Field
Vineyard Sound and Moshup's Bridge TCP	• Analysis Point 7

NHL = National Historic Landmark; TCP = traditional cultural property

2.1.4 Step 4: Develop Final Cumulative Viewshed Model

A second set of viewshed models, or reverse viewshed model, was developed to calculate the number of WTGs and the list of discrete WTG positions, theoretically visible from pixels within the boundaries of the observation points listed in Step 3, again based solely on WTG characteristics, topography, and curvature of the earth. This model assumed a viewing height of 6 feet off the ground. The output of this second model is a "heat map" showing the number of WTG blade tips and nacelle tops with a theoretical line of sight from each pixel, as well as a list of the discrete WTGs theoretically visible. These heat maps are provided in Appendix A.

2.2 Outputs

The first viewshed model detailed in Step 2 enabled the calculation of outputs to assess potential daytime and nighttime impacts, including the total affected area of the historic property; the areas within each historic property with at least one theoretically visible WTG; the percentage of total area within the historic properties where at least one WTG would be theoretically visible; the minimum, maximum, and average number of WTGs theoretically visible across each historic property; and the average number of WTGs theoretically visible in areas with at least one theoretically visible WTG. This model was used to identify individual points within each property with large numbers of theoretically visible WTGs to be carried forward for further analysis.

The viewshed models generated the following metrics from each analysis point listed in Table 2-2:

- The list of discrete WTG positions theoretically visible;
- Total number of WTGs theoretically visible; and
- Total proposed Project WTGs theoretically visible.

The latter two metrics enabled calculation of the ratio of theoretically visible proposed Project WTGs to all theoretically visible WTGs (including those from the proposed Project and other offshore wind projects). Tables 2-3 and 2-4 provide these outputs for WTG blade tips (daytime visibility) and nacelle tops (nighttime visibility), respectively. While nacelles would be visible during daytime, the nacelle-top lights would be the primary source of nighttime visual impacts; therefore, the visibility of nacelle tops is incorporated here as the indicator for nighttime visibility analysis.

Table 2-3: Wind Turbine Generator Blade Tip Theoretically Visible (Daytime Analysis)

	WTG Blade Tips Theoretically Visible During Daytime[a]			
Analysis Point	**Total**	**Proposed Project**	**Other Projects**	**Proposed Project Contribution[b]**
Gay Head Lighthouse, Aquinnah Cultural Center, Aquinnah Area Shops				
Top of lighthouse	756	128	628	17%
Ground next to lighthouse	749	129	620	17%
Chappaquiddick Island TCP				
Analysis Point 1	838	125	713	15%
Analysis Point 2	819	128	691	16%
Analysis Point 3	824	125	699	15%
Analysis Point 4	137	8	129	6%
Analysis Point 5	191	17	174	9%
Nantucket Sound TCP				
Analysis Point 6	260	32	228	12%
Nantucket Historic District NHL				
Muskeget Beach	739	126	613	17%
Tuckernuck Beach	833	125	708	15%
Madaket Beach	779	128	651	16%
Miacomet Beach	712	125	587	18%
Tom Never Beach	560	95	465	17%
Hill West (Nanahumas Neck)	756	127	629	17%
Hill Center (Miacomet Road)	433	83	350	19%
Prospect Hill Cemetery	414	76	338	18%
Hill Northeast	490	95	395	19%
Great Point	241	51	190	21%
Sankaty Head Golf Club	321	60	261	19%
Tom Nevers Field	613	102	511	17%
Vineyard Sound and Moshup's Bridge TCP				
Analysis Point 7	847	129	718	15%

NHL = National Historic Landmark; TCP = traditional cultural property; WTG = wind turbine generator

[a] Theoretical visibility is based on topography and the curvature of the earth only.

[b] This indicates the ratio of theoretically visible proposed Project WTGs to all theoretically visible WTGs.

Table 2-4: Wind Turbine Generator Nacelle Tops Theoretically Visible (Nighttime Analysis)

Analysis Point	WTG Nacelle Tops Theoretically Visible During Daytime[a]			
	Total	Proposed Project	Other Projects	Proposed Project Contribution[b]
Gay Head Lighthouse, Aquinnah Cultural Center, Aquinnah Area Shops				
Top of lighthouse	754	128	626	17%
Ground next to lighthouse	736	129	607	18%
Chappaquiddick Island TCP				
Analysis Point 1	519	118	401	23%
Analysis Point 2	620	127	493	20%
Analysis Point 3	629	124	505	20%
Analysis Point 4	24	0	24	0%
Analysis Point 5	38	0	38	0%
Nantucket Sound TCP				
Analysis Point 6	127	4	123	3%
Nantucket Historic District NHL				
Muskeget Beach	383	97	286	25%
Tuckernuck Beach	564	119	445	21%
Madaket Beach	457	104	353	23%
Miacomet Beach	451	90	361	20%
Tom Never Beach	330	52	278	16%
Hill West (Nanahumas Neck)	606	120	486	20%
Hill Center (Miacomet Road)	287	53	234	18%
Prospect Hill Cemetery	230	18	212	8%
Hill Northeast	406	93	313	23%
Great Point	25	0	25	0%
Sankaty Head Golf Club	79	4	75	5%
Tom Nevers Field	446	77	369	17%
Vineyard Sound and Moshup's Bridge TCP[c]				
Analysis Point 7	798	129	669	16%

NHL = National Historic Landmark; TCP = traditional cultural property; WTG = wind turbine generator

[a] Theoretical visibility is based on topography and the curvature of the earth only.

[b] This indicates the ratio of theoretically visible proposed Project WTGs to all theoretically visible WTGs.

3 Analysis

This section describes each of the affected historic properties and discusses the cumulative visual effects of the proposed Project and other offshore wind projects on those properties, including effects on NRHP eligibility.

3.1 Overview

3.1.1 Analysis Methodology

The primary visual effects of offshore wind development on the seven historic properties evaluated in this assessment would occur because of the construction of offshore WTGs within the properties' viewsheds. Any new visible WTGs in the RI/MA Lease Areas would introduce additional, modern, human-made structures into sea views that were uninterrupted prior to the start of offshore wind development. The proposed Project would be part of a nearly continuous offshore wind project construction period for nine offshore wind projects between 2022 and 2030.

Although WTGs from each offshore wind project in the RI/MA Lease Areas would differ in height, the WTGs from the proposed Project and other offshore wind projects would be similar in appearance and generally visible within the same view; thus, observers would be unable to easily distinguish WTGs from the proposed Project from those of other offshore wind projects. Observed from 21 miles away, the width of a proposed Project WTG base would be equivalent to the width of a pencil viewed from 113 feet, while the WTG blade width would be equivalent to the width of a drinking straw 91 feet away. In many cases, the additional WTGs from successive individual offshore wind projects installed during the 2022 to 2030 construction period would increase the density of WTGs theoretically visible from each historic property, rather than the extent of the affected viewshed. This increased density would be mitigated by distance from the historic property, as well as environmental and meteorological conditions such as clouds, fog, haze, and sea spray. Although viewshed modeling for this assessment assumed the clearest viewing conditions, actual atmospheric conditions would, at times, limit the visibility of WTGs.

Based on these considerations, this section focuses on the cumulative effects attributable to the proposed Project, as compared to the proportion attributable to other offshore wind projects. For purposes of this assessment, the cumulative effects are assumed to be proportional to the theoretically visible WTG blade tips and nacelle tops. Other factors influencing cumulative effects include the percent of horizon line occupied by proposed Project WTGs versus other offshore wind project WTGs, as well as the proximity of proposed Project or other project WTGs to the resource under typical visibility conditions.

3.1.2 Cumulative Visual Simulations

The applicant's consultant, Saratoga Associates, developed cumulative visual simulations as additional input into the COP for the proposed Project.[3] These simulations included views from the Aquinnah Cultural Center near the Gay Head Lighthouse, South Beach on Martha's Vineyard (about 3 miles west of Wasque Point on Chappaquiddick Island), Wasque Point on Chappaquiddick Island, Madaket Beach, on the west end of Nantucket, and Tom Nevers Field in the south-central portion of Nantucket. No simulation was prepared for Analysis Point 6 or 7, although those locations are analyzed to evaluate effects on the Vineyard Sound and Moshup's Bridge TCP and Nantucket Sound TCP, respectively. For each of the viewpoints listed above, the applicant provided the following panoramic simulations, each of which covered a 124-degree horizontal field of view and a 55-degree vertical field of view:

[3] Cumulative simulations are available online at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-ocs-0534-construction-and-operations-plan.

- The current view from each location;
- Simulated views with WTGs from the proposed Project alone;
- Simulated views with WTGs from other offshore wind projects alone; and
- Simulated views with WTGs from the proposed Project and the other offshore wind projects.

Panoramic simulations are tools used to inform the cumulative visual effects assessment. When viewed at the appropriate size and viewing distance specified by the applicant (COP Appendix III-H.b; Epsilon 2022), the simulations allow a view of the overall landscape, providing a visual context similar to that which an observer would experience. This context can be used to help compare the effect from the proposed Project and the other offshore wind projects. Static visual simulations cannot depict blade motion, which can attract attention, and have shown to be a significant factor in the visibility of onshore and offshore wind farms at certain distances (Sullivan et al. 2012, 2013). For smaller WTGs, blade motion for offshore wind farms has been observed up to distances of 23 nautical miles (26 miles) and is routinely visible at distances of 18 nautical miles (21 miles) or less (Sullivan et al. 2013).

While the simulations described above did not include all of the observation points identified in Section 2.2, the simulated views listed above would be similar to views available from the cultural resources evaluated in this analysis. The Aquinnah Cultural Center is within the Vineyard Sound and Moshup's Bridge TCP, although views of the proposed Project and other WTGs from Squibnocket Point would be closer than those simulated from Aquinnah. Thus, these simulations can contribute to the cumulative visual effects assessment.

To support the analysis, three ERM visual resource subject matter experts reviewed the simulations and applied a visibility rating system (Sullivan et al. 2012; Table 3-1) to assess the visibility of the proposed Project alone, other projects alone, and the cumulative scenario, based on simulations that assumed clear conditions and did not show blade motion. The subject matter experts reviewed each simulation, assigned a rating, and reviewed as a group to reach consensus. Ratings were not used to determine the proportion of visual effect attributable to the proposed Project versus other projects but are reported and discussed as support for these conclusions.

3.1.3 Distance Zones

Visual impact analyses frequently use the concept of distance zones—ranges of distances based on the landscape or seascape, viewing conditions, and the characteristics of human vision—to help characterize the visual effects of proposed projects (Sullivan et al. 2012, 2013). In evaluating the effects of meteorological conditions on visual simulations of offshore wind projects in the RI/MA Lease Areas, BOEM used three distance zones: 0 10to 10 nautical miles (0 to 12 miles); 10 to 20 nautical miles (12 to 23 miles); and 20 to 30 nautical miles (23 to 35 miles) (BOEM 2017). This assessment incorporates those three distance zones and also considers visibility beyond 30 nautical miles (35 miles), out to the 40 nautical miles (46 miles) limit for seaward views described in Section 2.1.1. Table 3-2 summarizes the number of WTGs from the proposed Project and other offshore wind projects in the RI/MA Lease Areas theoretically visible from selected viewpoints at or within each of the seven historic properties, within each zone between 10 and 40 nautical miles (12 to 46 miles) (there would be no WTGs within 10 nautical miles [12 miles] of any of the resources).

Table 3-1: Visibility Rating Form and Instructions

Visibility Rating	Description
VISIBILITY LEVEL 1: visible only after extended, close viewing; otherwise, invisible.	An object/phenomenon that is near the extreme limit of visibility. It could not be seen by a person who was not aware of it in advance and looking for it. Even under those circumstances, the object can only be seen after looking at it closely for an extended period of time.
VISIBILITY LEVEL 2: visible when scanning in general direction of study subject; otherwise, likely to be missed by casual observer.	An object/phenomenon that is very small and/or faint, but when the observer is scanning the horizon or looking more closely at an area, can be detected without extended viewing. It could sometimes be noticed by a casual observer; however, most people would not notice it without some active looking.
VISIBILITY LEVEL 3: visible after brief glance in general direction of study subject and unlikely to be missed by casual observer.	An object/phenomenon that can be easily detected after a brief look and would be visible to most casual observers, but without sufficient size or contrast to compete with major landscape elements.
VISIBILITY LEVEL 4: plainly visible, could not be missed by casual observer, but does not strongly attract visual attention, or dominate view because of apparent size, for views in general direction of study subject.	An object/phenomenon that is obvious and with sufficient size or contrast to compete with other landscape elements, but with insufficient visual contrast to strongly attract visual attention and insufficient size to occupy most of the observer's visual field.
VISIBILITY LEVEL 5: strongly attracts visual attention of views in general direction of study subject. Attention may be drawn by strong contrast in form, line, color, or texture, luminance, or motion.	An object/phenomenon that is not of large size, but that contrasts with the surrounding landscape elements so strongly that it is a major focus of visual attention, drawing viewer attention immediately, and tending to hold viewer attention. In addition to strong contrasts in form, line, color, and texture, bright light sources (such as lighting and reflections) and moving objects associated with the study subject may contribute substantially to drawing viewer attention. The visual prominence of the study subject interferes noticeably with views of nearby landscape elements.
VISIBILITY LEVEL 6: dominates view because study subject fills most of visual field for views in its general direction. strong contrasts in form, line, color, texture, luminance, or motion may contribute to view dominance.	An object/phenomenon with strong visual contrasts that is of such large size that it occupies most of the visual field, and views of it cannot be avoided except by turning the head more than 45 degrees from a direct view of the object. The object/phenomenon is the major focus of visual attention, and its large apparent size is a major factor in its view dominance. In addition to size, contrasts in form, line, color, and texture, bright light sources and moving objects associated with the study subject may contribute substantially to drawing viewer attention. The visual prominence of the study subject detracts noticeably from views of other landscape elements.

Source: Sullivan et al. 2012

Table 3-2: Number of Wind Turbine Generators Theoretically Visible by Distance Zone, Maximum-Case Visual Impact Scenario

Distance Zone	Total WTGs	Proposed Project WTGs		Other Project WTGs	
		Number	% of Total	Number	% of Total
Gay Head Lighthouse, Aquinnah Cultural Center, and Aquinnah Area Shops Viewpoint					
10–20 nautical miles (12–23 miles)	158	0	0%	158	100%
20–30 nautical miles (23–35 miles)	392	94	24%	298	76%
Subtotal for 10–30 nautical miles	550	94	17%	456	83%
30–40 nautical miles (35–46 miles)	243	36	15%	207	85%
Chappaquiddick Island TCP Viewpoint at Analysis Point 1					
10–20 nautical miles (12–23 miles)	92	0	0%	92	100%
20–30 nautical miles (23–35 miles)	315	84	27%	231	73%
Subtotal for 10–30 nautical miles	407	84	21%	323	79%
30–40 nautical miles (35–46 miles)	460	46	10%	414	90%
Nantucket Sound TCP Viewpoint at Analysis Point 6					
10–20 nautical miles (12–23 miles)	43	0	0%	43	100%
20–30 nautical miles (23–35 miles)	253	59	23%	194	77%
Subtotal for 10–30 nautical miles	296	59	20%	237	80%
30–40 nautical miles (35–46 miles)	474	70	15%	404	85%
Nantucket Historic District NHL Viewpoint at South Beach					
10–20 nautical miles (12–23 miles)	62	0	0%	62	100%
20–30 nautical miles (23–35 miles)	249	64	26%	185	74%
Subtotal for 10–30 nautical miles	311	64	21%	247	79%
30–40 nautical miles (35–46 miles)	507	65	13%	442	87%
Nantucket Historic District NHL Viewpoint at Tom Nevers Field					
10–20 nautical miles (12–23 miles)	1	0	0%	1	100%
20–30 nautical miles (23–35 miles)	199	18	9%	181	91%
Subtotal for 10–30 nautical miles	200	18	9%	182	91%
30–40 nautical miles (35–46 miles)	421	86	20%	335	80%
Vineyard Sound and Moshup's Bridge TCP Viewpoint at Analysis Point 7					
10–20 nautical miles (12–23 miles)	236	7	3%	229	97%
20–30 nautical miles (23–35 miles)	395	113	29%	282	71%
Subtotal for 10–30 nautical miles	631	120	19%	511	81%
30–40 nautical miles (35–46 miles)	248	10	4%	238	96%

NHL = National Historic Landmark; TCP = traditional cultural property; WTG = wind turbine generator

3.1.4 Weather and Atmospheric Conditions

Visibility of WTGs would be highly influenced by weather and other atmospheric conditions, such as visibility, haze, fog, precipitation, clouds, and sun angle, among other considerations. In general, WTGs that are located closer to affected resources would be visible more frequently and visually dominant in panoramic views during clear conditions due to proximity and extent of horizon occupied. BOEM conducted a meteorological study to assess typical visibility conditions near the RI/MA Lease Areas (BOEM 2017) at varying distances. Table 3-3 summarizes these data at the Nantucket and Martha's Vineyard airports.

Table 3-3: Visibility Conditions at the Nantucket and Martha's Vineyard Airports, 2017

Measure of Visibility	Martha's Vineyard Airport	Nantucket Airport
Average visibility distance in clear conditions	20 nautical miles (23 miles)	17 nautical miles (20 miles)
Days when visibility extends to 20 nautical miles (23 miles) for 50% or more of daylight hours	113 days/year	80 days/year
Days when visibility extends to 30 nautical miles (35 miles) for 50% or more of daylight hours	32 days/year	14 days/year

Source: BOEM 2017

As shown in Table 3-3, average visibility is slightly lower at Nantucket, conditions allowing for visibility to 20 nautical miles (23 miles) are generally limited, and visibility to 30 nautical miles (35 miles) is rare. Frequency of visibility conditions beyond 30 nautical miles (35 nautical miles) was not reported but is anticipated to be very rare. As a result, WTGs in the 10 to 20 nautical mile (12 to 23 mile) distance zone from each of the affected historic properties would be theoretically visible more frequently and more visually prominent in panoramic views during clear conditions due to proximity. However, the number of proposed Project WTGs actually visible or noticeable to the casual observer would vary based on actual visibility on a given day, which would generally decrease as distance increases.

3.1.5 Nighttime Lighting

The proposed Project would use an aircraft detection lighting system (ADLS), which would activate the FAA-required nacelle-top warning lights (FAA 2020) only when aircraft are detected approaching the proposed Project area. This system is anticipated to reduce the proposed Project's use of nighttime lighting to less than 13 minutes per year, less than 0.1 percent of annual nighttime hours (COP Appendix III-K; Epsilon 2022). During those hours, assuming favorable nighttime visibility, activated ADLS lighting would be a noticeable change to a nighttime seascape that is largely unlit except for transiting vessels. Activated WTG lights would be higher on the horizon than, and likely noticeably brighter than, lights on vessels at similar distances. These effects notwithstanding, the proposed Project's potential nighttime visual effects on historic properties would be limited by visibility conditions and mitigated by the rare use of ADLS. For purposes of this assessment and the analyses in the Draft EIS, BOEM assumes that all other offshore wind projects in the RI/MA Lease Areas would also use ADLS. The U.S. Coast Guard warning lights would be mounted on the WTG and ESP foundations no more than 148 feet MLLW, based on the height of the WTG platform (COP Section 3.2.1, Volume I; Epsilon 2022).

3.1.6 National Register of Historic Places Eligibility Criteria

The assessments of integrity in this assessment consider the four criteria established for potential inclusion in the NRHP (National Park Service 1995), which identify resources:

- Criterion A—That are associated with events that have made a significant contribution to the broad patterns of our history; or
- Criterion B—That are associated with the lives of persons significant in our past; or
- Criterion C—That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D—That have yielded or may be likely to yield, information important in prehistory or history.

3.2 Aquinnah Area Resources

This section describes the contributing elements of the cumulative effects on, and the assessment of integrity for, three historic properties located in the Aquinnah area of western Martha's Vineyard: the Gay Head Lighthouse, Aquinnah Cultural Center, and Aquinnah Shops Area. While each of these resources has unique contributing elements, the three resources are less than 0.2 mile from each other and would have comparable views of the proposed Project and other offshore wind projects. As a result, the three properties are evaluated together.

3.2.1 Contributing Elements for National Register of Historic Places Eligibility: Gay Head Lighthouse

The Gay Head Lighthouse is located at the westernmost tip of Martha's Vineyard. The lighthouse was constructed in 1855 to 1856 to mark Devil's Bridge Rocks and the shoals of the south shore of the island. The passage between Gay Head and Cuttyhunk into Vineyard Sound was a major approach to Boston Harbor for ships traveling northward along the coast. The Gay Head Lighthouse is considered one of the ten most important lighthouse resources on the East Coast and was originally equipped with one of the first Fresnel lenses. It was listed on the NRHP in 1987 as part of the Lighthouses of Massachusetts Thematic Resources Area and is significant under Criteria A and C (Section 3.1.6) as a historic maritime structure and aid to navigation (DiStefano and Salzman 1981).

The original site of the Gay Head Lighthouse was 150 feet west of its current location. In 2015, the 45-foot-high brick structure was moved to the east to prevent it from collapsing due to erosion of the Gay Head Cliffs (Figure 3-1). An amendment to the NRHP nomination produced in 2015 determined that, although its setting and location had been partially compromised, the lighthouse retained sufficient integrity of design, material, workmanship, feeling, and association for NRHP listing. The NRHP boundary of the site as defined in the amendment described above includes 1.35 acres owned by the Town of Aquinnah, comprised of Lots 22 and 23. The property includes the foundation of the former lighthouse location, as well as archaeological remains of other buildings that supported the lighthouse, including a keeper's house. None of these ancillary buildings remain standing (Massachusetts Historical Commission 2015).

In its Finding of Adverse Effect for the proposed Project, BOEM (2022) found that unobstructed views to the ocean were integral to the property's historic setting, feeling, and association. The role of the light in monitoring and guiding maritime traffic from its high vantage point was a significant historic function. In addition, the light is part of a historic "seascape," the area within which there is shared intervisibility between land and sea. The seascape is comprised of three components: an area of the sea (the seaward component), a length of coastline (the coastline component), and an area of land (the landward component). Only the seaward component of the Gay Head Lighthouse seascape would be affected by the proposed Project; modern elements such as power lines, buildings, and road improvements have previously affected the landward and coastline components. The proposed WTGs, however, would introduce new elements out of character with the historic seaward component of the property's viewshed. These elements affect the character of the seascape, which includes the "aesthetic, perceptual, and experiential aspects" of the property's setting (BOEM 2019).

Source: COP Appendix III-H.b; Epsilon 2022

Figure 3-1: Gay Head Lighthouse, View Southeast Toward the Proposed Project

The contributing elements of Gay Head Lighthouse's character are valued as both aesthetic and perceptual and are rooted in a deep cultural connection to the sea for the residents and visitors to the site. Whaling, fishing, and maritime trade played a central role in the history of Martha's Vineyard, and the safety of those at sea was a prominent concern. The lighthouse and its view to the sea, from both the ground level and viewing platform, represented an important point of interaction between the land and sea for sailors and fishermen and their families on land. That character is further valued as experiential for the tourists that come to the area to visit the lighthouse in its historic setting.

3.2.2 Contributing Elements for National Register of Historic Places Eligibility: Aquinnah Cultural Center

The Edwin Vanderhoop Homestead, also known as the Aquinnah Cultural Center (GAY.40/NRHP06000784), is a late 19th century two-story wood-frame, vernacular residence constructed sometime between 1890 and 1897. In 2006, the Edwin Vanderhoop Homestead was restored and opened as the Aquinnah Cultural Center. The property is significant at the local level in the areas of architecture and social history, much of which relates to unobstructed views of the ocean.

In its Finding of Adverse Effect for the proposed Project, BOEM (2022) found that the proposed Project would adversely affect the maritime setting of the Aquinnah Cultural Center and its viewshed through the introduction of new ocean-founded visual elements out of character with the historic setting, feeling, and

association of the property, thereby diminishing its integrity. Existing topography and mature tree growth to the south and west partially obstruct the ocean view.

3.2.3 Contributing Elements for National Register of Historic Places Eligibility: Aquinnah Area Shops

A cluster of nine commercial buildings, the Gay Head–Aquinnah Shops Area (Aquinnah Shops Area; GAY.B), was constructed during the early to mid-20th century. The buildings overlook the Atlantic Ocean at the western tip of a circle formed by the intersection of Lighthouse Road and South Road and line the north and south sides of the walkway leading up to the Clay Cliffs of Aquinnah Scenic Overlook. The buildings form a U-shape and were constructed due to the increase of tourism to the cliffs that began during the early 20th century.

The proposed Project is partially visible to the west from the Aquinnah Shops Area, due to the presence of the Gay Head Cliffs located to the north, west, and south of the property. Existing power lines and other modern elements are within the foreground of portions of the view (COP Appendix III-H.b, Section 6.2; Epsilon 2022). In its Finding of Adverse Effect for the proposed Project, BOEM (2022) concluded that the proposed Project would adversely affect the maritime setting of the Aquinnah Shops Area and its viewshed through the introduction of new ocean-founded visual elements that are out of character with the historic setting, feeling, and association of the property. Only the seaward component of the Aquinnah Shops Area seascape would be affected by the proposed Project; the existing power lines and other modern elements within the foreground 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 from the proposed Project.

3.2.4 Summary of Cumulative Effects

As stated above, the three resources in the Aquinnah area are close to each other and have similar potential views of the proposed Project. The analyses of cumulative effects and assessment of integrity for the three resources are, therefore, based on modeling for two points within the Gay Head Lighthouse property (Table 2-2), as well as applicant-prepared visual simulations from the south patio of the Aquinnah Cultural Center. Appendices A-1 and A-2 show the areas of intervisibility and total number of WTGs theoretically visible from the Gay Head Lighthouse property. Appendix B includes maps that show the view angles toward the proposed Project and other offshore wind projects in the RI/MA Lease Areas. The cumulative viewshed analysis model described in Chapter 2, Methods, determined that all or a portion of at least one WTG blade tip or nacelle from either the proposed Project and/or other offshore wind projects could be visible from approximately 77 percent of the Gay Head Lighthouse property. The theoretically visible WTG blade tips and nacelle lights attributable to the proposed Project would comprise approximately 17 percent of the total theoretically visible WTG blade tips and nacelle lights, at both the top of the lighthouse and on the ground next to the lighthouse (Tables 2-3 and 2-4).

The Aquinnah Cultural Center is less than 0.2 mile southwest of the Gay Head Lighthouse and approximately 20 feet lower in elevation than the lighthouse base. As shown in the simulations, the proposed Project would be visible from the Aquinnah Cultural Center on clear days. The view from the Gay Head Lighthouse and Aquinnah Shops Area would be similar, but ocean views from those resources would be marginally more influenced by intervening land and development. Compared to views from the Aquinnah Cultural Center, views of the open ocean from the other two resources would constitute a marginally smaller proportion of the overall viewshed. An observer can experience panoramic views of the ocean and adjacent islands from the property and can also experience sequential views of multiple projects as they move around the property and to related locations nearby (such as the observation deck near the adjacent shopping area or the Aquinnah Cultural Center).

In clear weather, proposed Project WTGs would be visible from the Gay Head Lighthouse and the surrounding property in views to the southeast. In views to the south, proposed Project WTGs would be theoretically visible in the extreme far left of the observer's field of view and would be less noticeable to the casual observer than WTGs associated with other projects located closer to the Gay Head Lighthouse. The proposed Project WTGs would disappear from the field of view as the observer turns to the west. Table 3-3 summarizes visibility considerations for Martha's Vineyard (based on data reported for Martha's Vineyard Airport) and shows that visibility is typically greater than 21 nautical miles (24 miles) for 39 percent of daylight hours (BOEM 2017). Table 3-4 summarizes some of the key considerations for evaluating the visual effects on the Gay Head Lighthouse, Aquinnah Cultural Center, and Aquinnah Shops Area due to visible WTGs from the proposed Project and other projects in the RI/MA Lease Areas.

Table 3-4: Factors Contributing to Visual Effects of Wind Turbine Generators on Aquinnah Area Resources

Factor	Proposed Project	Other Projects	Notes
Distance to closest WTG	22.1 nautical miles (25.4 miles)	12.0 nautical miles (13.8 miles)	The closest proposed Project WTGs would only be minimally visible over land; other project WTGs would be more prominent and visible more frequently due to their closer proximity.
WTG distribution by distance[a]	Percent of all proposed WTGs within: • 10–20 nautical miles: 0% • 20–30 nautical miles: 24% • 30–40 nautical miles: 15% Total for 10–30 nautical miles: 17%	Percent of all proposed WTGs within: • 10–20 nautical miles: 100% • 20–30 nautical miles: 76% • 30–40 nautical miles: 85% Total for 10–30 nautical miles: 83%	No WTGs would be within 10 nautical miles (12 miles) (Table 3-2). WTGs from other projects would be located closer to the Gay Head Lighthouse than proposed Project WTGs.
Percent of total theoretically visible WTG blade tips and nacelles	Blade tips: 17% Nacelles: 17%	Blade tips: 83% Nacelles: 83%	Section 2.2 accounts for WTGs visible during both daytime and nighttime.
Percent of 124-degree view with theoretically visible WTGs	28% (35 degrees)	100% (124 degrees)	See Appendix B-1. Other project WTGs would occupy a greater extent of the horizon line in a 124-degree view toward the southeast.[b]
Percent of 180-degree view with theoretically visible WTGs	18% of horizon line (35 degrees)	69% of horizon line (124 degrees)	This is indicative of a 180-degree field of view as an observer turns their head (as opposed to 124-degree static field of view). No WTGs would be visible on 31% of horizon line in a 180-degree south-facing view.

WTG = wind turbine generator

[a] This includes 130 proposed Project WTGs and 793 WTGs from the proposed Project and other projects within 40 nautical miles (46 miles) of this viewpoint.

[b] Percentages do not add to 100% due to overlap and positioning of proposed Project WTGs behind WTGs associated with other projects.

Potential nighttime visual impacts of the proposed Project would be limited by visibility (i.e., due to weather and atmospheric conditions) and mitigated by use of ADLS for the proposed Project and all other projects in the RI/MA Lease Areas, as discussed in Section 3.1.5.

In summary, other project WTGs would occupy the majority of the horizon line, and all of the open ocean horizon visible in 124-degree southward views from the Aquinnah area. WTGs associated with other projects would be situated in front of the proposed Project WTGs. While proposed Project WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the southeast horizon, they would be visible less often due to weather conditions and less visually prominent than other project WTGs due to distance.

These conclusions are supported by the cumulative visual simulation completed by the applicant from the Aquinnah Cultural Center (COP Appendix III-H.b). This simulation shows a view that would be similar to southeastward views from the Gay Head Lighthouse and Aquinnah Shops Area properties. Using the visibility rating system described in Section 3.1.2, the proposed Project was rated a Visibility Level 2 for the clear conditions depicted in the simulation. The WTGs associated with the proposed Project would be detectible to an observer scanning the horizon line to the southeast but small and faint and viewed over land versus the open ocean. Visibility would be somewhat higher from the top of the lighthouse compared to the visual simulation from the Aquinnah Cultural Center due to increased elevation, but the ocean view would constitute a smaller proportion of the total viewshed due to increased visibility of intervening land. Other projects and the cumulative scenario were both rated a Visibility Level 3. Other project WTGs are located as close as 14 miles from the viewpoint and would be plainly visible particularly when considering blade motion but would not be a major focus of visual attention, and views would still be dominated by sea, sky, and coastal lands.

3.2.5 Assessment of Integrity

The historic settings of Gay Head Lighthouse, Aquinnah Cultural Center, and Aquinnah Shops Area on land have been affected by the construction of roads, modern utilities, private residences, and limited commercial properties, as well as the loss of associated historic structures and relatively recent relocation of the lighthouse structure; however, the ocean view is relatively unencumbered. The elevated position and location of the lighthouse at the tip of the island allow unobstructed or partially obstructed views of the ocean horizon across a wide area of the viewshed. The locations of the Aquinnah Cultural Center and Aquinnah Shops Area also offer relatively wide ocean views. Those views are considered a part of the historic setting for all three properties and contribute to their feeling and association. The introduction of elements not historically associated with the historic view from the properties—specifically WTGs from the proposed Project or other offshore wind projects—diminishes the characteristics that convey the significance of these properties but account for only a portion of the integrity of these properties with respect to those characteristics. Views to and from the Gay Head Lighthouse, Aquinnah Cultural Center, and Aquinnah Shops Area during the day would retain sufficient integrity of setting that the properties can still be appreciated and understood in its historic context, even with the proposed Project and other offshore wind projects. At night, ADLS would greatly limit the amount of time the nacelle lights from the proposed Project and other offshore wind projects would be visible. In addition, the proposed Project and other projects would have no effect on the integrity of the properties with respect to location, design, or workmanship.

Undeveloped ocean views are a qualifying characteristic of historic setting of the Gay Head Lighthouse, Aquinnah Cultural Center, and Aquinnah Shops Area. In particular, the ocean views relate directly to the function of the lighthouse and its value. Nonetheless, the degree to which the characteristic of undeveloped ocean views is diminished by the visibility of WTGs offshore is small relative to the other aspects of integrity that remain intact for all three resources. BOEM (2022) determined that the direct adverse visual effect of the proposed Project on the three Aquinnah area resources would not diminish the integrity of the properties to the extent that it would disqualify them for NRHP eligibility. Although the cumulative effect of the other offshore wind projects would further adversely affect the setting of the Aquinnah area resources, this effect would not increase proportionately with the number of theoretically visible WTGs installed and would be moderated by the similar characteristics of the WTGs, the distance

from the properties, and environmental and meteorological conditions that limit visibility. While the proposed Project and other offshore wind projects would have long-term and cumulative adverse effects on the overall historic setting and other aspects of the integrity of the Aquinnah area resources, these projects would not diminish the integrity of these resources to the extent that it would disqualify the Gay Head Lighthouse, Aquinnah Cultural Center, or Aquinnah Area Shops from NRHP eligibility.

3.3 Chappaquiddick Island Traditional Cultural Property

This section describes the contributing elements of the cumulative effects on, and the assessment of integrity for, the Chappaquiddick Island TCP.

3.3.1 Contributing Elements for National Register of Historic Places Eligibility

BOEM determined Chappaquiddick Island to be potentially eligible for listing on the NRHP as a TCP (BOEM 2020b). The designation does not contain specific boundaries. BOEM found that the TCP is significant under Criterion A (BOEM 2020b). BOEM considers eight locations to comprise contributing elements of the Chappaquiddick Island TCP. Of these eight areas, six are considered to be within the APE. The traditional viewsheds would be altered by the introduction of human-made structures where no structures previously existed.

3.3.2 Summary of Cumulative Effects

Appendices A-3 and A-4 show the areas of intervisibility and total number of WTGs theoretically visible from the area within which the cumulative visual effects on the Chappaquiddick Island TCP are assessed. The cumulative viewshed analysis model described in Chapter 2 determined that all or a portion of at least one WTG from either the proposed Project and/or other offshore wind projects could be visible from approximately 41 percent of the Chappaquiddick Island TCP and that at least one nacelle top could be visible from approximately 24 percent of the property. This includes large areas of inland open water from which WTGs would be theoretically visible. Most land away from these areas of open water or south-facing beaches would have no view of any WTGs. As shown in Tables 2-3 and 2-4, the theoretically visible WTG blade tips attributable to the proposed Project would comprise approximately 6 to 16 percent of total theoretically visible blade tips within the TCP, and approximately 20 to 23 percent of total nacelle tops theoretically visible from Analysis Points 1 through 3, with no visibility from Analysis Points 4 and 5.

The applicant developed a visual simulation from South Beach on Martha's Vineyard (also called Katama Beach), which is located at sea level approximately 3 miles west of Analysis Point 1 analyzed in this assessment for the Chappaquiddick Island TCP. The view from Analysis Point 1 would not be materially different from the view shown on the simulation due to the proximity of the two points and because both analysis points are located on the beachfront.

An observer would be able to experience panoramic views of the ocean from the beachfront and some inland waters of the Chappaquiddick Island TCP. In clear weather, the proposed Project WTGs would be visible from portions of the Chappaquiddick Island TCP in views to the south. Views of proposed Project and other project WTGs from the interior of the TCP would be rare due to screening by topography and/or vegetation (Appendices A-3 and A-4). The proposed Project WTGs and other offshore wind project WTGs would appear similar as the observer moves between the east and west beachfront areas of the property. Table 3-3 summarizes visibility considerations for Martha's Vineyard (based on data reported for Martha's Vineyard Airport). Table 3-5 summarizes some of the key considerations for evaluating the visual effects of WTGs on the Chappaquiddick Island TCP.

Table 3-5: Factors Contributing to Visual Effects of Wind Turbine Generators on the Chappaquiddick Island Traditional Cultural Property

Factor	Proposed Project	Other Projects	Notes
Distance to closest WTG	20.6 nautical miles (23.7 miles)	12.9 nautical miles (14.8 miles)	The proposed Project and other project WTGs would be visible over open ocean from south-facing shorelines on Martha's Vineyard at approximately equal distances for the nearest WTGs.
WTG distribution by distance[a]	Percent of all proposed WTGs within: • 10–20 nautical miles: 0% • 20–30 nautical miles: 27% • 30–40 nautical miles: 10% Total for 10–30 nautical miles: 21%	Percent of all proposed WTGs within: • 10–20 nautical miles: 100% • 20–30 nautical miles: 73% • 30–40 nautical miles: 90% Total for 10–30 nautical miles: 79%	No WTGs would be within 10 nautical miles (12 miles) (Table 3-2). WTGs from other projects would be located closer to the Chappaquiddick Island TCP than proposed Project WTGs.
Percent of total theoretically visible WTG blade tips and nacelles	Blade tips: 6–16% Nacelles: 0–23%	Blade tips: 84–94% Nacelles: 77–100%	Range is based on different viewpoints within the TCP. See Section 2.2 for percent of theoretically visible WTG blade tips and nacelles from each viewpoint within the Chappaquiddick Island TCP.[b]
Percent of 124-degree view with theoretically visible WTGs	22% (28 degrees)	89% (111 degrees)	See Appendix B-2. Visibility depends on atmospheric and weather conditions. Other project WTGs would occupy a greater extent of the horizon line in a 124-degree view toward the southwest.[b,c]
Percent of 180-degree view with theoretically visible WTGs	14% of horizon line (28 degrees)	61% of horizon line (111 degrees)	This is indicative of a 180-degree field of view as an observer turns their head (as opposed to 124-degree static field of view). No WTGs would occupy 39% of horizon line in a 180-degree south-facing view.[b,c]

TCP = traditional cultural property; WTG = wind turbine generator

[a] This includes 130 proposed Project WTGs and 867 WTGs from the proposed Project and other projects within 40 nautical miles (46 miles) of this viewpoint.

[b] The exact percentage of theoretically visible blade tips and nacelles depends on the exact viewpoint within the Chappaquiddick Island TCP.

[c] Percentages do not add to 100% due to overlap and positioning of proposed Project WTGs behind WTGs associated with other projects.

Potential nighttime visual impacts of the proposed Project and other offshore wind projects in the RI/MA Lease Areas would be limited by visibility (i.e., due to weather and atmospheric conditions) and mitigated by use of ADLS, as discussed in Section 3.1.5.

In summary, WTGs from other projects would occupy a greater extent of the horizon line and are situated in front of the proposed Project WTGs. While proposed Project WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the southeast horizon, they would be visible less often due to weather conditions and less visually prominent than other project WTGs due to distance. None of the proposed Project WTGs are in the nearest distance zone (10 to 20 nautical miles [12 to 23 miles]). Proposed Project WTGs constitute 21 percent of WTGs within 30 nautical miles (35 miles) of the Chappaquiddick Island TCP. Where the closest proposed Project WTGs and other project WTGs overlap on the open ocean horizon line, they would create increased visual clutter due to additional clusters and lines of WTGs.

The proposed Project WTGs would contribute to less than one-quarter of the visual impact on the Chappaquiddick Island TCP, which is supported by the cumulative visual simulation completed by the applicant from South Beach/Katama Beach. This simulation shows a view that would be similar to southward views from Analysis Point 1. Using the visibility rating system described in Section 3.1.2, the proposed Project alone was rated Visibility Level 2, while the other projects alone and the cumulative scenario each were rated a Visibility Level 3. The proposed Project's WTGs would occupy a smaller extent of the horizon line and would be less noticeable to other project WTGs in a similar distance zone due to proximity. Both proposed Project and other project WTGs are unlikely to be missed by the casual observer, but the overall view would still be dominated by sea and sky.

3.3.3 Assessment of Integrity

The historic setting of Chappaquiddick Island TCP has been affected by the construction of roads, boat docks, private residences, limited commercial properties, and recreational and social facilities. Large natural areas remain. A number of locations along the shores of open waters within the TCP offer unobstructed or partially obstructed views of the ocean horizon. Those views are considered a part of the property's historic setting and contribute to its feeling and association. The introduction of elements not historically associated with the view from these points—specifically WTGs from the proposed Project or other offshore wind projects—diminishes the characteristics that convey the property's significance but account for only a portion of the property's integrity with respect to those characteristics. In addition, the cumulative actions would have no effect on the property's integrity with respect to location.

Most of the land area away from the beaches has no view of any WTGs. As described in Section 3.3.2 and illustrated in Appendices A-3 and A-4, WTGs from either the proposed Project or other offshore wind projects would not be visible from 41 percent of the TCP. In these areas, the setting would remain intact. In the areas where WTGs are visible—which includes large areas of inland open water—the setting would not be affected when the viewer is looking inland, away from the ocean, or when views of WTGs in the ocean view are obscured by clouds, haze, or other environmental or meteorological conditions. In addition, the WTGs would contribute to visual impacts along only 14 percent of the open ocean horizon line (a maximum of 28 degrees of the 124-degree view) to the south from the beachfront portions of the Chappaquiddick Island TCP. Other project WTGs would contribute to visual impacts along up to 61 percent of the ocean horizon line (approximately 111 degrees of the 124-degree view). The level of effects on the cultural setting of the property from the proposed Project and the other offshore wind projects relates to sensitivity of the viewshed to change rather than the size or extent of the change caused by the proposed Project and other offshore wind projects. As a result, the introduction of modern structures in these views, although small in scale and extent, creates adverse visual effects with respect to the resource's sensitivity to change as a potential TCP.

Nevertheless, the degree to which the property characteristics that convey its significance are diminished by the visibility of the proposed Project is small relative to the other aspects of integrity that remain intact. BOEM (2022) determined that the direct adverse visual effect of the proposed Project on the Chappaquiddick Island TCP would not diminish the integrity of the property to the extent that it would disqualify it for NRHP eligibility. Based on the number of WTGs theoretically visible and the distance of the WTGs from the TCP (as described in Section 2.2), the proposed Project would contribute less than one-quarter of the total cumulative visual effect on the Chappaquiddick Island TCP.

The cumulative effect of the proposed Project and other offshore wind projects would adversely affect the setting of Chappaquiddick Island TCP. This would be moderated by the similar characteristics of the WTGs, the distance from the property, and environmental and meteorological conditions that limit visibility. No formal NRHP nomination documentation has been produced that would provide guidance with respect to Chappaquiddick Island's areas of significance and level of integrity; however, it is not

anticipated that the cumulative effect of the proposed Project and other offshore wind projects would diminish the property's integrity to the extent that it would disqualify it from NRHP eligibility.

3.4 Nantucket Sound Traditional Cultural Property

This section describes the contributing elements of the cumulative effects on, and the assessment of integrity for, the Nantucket Sound TCP.

3.4.1 Contributing Elements for National Register of Historic Places Eligibility

The Nantucket Sound TCP has been determined eligible for listing in the NRHP under all four criteria (A through D); however, the boundary has not been fully defined.

3.4.2 Summary of Cumulative Effects

Appendices A-5 and A-6 show the areas of intervisibility and total number of WTGs theoretically visible from Analysis Point 6. The cumulative viewshed analysis model described in Chapter 2 determined that all or a portion of at least one WTG from either the proposed Project and/or other offshore wind projects could be visible from areas of open water in Nantucket Sound and associated shorelines of Martha's Vineyard and Nantucket, and associated islands. Most land away from these areas of open water or south-facing shorelines would have no view of any WTGs. As shown in Tables 2-3 and 2-4, the theoretically visible WTG blade tips attributable to the proposed Project would comprise approximately 12 percent of total theoretically visible blade tips from Analysis Point 6, and a similar pattern is evident in the analysis of nacelle visibility. The proposed Project WTGs represent approximately 3 percent of total nacelle tops theoretically visible from Analysis Point 6.

The applicant developed a visual simulation from Wasque Point, which is a bluff and beach area on the southeastern point of Chappaquiddick Island, approximately 1.5 miles south of Analysis Point 6. From Wasque Point, WTGs from the proposed Project and other projects would be marginally closer than from Analysis Point 6, but the two views would not be materially different overall. In clear weather, the proposed Project WTGs would be visible from portions of the Nantucket Sound TCP in views to the south. Views of proposed Project and other project WTGs from more inland areas of the TCP would be rare due to screening by topography and/or vegetation (Appendices A-5 and A-6). Views of all WTGs would diminish as an observer moves north along the Chappaquiddick Island coast. Table 3-6 summarizes some of the key considerations for evaluating the visual effects of WTGs on the Nantucket Sound TCP.

In summary, WTGs from other projects would occupy a greater extent of the horizon line and are situated in front of the proposed Project WTGs. While proposed Project WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the southeast horizon, they would be visible less often due to weather conditions and less visually prominent than other project WTGs due to distance. WTGs associated with the proposed Project constitute 0 percent of the WTGs in the nearest distance zone (10 to 20 nautical miles [12 to 23 miles]) and 20 percent of WTGs within 30 nautical miles (35 miles) of the Nantucket Sound TCP. Where the closest proposed Project WTGs and other project WTGs overlap on the open ocean horizon line, they would create increased visual clutter due to additional clusters and lines of WTGs.

Table 3-6: Factors Contributing to Visual Effects of Wind Turbine Generators on the Nantucket Sound Traditional Cultural Property

Factor	Proposed Project	Other Projects	Notes
Distance to closest WTG	23.4 nautical miles (26.9 miles)	15.6 nautical miles (18.0 miles)	The Proposed Project and other project WTGs would be visible over open ocean from south-facing shorelines on Martha's Vineyard at approximately equal distances for the nearest WTGs.
WTG distribution by distance[a]	Percent of all proposed WTGs within: • 10–20 nautical miles: 0% • 20–30 nautical miles: 23% • 30–40 nautical miles: 15% Total for 10–30 nautical miles: 20%	Percent of all proposed WTGs within: • 10–20 nautical miles: 100% • 20–30 nautical miles: 73% • 30–40 nautical miles: 90% Total for 10–30 nautical miles: 79%	No WTGs would be within 10 nautical miles (12 miles) (Table 3-2).
Percent of total theoretically visible WTG blade tips and nacelles	Blade tips: 12% Nacelles: 3%	Blade tips: 88% Nacelles: 97%	See Section 2.2 for percent of theoretically visible WTG blade tips and nacelles from each viewpoint within the Chappaquiddick Island TCP.[b]
Percent of 124-degree view with theoretically visible WTGs	20% (25 degrees)	83% (103 degrees)	See Appendix B-3. Visibility depends on atmospheric and weather conditions. Other project WTGs would occupy a greater extent of the horizon line in a 124-degree view toward the southwest.[b,c]
Percent of 180-degree view with theoretically visible WTGs	13% of horizon line (25 degrees)	57% of horizon line (103 degrees)	This is indicative of a 180-degree field of view as observer turns their head (as opposed to 124-degree static field of view). No WTGs would occupy 43% of horizon line in a 180-degree south-facing view.[b,c]

TCP = traditional cultural property; WTG = wind turbine generator

[a] This includes 129 proposed Project WTGs and 770 WTGs from the proposed Project and other projects within 40 nautical miles (46 miles) of this viewpoint.

[b] The exact percentage of theoretically visible blade tips and nacelles depends on the exact viewpoint within the Chappaquiddick Island TCP.

[c] Percentages do not add to 100% due to overlap and positioning of proposed Project WTGs behind WTGs associated with other projects.

Potential nighttime visual impacts of the proposed Project and other offshore wind projects in the RI/MA Lease Areas would be limited by visibility (i.e., due to weather and atmospheric conditions) and mitigated by use of ADLS, as discussed in Section 3.1.5.

The proposed Project WTGs would contribute to less than 25 percent of the visual impact on the Nantucket Sound TCP, which is supported by the cumulative visual simulation completed by the applicant from Wasque Point. This simulation shows a view that would be slightly closer than, but otherwise similar to, southward views from Analysis Point 6 and the east coast of Chappaquiddick Island. Based on the location of the Wasque Point simulation, the ratings for Analysis Point 6 using the visibility rating system described in Section 3.1.2 would be similar to the ratings for Wasque Point: Visibility Level 2 for the proposed Project alone and Visibility Level 3 for the other projects alone and the cumulative scenario. The proposed Project's WTGs would occupy a smaller extent of the horizon line and would be less noticeable than other project WTGs in a similar distance zone due to proximity. Both proposed

Project and other project WTGs are unlikely to be missed by the casual observer, but the overall view would still be dominated by sea and sky.

3.4.3 Assessment of Integrity

The historic setting of Nantucket Sound TCP has been affected by the construction of roads, boat docks, private residences, limited commercial properties, and recreational and social facilities along the shorelines and commercial/recreational fishing and boating in the waters of the sound. Large natural areas remain, particularly along shorelines, and some shoreline locations offer unobstructed or partially obstructed views of the ocean horizon. Those views are considered a part of the property's historic setting and contribute to its feeling and association. The introduction of elements not historically associated with the historic view from these points—specifically WTGs from the proposed Project or other offshore wind projects—diminishes the characteristics that convey the property's significance but account for only a portion of the property's integrity with respect to those characteristics. In addition, the cumulative actions would have no effect on the property's integrity with respect to location.

In the areas where WTGs are visible—which includes areas of open water in Nantucket Sound and nearby beaches on Martha's Vineyard, and Nantucket, and associated islands —the setting would not be affected when the viewer is looking toward Nantucket Sound, away from the ocean, or when views of WTGs in the ocean view are obscured by clouds, haze, or other environmental or meteorological conditions. In addition, the WTGs would contribute to visual impacts along only 20 percent of the open ocean horizon line (a maximum of 25 degrees of the 124-degree view) to the south from the beachfront portions of the Nantucket Sound TCP. Other project WTGs would contribute to visual impacts along up to 83 percent of the ocean horizon line (approximately 103 degrees of the 124-degree view). The level of effects on the cultural setting of the property from the proposed Project and the other offshore wind projects relates to sensitivity of the viewshed to change rather than the size or extent of the change caused by the proposed Project and other offshore wind projects. As a result, the introduction of modern structures in these views, although small in scale and extent, creates adverse visual effects with respect to the resource's sensitivity to change as a potential TCP.

Nevertheless, the degree to which the property characteristics that convey its significance are diminished by the visibility of the proposed Project is small relative to the other aspects of integrity that remain intact. BOEM (2022) determined that the direct adverse visual effect of the proposed Project on the Chappaquiddick Island TCP would not diminish the integrity of the property to the extent that it would disqualify it for NRHP eligibility. Based on the number of WTGs theoretically visible and the distance of the WTGs from the TCP (as described in Section 2.2), the proposed Project would contribute approximately less than one-quarter of the total cumulative visual effect on the Nantucket Sound TCP.

The cumulative effect of the proposed Project and other offshore wind projects would adversely affect the setting of the Nantucket Sound TCP. This effect would be moderated by the similar characteristics of the WTGs, the distance from the property, and environmental and meteorological conditions that limit visibility. No formal NRHP nomination documentation has been produced that would provide guidance with respect to Chappaquiddick Island's areas of significance and level of integrity; however, it is not anticipated that the cumulative effect of the proposed Project and other offshore wind projects would diminish the property's integrity to the extent that it would disqualify it from NRHP eligibility.

3.5 Nantucket National Historic Landmark

This section describes the contributing elements of the cumulative effects on, and the assessment of integrity for, the Nantucket Historic District NHL

3.5.1 Contributing Elements for National Register of Historic Places Eligibility

The islands of Nantucket, Tuckernuck, and Muskeget comprise the NRHP-listed Nantucket Historic District NHL. The island was developed by European colonists in the 17th and 18th centuries and still retains architectural resources from that period. It is significant under Criterion A for its association with the development of Nantucket and the whaling industry in the 18th century, under Criterion C for its exceptional collection of architecture from a variety of periods and representing a number of styles, and under Criterion D for its potential for well-preserved archaeological resources that would be important to the understanding of pre-Contact and Contact period Native American culture, as well as historic occupation by people of European and African origin (Section 3.1.6).

Nantucket was designated a local historic district in 1955 under early historic preservation legislation established by the Commonwealth of Massachusetts. It was listed as an NHL in 1967, just 1 year after the passage of the National Historic Preservation Act. The local community was supportive of historic preservation, recognizing heritage tourism as an important aspect of the economy after the decline of whaling. The original NHL nomination written in 1966 emphasized the whaling industry as the qualifying characteristic of the property's significance. Subsequent updates to the NRHP listing in 1975 and 2012 expanded the boundaries to include the entire island, as well as the islands of Tuckernuck and Muskeget, and established tourism and historic preservation as areas of significance (Chase-Harrell and Pfeiffer 2012; Heintzelman 1975). The updates also added emphasis to the role of Native Americans and African Americans in the whaling industry (BOEM 2022).

Although there are currently more than 5,000 contributing properties to the historic district, BOEM's (2022) Finding of Adverse Effect found that the proposed Project's adverse effect on the district is not specific to these contributing resources but is based on the maritime orientation of the island and its inhabitants, as the undeveloped ocean view is integral to the character, setting, feeling, and association of the historic property. Such unobstructed ocean views are located primarily along the island's southern coast and from the southward facing slopes beyond the beaches (Figures 3-4 and 3-5).

The view to the ocean is particularly associated with the first phase of whaling history on Nantucket, when elevated platforms were constructed along the south shore of the island to spot right whales and launch boats from the shore in pursuit (Oldham 2000). The contributing elements of Nantucket Island's character also are valued as aesthetic and perceptual, reflecting the cultural and spiritual connection to the sea for the residents and visitors to the site. The view to the open ocean represented an important point of interaction between the land and sea for sailors and fishermen and their families on land. That character is further valued as experiential for the tourists who come to the area to visit the island and take in its historic setting.

Source: COP Appendix III-H.b; Epsilon 2022

Figure 3-4: Tom Nevers Field, Nantucket Island, View Southwest Toward the Proposed Project

Source: COP Appendix III-H.b; Epsilon 2022

Figure 3-5: Eel Point, Nantucket Island, View Southwest Toward the Proposed Project

3.5.2 Summary of Cumulative Effects

Appendices A-7 and A-8 show the areas of intervisibility and total number of WTGs visible from the area within which the cumulative visual effects on the Nantucket Historic District NHL are assessed. The cumulative viewshed analysis model described in Chapter 2 determined that all or a portion of at least one WTG from either the proposed Project and/or other offshore wind projects could be visible from approximately 20 percent of the Nantucket Historic District NHL, and that at least one nacelle top could be visible from approximately 13 percent of the Nantucket Historic District NHL. Most of the land area away from the beaches would have no view of any WTGs. The theoretically visible WTG blade tips attributable to the proposed Project would comprise 15 to 21 percent of the total WTG blade tips theoretically visible from the Nantucket Historic District NHL, while theoretically visible nacelle-top lights from the proposed Project would comprise 0 to 25 percent of total theoretically visible nacelle-top lights, depending on viewer location (Tables 2-3 and 2-4). Proposed Project blade tips would be more visible on the eastern end of the island (Great Point, golf course) than the western end (Tuckernuck, Muskeget, and South Beaches), while both the lowest (15 percent at Tuckernuck Beach) and highest (21 percent at Great Point) percentages of proposed Project nacelle tops would be visible in the center of the island.

The applicant developed visual simulations from Madaket Beach and Tom Nevers Field. In clear weather and where clear sight lines occur, the proposed Project WTGs would be visible from the Nantucket Historic District NHL in views to the southwest. Views are mostly limited to beachfront areas—as shown in Appendices A-7 and A-8—and views from the interior portion of the NHL would be rare due to screening by topography and/or vegetation. An observer can experience panoramic views of the open ocean from the beachfront and elevated inland locations, such as Tom Nevers Field, and would also potentially experience views of WTGs from more than one project as they travel between the northwest and southeast shoreline. Table 3-3 summarizes visibility considerations for Nantucket (based on data reported for Nantucket Airport). Table 3-7 summarizes some of the key considerations for evaluating the visual effects of WTGs on the Nantucket Historic District NHL.

Potential nighttime visual impacts of the proposed Project would be limited by visibility (i.e., due to weather and atmospheric conditions) and mitigated by use of ADLS for the proposed Project and other offshore wind projects, as discussed in Section 3.1.5.

In summary, WTGs from other projects would occupy a greater extent of the horizon line and would be closer and more frequently visible than the proposed Project WTGs due to weather and atmospheric conditions. None of the proposed Project WTGs would be in the nearest distance zone (10 to 20 nautical miles [12 to 23 miles]), and all proposed Project WTGs would be behind WTGs from other projects and, thus, visible less frequently, and less noticeable to the casual observer in clear conditions.

The proposed Project WTGs would contribute less than other projects to cumulative visual impacts from the Nantucket Historic District NHL, which is supported by the cumulative visual simulations from Madaket Beach and Tom Nevers Field. Using the visibility rating system described in Section 3.1.2 for the entire Nantucket Historic District NHL, the proposed Project alone was rated a Visibility Level 2 overall (although it would be less prominent—possibly Visibility Level 1—at Madaket Beach), while the other projects alone and the cumulative scenario were rated a Visibility Level 3. The proposed Project WTGs would be detectible to an observer scanning the horizon line, but small and faint. WTGs from other projects are unlikely to be missed by the casual observer, but the view would still be dominated by sea and sky.

Table 3-7: Factors Contributing to Visual Effects of Wind Turbine Generators on the Nantucket National Historic Landmark at Madaket Beach

Factor	Proposed Project	Other Projects	Notes
Distance to closest WTG	21.5 nautical miles (24.7 miles)	14.4 nautical miles (16.6 miles)	The Proposed Project and other project WTGs would be visible over open ocean from south-facing shorelines on Nantucket at similar distances.
WTG distribution by distance[a]	Percent of all WTGs within: • 10–20 nautical miles: 0% • 20–30 nautical miles: 26% • 30–40 nautical miles: 13% Total for 10–30 nautical miles: 21%	Percent of all WTGs within: • 10–20 nautical miles: 100% • 20–30 nautical miles: 74% • 30–40 nautical miles: 87% Total for 10-30 nautical miles: 79%	No WTGs would be within 10 nautical miles (12 miles) (Table 3-2). WTGs from the proposed Project would comprise a larger percentage of all WTGs in the nearest distance zone.
Percent of total theoretically visible WTG blade tips and nacelles	Blade tips: 15–21% Nacelles: 0–25%	Blade tips: 79–85% Nacelles: 75–100%	See Section 2.2 for percent of theoretically visible WTG blade tips and nacelles from each viewpoint within the Nantucket Historic District NHL.[b]
Percent of 124-degree view with theoretically visible WTGs[b]	15% (16 to 19 degrees)	85% (105 degrees)	See Appendix B-4a. Visibility depends on atmospheric and weather conditions. Other project WTGs would occupy a greater extent of the horizon line in a 124-degree view toward the southwest.[c]
Percent of 180-degree view with theoretically visible WTGs	10% of horizon line (18 degrees)	58% of horizon line (104 degrees)	This is indicative of a 180-degree field of view as an observer turns their head (as opposed to 124-degree static field of view).[b] No WTGs would occupy 42% of the horizon line in a 180-degree southwest facing view.

NHL = National Historic Landmark; WTG = wind turbine generator

[a] This includes 129 proposed Project WTGs and 818 WTGs from the proposed Project and other projects within 40 nautical miles (46 miles) of this viewpoint.

[b] Percentages do not add to 100% due to overlap and positioning of proposed Project WTGs behind WTGs associated with other projects.

[c] From the Tom Nevers Field viewpoint, the proposed Project would occupy 13 percent (16 degrees) of the 124-degree view (Appendix B-4b).

3.5.3 Assessment of Integrity

Nantucket Island and the adjacent Tuckernuck and Muskeget islands are significant for their contributions to 17th and 18th century architecture, 19th century whaling culture, and more recently, for contributions to historic preservation (Chase-Harrell and Pfieffer 2012). Despite modern intrusions and losses due to fires, decay, and development, Nantucket and adjacent islands retain integrity of location, design, setting, material, workmanship, feeling, and association. Views to the ocean from points along the south shore of the islands and from cleared south-facing areas are unobstructed. Those views are considered a part of the property's historic setting and contribute to its feeling and association. Additionally, according to stakeholders, the undeveloped ocean views have a significant role in forming and sustaining the cultural identity of community members (BOEM 2019, 2022). The introduction of elements not historically associated with the historic view from these points—specifically WTGs from the proposed Project or

other offshore wind projects—diminishes the characteristics that convey the property's significance but account for only a portion of the property's integrity with respect to those characteristics.

Approximately 80 percent of land within the NHL would have no views of WTGs and 90 percent would have no views of nacelle tops. In these areas, the setting would remain unaffected by the proposed Project or other projects. In the areas where WTGs are visible, the setting would not be affected when the view is away from the ocean or when the ocean view is obscured by clouds, haze, or other atmospheric conditions. In addition, the proposed Project would have no effect on the property's integrity with respect to the location, design, materials, or workmanship of its contributing properties. Based on the number of WTGs theoretically visible and the distance of the WTGs from the Nantucket Historic District NHL (as described in Section 2.2), the proposed Project would contribute less than one-quarter of the total cumulative visual effect on the Nantucket Historic District NHL.

Thus, the degree to which the significant characteristic of an undeveloped ocean view is affected by the visibility of the proposed Project and other offshore wind projects would be small relative to the other aspects of the property's integrity that remain intact. BOEM (2022) determined that the direct adverse visual effect of the proposed Project on the Nantucket Historic District NHL would not diminish the integrity of the property to the extent that it would disqualify it for NRHP eligibility. Although the cumulative effects of the other offshore wind projects would further adversely affect the setting of the Nantucket Historic District NHL, the effect would not increase proportionately with the number of theoretically visible WTGs installed and would be moderated by the similar size (and potentially similar paint color and reflectivity) of the WTGs, the distance from the property, and environmental and meteorological conditions that limit visibility. While the proposed Project and other projects would have long-term and cumulative adverse effects on the Nantucket Historic District NHL's overall historic setting and other aspects of the property's integrity, these projects would not diminish the resource's integrity to the extent that it would disqualify the Nantucket Historic District NHL from NRHP eligibility.

3.6 Vineyard Sound and Moshup's Bridge Traditional Cultural Property

This section describes the contributing elements of the cumulative effects on, and the assessment of integrity for, the Vineyard Sound and Moshup's Bridge TCP.

3.6.1 Contributing Elements for National Register of Historic Places Eligibility

The Vineyard Sound Moshup's Bridge TCP is considered eligible for listing in the NRHP under all four Criteria (A through D). The maritime setting of Vineyard Sound and Moshup's Bridge TCP is an integral element to the resource's historical and cultural significance. The proposed Project and other offshore wind projects would be visible across open waters, including between Martha's Vineyard and Nomans Island and from Nomans Island itself. Nomans Land is closed to the public due to its status as a National Wildlife Refuge, as well as its former use as a military bombing target and the resultant presence of unexploded ordnance. Figure 3-6 shows a view toward the proposed Project from Squibnocket Beach, near Analysis Point 7, which was used to evaluate effects on the TCP.

Source: COP Appendix III-H.b; Epsilon 2022

Figure 3-6: Squibnocket Beach, View Toward Proposed Project

3.6.2 Summary of Cumulative Effects

Appendices A-9 and A-10 show the areas of intervisibility and total number of WTGs theoretically visible from the area around Analysis Point 7. Most of the land area in the TCP away from the beaches would have no view of any WTGs. The theoretically visible WTG blade tips attributable to the proposed Project would comprise 15 percent of the total WTG blade tips theoretically visible from Analysis Point 7, while theoretically visible nacelle-top lights from the proposed Project would comprise 16 percent of total theoretically visible nacelle-top lights, depending on viewer location (Tables 2-3 and 2-4).

The Aquinnah Cultural Center is within the Vineyard Sound and Moshup's Bridge TCP, and the visual simulation from the Aquinnah Cultural Center described in Section 3.2 is, thus, applicable to this TCP. Views from Analysis Point 7 would be approximately 4.5 miles closer to the proposed Project than from the Aquinnah Cultural Center and would have unobstructed ocean views of the proposed Project. The proposed Project WTGs and other offshore wind project WTGs viewed from Analysis Point 7 would be marginally larger and more prominent than as viewed from the Aquinnah Cultural Center.

An observer would be able to experience panoramic views of the ocean from Analysis Point 7. No images were available from Analysis Point 7; however, Figure 3-6 shows the view from Squibnocket Beach. The location on Figure 3-6 is approximately 1 mile north of (and lower in elevation than) Analysis Point 7 but is generally representative of a viewer's perspective from this part of Martha's Vineyard. In clear weather, this view would include proposed Project WTGs to the southeast (although WTGs from other projects would be between the viewer and the proposed Project). Views of proposed Project and other project WTGs from the interior of the TCP would be rare due to screening by topography and/or vegetation (Appendices A-9 and A-10). Table 3-3 summarizes visibility considerations for Martha's Vineyard (based on data reported for Martha's Vineyard Airport). Table 3-8 summarizes some of the key considerations for evaluating the visual effects of WTGs on the Vineyard Sound and Moshup's Bridge TCP.

Table 3-8: Factors Contributing to Visual Effects of Wind Turbine Generators on Vineyard Sound and Moshup's Bridge Traditional Cultural Property

Factor	Proposed Project	Other Projects	Notes
Distance to closest WTG	18.5 nautical miles (21.3 miles)	10.8 nautical miles (12.4 miles)	The proposed Project WTGs would be visible over open ocean from southeast-facing shorelines within the TCP but would appear behind WTGs from other projects.
WTG distribution By distance[a]	Percent of all proposed WTGs within: • 10–20 nautical miles: 3% • 20–30 nautical miles: 29% • 30–40 nautical miles: 4% Total for 10–30 nautical miles: 19%	Percent of all proposed WTGs within: • 10–20 nautical miles: 97% • 20–30 nautical miles: 71% • 30–40 nautical miles: 96% Total for 10–30 nautical miles: 81%	No WTGs would be within 10 nautical miles (12 miles) (Table 3-2). WTGs from other projects would be located closer to the Vineyard Sound and Moshup's Bridge TCP than proposed Project WTGs.
Percent of total theoretically visible WTG blade tips and nacelles	Blade tips: 15% Nacelles: 16%	Blade tips: 85% Nacelles: 84%	See Section 2.2.[b]
Percent of 124-degree view with theoretically visible WTGs	32% (39 degrees)	100% (100 degrees)	See Appendix B-5. Visibility depends on atmospheric and weather conditions. Other project WTGs would occupy a greater extent of the horizon line in a 124-degree view toward the southeast.[b,c]
Percent of 180-degree view with theoretically visible WTGs	20% of horizon line (39 degrees)	76% of horizon line (136 degrees)	This is indicative of a 180-degree field of view as an observer turns their head (as opposed to 124-degree static field of view). No WTGs would occupy 24% of horizon line in a 180-degree south-facing view.[b,c]

TCP = traditional cultural property; WTG = wind turbine generator

[a] This includes 130 proposed Project WTGs and 879 WTGs from the proposed Project and other projects within 40 nautical miles (46 miles) of this viewpoint.

[b] The exact percentage of theoretically visible blade tips and nacelles depends on the exact viewpoint within the Vineyard Sound and Moshup's Bridge TCP.

[c] Percentages do not add to 100% due to overlap and positioning of proposed Project WTGs behind WTGs associated with other projects.

Potential nighttime visual impacts of the proposed Project would be limited by visibility (i.e., due to weather and atmospheric conditions) and mitigated by use of ADLS for the proposed Project and all other offshore wind projects in the RI/MA Lease Areas, as discussed in Section 3.1.5.

In summary, WTGs from other offshore wind projects would occupy a greater extent of the horizon line than those of the proposed Project and would appear in front of and closer to the viewer than the proposed Project's WTGs. WTGs associated with the proposed Project constitute 3 percent of the WTGs in the nearest distance zone (10 to 20 nautical miles [12 to 23 miles]) and 19 percent of WTGs within 30 nautical miles (35 miles) of the Vineyard Sound and Moshup's Bridge TCP. Where the closest proposed Project WTGs and other project WTGs overlap on the open ocean horizon line, they would create increased visual clutter due to additional clusters and lines of WTGs. Other project WTGs would occupy the entirety of the horizon line visible in 124-degree southward views from Analysis Point 7. WTGs associated with other projects would be situated in front of the proposed Project WTGs. While proposed Project WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the southeast horizon, they would be visible less often due to weather conditions and less visually prominent

than other project WTGs due to distance and the proposed Project's location behind WTGs from other projects.

Using the visibility rating system described in Section 3.1.2 and accounting for Analysis Point 7's location approximately 4.5 miles closer to the proposed Project, the proposed Project alone was rated a Visibility Level 3, while other projects alone and cumulative scenario each were rated a Visibility Level 4. The proposed Project's WTGs would occupy a smaller extent of the horizon line and would be behind and, thus, less noticeable than other project WTGs in a similar distance zone. The proposed Project and other project WTGs together would be plainly visible and could not be missed by the casual observer, but the overall view would still be dominated by sea and sky.

3.6.3 Assessment of Integrity

The historic setting of the land portions of the Vineyard Sound and Moshup's Bridge TCP has been affected by the construction of roads, boat docks, private residences, limited commercial properties, and recreational and social facilities. Large natural or natural-appearing areas remain. Much of the coast near Analysis Point 7 offers unobstructed or partially obstructed views of the ocean horizon. Those views are considered a part of the property's historic setting and contribute to its feeling and association. The introduction of elements not historically associated with the historic view from these points—specifically WTGs from the proposed Project or other offshore wind projects—diminishes the characteristics that convey the property's significance but account for only a portion of the property's integrity with respect to those characteristics. In addition, the cumulative actions would have no effect on the property's integrity with respect to location.

Most of the land area away from the shoreline and bluffs has no view of any WTGs. In areas with no views of WTGs, the setting would remain intact. In the areas where WTGs are visible, the setting would not be affected when the viewer is looking inland, away from the ocean, or when views of WTGs in the ocean view are obscured by clouds, haze, or other environmental or meteorological conditions. The proposed Project WTGs would contribute to visual impacts along 32 percent of the open ocean horizon line (a maximum of 39 degrees of the 124-degree view) to the south from Analysis Point 7. Other project WTGs would occupy the entire 124-degree ocean horizon line and 76 percent of successive views within a 180-degree radius. As viewed from Analysis Point 7, the proposed Project WTGs would be behind—and likely would be difficult to distinguish from—the WTGs from other offshore wind projects.

The maritime setting of the Vineyard Sound and Moshup's Bridge TCP is "integral to its historical and cultural significance" (EDR 2020). The level of effects on the cultural setting of the property from the proposed Project and the other offshore wind projects relates to sensitivity of the viewshed to change rather than the size or extent of the change caused by the proposed Project and other offshore wind projects. The introduction of modern structures in these views, although small in scale and extent, creates adverse visual effects with respect to the resource's sensitivity to change as a potential TCP.

Nevertheless, the degree to which the property characteristics that convey its significance are diminished by the visibility of the proposed Project is small relative to the other aspects of integrity that remain intact. Based on the number of WTGs theoretically visible, the distance of the WTGs from the TCP (as described in Section 2.2), and the location of proposed Project WTGs behind the WTGs of other projects, the proposed Project would contribute less than one-quarter of the total cumulative visual effect on the Vineyard Sound and Moshup's Bridge TCP. This finding is a conservative estimate based on the location of Analysis Point 7.

The cumulative effect of the proposed Project and other offshore wind projects would adversely affect the setting of Vineyard Sound and Moshup's Bridge TCP. This effect would be moderated by the similar characteristics of the WTGs, the distance from the property, and environmental and meteorological

conditions that limit visibility. The direct adverse visual effect of the proposed Project and other offshore wind projects on the Vineyard Sound and Moshup's Bridge TCP would not diminish the integrity of the property to the extent that it would disqualify it for NRHP eligibility.

4 Conclusion

The Cumulative Historic Resources Visual Effects Assessment for the proposed Project was conducted using cumulative viewshed models to help inform how the presence of WTGs associated with the proposed Project and other offshore wind projects would affect seven historic properties on Martha's Vineyard and Nantucket. Cumulative viewshed models were created based on the height of the WTG at the maximum vertical extension of the blade tip (to calculate the theoretical viewshed for any part of the WTG) and the top of the WTG nacelle (to calculate the nighttime theoretical viewshed for the aviation hazard lights required by FAA regulations; FAA 2020). The cumulative viewshed models quantify the total number of WTGs that are theoretically visible from the historic properties and were used to help determine the proportion of adverse effect attributable to the proposed Project or other offshore wind projects in the RI/MA Lease Areas, along with other factors such as the percent of horizon line occupied by the proposed Project versus other offshore wind projects and proximity to the resource with consideration for typical visibility conditions. This assessment used such factors to evaluate the level of effect on historic properties, based on the NRHP integrity criteria (Section 3.1.6).

The proportion of effect from the proposed Project and the other offshore wind projects varied among the seven historic properties and from different viewpoints within the properties. Overall, the proposed Project would contribute minimally to cumulative adverse effects on Gay Head Lighthouse, Aquinnah Cultural Center, and Aquinnah Area Shops and less than one-quarter of cumulative effects on the Chappaquiddick Island TCP, Nantucket Sound TCP, Nantucket Historic District NHL, and Vineyard Sound and Moshup's Bridge TCP. None of the projects would be within 10 nautical miles (12 miles) of any of these historic properties. While the proposed Project WTGs would be visible from these resources, they would be behind WTGs from other offshore wind projects.

The cumulative effects of the proposed Project and other offshore wind projects would further adversely affect the setting of the historic properties, particularly Gay Head Lighthouse; however, the degree to which offshore wind projects would affect the significant characteristic of the undeveloped ocean view is small relative to the other aspects of the properties' integrity that remain intact. Accordingly, development of the proposed Project and other offshore wind projects in the RI/MA Lease Areas would not affect the integrity of any of the historic properties to the extent that it would make them ineligible for the NRHP.

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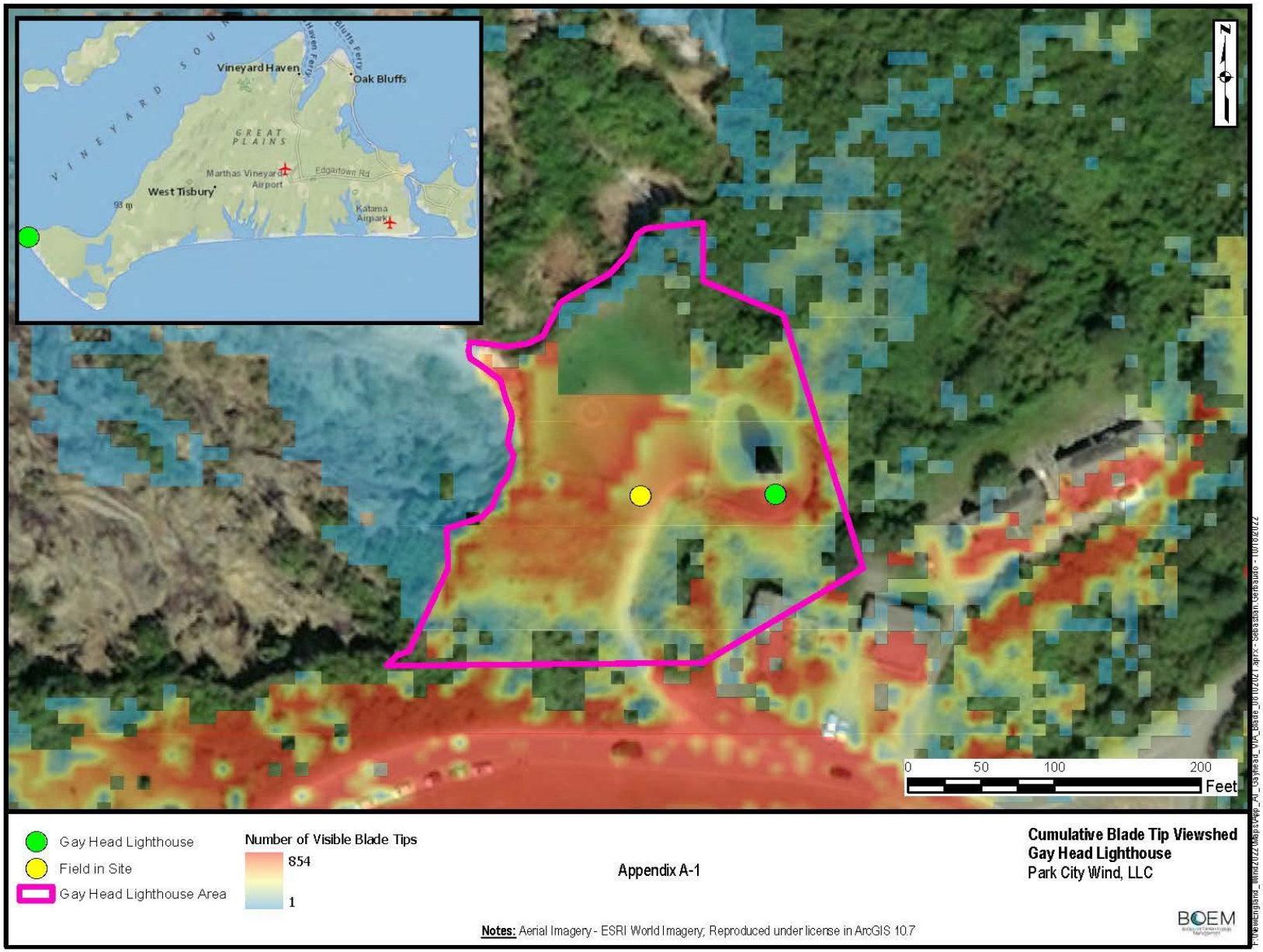
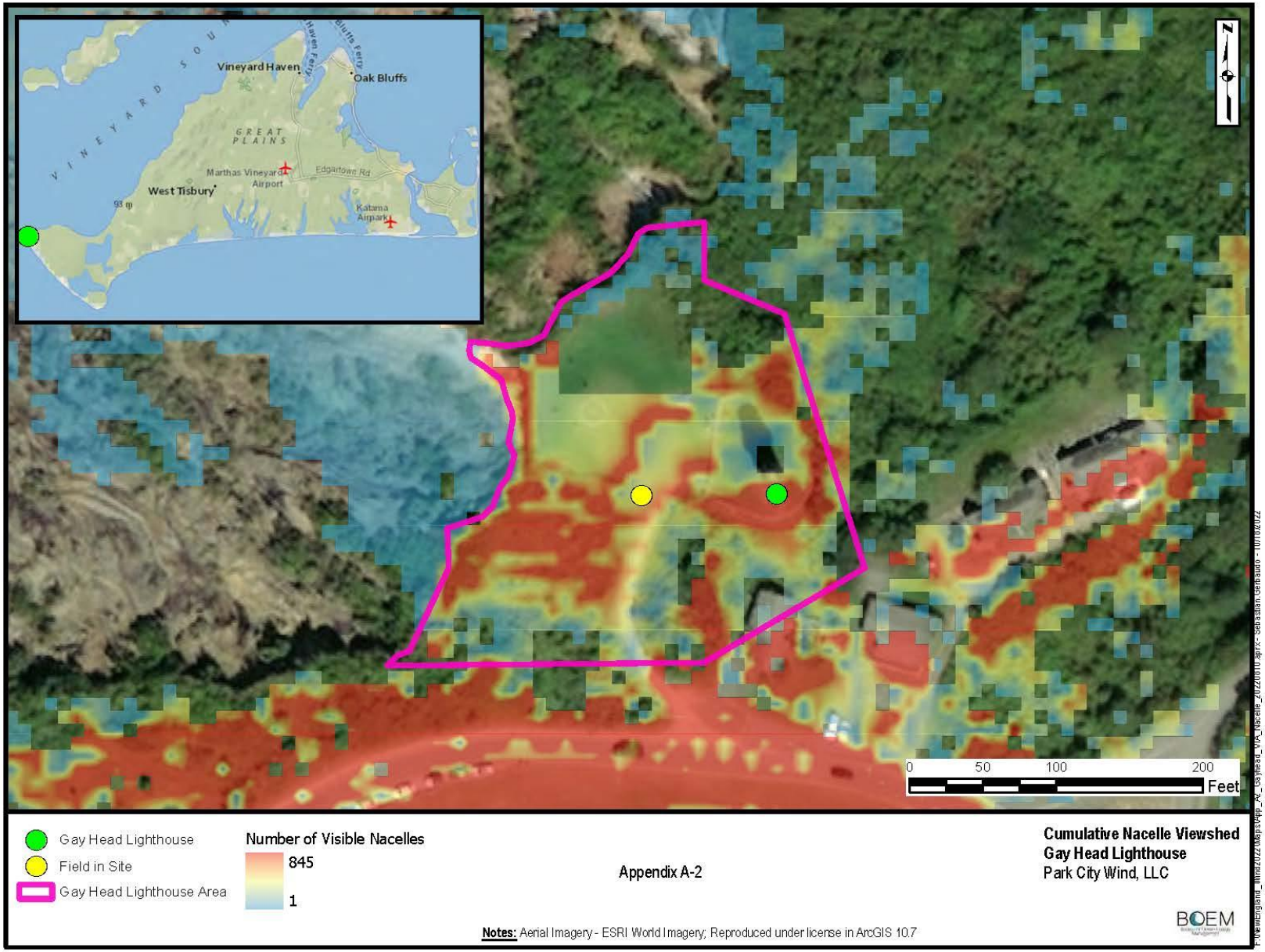
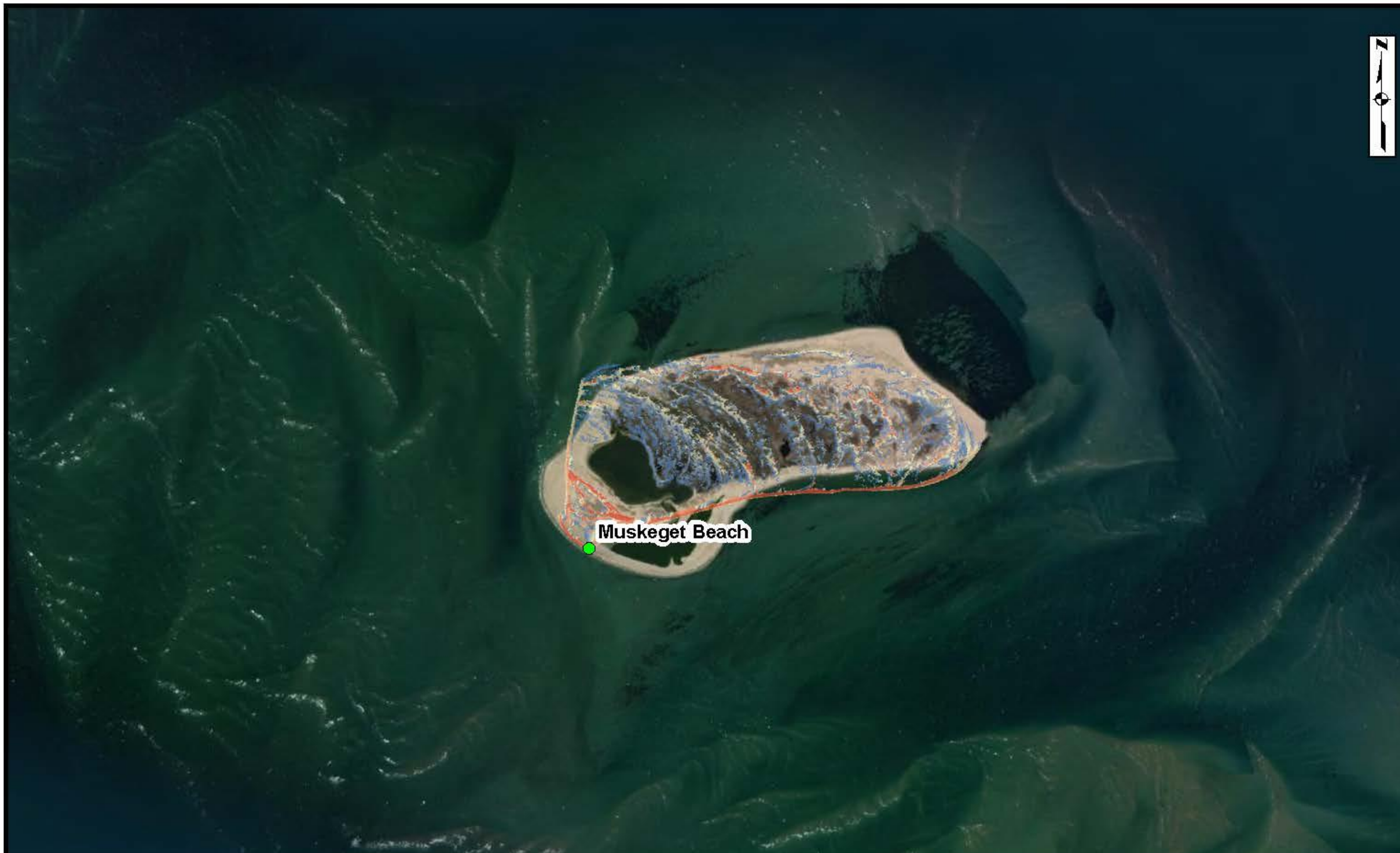
Sullivan, R.G., L,B. Kirchler, J. Cothren, and S.L. Winters. 2013. "Offshore Wind Turbine Visibility and Visual Impact Threshold Distances." *Environmental Practice*. Accessed: May 2020. Retrieved from: http://visualimpact.anl.gov/offshorevitd/docs/OffshoreVITD.pdf

APPENDIX A: INTERVISIBILITY MAPS


Vineyard Haven
Oak Bluffs
GREAT PLAINS
Edgartown Rd
Marthas Vineyard Airport
West Tisbury
Katama Airpark
N
0 50 100 200
Feet
Gay Head Lighthouse
Field in Site
Gay Head Lighthouse Area
Number of Visible Blade Tips
854
1
Appendix A-1
Cumulative Blade Tip Viewshed
Gay Head Lighthouse
Park City Wind, LLC
BOEM
Notes: Aerial Imagery - ESRI World Imagery; Reproduced under license in ArcGIS 10.7


Vineyard Haven
Oak Bluffs
GREAT PLAINS
Marthas Vineyard Airport
Edgartown Rd
West Tisbury
Katama Airpark
N
0
50
100
200
Feet
Gay Head Lighthouse
Field in Site
Gay Head Lighthouse Area
Number of Visible Nacelles
845
1
Appendix A-2
Cumulative Nacelle Viewshed
Gay Head Lighthouse
Park City Wind, LLC
BOEM
Notes: Aerial Imagery - ESRI World Imagery; Reproduced under license in ArcGIS 10.7

[Appendices A-3, A-4, A-5, and A-6 redacted.]



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Number of Visible Blade Tips

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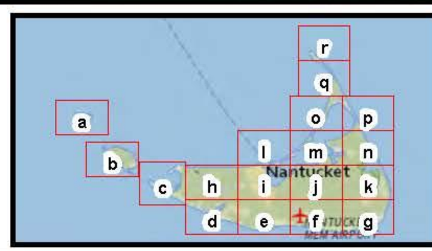

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7a

BOEM

NOTES: Water is included in this viewshed model; Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS 10.7

Analysis Points

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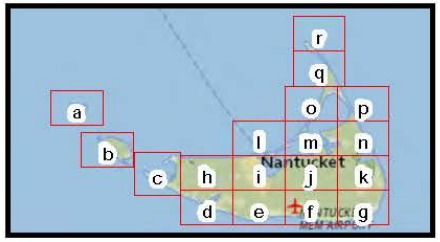

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7b

BOEM

NOTES: Water is included in this viewshed model; Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS 10.7

● Analysis Points

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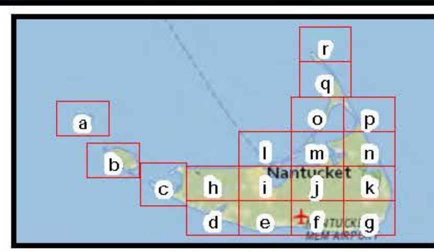

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7c

BOEM

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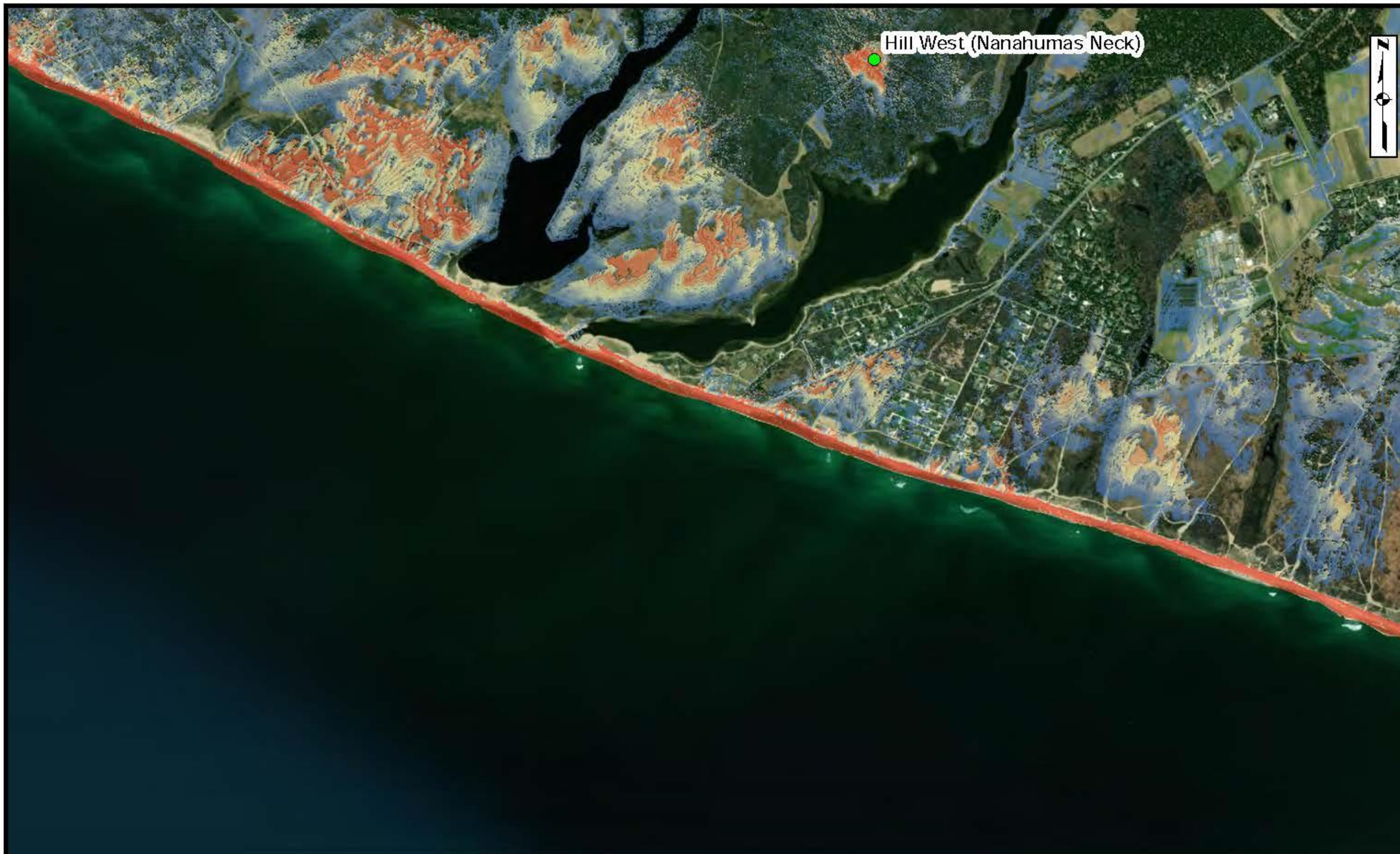

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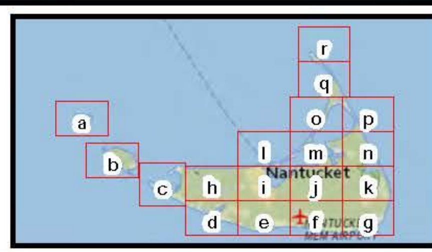

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7d

BOEM

NOTES: Water is included in this viewshed model; Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS 10.7

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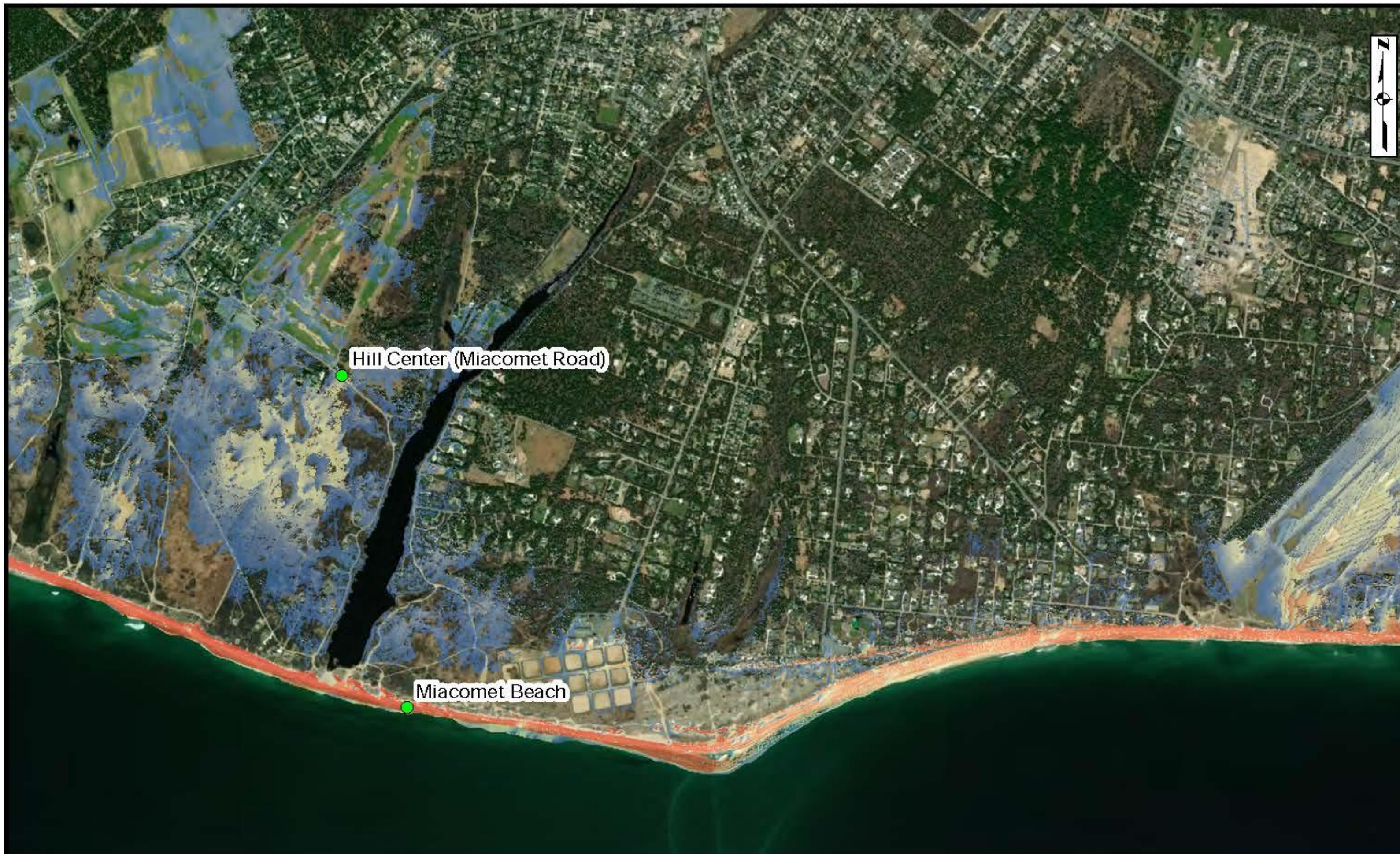

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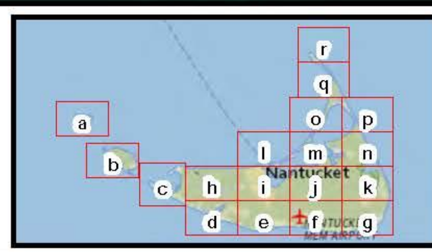

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7e

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NOTES: Water is included in this viewshed model; Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS 10.7

Analysis Points

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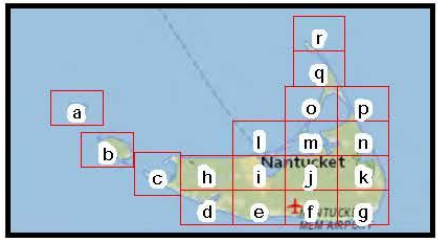

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7f

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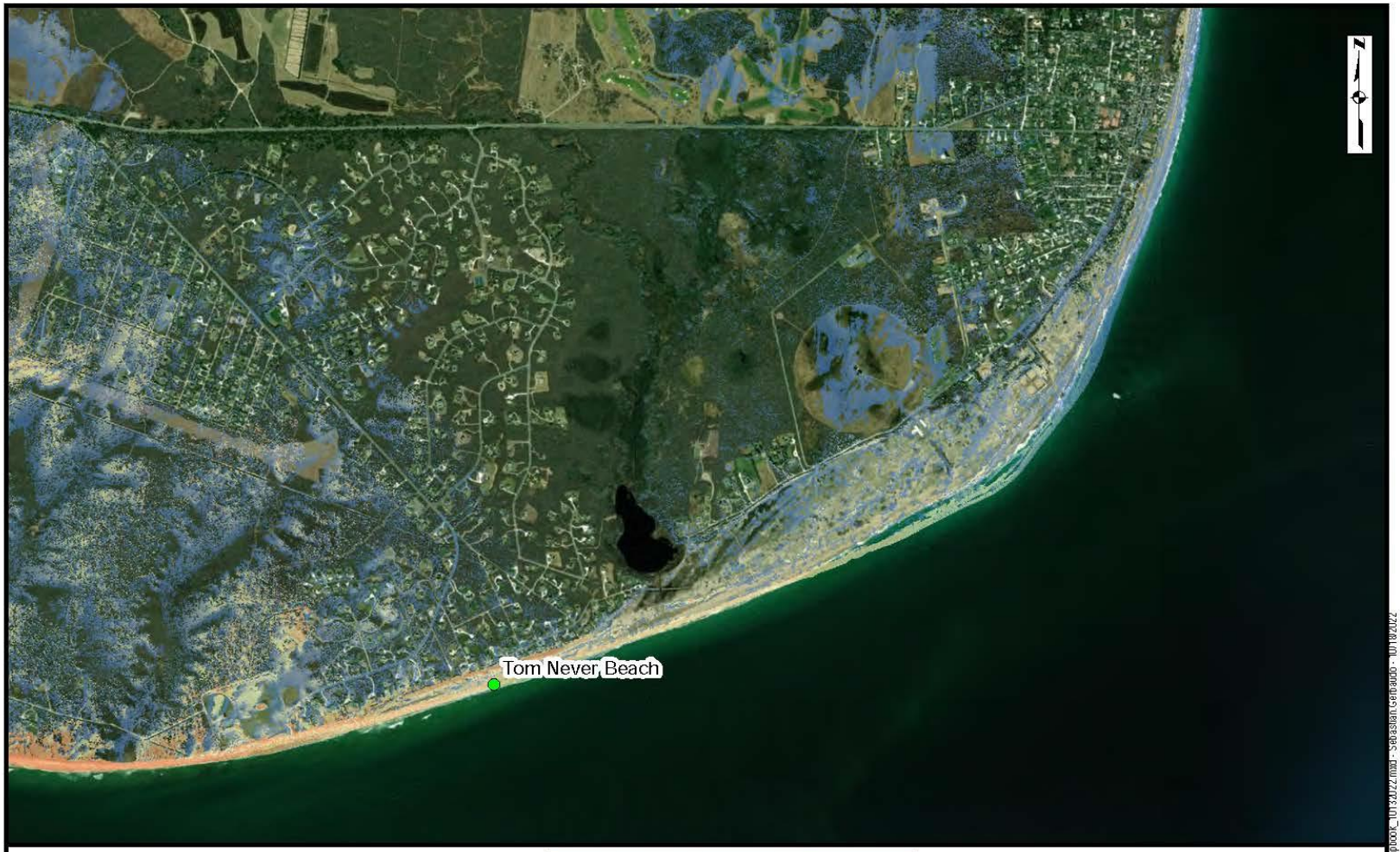

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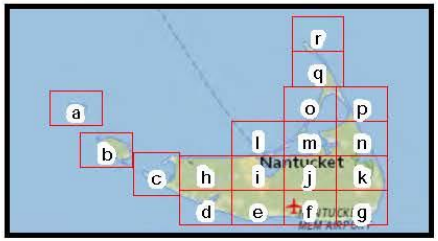

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7g

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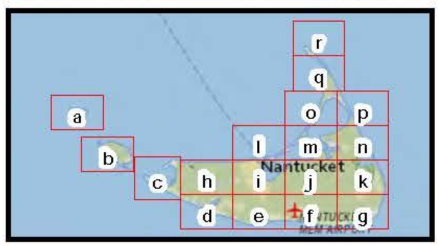

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
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Appendix A-7h

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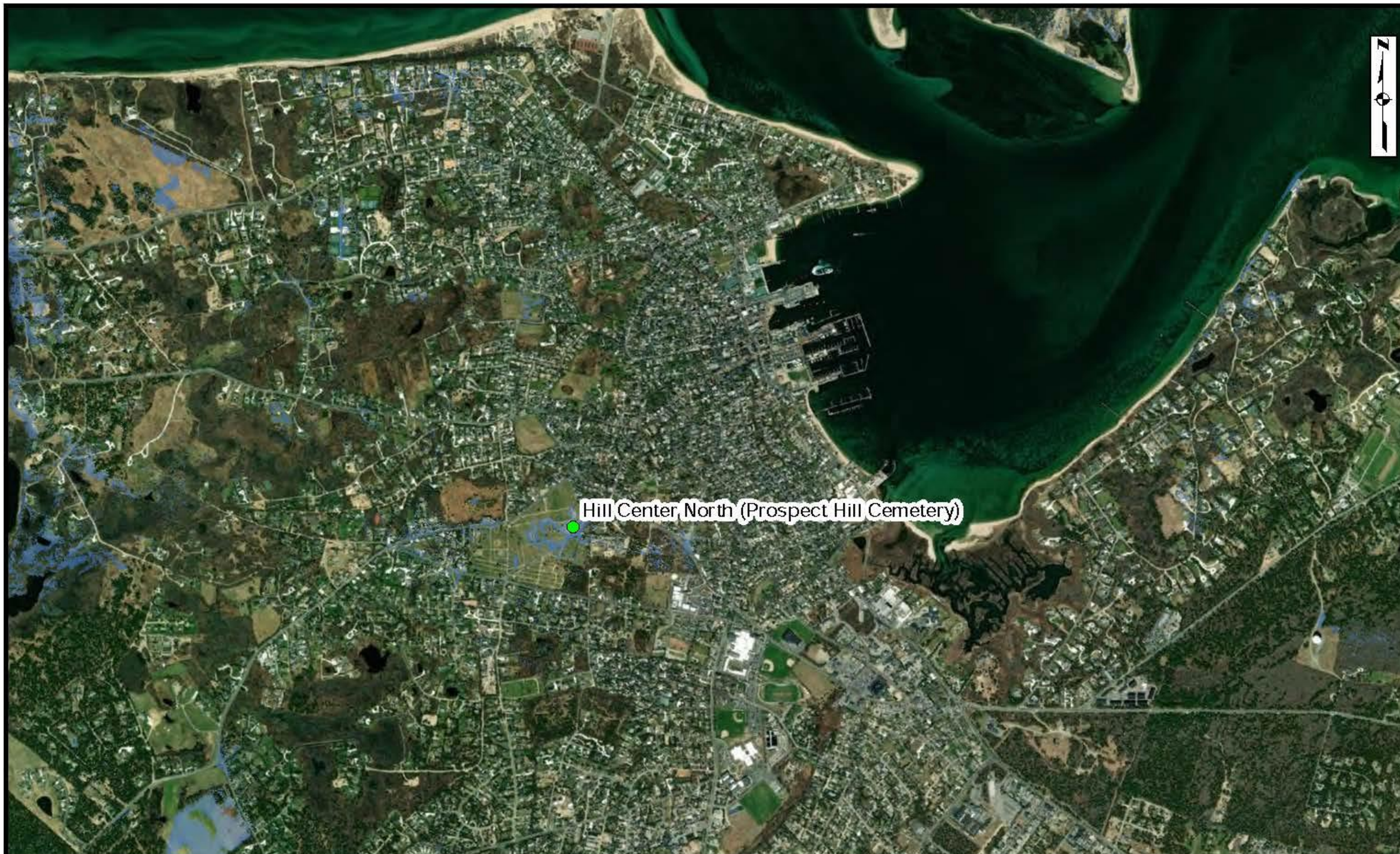

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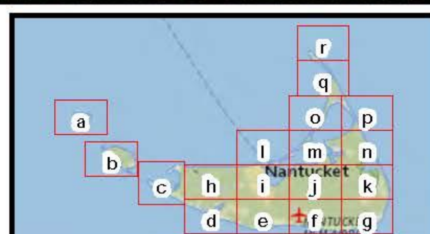

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7i

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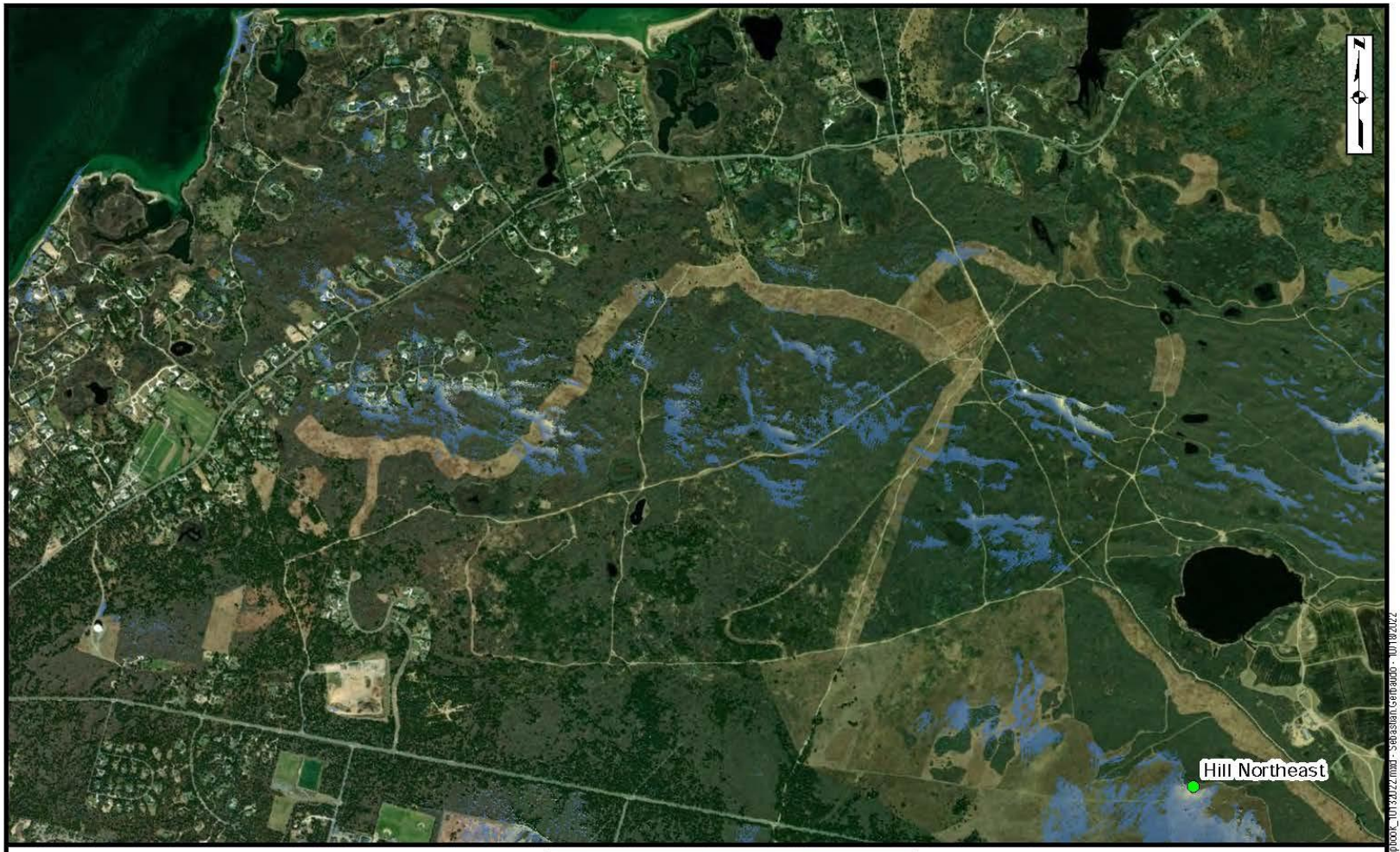

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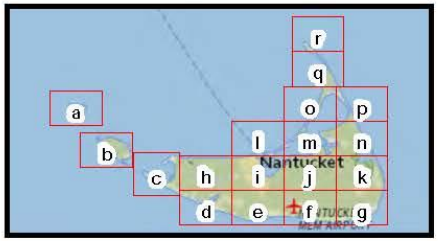

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7j

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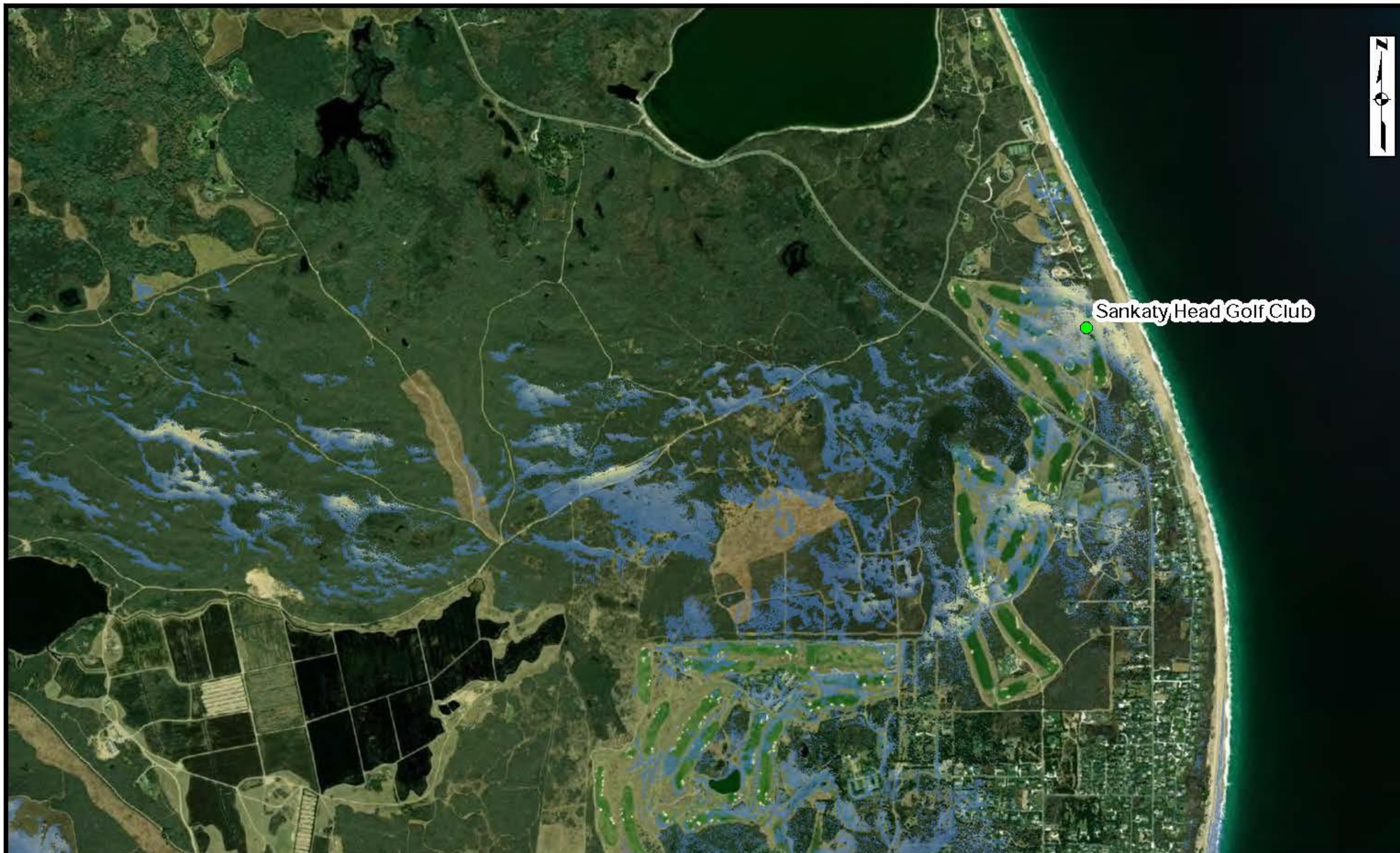

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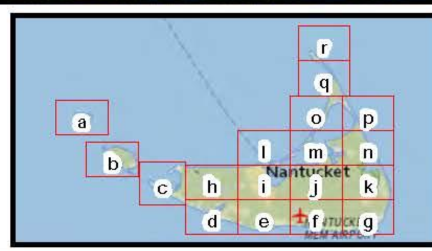

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7k

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Analysis Points

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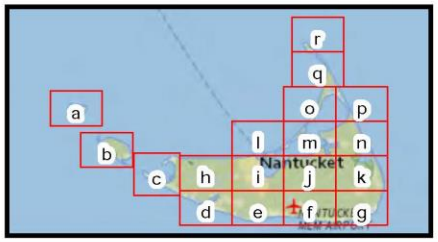

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7I

BOEM

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Analysis Points

Number of Visible Blade Tips

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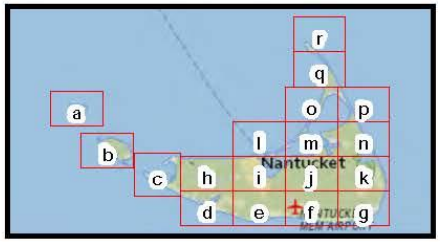

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7m

BOEM

NOTES: Water is included in this viewshed model; Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS 10.7

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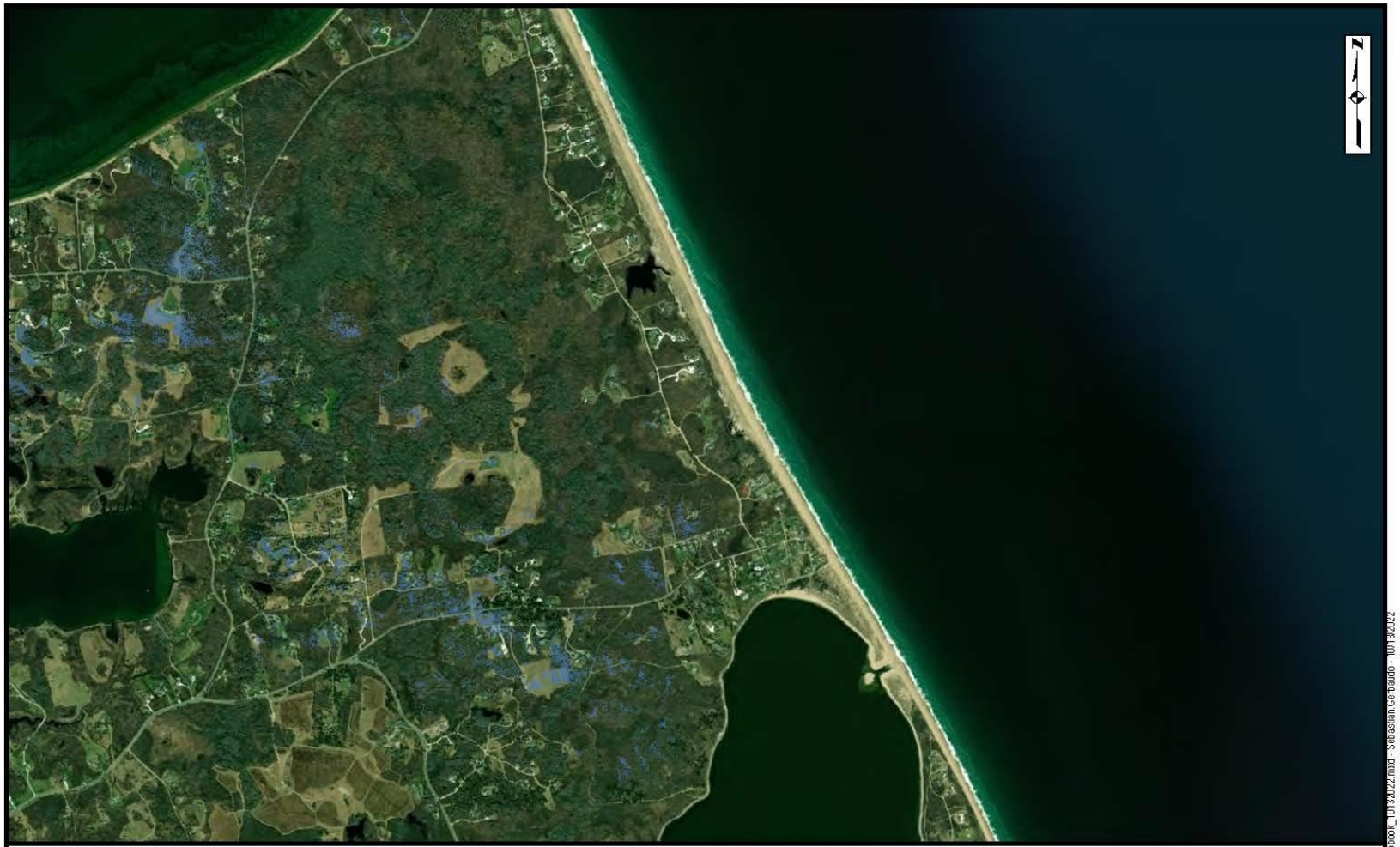

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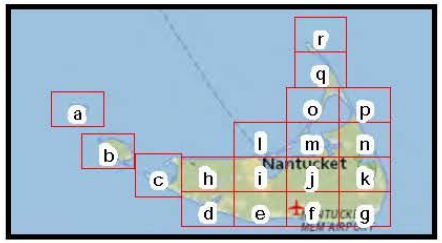

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7n

BOEM

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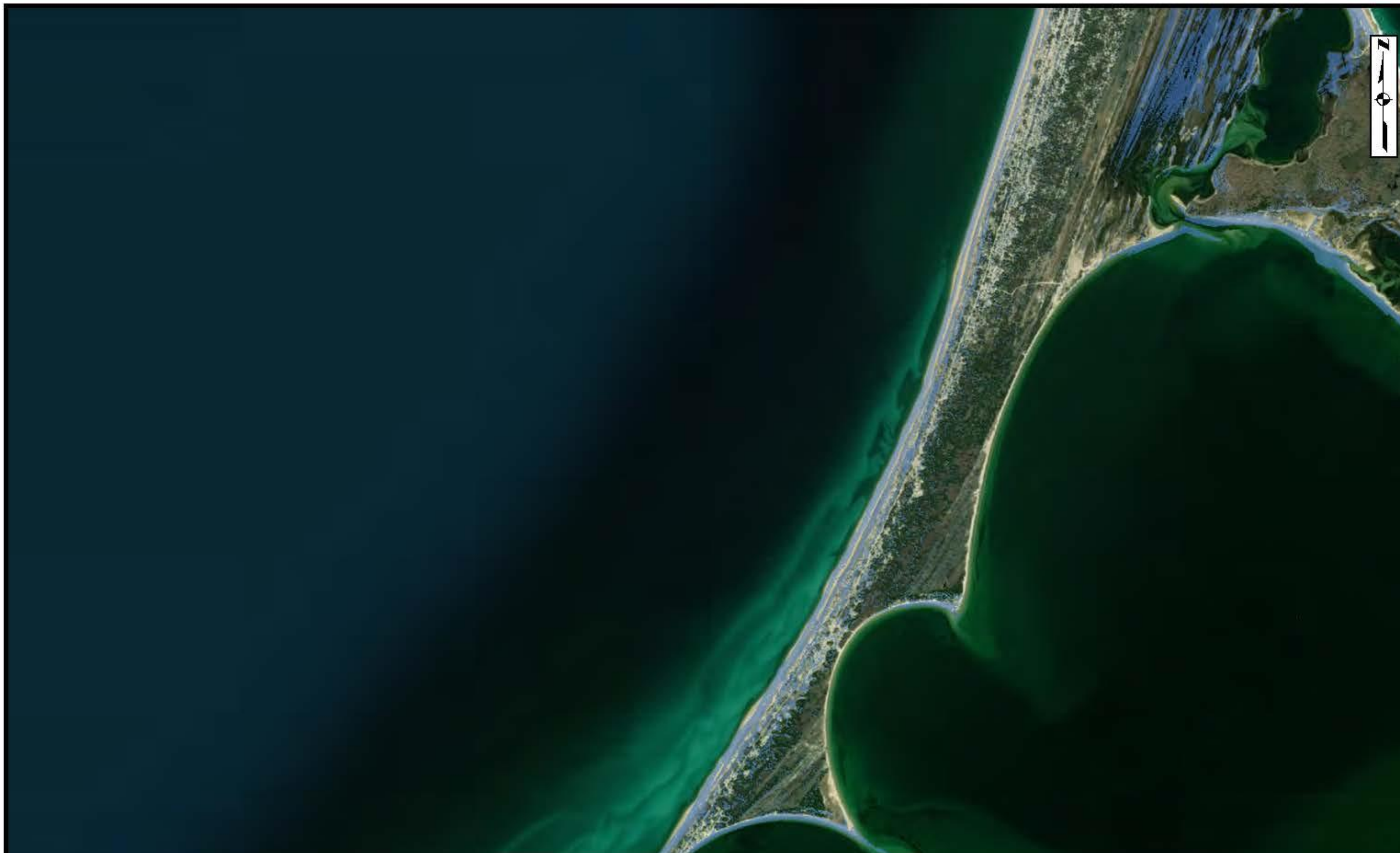

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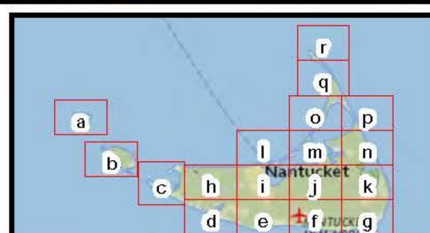

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7o

BOEM

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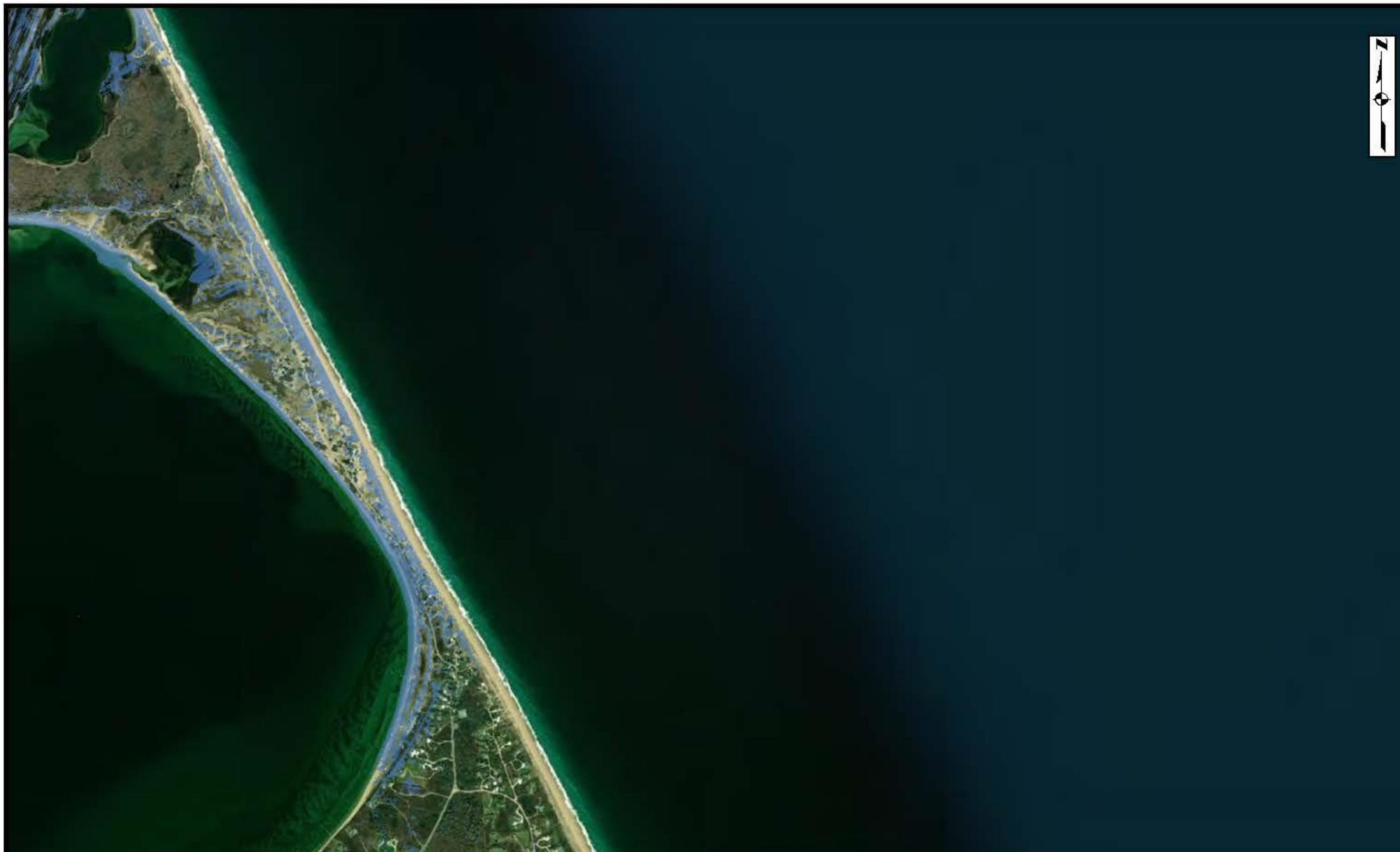

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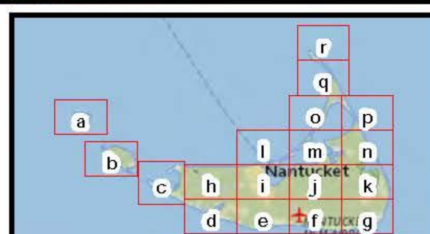

Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7p

BOEM

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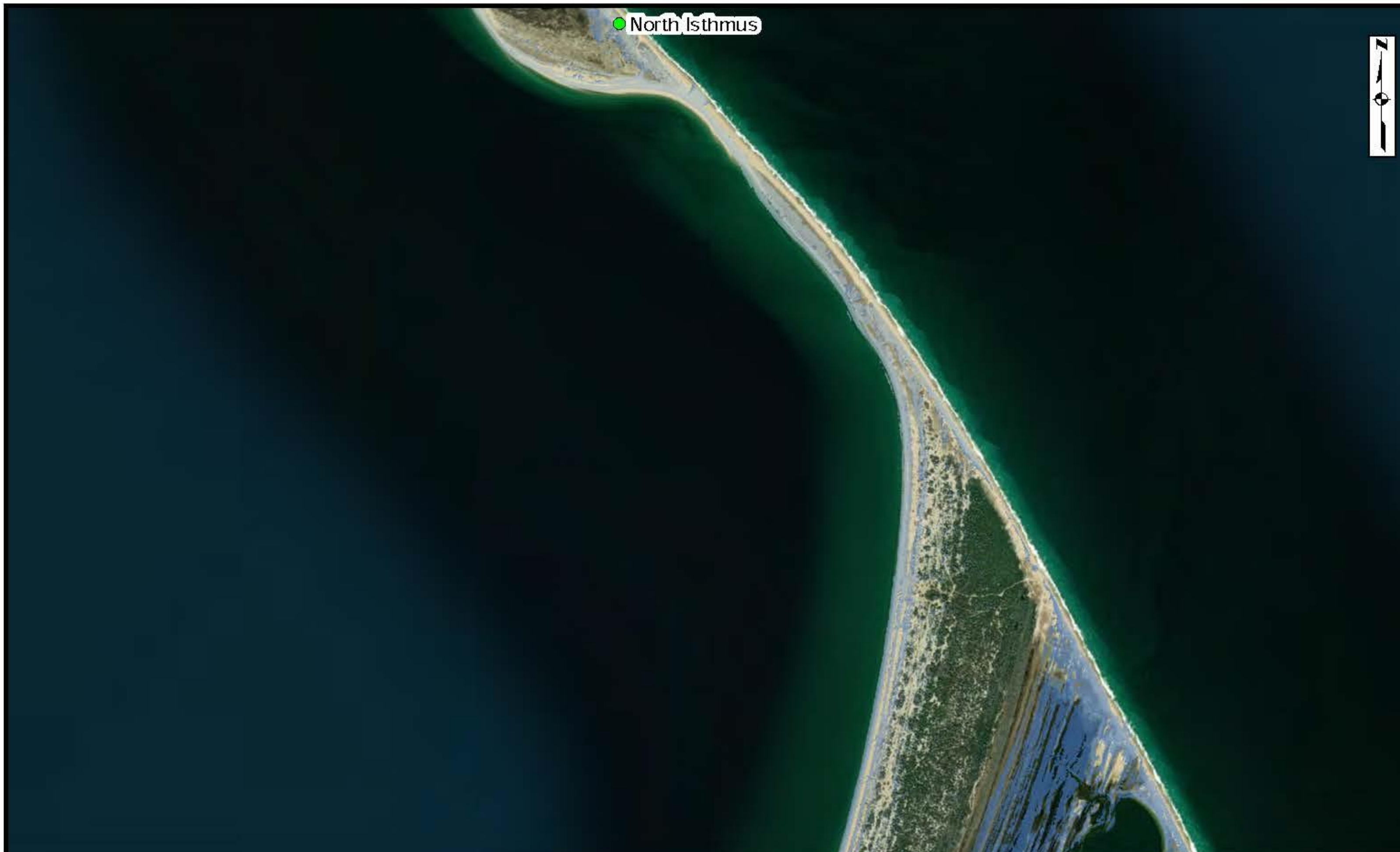

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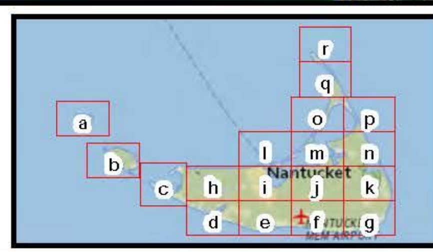
High : 854

Low : 1



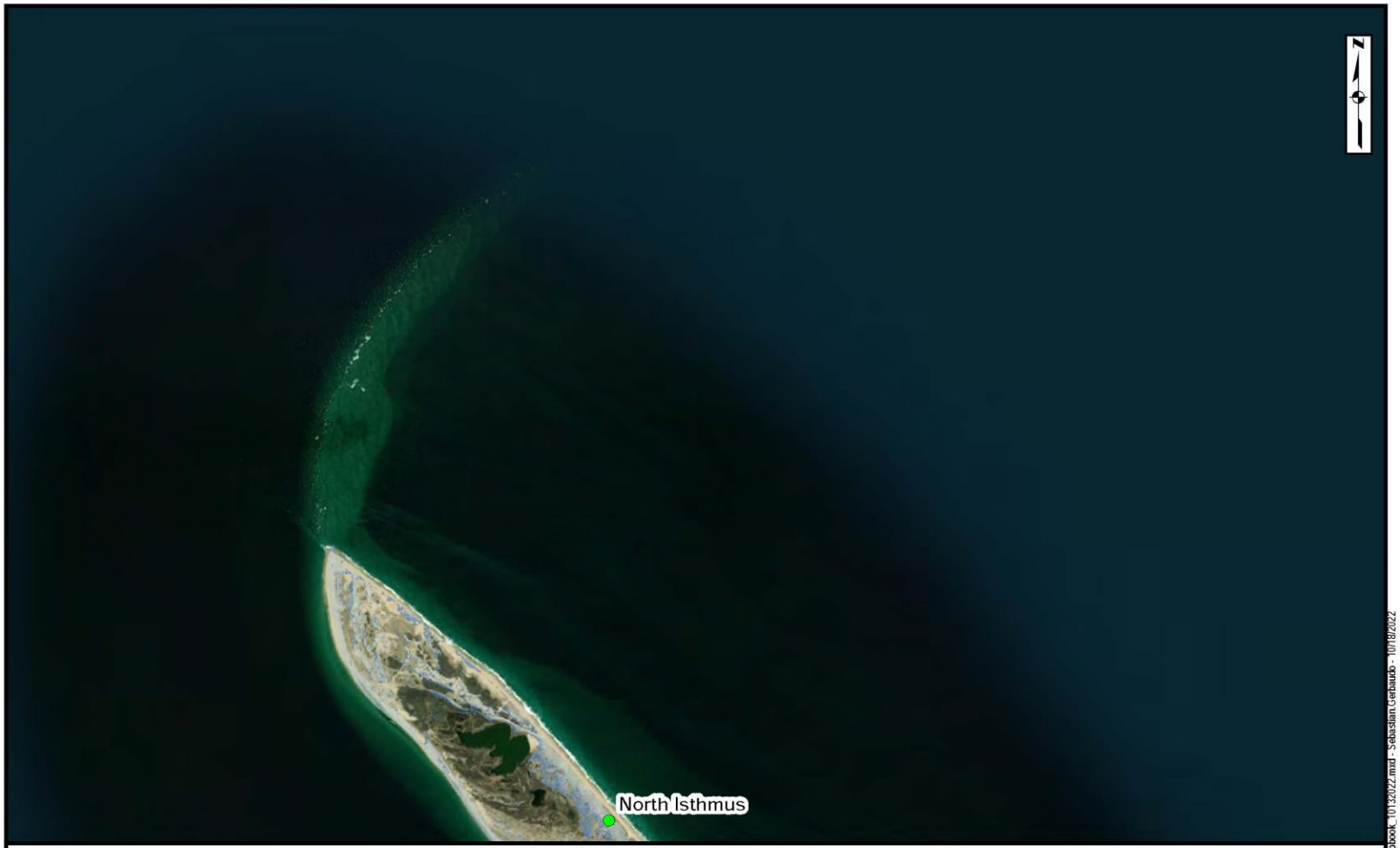
Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7q

BOEM

F:\NewEngland_Wind\2022\Maps\App_A7_NHN_Mapbook_10132022.mxd - Sebastian.Gerbaudo - 10/18/2022

NOTES: Water is included in this viewshed model; Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS 10.7

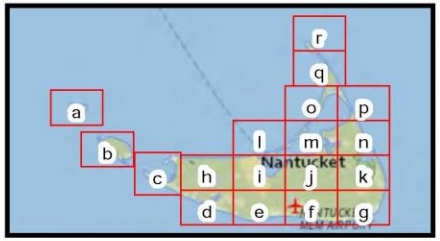


Analysis Points

Number of Visible Blade Tips

High : 854

Low : 1



Cumulative Blade Tip Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-7r

BOEM

F:\New_England_Wind\022\Maps\App_A7_NAN_Mapbook_10132022.mxd - Sebastian.Gerbaudo - 10/18/2022

NOTES: Water is included in this viewshed model; Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS 10.7

Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8a

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Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8b

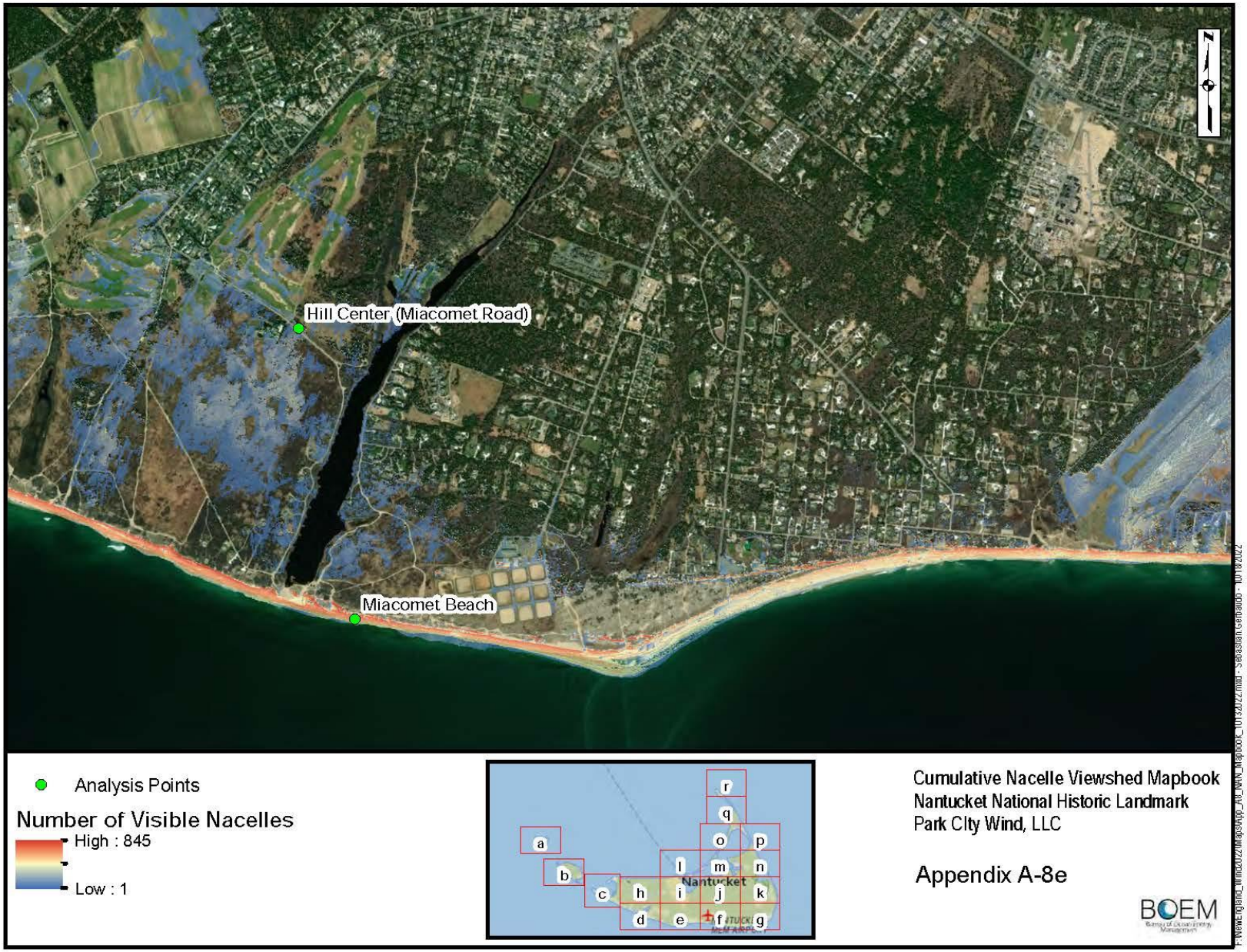
BOEM


Madaket Beach
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
Nantucket
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC
Appendix A-8c
BOEM

Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8d

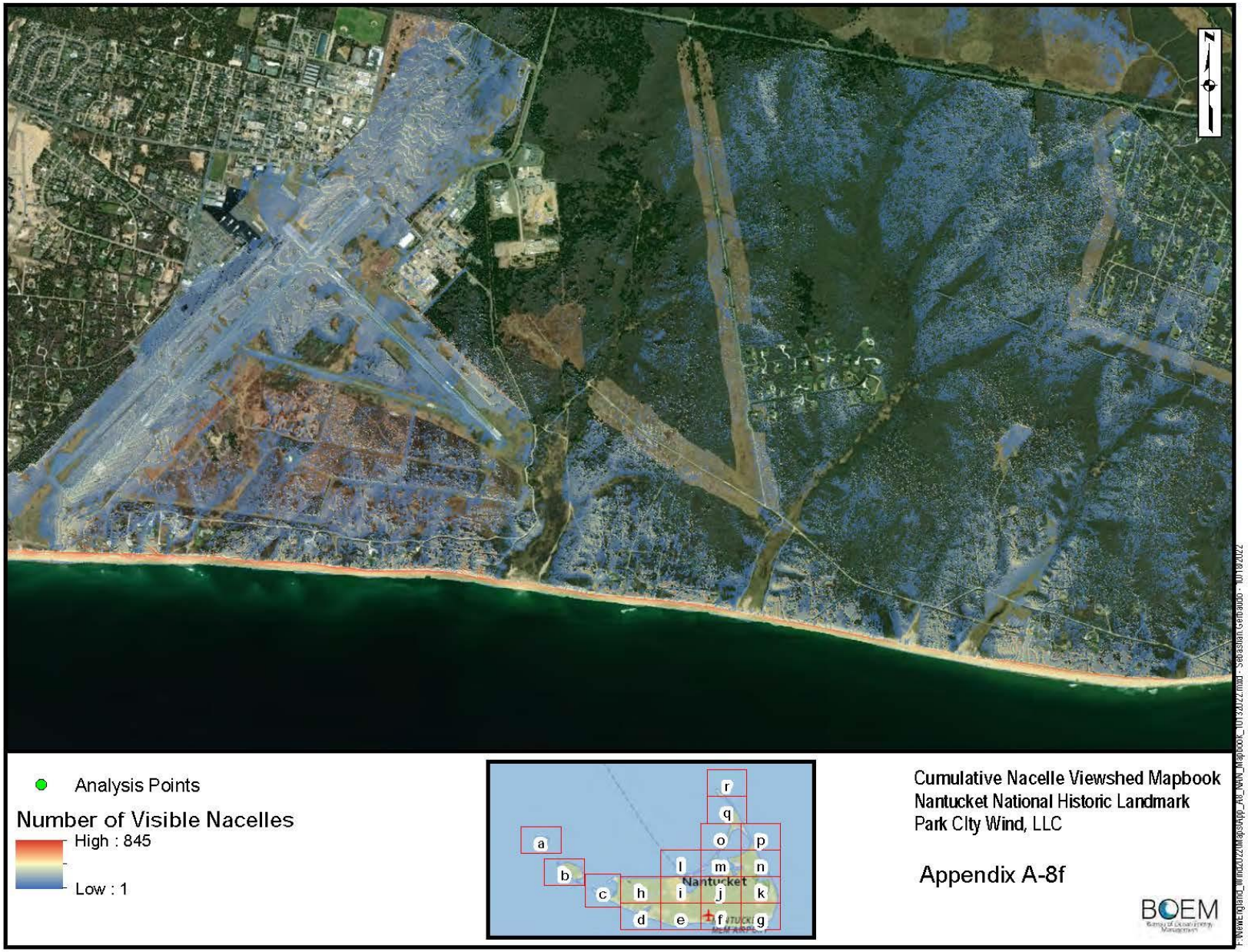
BOEM



Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8e

BOEM



Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8f

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Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8g

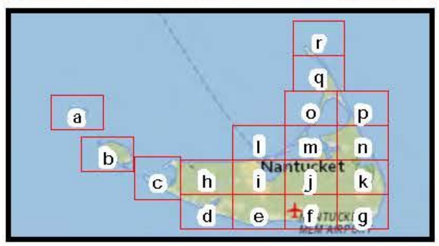
BOEM

Analysis Points

Number of Visible Nacelles

High : 845

Low : 1



Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8h

F:\NewEngland_Wind2022\Maps\App_A8_NHN_Mapbook_10132022.mxd - Sebastian.Gerbaudo - 10/18/2022

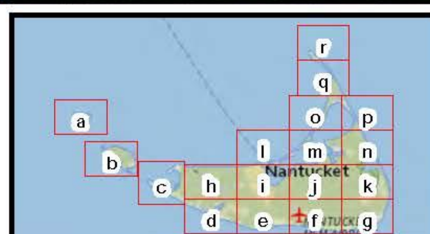

Hill Center North (Prospect Hill Cemetery)
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
Nantucket
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC
Appendix A-8i
BOEM

Analysis Points

Number of Visible Nacelles

High : 845

Low : 1



Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8j

BOEM

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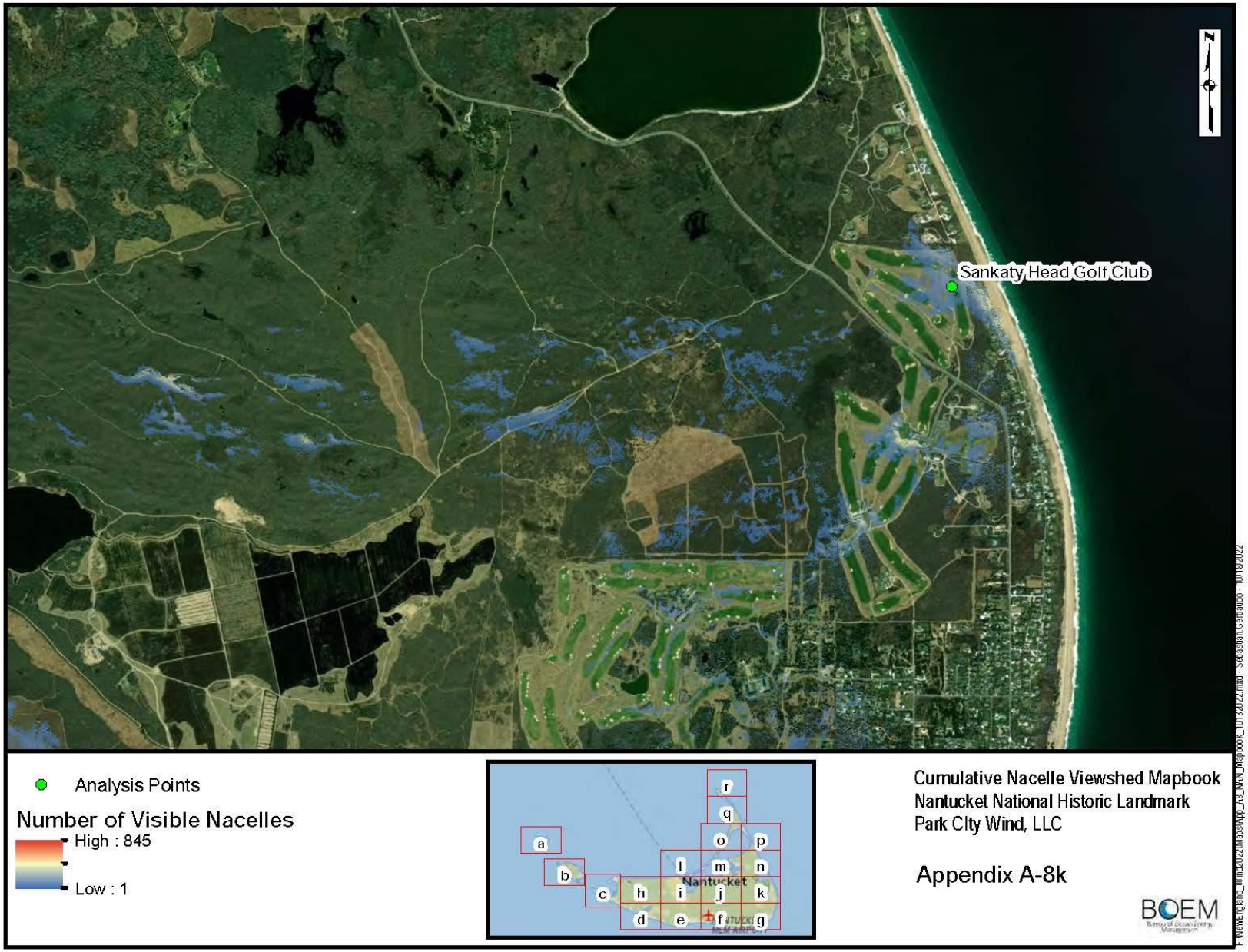


Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8k

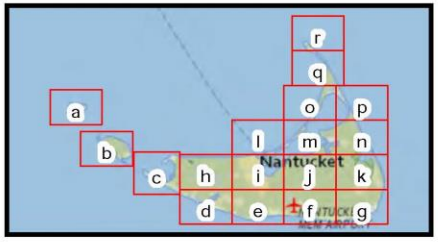
BOEM

Analysis Points

Number of Visible Nacelles

High : 845

Low : 1



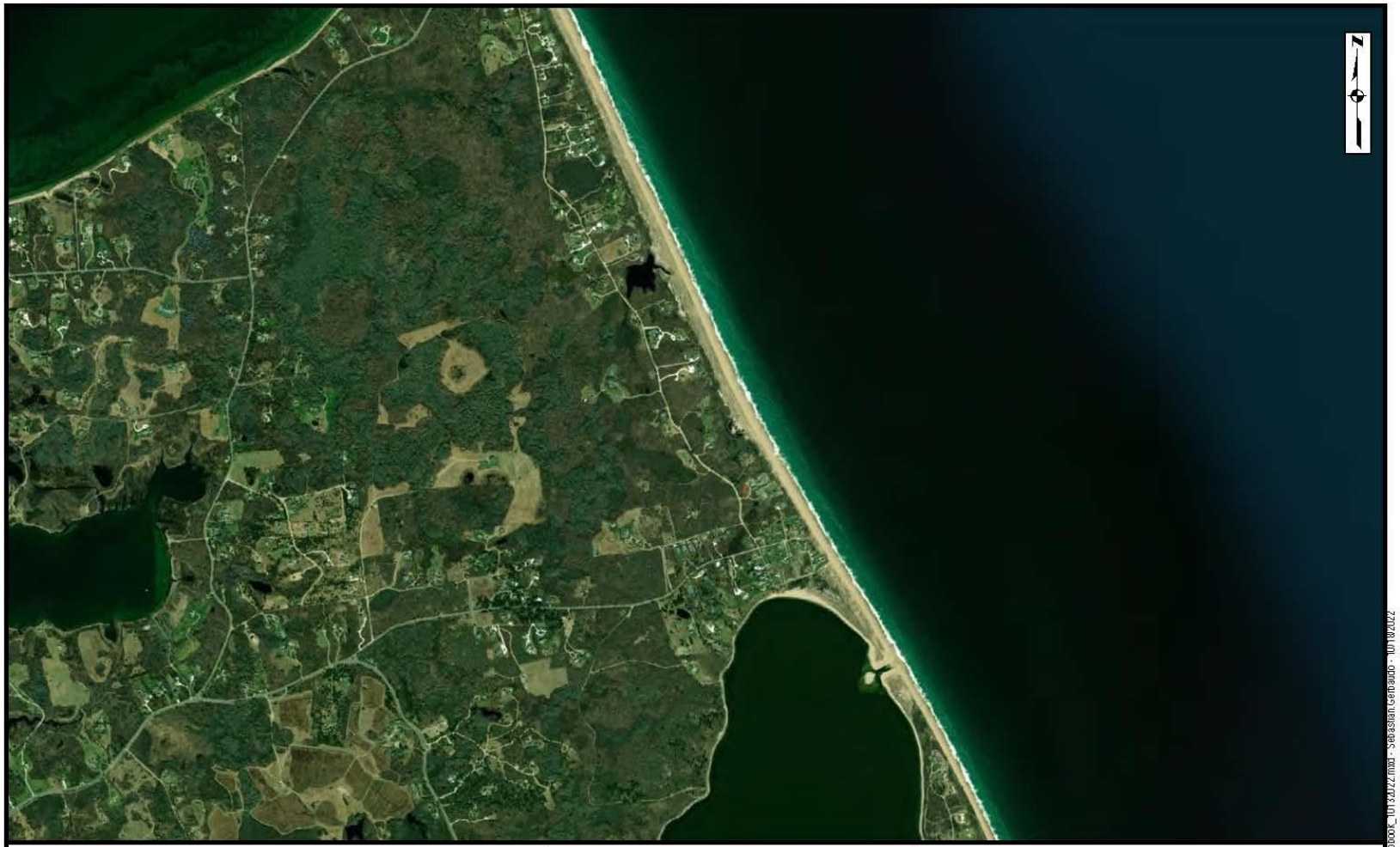
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8l

BOEM

P:\NewEngland_Wind\2022\Maps\App_A8_NAH_Mapbook_10182022.mxd - Sebastian.Gebauer - 10/18/2022


N
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
Nantucket
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC
Appendix A-8m
BOEM

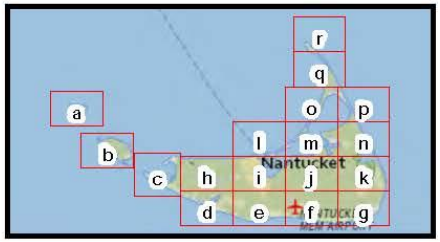


Analysis Points

Number of Visible Nacelles

High : 845

Low : 1



Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8n

BOEM

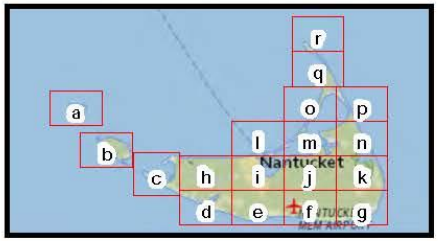
F:\New_England_Wind\2022\Maps\wp_A8_NAN_Mapbook_10132022.mxd - Sebastian.Cerbaudo - 10/18/2022

Analysis Points

Number of Visible Nacelles

High : 845

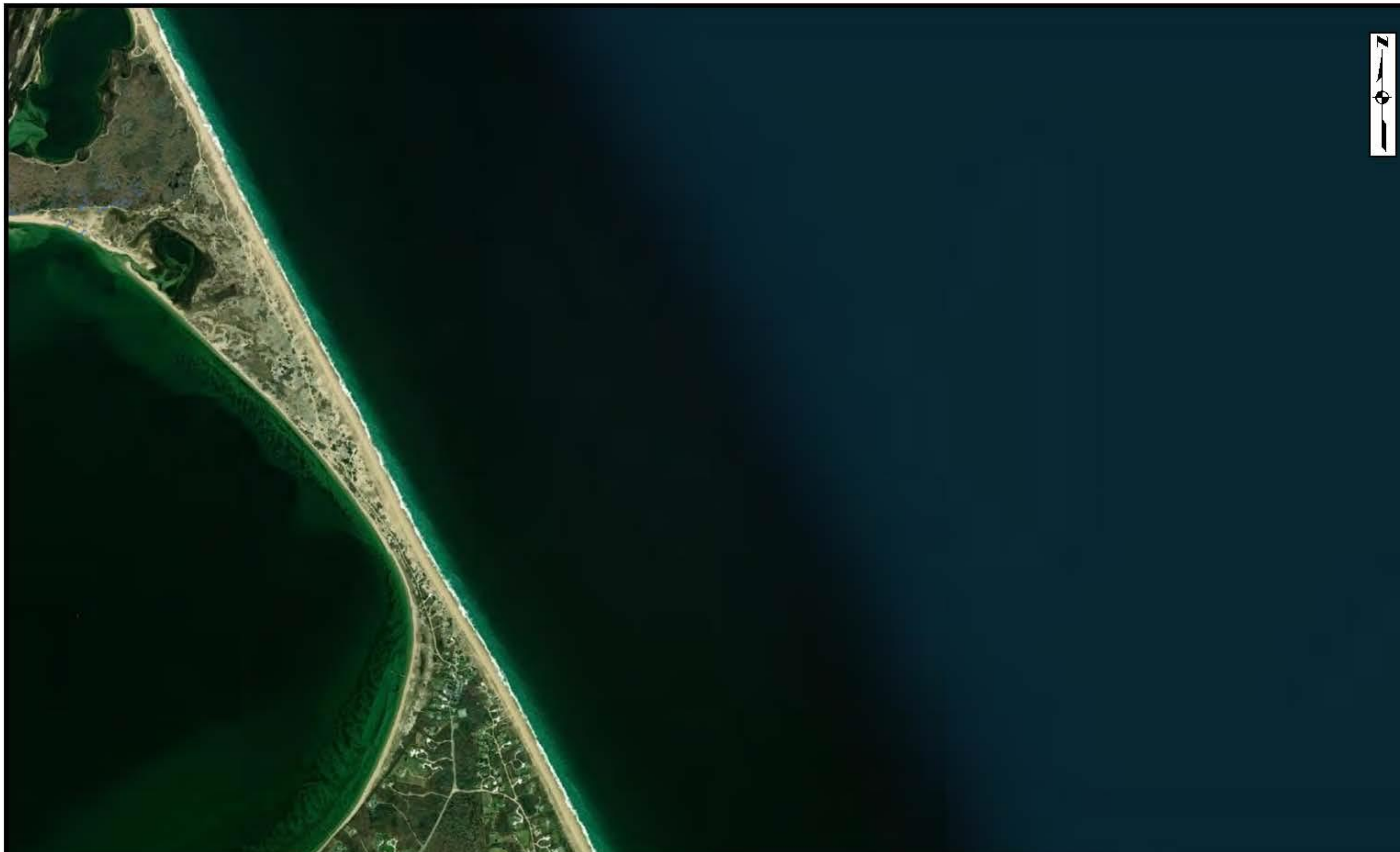
Low : 1



Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8o

BOEM

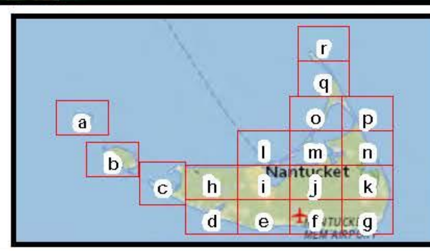


Analysis Points

Number of Visible Nacelles

High : 845

Low : 1



Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC

Appendix A-8p

BOEM


North Isthmus
N
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
a
b
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k
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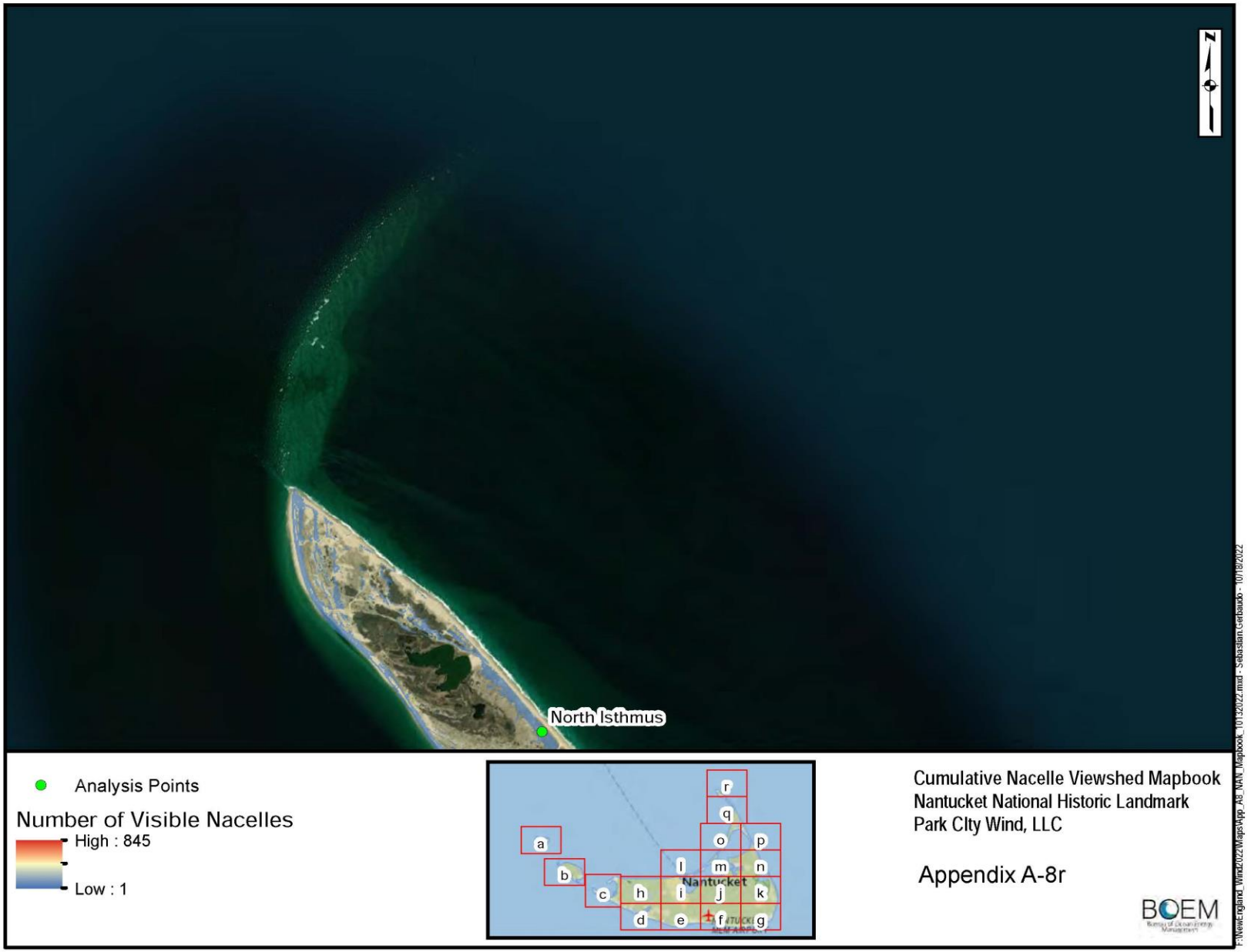
o
p
q
r
Nantucket
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Park City Wind, LLC
Appendix A-8q
BOEM



Cumulative Nacelle Viewshed Mapbook
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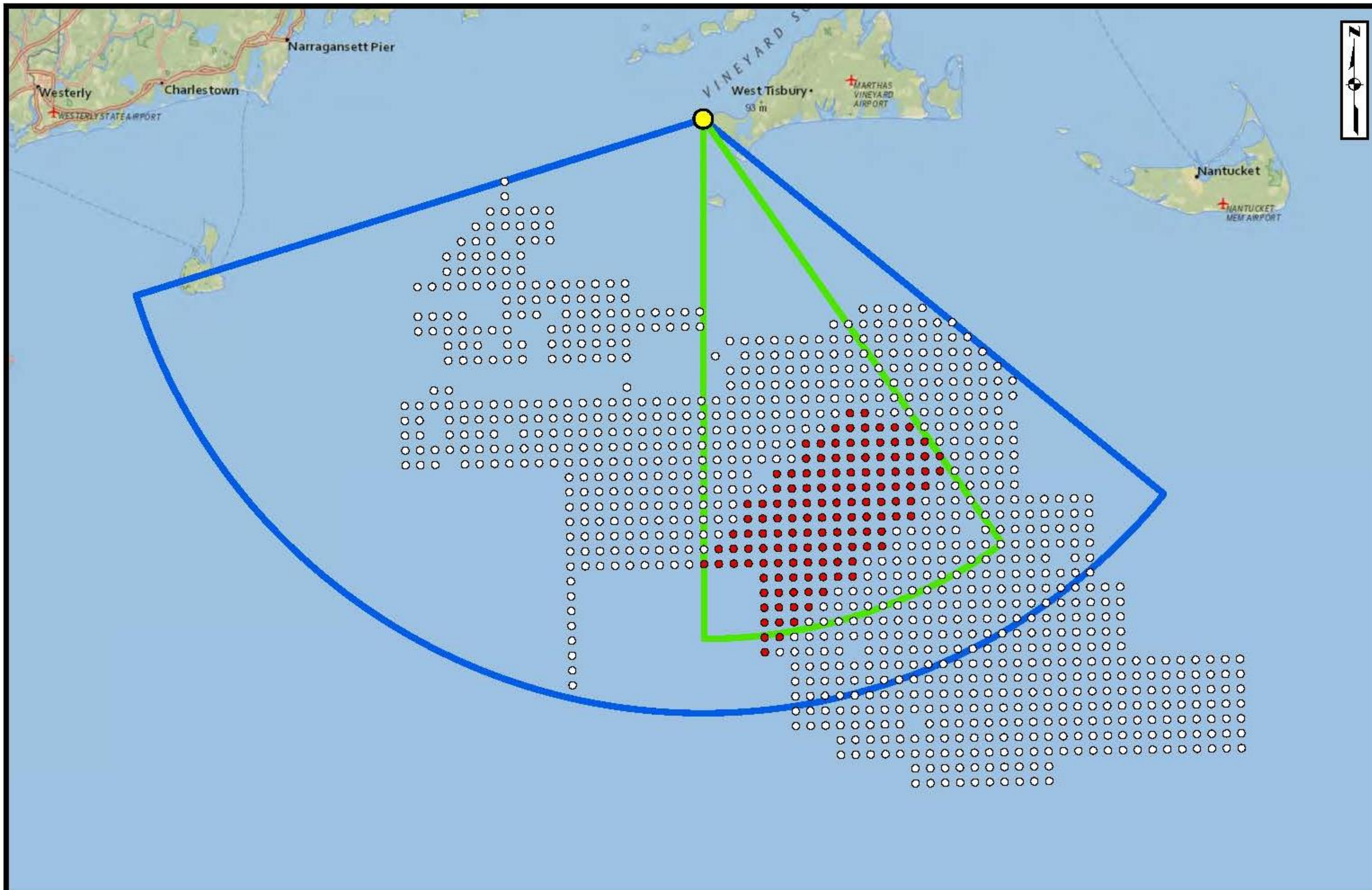
Appendix A-8r

BOEM

I:\New England_Wind\2024\Maps\App_A8_NAN_Mapbook_10132024.mxd - Sebastian.Gelbaudo - 10/18/2024

[Appendices A-9 and A-10 Redacted]

APPENDIX B: VIEW ANGLE MAPS



Angle of View for Wind Turbine Generators (WTGs)

- New England Wind WTGs: 35.06°
- All WTGs: 123.59°
- Gay Head Lighthouse
- New England Wind WTGs
- Other WTGs

0 4 8 16 Nautical Miles

NOTES:
Aerial Imagery: ESRI World Imagery
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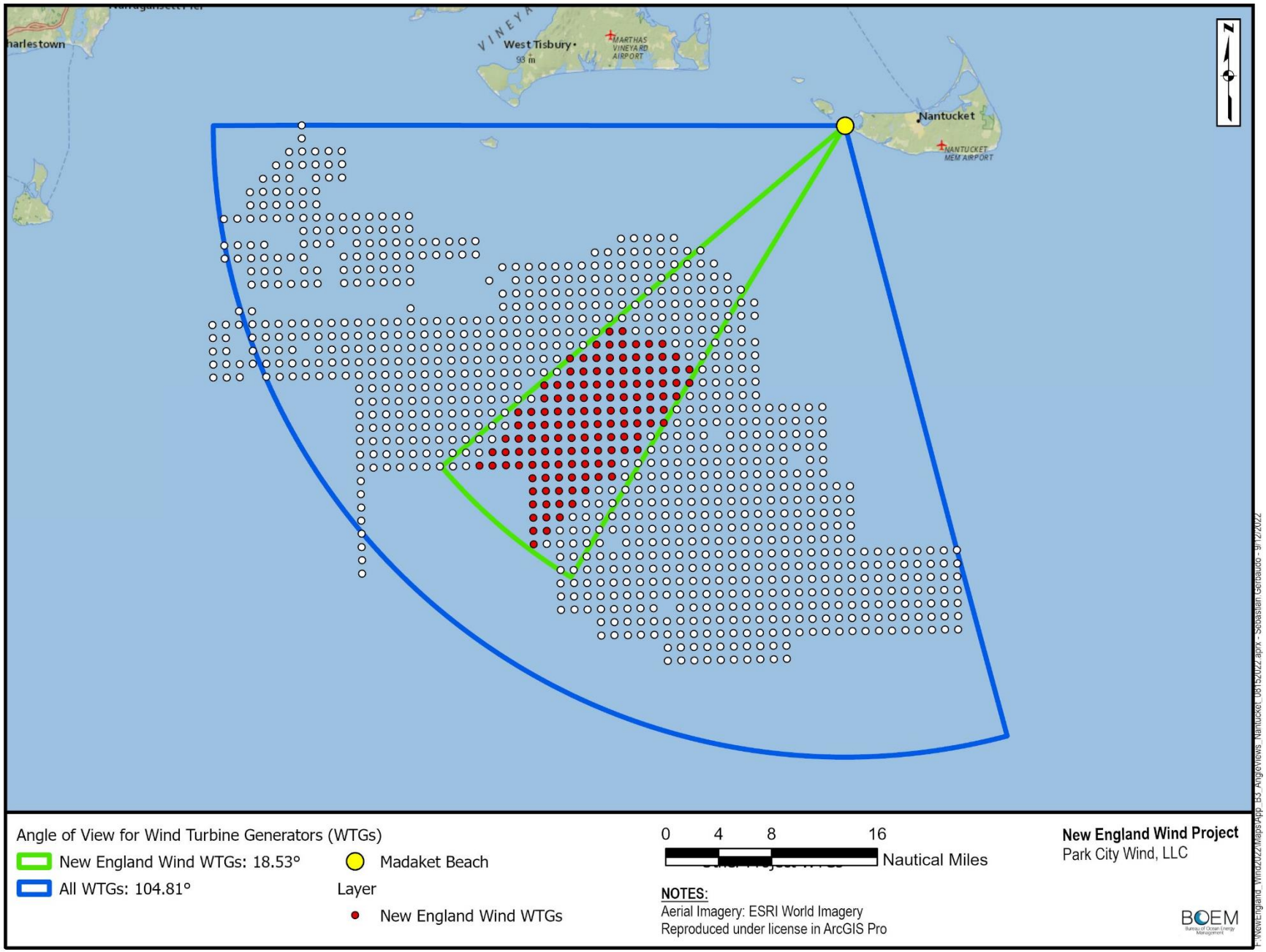
New England Wind Project
Park City Wind, LLC

Appendix B-1

BOEM

[Appendices B-2 and B-3 Redacted]


harlestown
West Tisbury
93 m
MARTHAS VINEYARD AIRPORT
Nantucket
NANTUCKET MEM AIRPORT
N
Angle of View for Wind Turbine Generators (WTGs)
New England Wind WTGs: 18.53°
All WTGs: 104.81°
Madaket Beach
Layer
New England Wind WTGs
0 4 8 16
Nautical Miles
NOTES:
Aerial Imagery: ESRI World Imagery
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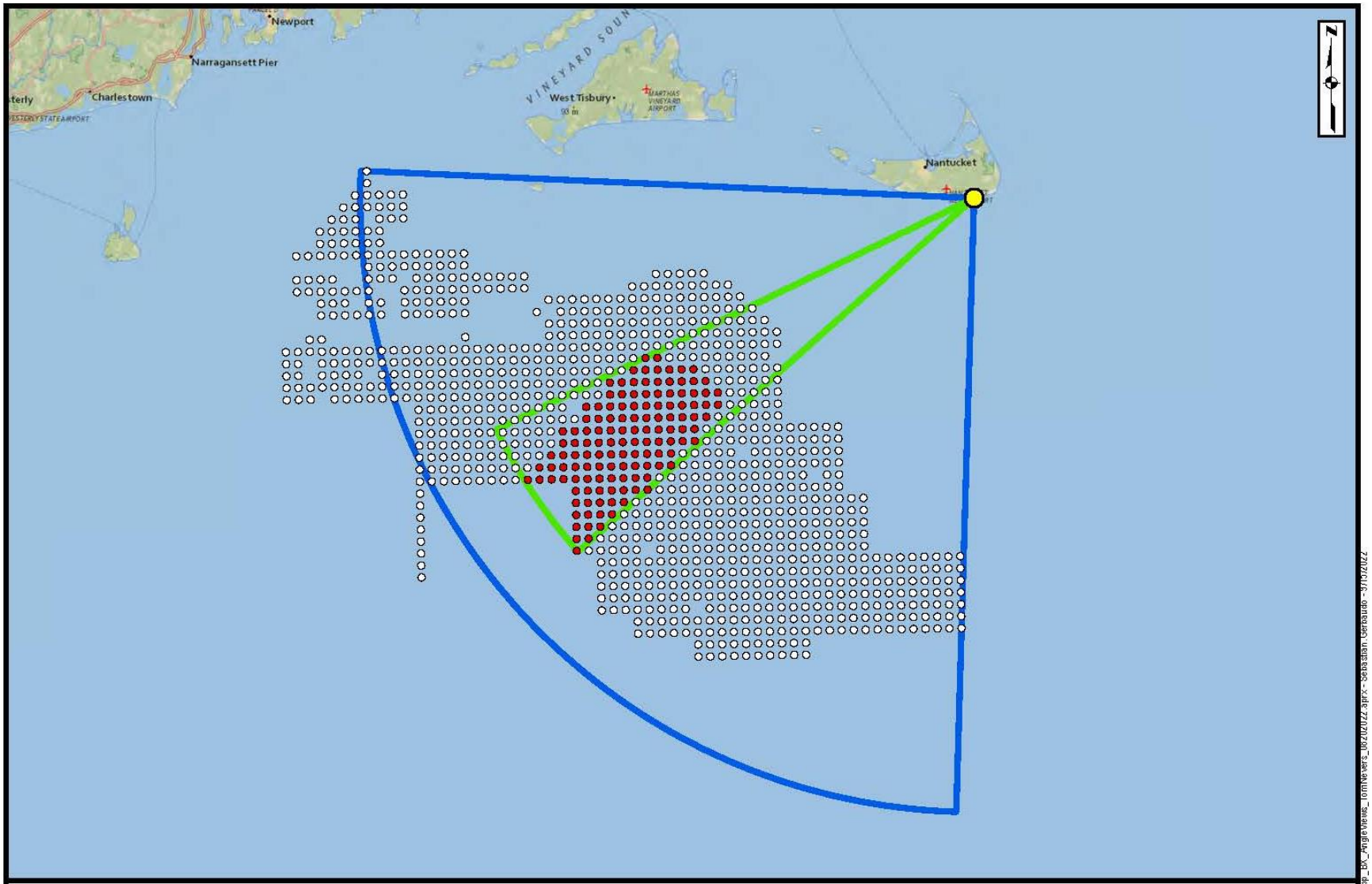
New England Wind Project
Park City Wind, LLC
BOEM
Bureau of Ocean Energy Management


Newport
Narragansett Pier
Charlestown
West Tisbury
Nantucket
N
Angle of View for Wind Turbine Generators (WTGs)
New England Wind WTGs: 15.89°
All WTGs: 90.88°
Tom Nevers Field
Layer
New England Wind WTGs
Other Project WTGs
0 5 10 20
Nautical Miles
NOTES:
Aerial Imagery: ESRI World Imagery
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New England Wind Project
Park City Wind, LLC
Appendix B-4b
BOEM

[Appendix B-5 Redacted]