Appendix I: Cumulative Historic Resource Visual Assessment (HRVEA)

Appendix I. Cumulative Historic Resources Visual Effects Assessment

Contents

List of Attachments

List of Tables

List of Figures

Abbreviations and Acronyms

ADLS	aircraft detection lighting system
APE	Area of Potential Effect
BOEM	Bureau of Ocean Energy Management
COP	Construction and Operations Plan
DEM	digital elevation model
DSM	digital surface model
FAA	Federal Aviation Administration
GSOE	Garden State Offshore Energy
HRVEA	Historic Resources Visual Effects Assessment
Lease Area	BOEM Renewable Energy Lease Area
LiDAR	light-detection and ranging
Met Tower	meteorological tower
MHT	Maryland Historical Trust
MLLW	mean lower low water
NRHP	National Register of Historic Places
OCS	outer continental shelf
OSS	offshore substation
Project	Maryland Offshore Wind Project
US Wind	US Wind, LLC
WTG	wind turbine generator

I.1 Introduction and Purpose

US Wind, LLC (US Wind) proposes to construct, operate, and eventually decommission the Maryland Offshore Wind Project (Project), which would consist of wind energy facilities generating at least up to 2,000 megawatts within Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area (Lease Area) OCS-A 0490. The Project would be offshore of Ocean City, Maryland in the Delmarva Peninsula. The Project would include a maximum of 114 wind turbine generators (WTG) and 4 offshore substations (OSS), and one meteorological (met) tower positions on foundation support structures. Up to four offshore export cables would transmit electricity from the WTGs and OSSs to an onshore export cable corridor.

The portion of the Lease Area developed by US Wind, referred to as the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS) Offshore Maryland, would occupy 80,000 acres. The Project area and other projects in the area offshore of Maryland and Delaware are depicted on Figure I-1. Figure I-2 shows the maximum dimensions of the WTGs constructed in both phases of the Project.

This Cumulative Historic Resources Visual Effects Assessment (HRVEA) for the Project is intended to assist BOEM and the Maryland Historical Trust (MHT) and Delaware Division of Historical and Cultural Affairs (in their roles for their respective State Historic Preservation Office) in their responsibilities to review the Project under Section 106 of the National Historic Preservation Act and the National Environmental Policy Act. This assessment considers the visual effects of the Project in combination with the visual effects of other offshore wind projects on historic properties within the shoreward geographic analysis area (see Section I.2.1.1).

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 (Appendix D, *Planned Activities Scenario* of the Draft EIS). In evaluating impacts on cultural resources, the planned activities scenario included in the Draft EIS for the Project (Appendix D of the Draft EIS) considers five offshore wind projects in the Maryland, Delaware, and New Jersey lease areas (Figure I-1), hereafter referred to as the cumulative lease areas (see Section I.2.1.1). Based on construction and operations plans (COP) submitted by project applicants, as well as announced electrical power offtake contracts, BOEM determined that WTGs constructed in 298 of the 438 positions within the cumulative 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 Project would consist of a maximum of 114 WTGs in 121 positions, each of which would measure up to 542 feet (165 meters) 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 938 feet (286 meters) MLLW (Figure I-2). Section I.2.1.1 includes additional assumptions about WTG characteristics for other offshore wind projects.

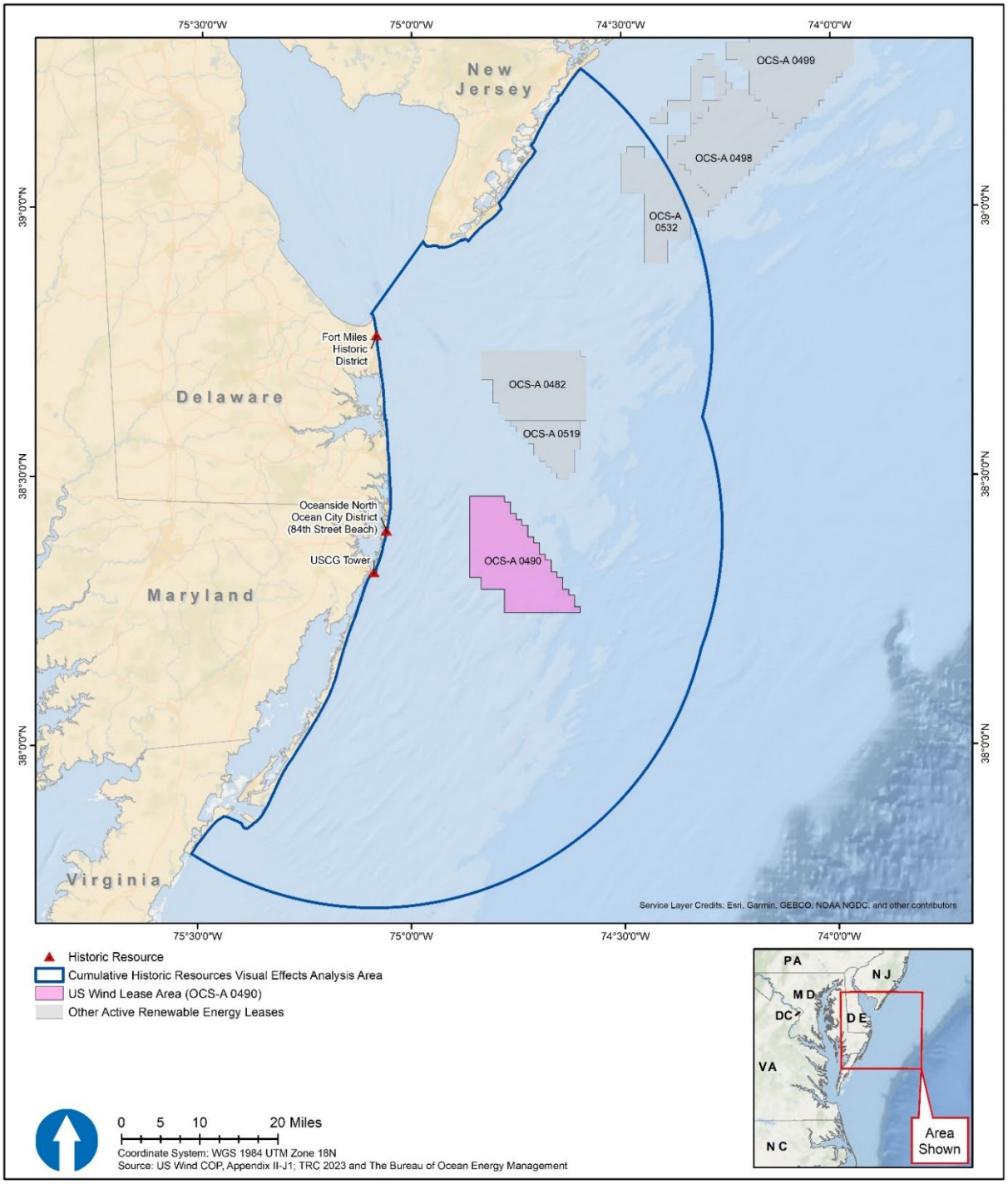


Figure I-1. Cumulative lease areas evaluated

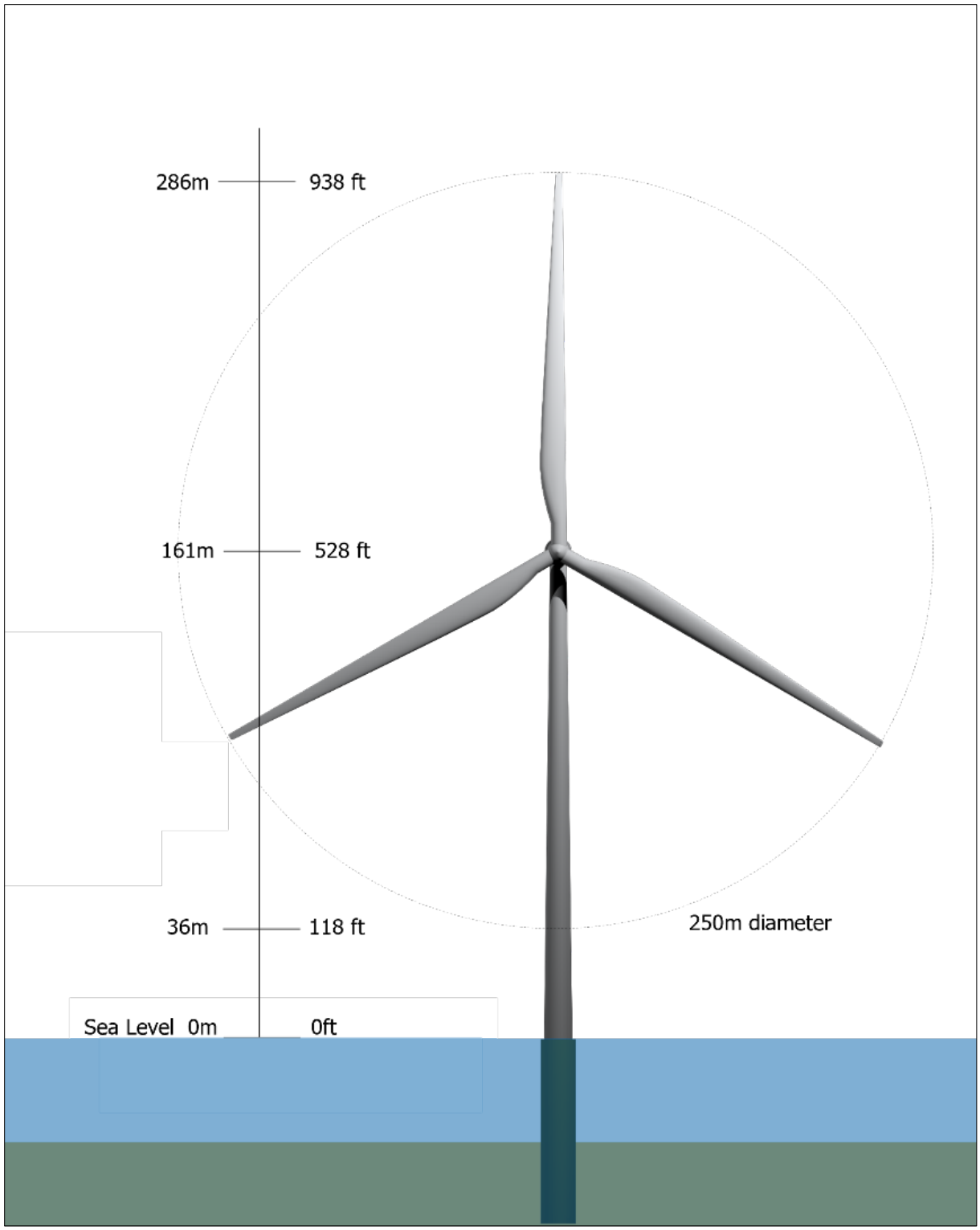


Figure I-2. US Wind Project maximum wind turbine generator size

US Wind prepared a Historic Resources Visual Effects Analysis (COP Appendix II-I3, Attachment B; R. Christopher Goodwin & Associates 2023), which determined that the Project would adversely affect three properties within the Area of Potential Effect (APE) with ocean views. This includes two properties in Maryland and one in Delaware. These properties are listed in Table I-1.

Table I-1. Historic properties within the Project Area of Potential Effect (APE)

State	SHPO ID Number	Location Name	Federal Eligibility Status	Maritime Setting	Sensitivity to Visual Effects	Potential Adverse Effect
Maryland	MIHP ID: WO-347	U.S. Coast Guard Tower	Eligible	Yes	High	Yes
Maryland	MIHP ID pending	Oceanside North Ocean City Survey District	Eligible	Yes	High	Yes
Delaware	CHRIS: 06048	Fort Miles Historic District	NRHP	Yes	High	Yes

Source: COP Ap II-I3, Attachment B, R. Christopher Goodwin & Associates 2023
CHRIS = Cultural and Historical Resources Information System; ID = identification number; MIHP = Maryland Inventory of Historic Properties

The properties include two historic district (Oceanside North Ocean City Survey District, Fort Miles Historic District), and one current U.S. Coast Guard facility (U.S. Coast Guard Tower in Ocean City). The Project's introduction of new, modern, and intrusive visual elements would not affect properties inland of oceanfront views. US Wind's assessment also determined that the scale, extent, and intensity of visual effects would be partially mitigated by environmental and atmospheric factors, as well as US Wind's voluntary actions to reduce the extent, scale, and magnitude of visual effects (COP Appendix II-I3, Attachment B; R. Christopher Goodwin & Associates 2023). US Wind's assessment also determined that the scale, extent, and intensity of visual effects would be partially mitigated by environmental and atmospheric factors, as well as US Wind's voluntary actions to reduce the extent, scale, and magnitude of visual effects (COP Appendix II-I3, Attachment B; R. Christopher Goodwin & Associates 2023).

Due to the limited number of historic properties affected and environmental and geographic mitigating factors, overall visual effects on historic properties from the Project and other offshore wind projects in the cumulative lease areas would be geographically limited, 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. As a result, construction of the 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 three cultural resources within the Project's viewshed APE.

This assessment presents an analysis of the combined visual effects of the Project and other offshore wind projects in the cumulative 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 Project.

I.2 Methods

This section summarizes the models used to evaluate cumulative visual effects of the Project and other offshore wind projects in the cumulative lease areas on historic properties, as well as the outputs of those models.

I.2.1 Models and Analysis

Models of the cumulative viewshed were developed to inform how the presence of WTGs associated with the Project and other offshore wind projects would affect views from the above-listed historic properties in Maryland and Delaware. 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 models (an initial quantitative viewshed model and a cumulative viewshed model) were prepared to quantify the total number of WTGs theoretically visible from the three historic properties that would be adversely affected by the Project (Table I-1) 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.

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

This assessment evaluates a maximum-case scenario in which portions of five offshore wind projects (including the Project and four other projects) would be potentially visible from the resources identified in Table I-1. These five projects include a total of 438 WTG positions occupied by a WTG and 12 positions occupied by an OSS. Table I-2 provides assumptions for WTG characteristics. Figure I-3 shows the locations of these structures used for this Cumulative HRVEA. 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. Although the Project would consist of 114 WTGs within the 121 available positions, US Wind's Project-specific HRVEA evaluated the effects of 121 WTGs (COP, Appendix II-J1, Section 2.2; US Wind 2023); therefore, this Cumulative HRVEA also includes 121 WTG positions for the Project.

Table I-2. Wind turbine generator capacity and height assumptions

Project (Lease Area)	Blade Tip Height, Feet (meters) MLLW [a]	Top of Nacelle Height, Feet (meters) MLLW [a]	Total WTGs Positions	Total OSS Positions
Garden State Offshore Energy (OCS-A 0482) and Skipjack Wind II (OCS-A 0519)[b]	853 (260)	506 (154)	94	2
Skipjack Wind I (OCS-1 0519)[b]	853 (260)	506 (154)	16	1
Ocean Wind 1 (OCS-A 0498)	906 (276)	525 (160)	98	4
Ocean Wind 2 (OCS-A 0532)[b]	906 (276)	525 (160)	109	1
US Wind (OCS-A 0490)	938 (286)	542 (165)	121	4
Total WTGs			438	12

MLLW = mean lower low water level; OSS = offshore substation; WTG = wind turbine generator

[a] Elevation above MLLW with the WTG 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. Blade tip and nacelle-top heights reflect BOEM assumptions based on adjacent projects or industry practices.

For this assessment, 43 miles (69 kilometers) was set as the limit for seaward views, and only WTG positions visible at this distance from the above-referenced historic properties were used for this assessment. As a result, the Atlantic Shores North (OCS-A 0549) and Atlantic Shores South (OCS-A 0499) projects are included in in the Cumulative Seascape/Landscape and Visual Impact Analysis (Appendix H of this Draft EIS) but are excluded from this evaluation due to distance. Studies of onshore and offshore visibility suggest that the extinction point for views of WTGs and other structures is much less than 43 miles (Sullivan et al. 2012, 2013). Because open ocean views are components of the setting of the three historic properties being evaluated, 43 miles is used here as an intentionally conservative outer limit for visibility.

I.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 three 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. The light-detection and ranging (LiDAR) DSM model used was the 2017 USACE NCMP Topobathy Lidar: East Coast (USACE 2017).

[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.

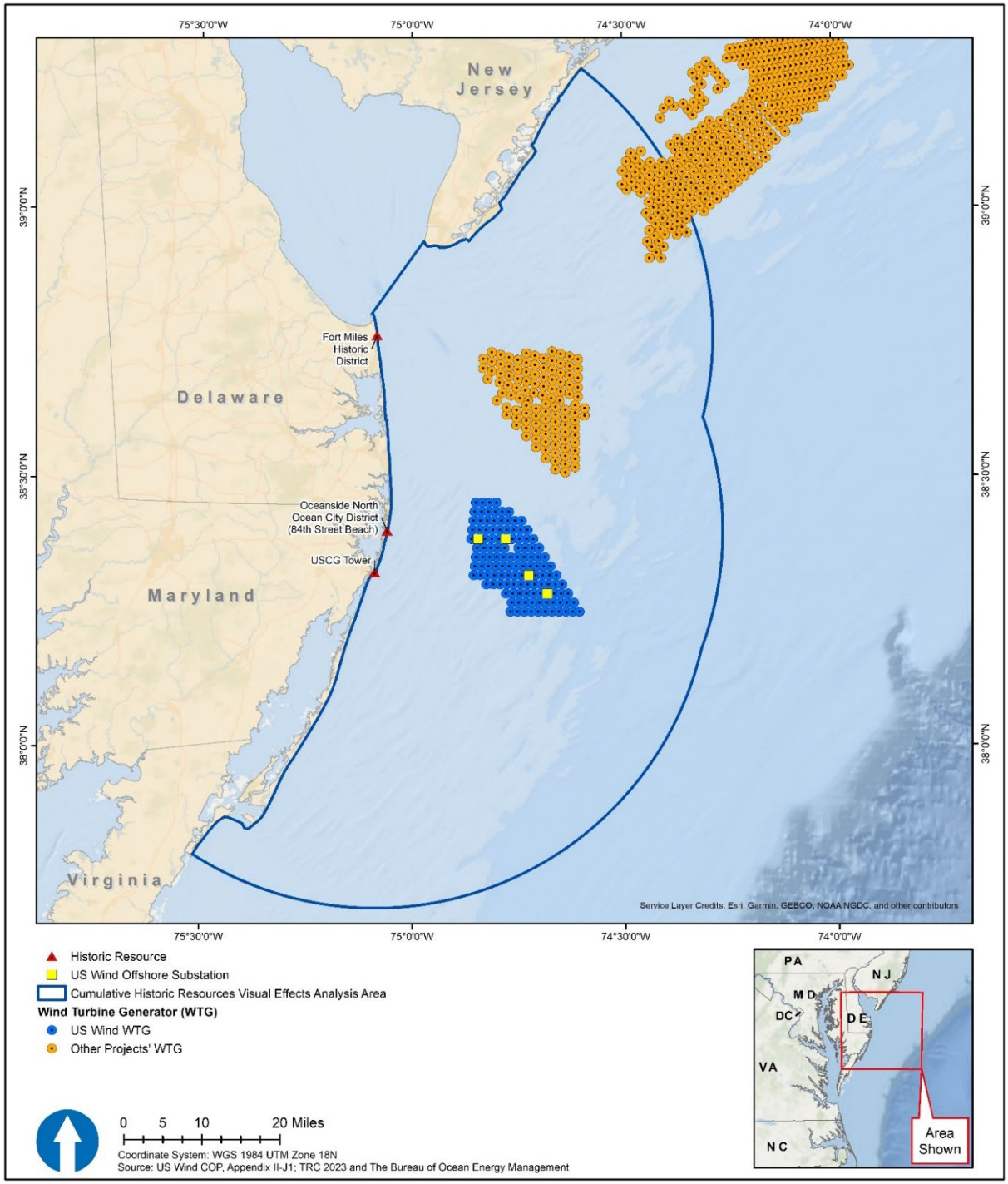


Figure I-3. Wind turbine generator layout

The WTGs from the 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 (18,288 meters) from the WTGs (open ocean areas where no WTGs are proposed). All inputs were projected using the North American Datum of 1983, UTM coordinate system for Zone 18N (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.

I.2.1.3 Step 3: Select Points for Detailed Analysis

The three historic properties (identified in Chapter 1 and described in detail in Chapter 3, Analysis) include specific structures or locations as well as districts that encompass broader areas. US Wind and BOEM identified discrete points of analysis for each resource. These points are shown in Table I-3.

Table I-3. Analysis Points

Historic Property	Analysis Point	Latitude	Longitude
U.S. Coast Guard Tower	Boardwalk adjacent to structure	38.32534409	-75.08795929
Oceanside North Ocean City Survey District	Top of berm at east end of 84th Street	38.40230179	-75.05873871
Fort Miles Historic District	Battery Herring	38.7648767	-75.08245850

Source: COP Appendix II-I3, Attachment B; R. Christopher Goodwin & Associates 2023

I.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 (1.83 meters) off the ground, which is consistent with the approximate eye level of human viewers. Neither the U.S. Coast Guard Tower nor Battery Herring (the representative viewpoint within the Fort Miles Historic District) offer designated elevated viewing positions. The berm viewpoint for the Oceanside North Ocean City Survey District was selected to provide a slightly elevated viewpoint. While elevated viewpoints are available within the Fort Miles Historic District, most of the district offers ground level views. Elevated views within the Oceanside North Ocean City Survey District are not typically open to the public; therefore, the berm viewpoint represents a typical public view within this district. Elevated private viewpoints within

[2] The complete projection identification is NAD 1983 BLM Zone 18N (US feet).

these districts would include a larger number of visible WTGs than discussed in the remainder of this analysis. The output of this second model is an Intervisibility Map (or "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. Intervisibility maps are provided in Attachment I-1.

I.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 number of WTGs (blade tips and nacelle tops) and OSS theoretically visible at each historic property. The viewshed models generated the following metrics from each analysis point listed in Table I-2:

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

The latter two metrics enabled calculation of the ratio of theoretically visible Project WTGs to all theoretically visible WTGs (including those from the Project and other offshore wind projects). Table I-4 provides these outputs for WTG blade tips (daytime visibility) and nacelle tops (nighttime visibility). 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 I-4. Wind turbine generators theoretically visible

Analysis Point	U.S. Coast Guard Tower	Oceanside North Ocean City Survey District (84th Street Beach)	Fort Miles Historic District (Battery Herring)
Number of Blade Tips Theoretically Visible, Daytime [a]			
Total	234	234	298
US Wind Project	121	121	119
Other Projects	113	113	179
Proposed Project Contribution [b]	51.7%	51.7%	39.9%
Number of Nacelle Tops Theoretically Visible, Nighttime [a]			
Total	146	231	118
US Wind Project	120	121	0
Other Projects	26	110	118
Proposed Project Contribution [b]	82.1%	52.4%	0%

WTG = wind turbine generator

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

[b] This indicates the ratio of theoretically visible Project WTG nacelle tops to all theoretically visible WTGs.

I.3 Analysis

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

I.3.1 Overview

I.3.1.1 Analysis Methodology

The primary visual effects of offshore wind development on the three 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 cumulative lease areas would introduce additional, modern, human-made structures into sea views that were uninterrupted prior to the start of offshore wind development. The Project would be part of a nearly continuous offshore wind project construction period for nine offshore wind projects between 2023 and 2030.

Although WTGs from each offshore wind project in the cumulative lease areas would differ in height, the WTGs from the 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 Project from those of other offshore wind projects visible at similar distances and viewing angles. In many cases, the additional WTGs from successive individual offshore wind projects installed during the 2023 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 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 Project WTGs versus other offshore wind project WTGs, as well as the proximity of Project or other project WTGs to the resource under typical visibility conditions.

I.3.1.2 Cumulative Visual Simulations

Panoramic simulations are tools used to inform the cumulative visual effects assessment. When viewed at the appropriate size and viewing distance specified by US Wind (COP Appendix II-J1; US Wind 2023), 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 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 26 miles (42 kilometers) and is routinely visible at distances of 21 miles (34 kilometers) or less (Sullivan et al. 2013).

US Wind prepared simulations as additional input into the COP for the Project. These include Project-specific simulations, as well as cumulative simulations showing the Project alone and in combination with other offshore wind projects. Table I-5 summarizes the visual simulations prepared by US Wind, including the historic properties represented by each simulation.

Table I-5. Summary of visual simulations

Simulation Location	Simulation Type	Historic Properties Represented	Distance/Direction from Resource
Ocean City Boardwalk	Cumulative	U.S. Coast Guard Tower	0.25 mile NE
Ocean City 84th Street Beach	Cumulative	Oceanside North Ocean City Survey District	At resource
Fort Miles Historic District	Project-specific	Fort Miles Historic District (Battery Herring)	At resource

E = east; NE = northeast; NW = northwest; S = south; SE = southeast; SW = southwest

To support the analysis, three visual resource subject matter experts reviewed the simulations and applied a visibility rating system (Sullivan et al. 2012; Table I-6) to assess the visibility of the 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 Project versus other projects but are reported and discussed as support for these conclusions.

I.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 cumulative lease areas, BOEM used four distance zones: 0 to 10 miles (0 to 19 kilometers); 10 to 20 miles (19 to 37 kilometers); and 20 to 30 miles (37 to 56 kilometers). This assessment incorporates those three distance zones and also considers visibility beyond 30 miles (56 kilometers), out to the 43 mile (69 kilometers) limit for seaward views described in Section I.2.1.1. Table I-7 summarizes the number of WTGs from the Project and other offshore wind projects in the cumulative lease areas theoretically visible from selected viewpoints at or within each of the three historic properties, and within each zone between 0 and 43 miles (0 to 69 kilometers).

I.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. Visibility in the region can occasionally be impaired by fog, precipitation, and haze. During the spring and early summer fog can be persistent, but often lift somewhat during the day, and more so near the shoreline. Visibilities are most likely to be constrained from December through June (COP Volume II, Section 2.7; US Wind 2023).

Table I-6. 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 Rating	Description
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 I-7. Number of wind turbine generators theoretically visible by distance zone

Resource and Distance Zone [a]		US Wind Project WTGs		Other Project WTGs	
	Total WTGs	Number	% of Total	Number	% of Total
U.S. Coast Guard Tower					
0 to 10 miles (0 to 19 km)	0	0	NA	0	NA
10 to 20 miles (19 to 37 km)	82	82	100%	0	0%
20 to 30 miles (37 to 56 km)	85	39	46%	46	54%
30 to 43 miles (56 to 69 km)	67	0	0%	67	100%
Total	234	121	52%	113	48%
Oceanside North Ocean City Survey District					
0 to 10 miles (0 to 19 km)	0	0	NA	0	NA
10 to 20 miles (19 to 37 km)	89	89	100%	0	0%
20 to 30 miles (37 to 56 km)	133	32	24%	101	76%
30 to 43 miles (56 to 69 km)	12	0	0%	12	100%
Total	234	121	52%	113	48%
Fort Miles Historic District					
0 to 10 miles (0 to 19 km)	0	0	NA	0	NA
10 to 20 miles (19 to 37 km)	27	0	0%	27	100%
20 to 30 miles (37 to 56 km)	113	28	25%	85	75%
30 to 43 miles (56 to 69 km)	158	91	58%	67	42%
Total	298	119	40%	179	60%

km = kilometers; NA = not applicable; WTG = wind turbine generator

I.3.1.5 Nighttime Lighting

The Project would use an aircraft detection lighting system (ADLS), which would activate the FAA-required nacelle-top warning lights only when aircraft are detected approaching the Project area. This system is anticipated to reduce the Project's use of nighttime lighting to approximately 0.1 percent of annual nighttime hours (Capitol Airspace Group 2023). 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 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 cumulative lease areas would also use ADLS. BOEM also assumes that U.S. Coast Guard warning lights would be mounted on the WTG and OSS foundations no more than 74 feet (22.55 meters) MLLW, based on the height of the Project's WTG platform.

I.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 (NPS 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.

I.3.2 U.S. Coast Guard Tower

This section describes the contributing elements of the cumulative effects on, and the assessment of integrity for, the U.S. Coast Guard Tower in Ocean City, Maryland.

I.3.2.1 Contributing Elements for National Register of Historic Places Eligibility

The U.S. Coast Guard Tower (WO-347) is a five-story, braced metal observation tower (Figure I-4) erected at the south end of Ocean City after the Ocean City Inlet was formed during a 1933 storm and is the oldest observation tower on Maryland's Atlantic coast (MHT 2019). For the purposes of the project, the resource is considered eligible under Criterion C for potential architecture significance at the local level (COP, Appendix II-I3, Attachment B; R. Christopher Goodwin & Associates 2023).

Source: COP, Appendix II-I3, Attachment B; R. Christopher Goodwin & Associates 2023

Figure I-4. U.S. Coast Guard Tower

I.3.2.2 Summary of Cumulative Effects

Table I-8 summarizes the number of WTGs from the Project and other offshore wind projects visible from the boardwalk adjacent to the U.S. Coast Guard Tower. The tower itself is not publicly accessible. Overall, 234 WTGs would be fully or partially visible from the boardwalk adjacent to the U.S. Coast Guard Tower in views toward the east-northeast, including all 121 WTG positions (52 percent of the total) from the Project. The Project's WTGs would comprise all of the WTGs visible within 20 miles (37.0 kilometers), 46 percent of all WTGs visible at 20 to 30 miles (37.0 to 56 kilometers), and none of the WTGs visible beyond 30 miles (55.6 kilometers). In clear weather, Project WTGs would occupy a substantial portion of the view from the U.S. Coast Guard Tower location. Due to distance and the view angle (see Attachment I-1), the Projects' WTGs would be substantially more noticeable to observers than the WTGs associated with the Garden State Offshore Energy (GSOE) and Skipjack I and II projects, which would be farther away and visible to the northeast. Most of the Skipjack I WTGs would be visible behind the Project's WTGs, while the Skipjack II and GSOE WTGs would be visible in a relatively narrow portion of the view to the left (northeast) of the Project. The other project WTGs would disappear from the field of view as the observer turns to the southeast.

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

Based on the information in Table I-8, US Wind's simulations (COP, Appendix II-J1, Attachment B; US Wind 2023), the intervisibility maps in Attachment I-1 and the view angle maps in Attachment I-2, WTGs from the Project would occupy a larger portion of the horizon line than those from the other projects and would be substantially closer to U.S. Coast Guard Tower. While WTGs from other projects would contribute to visual impacts on clear days by creating additional visual clutter on the northeast horizon, they would be visible less often due to distance and weather conditions.

These conclusions are supported by the cumulative visual simulation completed by US Wind from the U.S. Coast Guard Tower (COP Appendix II-J1, Attachment B; US Wind 2023). Using the visibility rating system described in Section I.3.1.2, the Project was rated a Visibility Level 5 for the clear conditions depicted in the simulation. The WTGs associated with the Project would attract strong attention, would create a notable contrast against the open ocean horizon (including blade motion, which would be plainly visible at this distance), and would occupy a significant portion of the horizon. Other projects were rated a Visibility Level 3, due to the increased distance from shore and more oblique viewing angle (compared to the presumed east-facing predominant view). The cumulative scenario (including WTGs from the Project and other projects) was rated a 5, primarily reflecting the effect of the Project's WTGs.

Overall, the undertaking would contribute approximately three-quarters of the cumulative visual effects of offshore wind projects on the U.S. Coast Guard Tower. The Project's WTGs would occupy a substantial portion of the open ocean horizon visible in 124-degree east-northeastward views from the U.S. Coast Guard Tower. WTGs associated with other projects are situated behind, adjacent to, and farther away than the Project's WTGs. The Project's WTGs would be substantially more visible than those from other Projects, especially if less than ideal viewing conditions diminish the more distant views of WTGs from other projects.

Table I-8. Factors contributing to visual effects, U.S. Coast Guard Tower

Factor	Proposed Project	Other Projects	Notes
Distance to closest WTG	12.7 mi (20.4 km)	26.1 mi (42.0 km)	The Project WTGs would be more prominent and visible more frequently due to their closer proximity and the perpendicular view angle from the shore. Some of the other project WTGs would be visible behind the Project's WTGs.
WTG distribution by distance [a]	Percent of all WTGs within: • 10–20 mi: 100% • 20–30 mi: 13.1% • 10–30 mi: 55% • 30–43 miles: 0% Total for 10–30 mi: 55%	Percent of all WTGs within: • 10–20 mi: 0% • 20–30 mi: 86.8% • 10–30 mi: 45% • 30–43 miles: 100% Total for 10–30 mi: 45%	No WTGs would be within 10 nm (12 miles) (Table I-7). WTGs from other projects would be farther from the U.S. Coast Guard Tower than the Project's WTGs.
Percent of total theoretically visible WTG blade tips and nacelles	Blade tips: 81% Nacelles: 82%	Blade tips: 19% Nacelles: 18%	See Table I-4.
Percent of 124-degree view with theoretically visible WTGs [b]	41% (51 degrees)	34% (43 degrees)	See Attachment I-2. The Project's WTGs would occupy a greater extent of the horizon line in a 124-degree view toward the east.
Percent of 180-degree view with theoretically visible WTGs [b c]	28% of horizon line (51 degrees)	24% of horizon line (43 degrees)	No WTGs would be visible on 31% of horizon line in a 180-degree south-facing view. WTGs from the Project and other projects would have minimal overlap.

mi = miles; km = kilometers; WTG = wind turbine generator

[a] This includes the Project's 121 WTG positions and 199 WTGs from other projects within 43 miles (46 miles) of this viewpoint.

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

[c] 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).

I.3.2.3 Assessment of Integrity

The historic setting of the U.S. Coast Guard Tower on land has been affected by the construction of roads, modern utilities, private residences, and limited commercial properties; however, the ocean view is relatively unencumbered. The location of the tower at the tip of the peninsula allows unobstructed or partially obstructed views of the ocean horizon. Although the tower is not publicly accessible and the analysis above reflects views from the adjacent boardwalk, the elevated position of original U.S. Coast Guard users of the tower offered an expansive view of the open ocean and shoreline. Those views are considered a part of the historic setting for the tower and contributes to its feeling and association. The introduction of elements not historically associated with the historic view from the property—specifically WTGs from the Project or other offshore wind projects—diminishes the characteristics that convey the significance of the property but account for only a portion of the integrity of the property with respect to those characteristics. Views to and from the U.S. Coast Guard Tower location 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 visible presence of the Project and other offshore wind

projects. At night, ADLS would greatly limit the amount of time the nacelle lights from the Project and other offshore wind projects would be visible. In addition, the Project and other projects would have no effect on the integrity of the property with respect to location, design, or workmanship.

Undeveloped ocean views are a qualifying characteristic of historic setting of the U.S. Coast Guard Tower. In particular, the ocean views relate directly to the function of the tower 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 the tower. BOEM (Appendix J, *Determination of Effect for NHPA Section 106 Consultation* of the Draft EIS) determined that the direct adverse visual effect of the Project on the U.S. Coast Guard Tower would not diminish the integrity of the property to the extent that it would disqualify it for NRHP eligibility. Although the cumulative effect of the other offshore wind projects would further adversely affect the setting of the tower, this effect would not increase proportionately with the number of theoretically visible WTGs and would be moderated by the similar characteristics of the WTGs, the increased distance from the property, and environmental and meteorological conditions that limit visibility. While the 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 tower, these projects would not diminish the integrity of this resource to the extent that it would disqualify the U.S. Coast Guard Tower from NRHP eligibility.

I.3.3 Oceanside North Ocean City Survey District

This section describes the contributing elements of the cumulative effects on, and the assessment of integrity for, the Oceanside North Ocean City Survey District.

I.3.3.1 Contributing Elements for National Register of Historic Places Eligibility

The Oceanside North Ocean City Survey District (MIHP Number Pending) is a district of twentieth century residential, recreational lodging, and commercial buildings with a period of significance from 1900 to 1989 (see Figure I-5). The district is representative of twentieth century development common to seasonal communities along the coast with intact early-twentieth century summer cottages, multi-unit condominiums, mid-twentieth century motels, and mid- to late-twentieth century high-rise hotels. The Oceanside North Ocean City Survey District is recommended eligible for NRHP listing pending MHT concurrence (COP, Appendix II-I3 Attachment B; R. Christopher Goodwin & Associates 2023).

I.3.3.2 Summary of Cumulative Effects

Table I-9 summarizes the number of WTGs from the Project and other offshore wind projects visible from the 84th Street Beach location in the Oceanside North Ocean City Survey District Overall, 234 WTGs would be fully or partially visible in views toward the east, including all 121 WTG positions (52 percent of the total) from the Project. The Project's WTGs would comprise all of the WTGs visible within 20 miles (37.0 kilometers), 24 percent of all WTGs visible at 20 to 30 miles (37.0 to 56 kilometers), and none of the WTGs visible beyond 30 miles (55.6 kilometers). In clear weather, Project WTGs would occupy a substantial portion of the view from the 84th Street Beach location. Due to distance and the view angle (see Attachment I-2), the Projects' WTGs would be substantially more noticeable to observers than the WTGs associated with the GSOE and Skipjack I and II projects, which would be farther away and visible to the northeast. The Skipjack I and II and GSOE WTGs would be visible in a relatively narrow portion of the view to the left (northeast) of the Project. The other project WTGs would disappear from the field of view as the observer turns to the southeast.

Figure I-5. Oceanside North Ocean City Survey District
Source: COP, Appendix II-I3, Attachment B; R. Christopher Goodwin & Associates 2023

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

Based on the information in Table I-9, US Wind's simulations (COP, Appendix II-J1, Attachment B; US Wind 2023), the intervisibility maps in Attachment I-1 and the view angle maps in Attachment I-2, WTGs from the Project would occupy a larger portion of the horizon line than those from the other projects and would be substantially closer to Oceanside North Ocean City Survey District. While the WTGs from other projects would contribute to visual impacts on clear days by creating additional visual clutter on the northeast horizon, they would be visible less often due to distance and weather conditions.

These conclusions are supported by the cumulative visual simulation completed by US Wind from Oceanside North Ocean City Survey District (COP Appendix II-J1, Attachment B; US Wind 2023). Using the visibility rating system described in Section I.3.1.2, the Project was rated a Visibility Level 5 for clear conditions. The WTGs associated with the Project would attract strong attention, would create a notable contrast against the open ocean horizon (including blade motion, which would be plainly visible at this distance), and would occupy a significant portion of the horizon. Other projects were rated a Visibility Level 3, due to the increased distance from shore and more oblique viewing angle (compared to the presumed east-facing predominant view). The cumulative scenario (including WTGs from the Project and other projects) was rated a 5, primarily reflecting the effect of the Project's WTGs.

Table I-9. Factors contributing to visual effects, Oceanside North Ocean City Survey District

Factor	'Project	Other Projects	Notes
Distance to closest WTG	10.8 mi (17.4 km)	21.4 mi (34.4 km)	The Project WTGs would be more prominent and visible more frequently due to their closer proximity and the perpendicular view angle from shore.
WTG distribution by distance [a]	Percent of all WTGs within: • 10–20 mi: 87.5% • 20–30 mi: 10.9% • 10–30 mi: 50.8% • 30–43 miles: 0% Total for 10–30 mi: 50.9%	Percent of all WTGs within: • 10–20 mi: 12.5% • 20–30 mi: 89% • 10–30 mi: 49.1% • 30–43 miles: 100% Total for 10–30 mi: 49.1%	WTGs from other projects would be farther from the Oceanside North Ocean City Survey District than the Project's WTGs.
Percent of total theoretically visible WTG blade tips and nacelles	Blade tips: 52% Nacelles: 52%	Blade tips: 48% Nacelles: 48%	See Table I-4.
Percent of 124-degree view with theoretically visible WTGs [b]	41% (51 degrees)	28% (35 degrees)	See Attachment I-2. The Project's WTGs would occupy a greater extent of the horizon line in a 124-degree view toward the east-northeast.
Percent of 180-degree view with theoretically visible WTGs [b c]	28% of horizon line (51 degrees)	20% of horizon line (35 degrees)	No WTGs would be visible on 48% of horizon line in a 180-degree south-facing view.

mi = miles; km = kilometers; WTG = wind turbine generator

[a] This includes the Project's 121 WTG positions and 199 WTGs from other projects within 43 miles (46 miles) of this viewpoint.

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

[c] 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).

Overall, the undertaking would contribute approximately three-quarters of the cumulative visual effects of offshore wind projects on the Oceanside North Ocean City Survey District. The Project's WTGs would occupy a substantial portion of the open ocean horizon visible in 124-degree east-northeastward views from the Oceanside North Ocean City Survey District. WTGs associated with other projects are situated behind, adjacent to, and farther away than the Project's WTGs. The Project's WTGs would be substantially more visible than those from other Projects, especially if less than ideal viewing conditions diminish the more distant views of WTGs from other projects.

I.3.3.3 Assessment of Integrity

The historic setting of the Oceanside North Ocean City Survey District on land has been affected by the construction of roads, modern utilities, private residences, and commercial properties; however, the ocean view is relatively unencumbered. The location of the Oceanside North Ocean City Survey District offers relatively wide ocean views. Those views are considered a part of the historic setting for the district and contributes to its feeling and association. The introduction of elements not historically associated with the historic view from the district—specifically WTGs from the 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 Oceanside North Ocean City Survey District during the day would retain sufficient integrity of setting that the properties can still be appreciated and understood in their historic context, even with the visible presence of WTGs from the Project and other offshore wind projects. At night, ADLS would greatly limit the amount of time the nacelle lights from the Project and other offshore wind projects would be visible. In addition, the Project and other projects would have no effect on the integrity of the properties with respect to location, design, or workmanship.

Unobstructed ocean views are a qualifying characteristic of historic setting of the Oceanside North Ocean City Survey District. In particular, the ocean views and access to the Atlantic Ocean, relate directly to 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 the properties. BOEM (Appendix J, *Determination of Effect for NHPA Section 106 Consultation* of the Draft EIS) determined that the direct adverse visual effect of the Project on the Oceanside North Ocean City Survey District 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 properties, 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 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 properties, these projects would not diminish the integrity of these resources to the extent that it would disqualify the Oceanside North Ocean City Survey District from NRHP eligibility.

I.3.4 Fort Miles Historic District

This section describes the contributing elements of the cumulative effects on, and the assessment of integrity for, the Fort Miles Historic District.

I.3.4.1 Contributing Elements for National Register of Historic Places Eligibility

The Fort Miles Historic District is a former Army installation that now operates as a historical area at Cape Henlopen State Park in Lewes, Delaware (Figure I-6). The installation was constructed between 1938 and 1941 with the primary purpose to defend the Delaware Bay and protect domestic shipping between Cape May and Cape Henlopen. The historic district consists of 51 contributing buildings and 9 structures over approximately 1,165-acres. Fort Miles is exemplary of a mid-twentieth century military landscape consisting of defense and support buildings and structures. These include resources such as batteries, gun emplacements, fire control towers, a parade ground, and road layout, as well as examples of support resources such as storage buildings, barracks, and mess halls. The historic district was listed in the NRHP in 2004 under Criterion A for its association with the broad patterns of the nation's military history and Criterion C for its distinctive design and materials (COP, Appendix II-I3, Attachment B; R. Christopher Goodwin & Associates 2023). The Fort Miles Historic District represents national significant trends in federal coastal defense policy, military landscape and post planning, and standardized military architecture.

US Wind's assessment of the visual effects of the Project on the Fort Miles Historic District found that that the Project would adversely affect the maritime setting of the Fort Miles Historic District and its viewshed through the introduction of new elements out of character with the historic setting, feeling, and association, thereby diminishing its integrity under Criterion C.

Figure I-6. Fort Miles Historic District

I.3.4.2 Summary of Cumulative Effects

Table I-10 summarizes the number of WTGs from the Project and other offshore wind projects visible from the Battery Herring location within the Fort Miles Historic District. Overall, 298 WTGs would be fully or partially visible in views toward the east, including 119 WTGs (40 percent of the total) from the Project. The Project's WTGs would comprise none of the WTGs visible within 20 miles (37.0 kilometers), 25 percent of all WTGs visible at 20 to 30 miles (37 to 56 kilometers), and 58 percent of all WTGs visible beyond 30 miles (56 kilometers). In clear weather, Project WTGs would be visible in a relatively small portion of the southeast-facing view from Battery Herring and other coastal portions of the Fort Miles Historic District. Due to distance and the view angle (see Attachment I-1), the Project's WTGs would be less noticeable to observers than WTGs associated with the GSOE and Skipjack I and II projects, which would be closer and visible more directly to the east (i.e., the assumed prevailing direction of most land-based ocean views). The Project WTGs would disappear from the field of view as the observer turns to the north.

Table I-10. Factors contributing to visual effects, Fort Miles Historic District

Factor	US Wind Project	Other Projects	Notes
Distance to closest WTG	24.9 miles (40.0 km)	13.9 miles (22.4 km)	Other project WTGs would be more prominent and visible more frequently due to their closer proximity.

Factor	US Wind Project	Other Projects	Notes
WTG distribution by distance [a]	Percent of all WTGs within: • 10–20 mi: 0% • 20–30 mi: 25% • 30–43 mi: 58% Total for 10–30 mi: 20%	Percent of all WTGs within: • 10–20 mi: 100% • 20–30 mi: 75% • 30–43 mi: 42% Total for 10–30 mi: 80%	No WTGs would be within 10 mi (16 km) (Table I-7). WTGs from other projects would be located closer to the Fort Miles Historic District than the Project's WTGs.
Percent of total theoretically visible WTG blade tips and nacelles	Blade tips: 37% Nacelles: 0%	Blade tips: 63% Nacelles: 100%	See Table I-2.
Percent of 124-degree view with theoretically visible WTGs [b]	13% (16 degrees)	72% (58 degrees)	See Attachment I-2. Other project WTGs would occupy a greater extent of the horizon line in a 124-degree view toward the southeast.
Percent of 180-degree view with theoretically visible WTGs [b c]	9% of horizon line (16 degrees)	40% of horizon line (58 degrees)	No WTGs would be visible on 42% of horizon line in a 180-degree east-facing view.

mi = miles; km = kilometers; WTG = wind turbine generator

[a] This includes the Project's 121 WTG positions and 199 WTGs from other projects within 43 miles (46 miles) of this viewpoint.

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

[c] 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).

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

Based on the information in Table I-10, US Wind's simulations (COP, Appendix II-J1, Attachment B; US Wind 2023), the intervisibility maps in Attachment I-1 and the view angle maps in Attachment I-2, WTGs from other projects would occupy a larger portion of the horizon line than those from the Project and would be substantially closer to Battery Herring and other portions of the Fort Miles Historic District. While the Project's 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 projects' WTGs due to distance.

These conclusions are supported by the cumulative visual simulation completed by US Wind from the Battery Herring point of the Fort Miles Historic District (COP Appendix II-J1, Attachment B; US Wind 2023). This simulation shows a view that would be similar to southeastward views from other points within the historic district. Using the visibility rating system described in Section I.3.1.2, the Project was rated a Visibility Level 3 for the clear conditions depicted in the simulation. The WTGs associated with the Project would be easily detectable to an observer scanning the horizon line to the southeast but small. Other projects and the cumulative scenario were both rated a Visibility Level 4, due primarily to the closer proximity to shore of the GSOE and Skipjack II projects. Other project WTGs are located as close as 13 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.

Overall, the undertaking would contribute approximately one-quarter of the cumulative visual effects of offshore wind projects on the Fort Miles Historic District. In summary, other projects' WTGs would occupy the majority of the horizon line, and all of the open ocean horizon visible in 124-degree

southeastward views from the Fort Miles Historic District. WTGs associated with other projects are situated in front of the Project's WTGs. While the Project's WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the south-southeast horizon, they would be visible less often due to weather conditions, and less visually prominent than other projects' WTGs due to distance.

I.3.4.3 Assessment of Integrity

The historic setting of Fort Miles Historic District on land reflects a high level of physical integrity, particularly for a fort of the World War II Period. However, there has been some loss of resources from various points of development, including the temporary construction during its initial development period. The Fort was strategically placed at Cape Henlopen for views over the Atlantic Ocean and Delaware Bay and now situated within the Cape Henlopen State Park. It retains its historic boundaries and was not significantly altered by later use (Rose 2004). The ocean view is relatively unencumbered. The elevated position and location of the batteries and fire control towers along the eastern shore allow unobstructed or partially obstructed views of the ocean horizon across a wide area of the viewshed. Those views are considered a part of the historic setting for the district and contributes to their feeling and association. The introduction of elements not historically associated with the historic view from the district—specifically WTGs from the 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 Fort Miles Historic District during the day would retain sufficient integrity of setting that the historic district can still be appreciated and understood in its historic context, even with the Project and other offshore wind projects. At night, ADLS would greatly limit the amount of time the nacelle lights from the Project and other offshore wind projects would be visible. In addition, the 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 Fort Miles Historic District. In particular, the ocean views allowed the military to detect and react toward enemy submarines and relate directly to the function of the military post. 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 the historic district. BOEM (Appendix J, *Determination of Effect for NHPA Section 106 Consultation* of the Draft EIS) determined that the direct adverse visual effect of the Project on the Fort Miles Historic District 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 historic district, 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 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 historic district resources, these projects would not diminish the integrity of these resources to the extent that it would disqualify the Fort Miles Historic District from NRHP eligibility.

I.4 Conclusion

The Cumulative Historic Resources Visual Effects Assessment for the Project was conducted using cumulative viewshed models to help inform how the presence of WTGs associated with the Project and other offshore wind projects would affect three historic properties in Maryland and Delaware.

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 Project or other offshore wind projects in the cumulative lease areas, along with other factors such as the percent of horizon line occupied by the 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 I.3.1.6).

The proportion of effect from the Project and the other offshore wind projects varied among the three historic properties. Overall, the Project would contribute approximately three-quarters of the cumulative adverse effects on the U.S. Coast Guard Tower in Ocean City and the Oceanside North Ocean City Survey District and approximately one-quarter of the cumulative adverse effects from the Fort Miles Historic District. None of the projects would be within 10 miles (16 kilometers) of any of these historic properties. In views from the two Maryland resources, the Project's WTGs would be prominently visible in front of and adjacent to WTGs from other projects. In views from the Fort Miles Historic District, the Project's WTGs would be visible adjacent to and substantially farther away than WTGs from other projects.

The cumulative effects of the Project and other offshore wind projects would adversely affect the setting of the historic properties; 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 Project and other offshore wind projects in the cumulative 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.

I.5 References

Capitol Airspace Group. 2023. US Wind Offshore Wind Project Aircraft Detection Lighting System (ADLS).

Brunner, F. K. 1984. Geodetic Refraction Effects of Electromagnetic Wave Propagation Through the Atmosphere. Springer, Berlin.

FAA (Federal Aviation Administration). 2020. *Obstruction Marking and Lighting. Advisory Circular AC70/7460-M*. U.S. Department of Transportation. Effective November 16, 2020.

MHT (Maryland Historical Trust). 2019. WO-347 U.S. Coast Guard Tower. Updated November 18, 2019. Accessed July 29, 2023. Retrieved from: https://mht.maryland.gov/secure/Medusa/PDF/Worcester/WO-347.pdf .

NPS (National Park Service). 1995. "How to Apply the National Register Criteria for Evaluation." National Register Bulletin. Revised for internet, 1995. Accessed: August 20, 2022. Retrieved from: https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf .

R. Christopher Goodwin & Associates, Inc. 2023. Maryland Offshore Wind Project Attachment B Offshore Project Components Historic Resources Visual Effects Analysis. Prepared for U.S. Wind, Inc.

Rose, Elizabeth. 2004. Fort Miles Historic District. National Register of Historic Places Nomination Form. Delaware Department of Natural Resources and Environmental Control. On file National Register of Historic Places, Washington D.C.

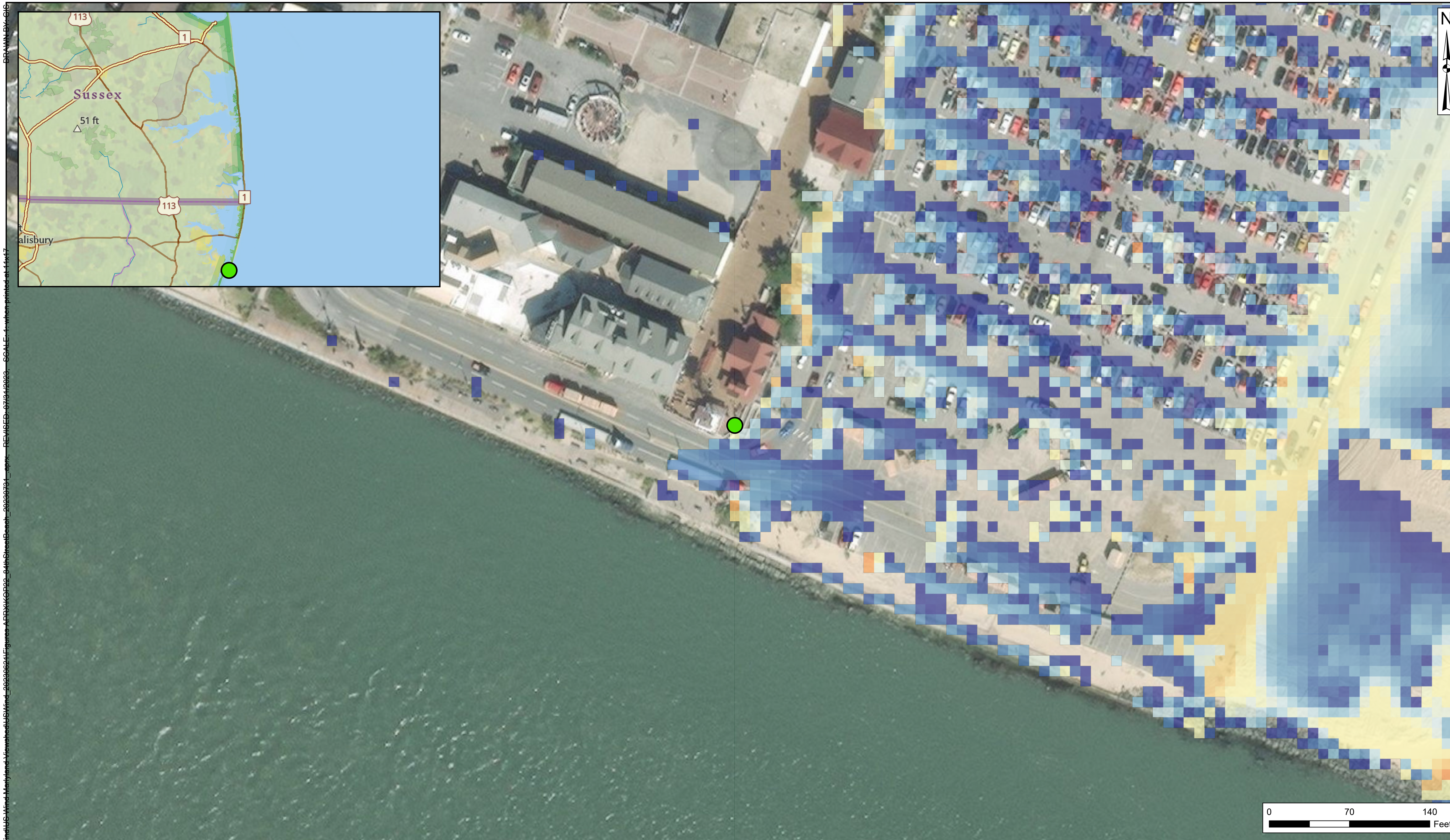
Sullivan, R.G., L.B. Kirchler, T. Lahti, S. Roché, K. Beckman, B. Cantwell, and P. Richmond. 2012. "Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes." In: *Proceedings, National Association of Environmental Professionals*, 37th Annual Conference, May 21–24, 2012, Portland, OR.

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.

US Wind. 2023. Construction and Operations Plan: Maryland Offshore Wind Project. July 2023. TRC Companies. Waltham (MA). 2 vols + appendices. https://www.boem.gov/renewable-energy/state-activities/us-wind-construction-and-operations-plan.

USACE (U.S. Army Corps of Engineers). 2017. 2017 USACE NCMP Topobathy Lidar DEM: East Coast (NY, NJ, DE, MD, VA, NC, SC, GA). Accessed July 2023. Retrieved from: https://www.fisheries.noaa.gov/inport/item/52446.

Attachment I-1. Intervisibility Maps



Analysis Point

Number of Visible WTG Blades

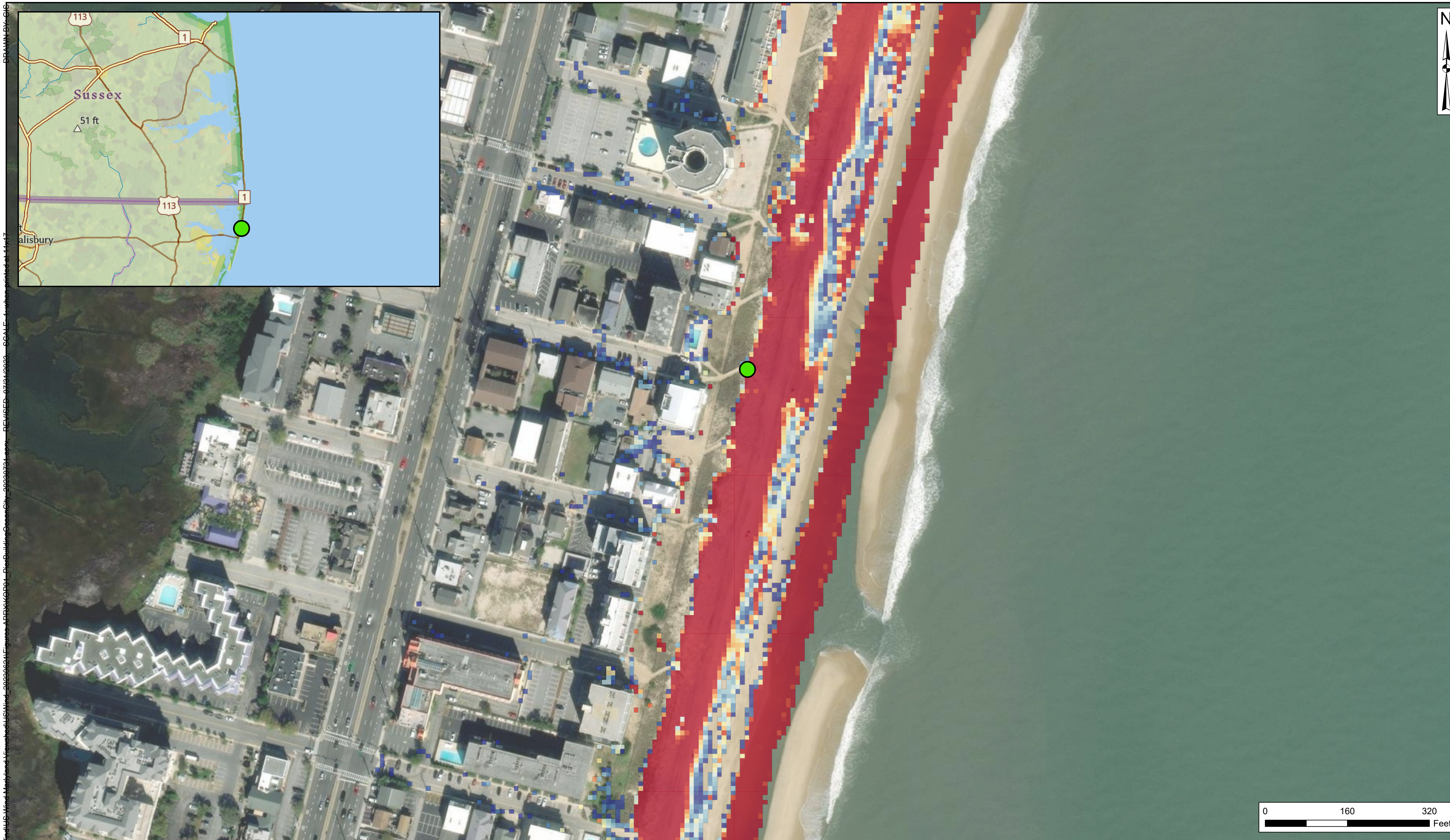
231

1

Cumulative WTG Blade Viewshed
US Coast Guard Tower, Ocean City
US Wind

Notes: Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS Pro

Source: Esri - World Topoographic Map; NAD 1983 BLM Zone 18N



Analysis Point

Number of WTG Visible Blades

231

1

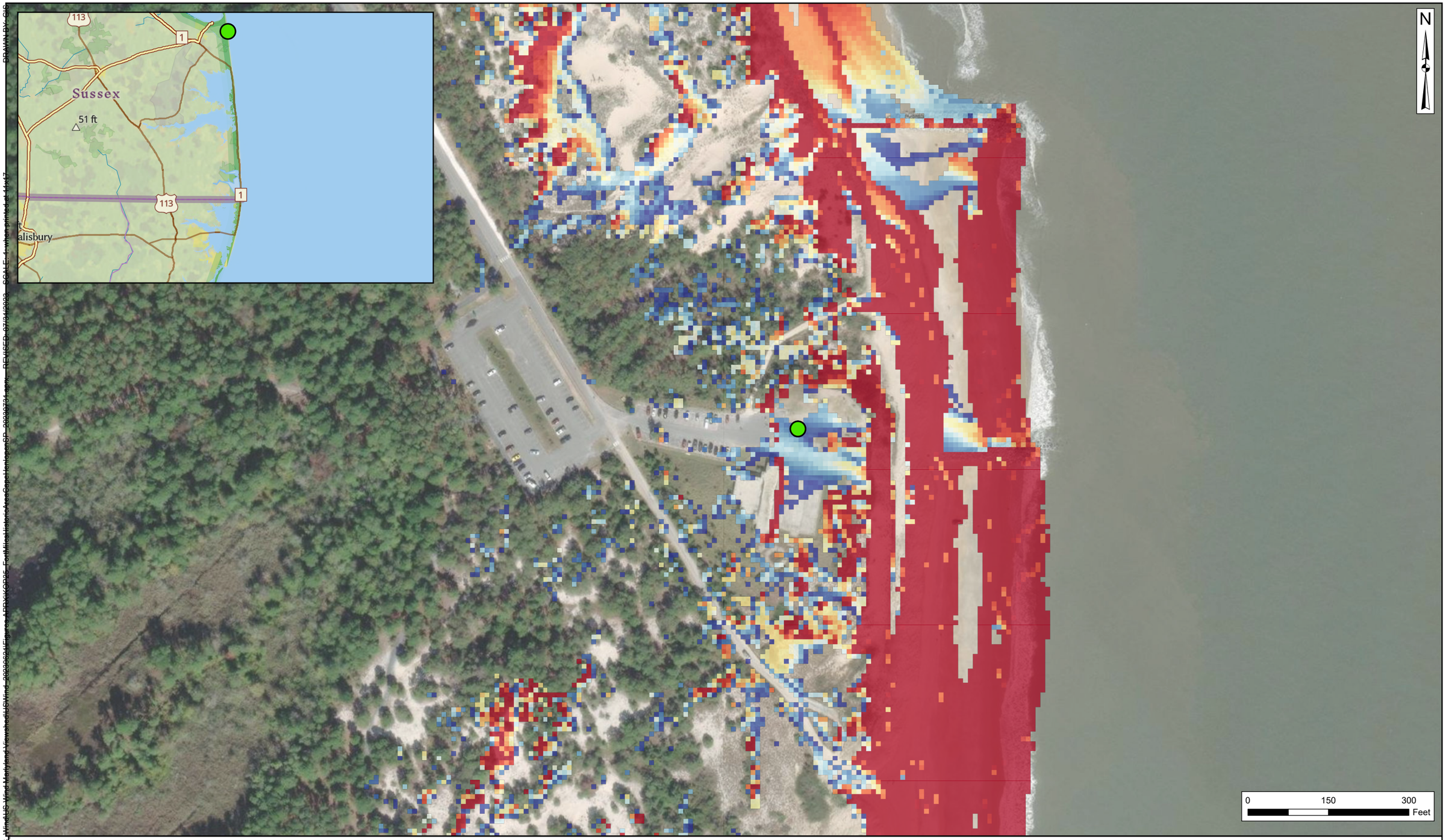
Cumulative WTG Blade Viewshed

84th Street Beach, Ocean City

US Wind

Notes: Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS Pro

Source: Esri - World Topoogrpahic Map; NAD 1983 BLM Zone 18N



Analysis Point

Number of Visible WTG Blades

321

1

Notes: Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS Pro

Cumulative WTG Blade Viewshed
Fort Miles Historic District (Battery Herring)
US Wind

Source: Esri - World Topoographic Map; NAD 1983 BLM Zone 18N

M:\GIS\Projects\USWind\US_Wind\US_Wind_Maryland_Viewshed\USWind_20250624.aprx - REVISED 07/31/2025 - SCALE: 1 when printed at 11"x17" - DRAWN BY: CSP

Analysis Point

Number of Visible WTG Nacelles

231

1

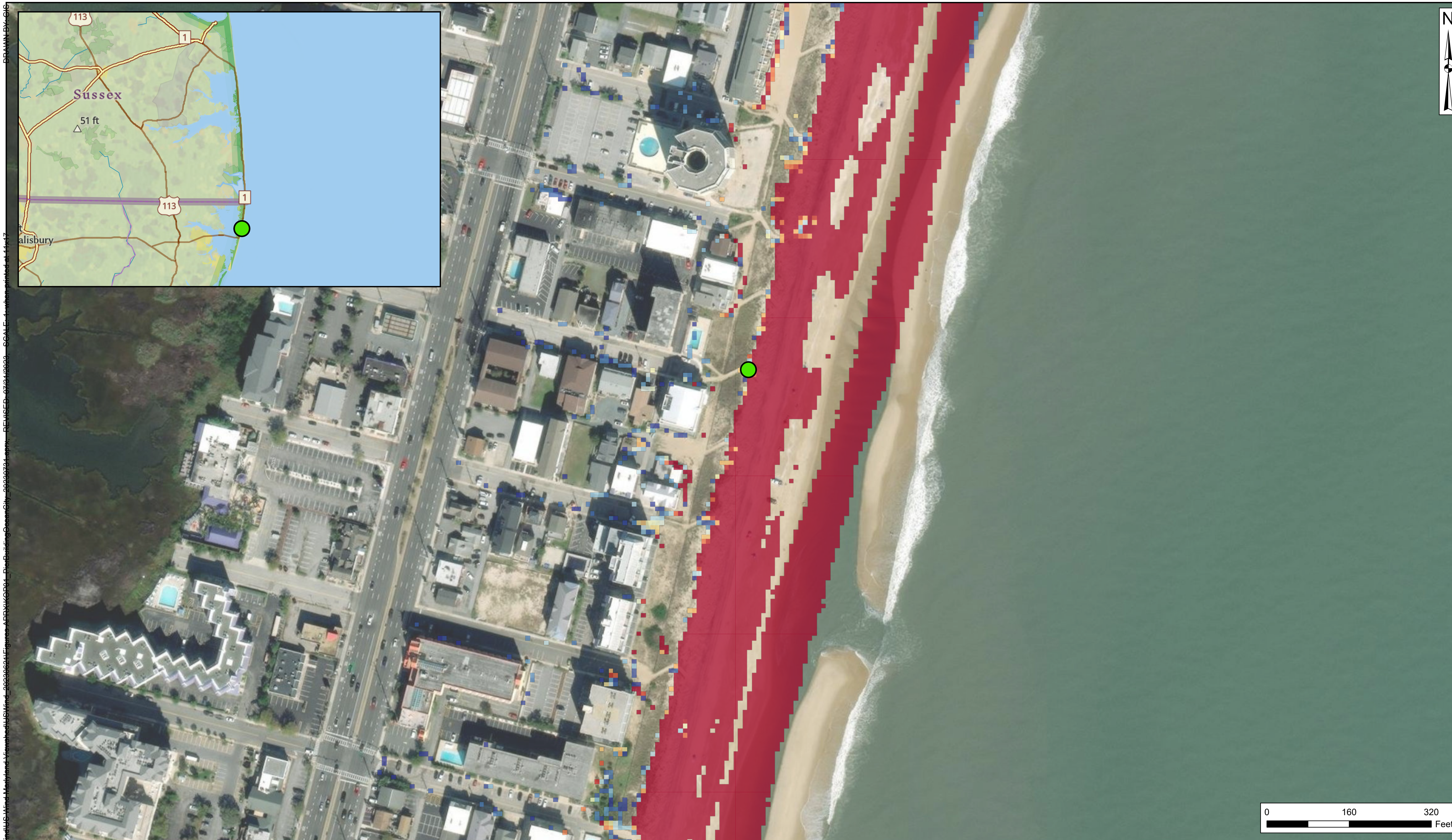
Notes: Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS Pro

Cumulative WTG Nacelle Viewshed
US Coast Guard Tower, Ocean City
US Wind

Source: Esri - World Topoographic Map; NAD 1983 BLM Zone 18N

DRAWN BY: CIC

M:\GIS\Projects\US_Wind\US Wind Maryland Viewsheds\USWind_20230621\Figures_APP\MXD\P22_04thStreetBeach_20230731_.aprx - REVISED: 07/31/2023 - SCALE: 1: when printed at 11x17



Analysis Point

Number of Visible WTG Nacelles

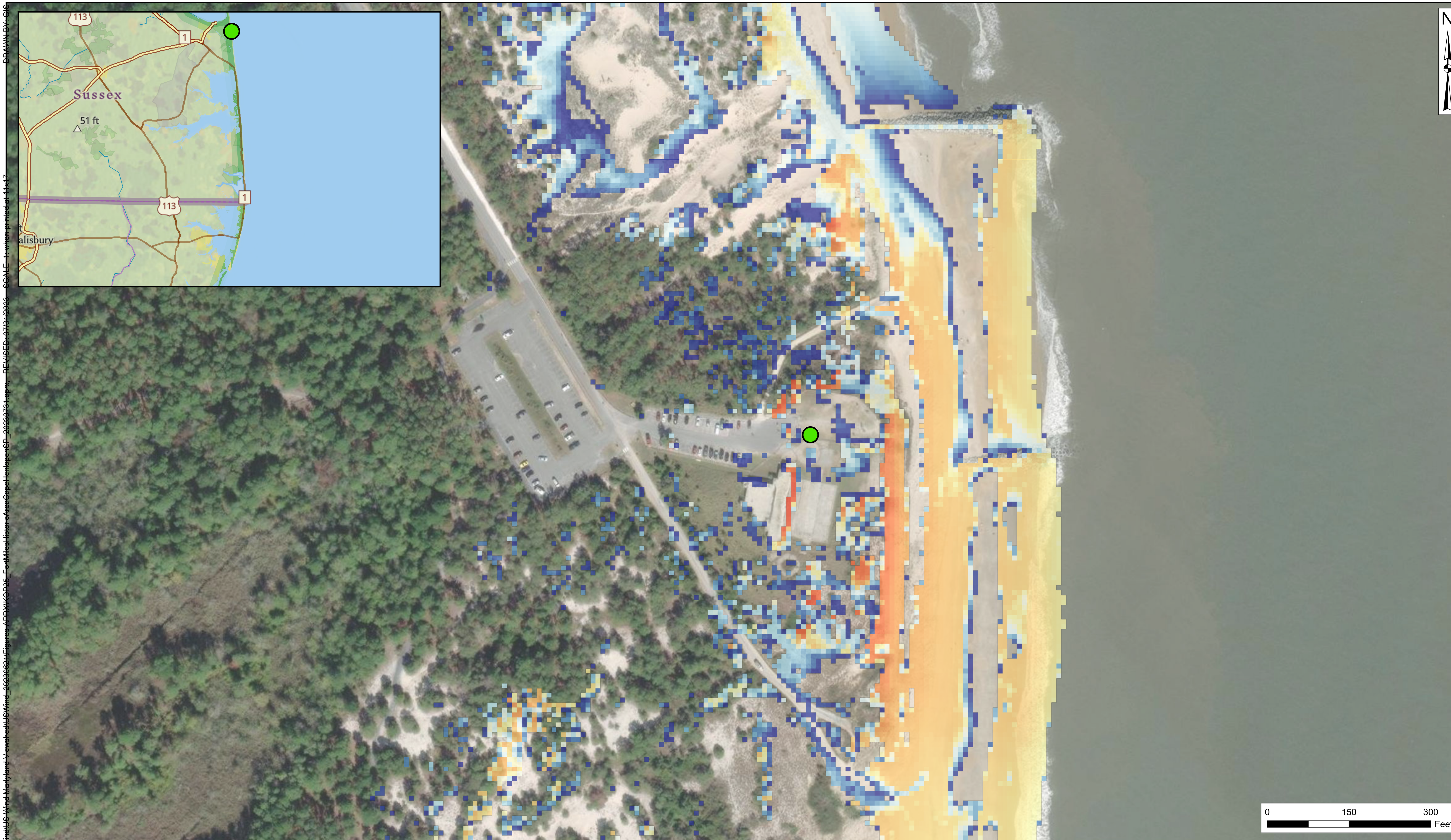
231

1

Cumulative WTG Nacelle Viewshed
84th Street Beach, Ocean City
US Wind

Notes: Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS Pro

Source: Esri - World Topoographic Map; NAD 1983 BLM Zone 18N



Analysis Point

Number of Visible WTG Nacelles

286

1

Notes: Aerial Imagery: ESRI World Imagery; Reproduced under license in ArcGIS Pro

Cumulative WTG Nacelle Viewshed
Fort Miles Historic District (Battery Herring)
US Wind

Source: Esri - World Topographic Map; NAD 1983 BLM Zone 18N

Attachment I-2. View Angle Maps

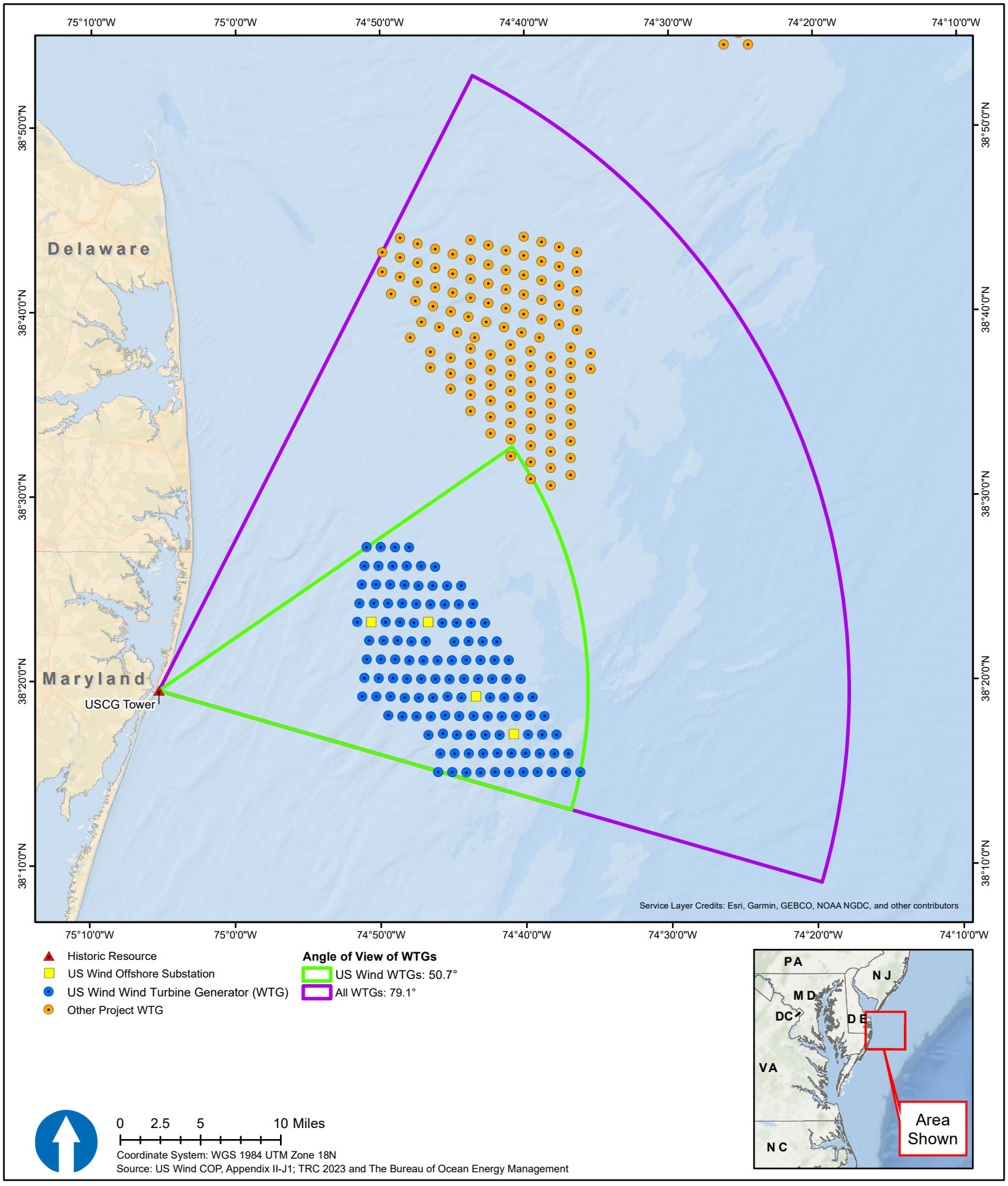


Figure I.3-1. U.S. Coast Guard Tower

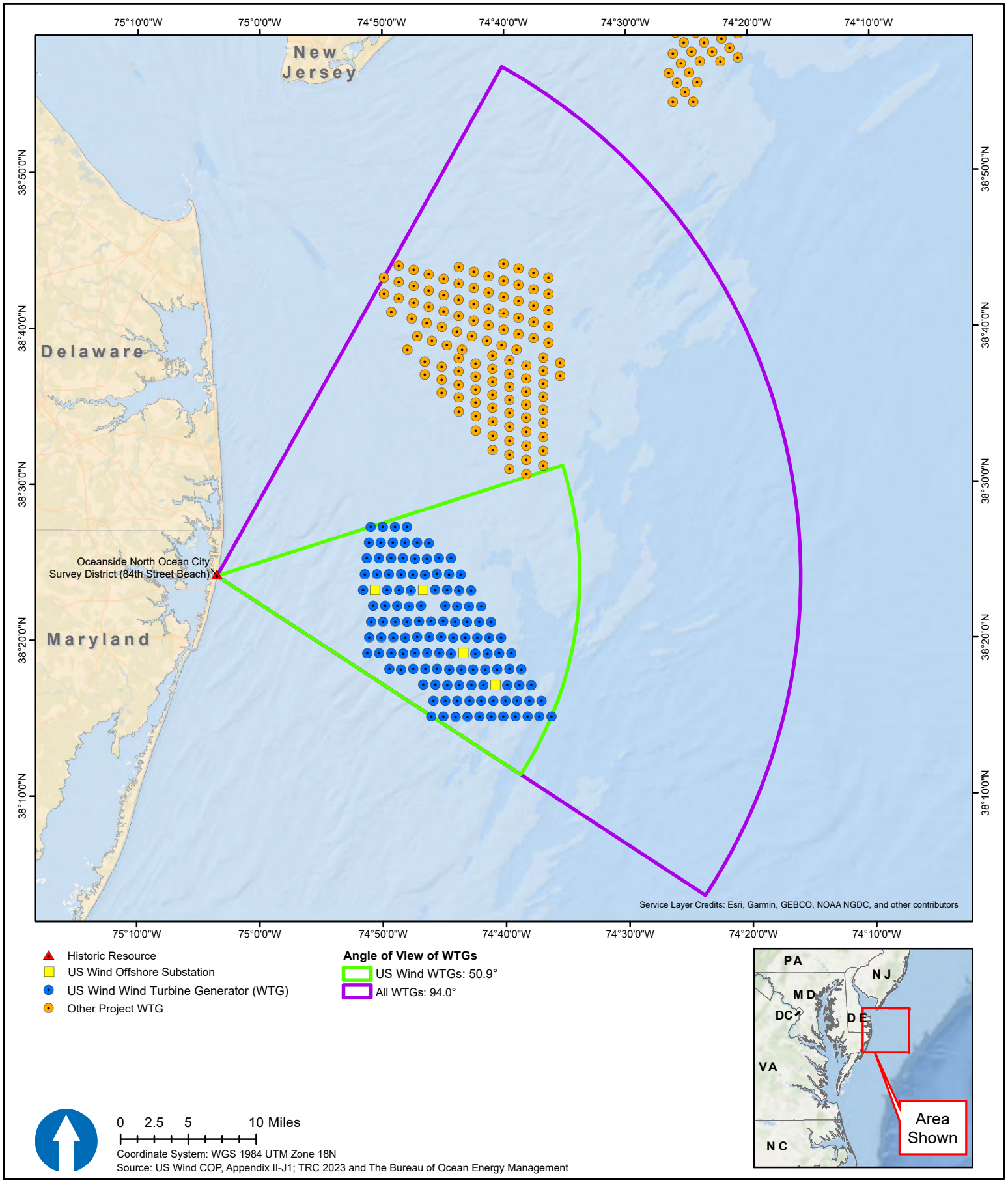


Figure I.3-2: Oceanside North Ocean City Survey District (84th Street Beach)

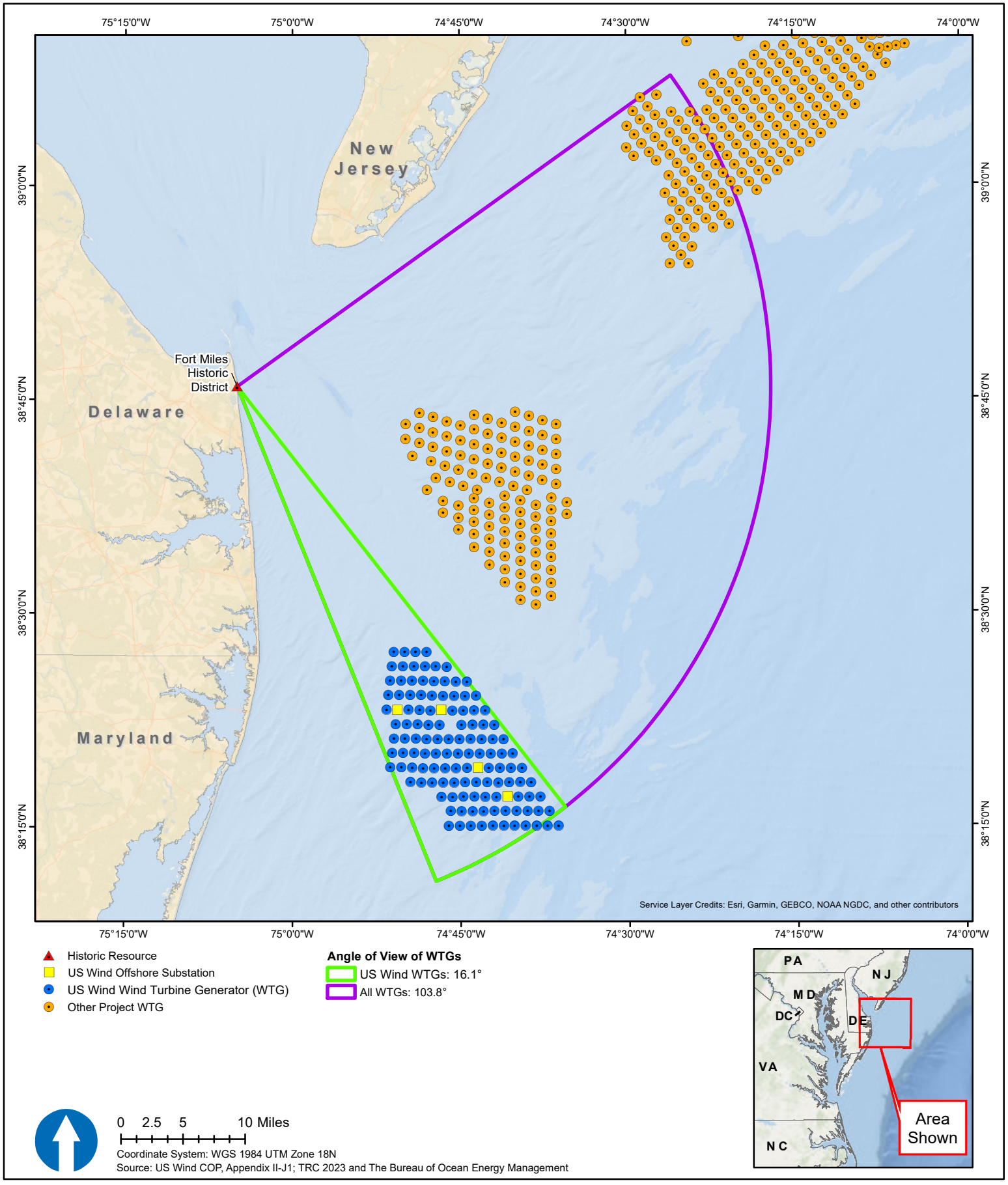


Figure I.3-3. Fort Miles Historic District