CUMULATIVE HISTORIC RESOURCES VISUAL EFFECTS ANALYSIS – OCEAN WIND OFFSHORE WIND FARM PROJECT

Prepared for

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ABSTRACT

The Bureau of Ocean Energy Management (BOEM) requested that ICF prepare a cumulative historic resources visual effects analysis (CHRVEA) for the Ocean Wind Offshore Wind Farm Project (Project). The Project has the potential to contribute to the cumulative visual effects on historic properties in combination with the potential effects of other proposed actions, most specifically other offshore wind energy development activities proposed in offshore wind lease areas adjacent to the Project. Where BOEM has determined that the Project has the potential to result in adverse visual effects on historic properties, this CHRVEA analyzes further where the effects of other reasonably foreseeable development activities may be additive to those of the Project, resulting in cumulative effects. In considering the potential for cumulative visual effects of the Project on historic properties, the CHRVEA assists BOEM in complying with Section 106 of the National Historic Preservation Act (NHPA), as amended (at 54 United States Code 306108), and its implementing regulations (36 Code of Federal Regulations [CFR] 800). This includes meeting the requirements of NHPA Section 110(f) for protecting National Historic Landmarks (NHL), pursuant to 36 CFR 800.10.

The historic resources visual effects assessment (HRVEA) report prepared specific to the Project and updated in March 2021 identified historic properties within the Area of Potential Effects (APE) for visual effects analysis, the area within which adverse visual effects could result from wind turbine generator (WTG) installation. The HRVEA recommended potential adverse effects on historic properties resulting from the proposed Project (Construction and Operations Plan [COP] Volume III, Appendix F-3; Ocean Wind 2022). BOEM, in review of the HRVEA and information and comments received from consulting parties, determined the Project would result in adverse effects on five historic properties in New Jersey that were either previously determined eligible or recommended eligible for the National Register of Historic Places (NRHP):

1. Riviera Apartments, 116 S. Raleigh Avenue, Atlantic City, New Jersey
2. Vassar Square Condominiums, 4800 Boardwalk, Ventnor City, New Jersey
3. House, 114 S. Harvard Avenue, Ventnor City, New Jersey
4. Charles Fischer House, 115 S. Princeton Avenue, Ventnor City, New Jersey
5. Ocean City Music Pier, 811 Boardwalk, Ocean City, New Jersey

While the HRVEA also identified Villa Maria by the Sea among the adversely affected properties, it was demolished in 2021. For the remaining properties, clear ocean views are considered a character-defining feature of each property's significance (COP Volume III, Appendix F-3; Ocean Wind 2022).

Where BOEM has determined that the Project would result in adverse visual effects on historic properties, this CHRVEA further analyzes where the effects from other offshore wind energy development activities may be additive to the adverse visual effects from the Project, resulting in cumulative effects. Cumulative visibility of the WTGs and other offshore wind energy development activities is anticipated to intensify the level of adverse effect on the five historic properties. WTGs associated with the Project would represent 16–17 percent of the total WTGs visible from each property, and WTGs associated with other offshore wind energy development activities would represent 83–84 percent of the total WTGs visible from each property. As such, the proposed Project is a relatively small-scale development compared to other developments planned nearby, including Ocean Wind 2 (part of Lease Area OCS-A 0532), Atlantic Shores North (Lease Area OCS-A 0499), Atlantic Shores South (part of Lease Area OCS-A 0499), Garden State Offshore Energy (Lease Area OCS-A 0482), and Skipjack Offshore Energy (Lease Area OCS-A 0519). Moreover, views from the historic properties to the Project WTGs could be obstructed by a portion of Ocean Wind 2 and Atlantic Shores South, which include WTG locations positioned closer to shore (Ocean Wind 2 between 8.8 and 9.0 miles, and Atlantic Shores between 10.5 and 11.1 miles).

The conclusions herein are ICF's recommendations regarding the Project's WTGs' incremental contribution to cumulative visual effects (daytime and nighttime) on historic properties when combined with past, present, and reasonably foreseeable offshore wind energy development activities in the APE for this Project. These recommendations are provided to inform BOEM's determination of Project effects on historic properties and consultation on any effects found. Where BOEM has made its determination in the *Finding of Adverse Effect for the Ocean Wind Farm Construction and Operations Plan*, this determination is expressed consistently in the CHRVEA. While Section 106 consultation is ongoing among BOEM, the New Jersey State Historic Preservation Officer, the Advisory Council on Historic Preservation (ACHP), and other identified consulting parties on the Project, final determinations remain with BOEM in accordance with 36 CFR 800. This includes ongoing consultation with Native American tribes that may identify properties of traditional cultural and religious significance in the APE.

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1 INTRODUCTION

This cumulative historic resources visual effects analysis (CHRVEA) assesses the contribution of the Ocean Wind Offshore Wind Farm Project (the Project) to cumulative visual effects on historic properties. Cumulative effects on historic properties are the incremental effects that the Project could have when added to other past, present, or reasonably foreseeable future actions, regardless of which agency or person undertakes the actions (40 Code of Federal Regulations [CFR] 1508.7). Where the Bureau of Ocean Energy Management (BOEM) has determined that the Project has the potential to result in adverse visual effects on historic properties, this CHRVEA analyzes further where the effects of other reasonably foreseeable development activities may be additive to those of the Project, resulting in cumulative effects. The CHRVEA focuses on cumulative visual effects on historic properties.

1.1 Project Background

BOEM is the lead federal agency responsible for the decision on whether to approve, approve with modifications, or disapprove the Project's construction and operations plan (COP) pursuant to 43 United States Code 1332(3). To further inform that decision, BOEM requested that ICF prepare a CHRVEA to assist in BOEM's compliance with Section 106 of the National Historic Preservation Act (NHPA), as amended (54 United States Code 306108), and its implementing regulations (36 CFR 800).

In the COP, Ocean Wind, LLC (Ocean Wind) proposes to develop a commercial-scale offshore wind energy facility in BOEM Lease Area OCS-A 0498 (Lease Area) with up to 98 wind turbine generators (WTG), up to three offshore substations, inter-array cables linking the individual turbines to the offshore substations, substation interconnector cables linking the substations to each other, offshore export cables, an onshore export cable system, two onshore substations, and connections to the existing electrical grid in New Jersey. Ocean Wind plans to construct the Project by 2026.

In addition to the proposed Project, BOEM has identified 10 types of actions that could result in cumulative effects on the human environment, including historic properties: (1) other offshore wind energy development activities; (2) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); (3) tidal energy projects; (4) marine minerals use and ocean-dredged material disposal; (5) military use; (6) marine transportation; (7) fisheries use and management; (8) global climate change; (9) oil and gas activities; and (10) onshore development activities, such as onshore wind turbines, telecommunications towers, planned projects in town master plans, and railroad/railroad station improvements.

Of the above actions, the visual effects from other offshore wind energy development activities in BOEM offshore wind lease areas adjacent to the Project (Figure 1) pose the greatest potential for cumulative effects on historic onshore properties when combined with those identified for the Project (Figure 2). The following discussion presents the reasonably foreseeable cumulative visual effects associated with other offshore wind energy development activities and the Project.

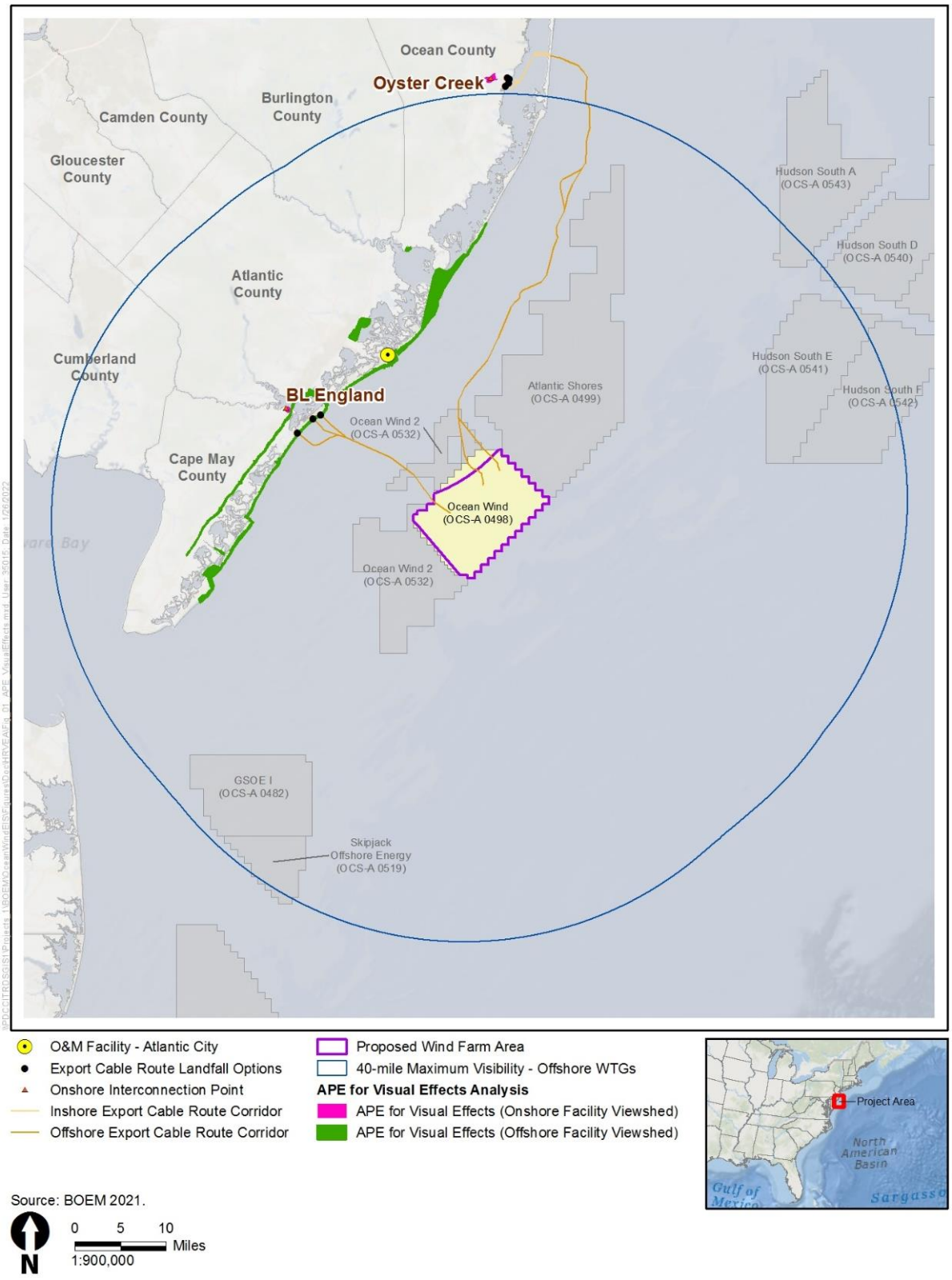


Figure 1 **Area of Potential Effects for Visual Effects Analysis within the Maximum Distance for Potential Visibility of Project Facilities**

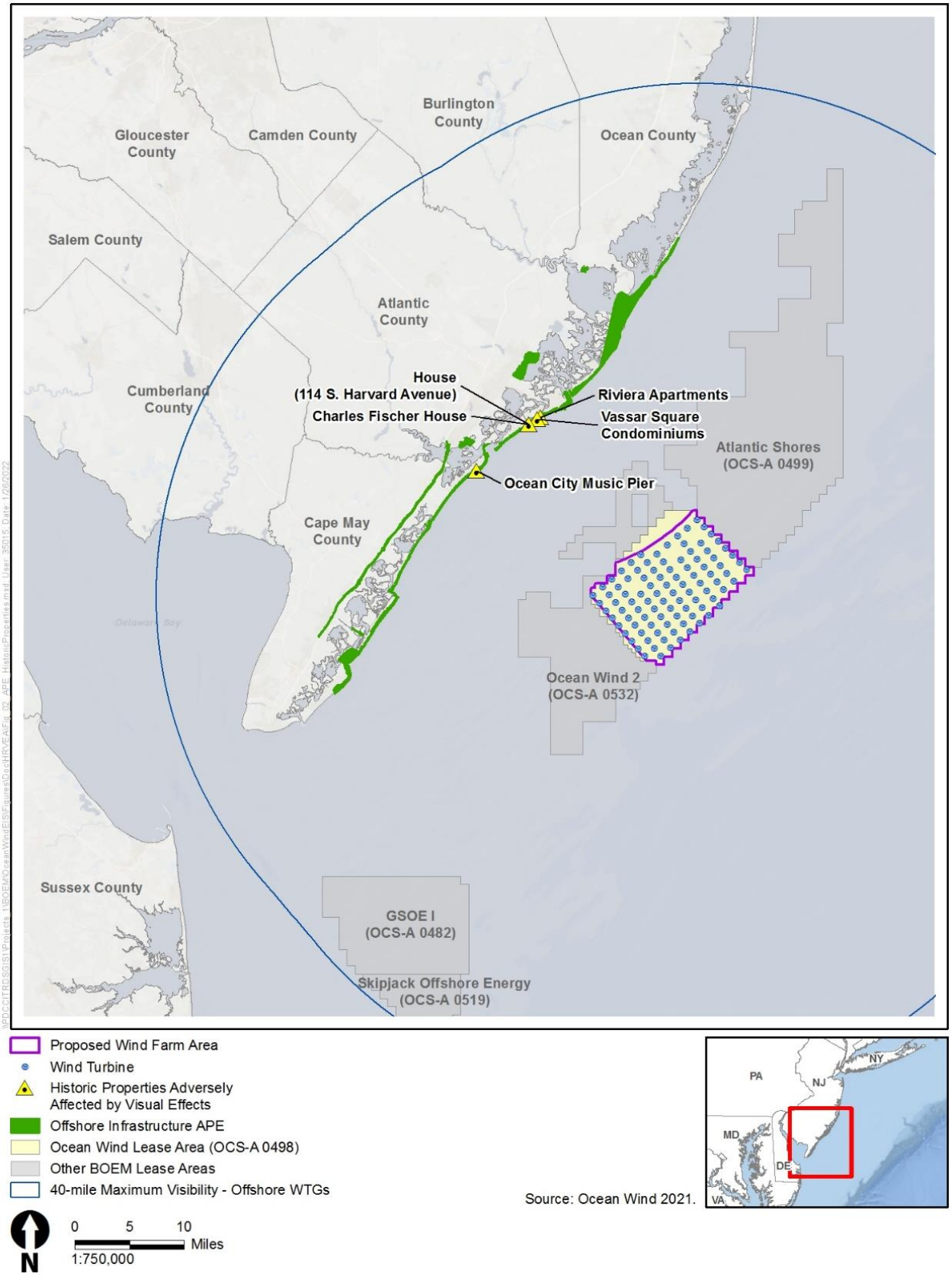


Figure 2 Area of Potential Effects with Affected Historic Properties

1.2 Area of Potential Effects and Historic Properties Identified

Visual effects from the Project have the potential to adversely affect historic properties within the Area of Potential Effects (APE) that BOEM has defined for the Project. The APE encompasses the viewshed from which renewable energy structures would be visible, whether offshore or onshore (see Figure 1 and Figure 2). The APE for visual effects analysis for the Project includes onshore coastal areas of New Jersey. Geographic information system analysis and subsequent field investigation delineated the viewshed APE methodically through a series of steps, beginning with the maximum theoretical distance that WTGs could be visible (COP Volume III, Appendix F-3; Ocean Wind 2022). This was determined by first taking into account the visibility of a WTG from the water level to the tip of an upright rotor blade at a height of 906 feet. This analysis next accounted for how distance and curvature of the Earth impede visibility as space increases between the viewing point and WTGs increases (i.e., by a 40-mile distance, even blade tips would be below the sea level horizon line). The mapping effort then removed all areas analyzed with obstructed views toward the Project's WTGs, such as those impeded by intervening topography, vegetation, and structures. Areas with unobstructed views of offshore Project elements then composed the APE (see shaded APE areas for the Project viewshed on Figure 1 and Figure 2).

Generally, the offshore visual APE extends from Wildwood in Cape May County in the south to Beach Haven in Ocean County in the north and includes the first developed block of the barrier islands and select inland areas with views across bays opening to the Atlantic Ocean. The onshore visual APEs include a 0.25-mile boundary around the BL England substation location and the Oyster Creek substation location and include overhead lines from the substation to point of interconnection. Cumulative visual effects associated with the Project in combination with other planned offshore wind energy development activities in adjacent BOEM offshore wind lease areas were assessed within the APE. Effects on historic properties outside the APE were not assessed.

The APE for visual effects for the Project was previously analyzed for Project-specific historic visual effects in the historic resources visual effects assessment (HRVEA) (COP Volume III, Appendix F-3; Ocean Wind 2022) for onshore and offshore Project elements. Beyond visual effects from WTGs, the HRVEA did not identify adverse visual effects on historic properties from other Project facilities, such as the onshore substation locations or associated overhead grid connections. The HRVEA recommended potential adverse effects on historic properties resulting from the proposed Project (COP Volume III, Appendix F-3; Ocean Wind 2022). BOEM reviewed the HRVEA and information and comments received from consulting parties and meetings in determining effects on all historic properties identified in the APE. This cumulative effects analysis addresses those historic properties BOEM found to be adversely affected by visual effects from the Project.

Visual effects on historic properties tend to especially risk the alteration of characteristics that qualify a property for inclusion in the National Register of Historic Places (NRHP) when these effects diminish integrity of setting, feeling, or association of that property. The National Park Service (NPS) defines *setting*, *feeling*, and *association* as follows (NPS 1997):

1. Setting is the physical environment of a historic property and refers to the character of the place in which the property played its historical role. The physical features that constitute the setting of a historic property can be either natural or human made, including such elements as topographic features, vegetation, human-made features/landscape structures, and relationships between buildings and other features or open space. These features and their relationships are considered between the property and its outside surroundings as well as inside the boundaries of the property.
2. Feeling is a property's expression of the aesthetic or historic sense of a particular period of time. It results from the presence of physical features that, taken together, convey the property's historic character. A historic property retaining original design, materials, workmanship, and setting might relate the feeling of its historic period of significance—its historic feel.

3. Association is the direct link between an important historic event or person and a historic property. A property retains association if it is the place where the event or activity occurred and is sufficiently intact to convey that relationship to an observer. Like feeling, association requires the presence of physical features that convey a property's historic character.

The HRVEA identified 41 historic properties in the offshore visual APE. Of these, 27 were identified as having character-defining or potentially character-defining ocean views that could potentially contribute to the property's significance. Of the 27 historic properties, six were identified as having a maritime setting that directly contributes to the property's NRHP eligibility, including significant open seaward views that support the integrity of the maritime setting, which are oriented toward the Ocean Wind WTGs. While the HRVEA recommended a finding of adverse effect on the six historic properties, one of the properties, Villa Maria by the Sea in Stone Harbor, New Jersey, was demolished in 2021 (Leahy and Leahy 2021; COP Volume III, Appendix F-3; Ocean Wind 2022). As such, BOEM, in its review of the HRVEA, determined adverse effects from visual impacts on five historic properties:

1. Riviera Apartments, 116 S. Raleigh Avenue, Atlantic City, New Jersey
2. Vassar Square Condominiums, 4800 Boardwalk, Ventnor City, New Jersey
3. House, 114 S. Harvard Avenue, Ventnor City, New Jersey
4. Charles Fischer House, 115 S. Princeton Avenue, Ventnor City, New Jersey
5. Ocean City Music Pier, 811 Boardwalk, Ocean City, New Jersey

Appendix A provides a description, historic character, and basis for NRHP eligibility of the five historic properties with adverse effects from the Project. Figure 2 shows the locations of each property within the APE.

This CHRVEA specifically analyzes cumulative adverse effects on historic properties where BOEM has determined adverse visual effects could result from the Project. In addition to the proposed Project WTGs, this CHRVEA assesses where the WTGs proposed for other planned offshore wind energy development activities may combine with the Project to produce cumulative visual effects on historic properties in the APE.

1.3 Cumulative Visual Effects Analysis

Modeling for the HRVEA mapped the maximum area of potential onshore visibility to the Project WTGs within which historic properties may occur. This area established the APE for the visual effects analysis (COP Volume III, Appendix F-3; Ocean Wind 2022). Modeling for the CHRVEA next established the maximum potential number and positioning of the Project WTGs and other actions' WTGs cumulatively visible from the historic properties.

1.3.1 Modeling Viewshed and Cumulative Wind Turbine Generator Visibility

Modeling viewshed and WTG visibility is a multi-step process. The method applied for initial Project-level viewshed modeling is as described in the following summary from the HRVEA (COP Volume III, Appendix F-3; Ocean Wind 2022):

> A computer-based viewshed analysis was used to examine potential visibility of offshore infrastructure…using landscape topography and digital surface models. The analysis relied on a Digital Terrain Model (DTM) to represent topography (i.e., bare earth conditions)…, as well as a Digital Surface Model (DSM) to represent vegetation, buildings, and other structures in the landscape… up to 40 miles from the WFA. The viewshed analysis was conducted using ESRI ArcGIS Pro software. The DTM and DSM used to represent the landscape are derived from LiDAR point cloud data, which was taken from The National Map produced by the U.S.

> Geological Survey (USGS). The point cloud data was processed to create 10 ft square resolution surface raster models. A viewer height of 5 ft above the model elevation was assigned to represent the eye level of a typical viewer. In the analysis, Project components are considered visible if the computer determines that a single point on the component could be theoretically visible from a point on the model. This analysis also accounts for the variable effect of refraction. The viewshed analysis does not determine actual visibility based on distance, weather, or other atmospheric conditions, nor does it determine if the point on the model could be occupied or considered a viewpoint (e.g., the model predicts visibility from treetops and building roofs), nor does it determine the number of theoretically visible turbines from any particular point. As an initial screening tool for this investigation, it was used to determine the maximum theoretical extent of Project visibility

Desktop analysis was conducted to confirm the results of the computer-based viewshed analysis. Using Google Street View, this included block-by-block review to assess likelihood the Project would be visible based on presence of open-ocean views or obstructed by topography, vegetation, or buildings within the first developed block on the shoreline, or the first row of buildings on the second developed block. Field verification was performed to confirm viewshed modeling and desktop analysis.

The HRVEA also reviewed field photographs and visual simulations from select key observation points (KOP) to assess potential Project visibility at various viewing distances, times of day, times of year, viewing elevations, weather conditions, and local contexts. The visualizations provided a more accurate and realistic impression of Project visibility than the geographic extent of theoretical visibility presented in the computer-based viewshed analysis. Based on the Project visualizations, the HRVEA concluded visibility of offshore infrastructure beyond 25 miles is unlikely (COP Volume III, Appendix F-3; Ocean Wind 2022).

Cumulative effects modeling was based on technical specifications and Project layouts or layout criteria provided by BOEM for potential locations where WTGs for the Project and all other offshore wind lease areas (within 40 miles around the Project) could be visible from historic properties (Figure 3). The cumulative WTG visibility assessment considered the combined, simultaneous visibility from the APE of potentially visible WTG locations on offshore wind lease area grids associated with Ocean Wind, Ocean Wind 2, Atlantic Shores, Atlantic Shores North, Garden State Offshore Energy, and Skipjack Offshore Energy. Turbines are counted as "visible" if the computer model determines a single point on the component would be seen from the eye level of a window, observation deck, or ground location. In addition to height of the viewer at each of the five historic properties, the analysis also considered height of the WTGs, earth curvature, and distance between the historic properties and WTGs. WTG height varied among the Project, which proposes WTGs with a blade tip height of 906 feet, and the other offshore wind energy development activities, which propose WTGs with blade tip heights ranging from 850 to 1,048 feet (maximum blade tip elevation above flat sea surface) (Figure 4). This maintains consistency with the "reasonably foreseeable future offshore WTGs" analyzed in the Draft Environmental Impact Statement (BOEM 2022).

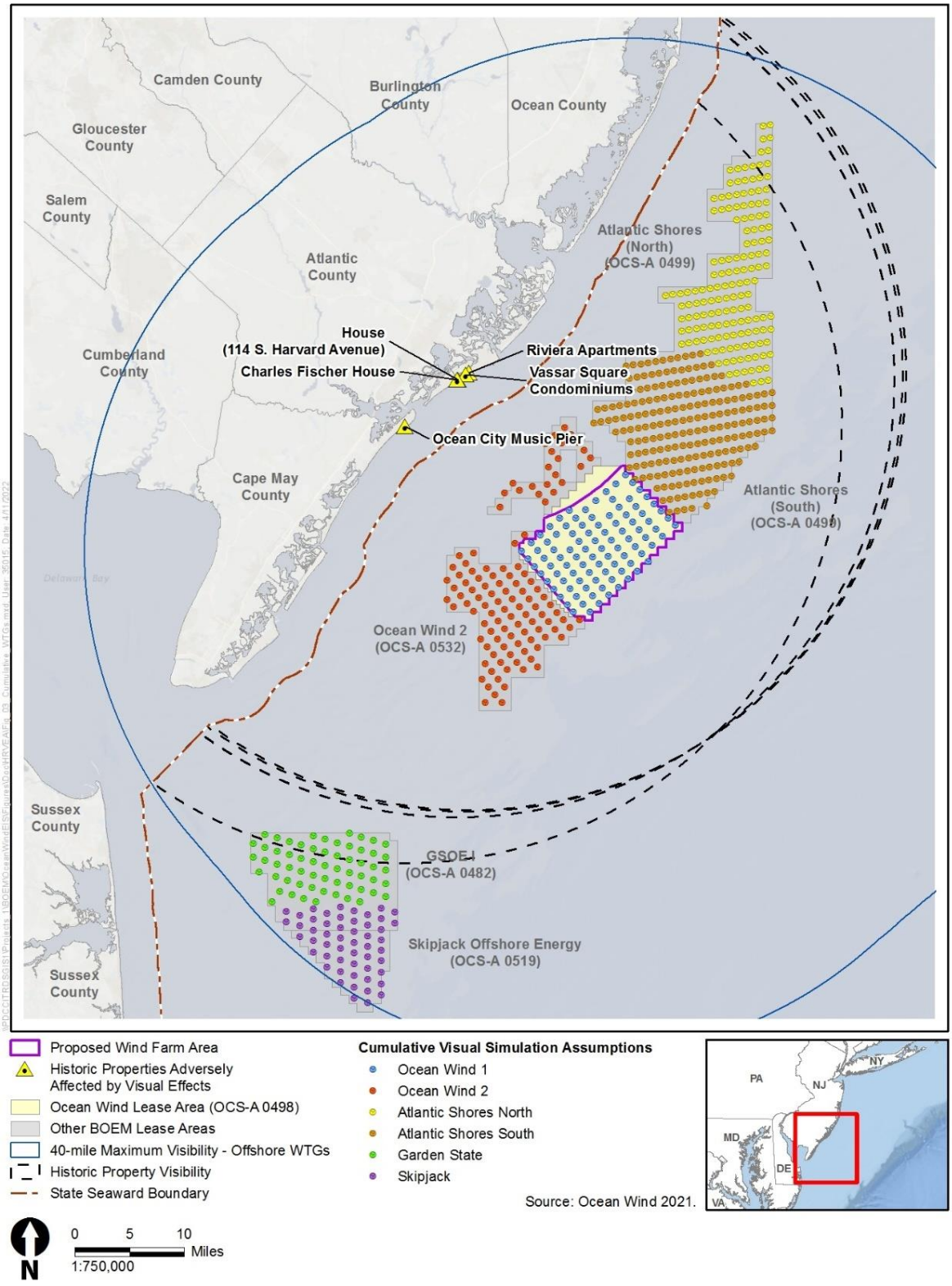
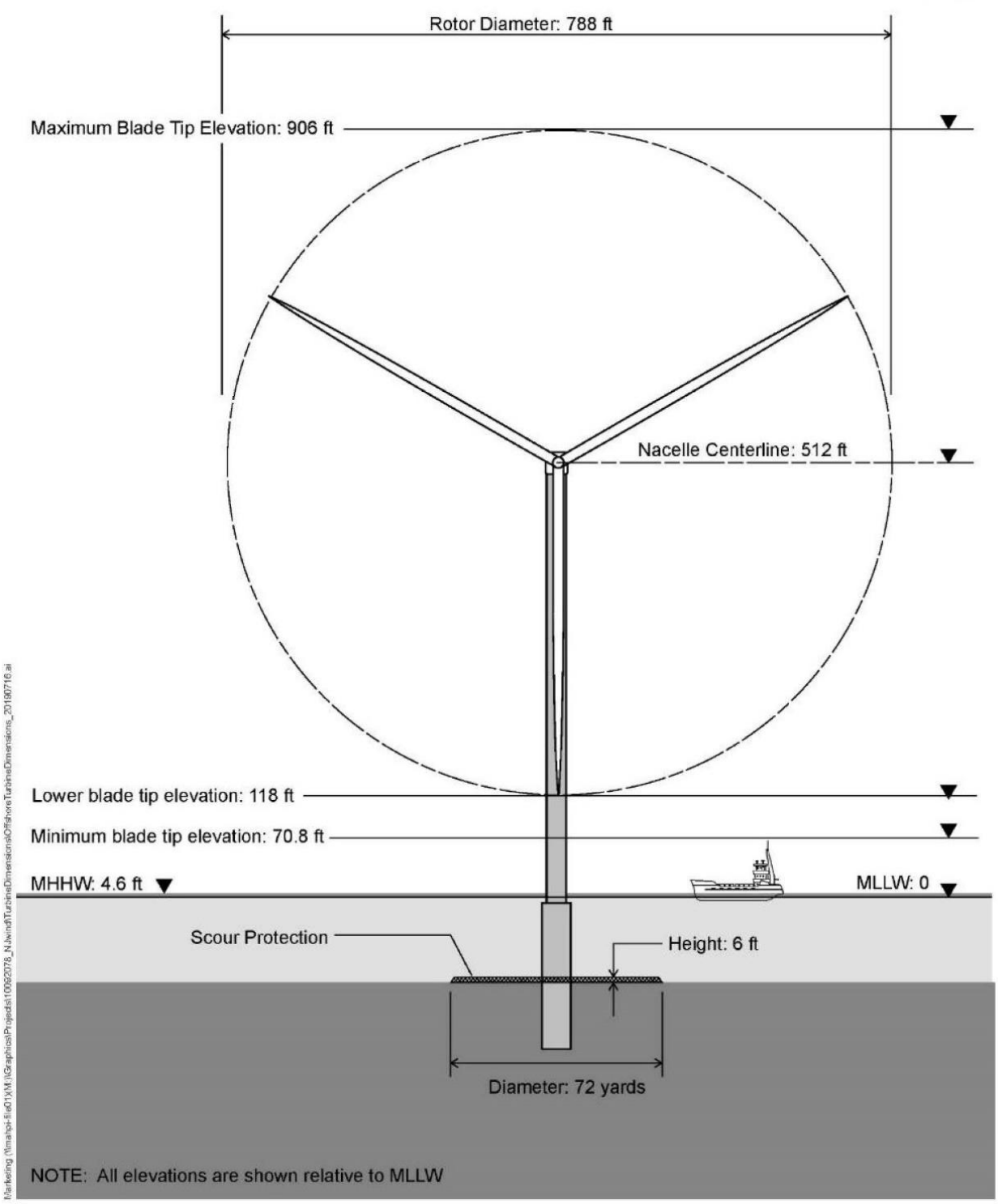


Figure 3 Wind Turbine Generator Locations for Cumulative Visual Simulations Across the Adjacent Bureau of Ocean Energy Management Lease Areas, Including the Proposed Ocean Wind 2, Atlantic Shores North, Atlantic Shores South, Garden State Offshore Energy, and Skipjack Offshore Energy Projects that Would Surround the Ocean Wind Lease Area



WTG dimensions used for cumulative visual simulations varied by project, with wind turbine blade tip height ranging from 850 to 1,048 feet.
Source: COP Volume III, Appendix F-3; Ocean Wind 2022.

Figure 4 Dimensions for Wind Turbine Generators Proposed for the Project (906 Feet)

1.3.2 Visual Effects

This CHRVEA analyzes how the adverse visual effects from the Project, which BOEM has determined for the five historic properties, have the potential to result in additive cumulative visual effects in combination with the other reasonably foreseeable offshore wind energy development activities.

This CHRVEA uses the modeling of the Project viewshed and cumulative WTG visibility within that viewshed to inform this analysis. The analysis considers the importance of maritime setting to the integrity of the five historic properties from the vantage of significant seaward views that could include the WTGs and the WTGs of other planned offshore wind energy development activities. The modeling quantifies the total number of WTGs that are theoretically visible from the historic properties and the distance at which they may be visible. Based on these factors, this CHRVEA analyzes the level of effect on the integrity of the five historic properties.

Table 1 provides the maximum number of potentially visible WTG locations for each of the five historic properties based on reasonably foreseeable offshore wind energy development activities. Although all planned Project WTGs would be visible, not all potential WTGs from other reasonably foreseeable offshore wind energy development activities would be visible from the five historic properties. WTGs would begin to disappear from view at locations with increased distance, where potential development locations within the offshore wind lease areas extend south-southeastward and north-northeastward. Table 2 summarizes the number of theoretically visible WTGs by project.

Appendix C presents cumulative visual simulations that illustrate theoretical visibility of WTGs associated with the Project in combination with those of other foreseeable projects. These visual simulations are modeled based on KOPs positioned at locations with representative views. These representative views are not intended to be located at all elements of historic properties, or even directly at historic properties, but are rather situated at approximate locations to provide open views toward WTGs, considering the distance of historic properties from the maximum possible build-out of all WTG locations modeled in the offshore wind lease areas for the Project and other offshore wind energy development activities (Appendix B). KOPs were placed where seaward views and potentially visible historic properties could be maximized and are considered important.

The standards for selecting these viewpoints were defined as follows (Appendix B):

- The representative viewpoints and existing (i.e., previously prepared for the Project) visualizations should represent a full range of possible visibility of other projects.
- The Project should be readily noticeable under ideal viewing conditions, which may exceed 25 miles from the viewer during daylight hours.
- The location and photographic quality should show meteorological and lighting conditions to enable BOEM to assess the worst-case visibility and potential cumulative effects on the seascape.

Table 1 Key Observation Points for Historic Properties and Wind Turbine Generator Visibility

Historic Property	Total Number of Potentially Visible WTGs (blade tips) from the Historic Property (including the Project WTGs)	Distance from the Historic Property to the Nearest Potentially Visible WTG for Other Proposed and Built Wind Farms and Ocean Wind 1
Riviera Apartments	617 WTGs (16 percent are Ocean Wind 1)	15.2 miles to nearest Ocean Wind 1 WTG and 8.9 miles to the nearest potential WTG location for other wind energy development activities
Vassar Square Condominiums	629 WTGs (16 percent are Ocean Wind 1)	16.0 miles to nearest Ocean Wind 1 WTG and 9.0 miles to the nearest potential WTG location for other wind energy development activities
House, 114 S. Harvard Ave	571 WTGs (17 percent are Ocean Wind 1)	16.0 miles to nearest Ocean Wind 1 WTG and 9.0 miles to the nearest potential WTG location for other wind energy development activities
Charles Fischer House	571 WTGs (17 percent are Ocean Wind 1)	16.0 miles to nearest Ocean Wind 1 WTG and 9.0 miles to the nearest potential WTG location for other wind energy development activities
Ocean City Music Pier	612 WTGs (16 percent are Ocean Wind 1)	15.5 miles to nearest Ocean Wind 1 WTG and 8.8 miles to the nearest potential WTG location for other wind energy development activities

Table 2 Summary of Number of Theoretically Visible Wind Turbines by Project

Historic Property	Number of Theoretically Visible Wind Turbines (Based on WTG Blade Tip Visibility)						
	Ocean Wind 1	Ocean Wind 2	Atlantic Shores North	Atlantic Shores South	Garden State Offshore Energy	Skipjack Offshore Energy	Total
Riviera Apartments	98	121	148	204	46	0	617
Vassar Square Condominiums	98	121	149	204	55	2	629
House, 114 S. Harvard Ave	98	121	148	204	0	0	571
Charles Fischer House	98	121	148	204	0	0	571
Ocean City Music Pier	98	121	148	204	41	0	612

The Project would incrementally add to the cumulative visual effects on the five historic properties identified within its APE for visual effects analysis, when combined with the effects of other past, present, or reasonably foreseeable future actions. This may occur where there is intervisibility between the Project viewshed and the viewshed of other actions, the area of intervisibility being the geographic extent of the intersection of Project visibility with the visibility of another action. The potential Project WTG locations within the Lease Area (OCS-A 0498) have the potential for intervisibility with other WTG locations to be installed within the adjoining lease area for Ocean Wind 2 (part of Lease Area OCS-A 0532) and within the BOEM offshore wind lease areas to the north—Atlantic Shores North (Lease Area OCS-A 0499) and Atlantic Shore South (part of Lease Area OCS-A 0499)—and to the south—Garden

State Offshore Energy (Lease Area OCS-A 0482), and Skipjack Offshore Energy (Lease Area OCS-A 0519). These could be constructed from 2024 through 2030 (with up to four projects simultaneously under construction in 2026–2027 (BOEM 2022, Appendix F).

This intervisibility and related adverse effects would apply for daytime visibility. Nighttime lighting impacts would be restricted to cultural resources for which a dark nighttime sky is a contributing element to their historic integrity, cultural resources stakeholders use at night, and resources that do not generate a substantial amount of their own light pollution. Of the five historic properties assessed in the CHRVEA, none met these conditions. As such, there would be no cumulative visual effects from nighttime visibility of aviation obstruction lights on the WTG nacelles associated with the Project and other proposed offshore wind development projects; from use of an Aircraft Detection Lighting System to reduce the period and intensity of effects from aviation obstruction lights on the Project; or from other short-term lighting visibility from vessels during construction or decommissioning, area lighting during construction, or other activities that could arise cumulatively during construction and decommissioning, should they occur after dark (COP Volume III, Appendix F-3; Ocean Wind 2022). For visual simulations of nighttime lighting from the Project and other offshore wind energy development activity WTGs, see Appendix C.

As presented in Table 1, the Project WTG locations represent 16–17 percent of the total WTGs that are potentially visible from the five historic properties in the cumulative build-out scenario of wind energy developments in the area. For this reason, the Project WTGs would foreseeably be surrounded by other offshore wind energy development activities that would constitute 83–84 percent of the total WTGs potentially visible from the five historic properties on WTG build-out from all development activities. Views from the historic properties to the Project WTGs could be obstructed by a portion of Ocean Wind 2 and Atlantic Shores South, which include WTG locations positioned closer to shore (Ocean Wind 2 between 8.8 and 9.0 miles, and Atlantic Shores between 10.5 and 11.1 miles).

The WTGs would serve as background development amid the more numerous WTGs of other offshore wind energy development activities visible from the historic properties as the other activities reach build-out. WTGs of other offshore wind energy development activities would be readily noticeable to and draw the attention of the casual observer at the historic properties (Sullivan et al. 2013). Sullivan et al. (2013) found in general that offshore wind facilities tend to be a major focus of visual attention at distances up to 10 miles and were only noticeable to casual observers at distances of up to almost 18 miles.

To inform determinations of adverse and cumulative visual effects, BOEM reviewed the HRVEA's list of historic properties assessed as likely to be adversely affected by the Project. In making these determinations, BOEM further reviewed all information and comments provided by consulting parties in correspondence and at meetings. The five historic properties determined to be adversely affected represent all of the properties identified within the APE that retain a maritime setting and where the maritime setting contributes to the property's NRHP eligibility. These historic properties are in areas that offer significant seaward views that support the integrity of the maritime setting and vantage points with the potential for open views from each property toward the WTGs (COP Volume III, Appendix F-3; Ocean Wind 2022).

BOEM has determined the Project would have visual adverse effects on these five historic properties with direct views to WTGs. Cumulative visibility of the Project and other offshore wind energy development activities is anticipated to intensify the level of adverse effects on the five historic properties. Specifically, the Project would contribute approximately 17 percent of the cumulative adverse effect, owing to the location and intensity of the foreseeable build-out attributable to other offshore wind energy development activities. Additionally, direct visibility to the Project from the historic properties would be diminished because portions of Ocean Wind 2 and Atlantic Shores South are closer to shore than the Project.

The HRVEA found that the Project would not adversely affect the remaining 35 historic properties identified in the viewshed APE (COP Volume III, Appendix F-3; Ocean Wind 2022). BOEM agrees with this assessment, finding no adverse effects on any historic properties identified in the viewshed APE beyond the five historic properties identified as adversely affected above.

2 CONCLUSION

This CHRVEA concludes that the Project would have a cumulative adverse effect on the five historic properties identified:

1. Riviera Apartments, 116 S. Raleigh Avenue, Atlantic City, New Jersey
2. Vassar Square Condominiums, 4800 Boardwalk, Ventnor City, New Jersey
3. House, 114 S. Harvard Avenue, Ventnor City, New Jersey
4. Charles Fischer House, 115 S. Princeton Avenue, Ventnor City, New Jersey
5. Ocean City Music Pier, 811 Boardwalk, Ocean City, New Jersey

For the five historic properties noted above, each would retain its maritime setting, and that maritime setting contributes to the property's NRHP eligibility and continues to offer significant seaward views that support the integrity of the maritime setting; those seaward views include vantage points with the potential for an open view from each property toward the WTGs (COP Volume III, Appendix F-3; Ocean Wind 2022).

Cumulative visibility of the WTGs and other offshore wind energy development activities, including construction and operation, is anticipated to intensify the level of adverse effects on the five historic properties. The Project would contribute approximately 17 percent of the cumulative adverse effect, owing to the location and intensity of the Project and foreseeable build-out attributable to other offshore wind energy development activities.

The conclusions here are recommendations by ICF regarding the WTGs' incremental contribution to cumulative visual effects (daytime and nighttime) on historic properties when combined with past, present, and reasonably foreseeable offshore wind energy development activities in the APE for this Project. These recommendations are provided to inform BOEM's determination of Project effects on historic properties and consultation on any effects found. Where BOEM has made its determination in the *Finding of Adverse Effect for the Ocean Wind Construction and Operations Plan*, this determination is expressed consistently in the CHRVEA. While Section 106 consultation is ongoing among BOEM, State Historic Preservation Officers, and other identified consulting parties on the Project, final determinations and findings remain with BOEM in accordance with 36 CFR 800. This includes ongoing consultation with Native American tribes that may identify properties of traditional cultural and religious significance in the APE.

2.1 National Historic Landmarks and the National Historic Preservation Act Section 106 Process

The NPS, which administers the NHL program for the Secretary of the Interior (Secretary), describes NHLs and requirements for NHLs as follows:

> National Historic Landmarks (NHL) are designated by the Secretary under the authority of the Historic Sites Act of 1935, which authorizes the Secretary to identify historic and archaeological sites, buildings, and objects which "possess exceptional value as commemorating or illustrating the history of the United States." Section 110(f) of the NHPA requires that Federal agencies

> exercise a higher standard of care when considering undertakings that may directly and adversely affect NHLs. The law requires that agencies, "to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark." In those cases when an agency's undertaking directly and adversely affects an NHL, or when Federal permits, licenses, grants, and other programs and projects under its jurisdiction or carried out by a state or local government pursuant to a Federal delegation or approval so affect an NHL, the agency should consider all prudent and feasible alternatives to avoid an adverse effect on the NHL. (NPS 2021)

NHPA Section 110(f) applies specifically to NHLs. BOEM is implementing the special set of requirements for protecting NHLs and for compliance with NHPA Section 110(f) at 36 CFR 800.10, which, in summary:

1. Requires the agency official, to the maximum extent possible, to undertake such planning and actions as may be necessary to minimize harm to any NHL that may be directly and adversely affected by an undertaking;
1. Requires the agency official to request the participation of the ACHP in any consultation conducted under 36 CFR 800.6 to resolve adverse effects to NHLs; and
2. Further directs the agency to notify the Secretary of any consultation involving an NHL and to invite the Secretary to participate in consultation where there may be an adverse effect.

The HRVEA identified two NHLs in the visual APE for the Project: Lucy the Elephant and Atlantic City Convention Hall. BOEM has determined these properties would not be adversely affected by the Project. While these buildings have a seaside location, these ocean views are not character defining (COP Volume III, Appendix F-3, pages 51–52, 77; Ocean Wind 2022). As such, these properties were not included in the CHRVEA.

3 PERSONNEL

This study was co-authored by key personnel: Secretary of the Interior–qualified professional architectural historian January Tavel, MHP; historic preservation specialist Alex Ryder, MA; and historic preservation specialist Corey Lentz, MHP. Resumes of the report co-authors can be found in Appendix D, *Key Personnel Resumes.*

4 REFERENCES CITED

Bureau of Ocean and Energy Management (BOEM). 2022. *Ocean Wind 1 Offshore Wind Farm Draft Environmental Impact Statement*. Available: https://www.boem.gov/renewable-energy/state-activities/ocean-wind-1.

Leahy, Bill, and Kay Leahy. 2021. Avalon and Stone Harbor Weekly Update, May 20, 2021. May 20. Available: https://bleahy.com/2021/05/20/avalon-and-stone-harbor-weekly-update-may-20-2021/. Accessed: December 5, 2021.

National Historic Preservation Act, Section 106, 36 Code of Federal Regulations Part 800. April 5, 2004. Available: https://www.achp.gov/sites/default/files/regulations/2017-02/regs-rev04.pdf. Accessed: February 4, 2022.

National Park Service (NPS). 1997. *How to Apply the National Register Criteria for Evaluation*. Rev. ed. National Register Bulletin 15. Available: https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf. Accessed: August 26, 2020.

National Park Service (NPS). 2021. Section 110 of the National Historic Preservation Act. Available: https://www.nps.gov/fpi/Section110.html. Accessed: April 29, 2021.

Ocean Wind, LLC (Ocean Wind). 2022. *Construction and Operations Plan, Ocean Wind Offshore Wind Farm.* Volumes I–III. May. Available: https://www.boem.gov/ocean-wind-construction-and-operations-plan/. Accessed: August 26, 2020.

Sullivan, Robert G., Leslie B. Kirchler, Jackson Cothren, and Snow L. Winters. 2013. *Offshore Wind Turbine Visibility and Visual Impact Threshold Distances*. Available: https://blmwyomingvisual.anl.gov/docs/WindVITD.pdf. Accessed: November 19, 2020.

APPENDIX A

Description, Historic Character, and Basis for National Register of Historic Places Eligibility of the Five Historic Properties with Adverse Effects from the Project

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The HRVEA (COP Volume III, Appendix F-3; Ocean Wind 2022) provided a description, photograph, historic character, and basis for the NRHP eligibility of each of the five historic properties that could be adversely affected by the Project, as summarized below:

> The Riviera Apartment building at 116 South Raleigh Avenue in Atlantic City is a nine-story apartment building dating to 1930 … . The building was originally recorded in 1980 and has an "Identified" status with the NJ HPO. It was surveyed for the Project in January 2021, and is recommended eligible under Criterion C for its Spanish-influenced Art Deco style of architecture. The original survey form attributes the design to Philadelphia architect Harry Sternfeld, and describes the building as "the queen of Atlantic City's larger apartment houses—its concrete and tile decoration are exuberant and original, rare outside of New York" … . The building appears to have undergone very few changes over the years, maintaining its original form, massing, and Art Deco design details. The building is adjacent to the Atlantic City Boardwalk. Its primary façade (northeast elevation) does not face the ocean. Both the northeast and southeast elevations include bands of windows including bay windows to optimize ocean views. The building also includes rooftop balconies with ocean views. The building is approximately 15.6 mi from the [Wind Farm Area] (COP Volume III, Appendix F-3; Ocean Wind 2022:56).

Figure A-1 Riviera Apartment, 116 South Raleigh Avenue, Atlantic City

> The Vassar Square Condominiums at 4800 Boardwalk in Ventnor City is a high-rise building dating to 1969 … . The 21-story building is 218 feet (66.45 meters) tall, and was surveyed for the first time for this Project in January 2021. The building is recommended eligible for the NRHP under Criterion C for Architecture as a good example of mid-century high-rise design with Formalist architectural details (reinterpretations of classical building components). The building's

units each have a cantilevered balcony with glass railings. Corner balconies have view in multiple directions. This is especially important for units at the rear of the building (northwest), which, despite their location, have ocean views due to the balcony design. Balconies on the northeast and southwest elevations angle outward to create an interesting dimensional effect across the wall plane. The angle also affords additional space on the balcony and increases the field of view from each unit. The building's upper levels are primarily glass and brick, while the ground level features stuccoed arches infilled with glass or metal grate … . The [Wind Farm Area] is approximately 16 miles southeast of the property (COP Volume III, Appendix F-3; Ocean Wind 2022:60).

Figure A-2 Vassar Square Condominiums, 4800 Boardwalk, Ventnor City

The house at 114 South Harvard Avenue in Ventnor City is a two-and-a-half-story French Eclectic style building dating to 1925 … . The building was surveyed in January 2021, and is recommended NRHP-eligible under Criterion C for Architecture as a good example of early twentieth century beachfront housing in Ventnor City. The building appears to retain its original form and massing, and includes French Eclectic features such as textured stucco walls, steeply pitched roof, flared eaves and multiple eave heights, and an asymmetrical plan with a tower. The house is immediately adjacent to the beach and Boardwalk, and has open views toward the Atlantic Ocean. The building faces northeast toward South Harvard Avenue, with its southeast elevation facing the Boardwalk. The southeast elevation includes an enclosed ground-level sun room with arched windows facing the ocean. Above the sun room is a second-story porch with unobstructed water views … . The [Wind Farm Area] is approximately 15.7 miles southeast of the property (COP Volume III, Appendix F-3; Ocean Wind 2022:70).

Figure A-3 House at 114 South Harvard Avenue, Ventnor City

The Charles Fischer House at 115 South Princeton Avenue in Ventnor City is a two-and-a-half-story Mediterranean-eclectic style building dating to 1915 … . The building was surveyed in January 2021, and is recommended NRHP-eligible under Criterion C for architecture as a good example of early twentieth century beachfront housing in Ventnor City. The building appears to retain its original form and massing, including classic Mediterranean features including stucco walls, tile roof, decorative tile inlay, and a prominent arched door opening with alcoves. The house is immediately adjacent to the beach and Boardwalk, and has open views toward the Atlantic Ocean. The building faces southwest toward South Princeton Avenue, with its southeast elevation facing the Boardwalk. The southeast elevation includes an enclosed second-story sun room with arched windows facing the ocean. Views from this location are currently partially obstructed by trees … . The [Wind Farm Area] is approximately 15.7 miles southeast of the property (COP Volume III, Appendix F-3; Ocean Wind 2022:73).

Figure A-4 Charles Fischer House at 115 South Princeton Avenue, Ventnor City

The Ocean City Music Pier was constructed as a concert hall in 1928, after a fire destroyed much of the Ocean City boardwalk. The Ocean City Music Pier was determined eligible for the NRHP in 1990. NJ HPO online records do not include information on the building's NRHP significance; however, it appears to be significant under Criterion A for Entertainment and Recreation due to its long history as an entertainment venue on the Ocean City Boardwalk, and under Criterion C for Architecture. The Ocean City Music Pier continues to function as a music venue. The building includes an enclosed concert hall and attached open air loggia (Figure 62). The enclosed portion of the building features large arched windows (Figure 63), while the loggia has open arches. There are ocean views from both inside the concert hall and inside the loggia, although the views have changed somewhat over the years. Originally, the pier was built over the water and views were exclusively of the ocean. In 1993, a major beach restoration project imported 6.4 million cubic ft of sand to widen Peck Beach in Ocean City (USACE 2011). Since 1993, the pier has been over sand rather than water and the views to the north and south primarily include the beach, with water views visible at an angle. The building's primary entrance faces west and is accessed via the Ocean City Boardwalk, and the rear of the building sits on piers driven into the sand. The Project area is due east of the Ocean City Music Pier, approximately 15.2 mi away (COP Volume III, Appendix F-3; Ocean Wind 2022:91).

Figure A-5 Ocean City Music Pier, Boardwalk, Ocean City

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APPENDIX B

Memorandum: Ocean Wind 1 Cumulative Assessment Visual Material, May 24, 2022

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tjd&a | Landscape Architects & Planners

May 24, 2022

Ocean Wind 1 Cumulative Assessment Visual Material

In accordance with BOEM guidance for assessing the effects of Reasonably Foreseeable Planned Actions (RFPA)[1], OCW01 is presented through **computer-based viewshed analyses** and **visualizations from four representative Key Observation Points (KOPs)** in relation to the following proposed projects or lease areas. These projects/lease areas have the theoretical potential to be seen in the same viewshed as OCW01:

1. New York Bight WEA, Lease Areas (OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542)
2. Atlantic Shores South (OCS-A 0499)
3. Atlantic Shores North (OCS-A 0549)
4. Ocean Wind 2 and Ocean Wind X (OCS-A 0532)
5. Garden State OE I (OCS-A 0482)
6. Skipjack OE (OCS-A 0519)
7. US Wind (OCS-A 0490)

The information provided in this cover letter outlines the materials, data, and processes used to complete the visual materials. Visual materials referenced in this cover letter include:

- Cumulative Assessment Visualizations, dated May 6, 2022
- Cumulative Assessment Viewshed Analysis, dated September 24, 2021.

[1] Sullivan, Robert G. Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States. US Department of the Interior, Bureau of Ocean Energy Management. Chapter 8. April 2021.

PROJECT DATA

The analysis includes eight offshore wind projects, including OCW01.

The turbine specifications and layout for each of the above projects was based on the dimension and layout specifications provided by BOEM in cell D13 of the *Draft Cumulative Effects Visual Simulations Comments Spreadsheet* dated September 30, 2021. The following table summarizes the specifications used in the Cumulative Effect Visualizations for each project:

Offshore Wind Project	WTG Number	Hub Height (ft)	Blade Tip Height (ft)	Rotor Diameter (ft)	WTG Layout
Hudson South	547	492	853	722	1nm x 1nm between WTGs and rows
Atlantic Shores South	202	574.2	1046.6	918.6	1nm rows spaced 0.6nm apart
Atlantic Shores North	160	574.2	1046.6	918.6	1nm rows spaced 0.6nm apart
Ocean Wind 1	99	512	906	788	Layout consistent with COP
Ocean Wind 2	88	512	906	788	Spacing same as Ocean Wind 1
Ocean Wind X	33	512	906	788	Spacing same as Ocean Wind 1
Garden State	131	492	853	722	0.8nm x 0.8nm between WTGs and rows
Skip Jack	52	492	853	722	0.8nm x 0.8nm between WTGs and rows
US Wind	98	492	853	722	1nm x 1nm between WTGs and rows

VIEWSHED ANALYSIS

This analysis identifies areas in the landscape where any of the projects may be visible under optimal conditions. This work includes three visual representations of project visibility:

1. Areas of potential hub and blade tip visibility for each individual project (maps 1-8).
2. Areas of potential blade tip visibility for all projects except OCW01 (map 9).
3. Areas of potential blade tip visibility for all projects, including OCW01 (map 10).

The following outlines the technical methodology and limitations of the computer-based viewshed analysis.

Technical Methodology

The viewshed analysis was conducted using ESRI ArcGIS Pro software. The Digital Terrain Model (DTM) and Digital Surface Model (DSM) used to represent the landscape in the viewshed analysis were derived from LiDAR point cloud data taken from The National Map produced by the U.S. Geological Survey (USGS)[2]. The point cloud data was processed to create 10-foot square resolution surface raster models. A viewer height of 5 feet above the terrain was assigned to represent the eye level of a typical viewer in the landscape.

Surface Data

The surface data used in the analysis was limited to the 40-mile visual study area identified in the Ocean Wind 1 Visual Impact Assessment as the visual study area. This area extends along the New Jersey

[2] The National Map produced by the U.S. Geological Survey is available here: https://viewer.nationalmap.gov/basic/

coastline from Barnegat Light in the north to Cape May in the south, and extends inland as far west as Vineland, NJ. The total size of the study area is 6,769 square miles.

The surface data primarily covers the land mass within the study area and not the open ocean. While the ocean does not appear to have potential visibility in the analysis, it is understood that the projects would be visible from all points on the open ocean within the 40-mile study area because there are no fixed features on the open water that would block visibility.

The viewshed analysis modeled the potential visibility of the turbine blades and hubs based upon both the topography (DTM) and structures and vegetation (DSM). This analysis considers features in the landscape beyond topography that would block views of the turbines. Intervening structures and tree masses in the relatively flat landscape that is characteristic of southern New Jersey play an important role in screening the projects, making the DSM an essential component of the computer-based analysis.

Theoretical Visibility

The computer-based viewshed assessment included project turbines within 40-miles of the surface data. This 40-mile limitation accounts for the limits of theoretical visibility. While project turbines may be located above the horizon beyond this distance, they are unlikely to be detected by casual observers due to the relative thinness of the blades and the limits of visual acuity.

Analysis Limitations

In this type of analysis, turbines are counted as 'visible' if the computer determines that a single point on the component would be seen from an observation point five feet above the ground (i.e., equivalent to the eye level of an average person). Computer-based viewshed analysis does not determine the degree of potential visibility based on distance, weather, or other atmospheric conditions. Nor does it determine how many turbines or how much of a turbine would be visible from any particular viewpoint. Because the degree of potential visibility cannot be represented in the viewshed analysis, the analysis maps should not be used in isolation or without the aid of visualizations.

This analysis does not take into account the potential screening effect of other offshore wind projects. For example, it is possible that Atlantic Shores may screen views of Hudson South from some locations because Atlantic Shores is located between the shoreline and the Hudson South turbines.

VISUALIZATIONS

Visualizations (also known as photosimulations) were prepared from representative KOPs of the identified offshore wind projects. At each KOP, a panoramic visualization was prepared showing three conditions:

1. Only OCW01.
2. All identified offshore wind projects.
3. All identified offshore wind projects with the exception of OCW01.

The following outlines the process for developing the visualizations.

Representative KOP Selection

In selecting representative OCW01 KOPs, the goal was to identify a sample of viewpoints that show OCW01 in relation to other projects that may also be visible within the OCW01 visual study area. The

standards for selecting these viewpoints were defined by TJD&A at the onset of the process to meet BOEM's objectives in evaluating RFPAs[3]:

- The representative viewpoints and existing visualizations (i.e., previously prepared for Ocean Wind) should represent a full range of possible visibility of other projects.
- Ocean Wind should be readily noticeable under ideal viewing conditions, which may exceed 25 miles from the viewer during daylight hours.
- The location and photographic quality of the existing photography should show meteorological and lighting conditions that enable BOEM to assess the worst-case visibility and potential CE on the landscape/seascape.

Our visual assessment team used a systematic selection process to identify KOPs that were prepared for the COP that best represented the selection standards for the Cumulative Effects analysis.

1. **Mapping Analysis.** A mapping analysis to determine theoretical visibility from each viewpoint and sort the KOPs by geographic area groups.
2. **Elimination of Faint KOPs.** Elimination of KOPs with a faint compatibility rating per the Ocean Wind VIA; i.e., those locations where the WTGs were scarcely visible in the visualization.
3. **Evaluation of Location and Photographic Quality.** Selection of locations with photographs that best capture both the full extent of the RFPAs and the ideal meteorological conditions needed for optimum visibility.

1. Mapping Analysis

Mapping analysis was conducted to determine theoretical visibility of the foreseeable future projects from each viewpoint.

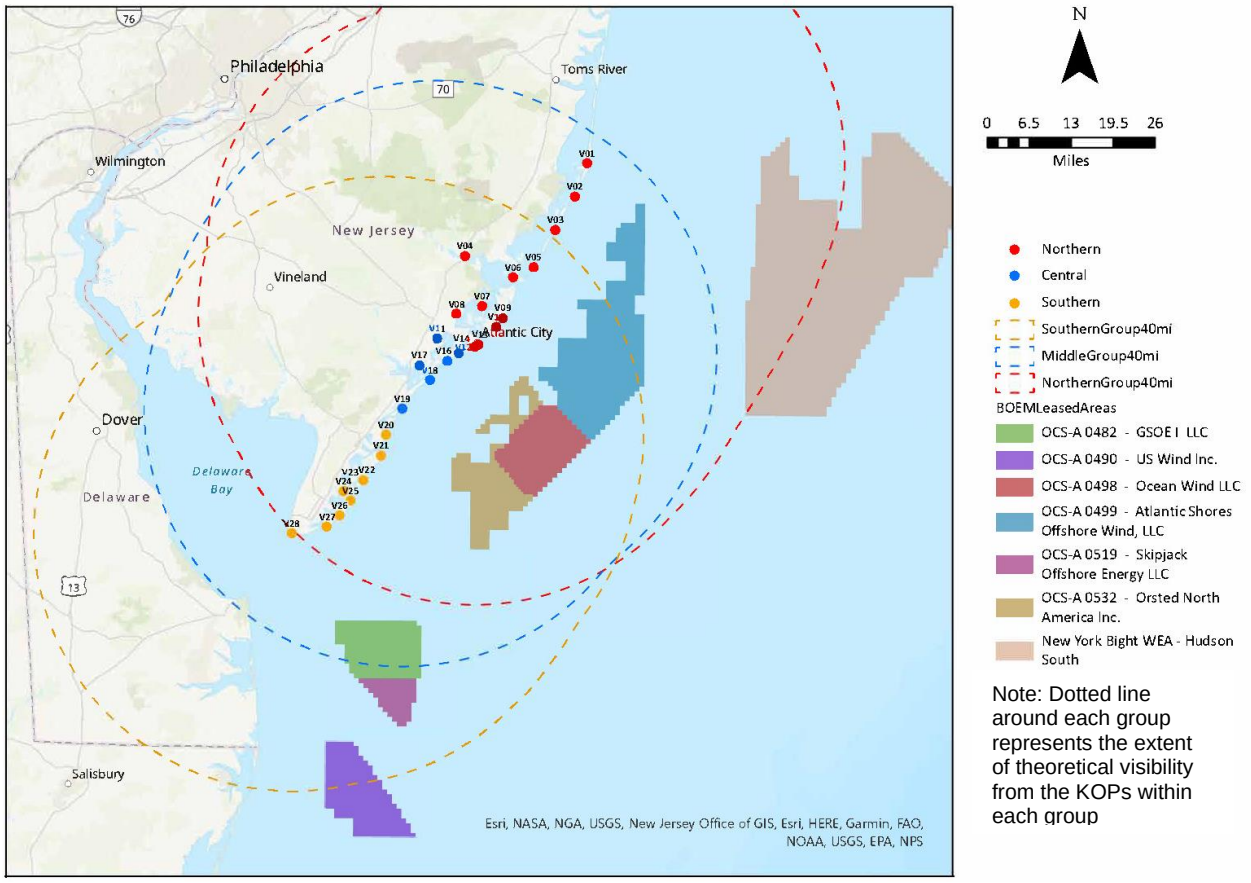
1. Using ESRI ArcMap, we evaluated all 28 KOP locations in relation to OCW01 and all other projects identified by BOEM for CE analysis.
2. A 360° radius of 40 miles was established around each KOP that represents the area of theoretical visibility from each KOP.
3. The foreseeable future offshore wind projects potentially visible from each KOP were identified. The KOPs with potential visibility of the same projects were grouped together. These groups also represented KOPs with similar viewing direction and orientation to OCW01.

[3] Ibid. "Because of the high likelihood of important seascape/landscape and visual RFPA effects from offshore wind energy development, it is important to develop visual simulations for RFPA effects where the proximity of other projects suggests there may be RFPA effects associated with these projects. ... Their use for RFPA effects assessment for offshore wind facilities will be of significant help in visualizing the relationship between the proposed project and other projects already proposed or under consideration, as well as the total impacts of multiple offshore wind projects and onshore projects that may be visible from one or more locations along the coast." pp 52-53.

4. This resulted in three groups[4]:
    a. **North Group**: New York Bight WEA - Hudson South; OCS-A 0499 - Atlantic Shores Offshore Wind, LLC; OCS-A 0532 - Orsted North America Inc.[5]
    b. **Central (Middle) Group**: OCS-A 0499 - Atlantic Shores Offshore Wind, LLC; OCS-A 0532 - Orsted North America Inc.; OCS-A 0482 - GSOE I LLC
    c. **South Group**: OCS-A 0499 - Atlantic Shores Offshore Wind, LLC; OCS-A 0532 - Orsted North America Inc.; OCS-A 0482 - GSOE I LLC; OCS-A 0519 - Skipjack Offshore Energy LLC; OCS-A 0490 - US Wind Inc.

All KOPs within each of the three groups have potential visibility of the same projects. By selecting representative KOP(s) from each group for the CE analysis, all projects and combinations of projects potentially visible within the OCW01 study area will be visually represented.

The map below illustrates these groupings. The dotted line around each group represents the extent of theoretical visibility from the KOPs within each group.



[4] The viewshed analysis was conducted in September 2021, prior to Atlantic Lease Sale 8 in the New York Bight and the segregation of commercial lease OCS-A 0499 (Atlantic Shores Offshore Wind, LLC) which resulted in the creation of commercial lease OCS-A 0549 commonly referred to as Atlantic Shores North. Projects/lease areas are identified as they existed at the time of the viewshed analysis.

[5] OCS-A 0532 - Orsted North America Inc. is also referred to as projects Ocean Wind 2 and Ocean Wind X.

2. Elimination of Faint KOPs

In order illustrate how the Ocean Wind project contributes to the incremental changes to the viewshed in relation to other offshore wind projects, the Ocean Wind project should be readily noticeable or visually apparent in the selected KOPs.

Viewpoints where OCW01 is difficult to discern are less likely to contribute to the overall cumulative visual effect. Selecting a KOP where the Ocean Wind project is not readily noticeable or visually apparent may misrepresent Ocean Wind's potential contribution to the CE analysis.

Faint Compatibility Rating: The Ocean Wind VIA evaluated each of the 28 KOP visualizations based on compatibility with the existing landscape/seascape. This evaluation is based upon project visibility and the degree of contrast (in form, line, color, and texture) anticipated with the surrounding seascape/landscape. The evaluation scale ranged from *faint, apparent, conspicuous, prominent, to dominant*.

A compatibility rating of **faint** was defined as: "Project is indistinct or not obvious within the view, either due to its proximity, massing, width, height, number of structures, duration of view, scale, visibility or contrast with the surrounding seascape. Project causes a very small alteration to the seascape character, or features within the seascape, such that there is a de minimis change from the pre-existing condition".

An analysis of the 28 KOPs found that viewpoints over 25 miles away were evaluated as *faint*, regardless of viewer elevation, weather conditions, or lighting conditions. At that distance the relative size of the turbines (measured at arm's length) was less than 1/8 inch. Viewpoints less than 25 miles away evaluated as *faint* contained visual obstructions (such as land mass, buildings, or vegetation between the viewpoint and the project) or were based on night conditions where only the FAA warning lights may be visible on the horizon. Significant visual obstructions, such as the buildings that frame the view from V15 Ventnor City Hall or the presence of tall dunes at V20 Sea Isle City Promenade, made the project *faintly* visible even at distances 15 to 20 miles from the Project.

The table below lists all KOPs, colored by each group (North, Central, South). With the exception of VO6 Great Bay Boulevard WMA, all KOP viewpoints with a visual compatibility rating of faint were eliminated as representative KOPs for the CE analysis. VO6 Great Bay Boulevard was subsequently retained at the request of BOEM.

Group	#	Viewpoint Location	Compatibility Evaluation	Distance to Nearest Turbine	Visual Obstruction	Time of Day
NORTH	V01	Barnegat Light House	Faint	38.64 mi	No	11:34 AM
	V02	Harvey Cedars Beach Access	Faint	33.36 mi	No	10:59 AM
	V03	Bayview Park	Faint	28.08 mi	No	10:14 AM
	V04	Garden State Parkway	Faint	27.98 mi	Yes	8:03 AM
	V05	**Edwin B. Forsythe NWR - Holgate Unit**	Apparent	22.58 mi	No	7:57 AM
	V06	**Great Bay Boulevard WMA**	Faint	21.85 mi	Yes	9:40 AM
	V07	Edwin B. Forsythe National Wildlife Refuge	Faint	20.04 mi	Yes	5:45 PM
	V08	Absecon Creek Boat Ramp	Faint	21.01 mi	Yes	3:13 PM
	V09	**North Brigantine Natural Area Observation Deck**	Conspicuous	16.77 mi	No	6:33 PM
	V10	**16th Street Park Beachfront (Evening)**	Conspicuous	16.22 mi	No	6:09 PM
	V11	Atlantic City Country Club	Faint	19.71 mi	Yes	12:10 PM
	V12	**Atlantic City Beachfront (Day)**	Conspicuous	16.04 mi	No	2:39 PM
	V13	**Atlantic City Beachfront (Night)**	Apparent	16.04 mi	No	10:45 PM
	V14	**Playground Pier**	Conspicuous	15.21 mi	No	12:28 PM
CENTRAL	V15	City Hall in Ventnor City	Faint	15.80 mi	Yes	3:55 PM
	V16	**Lucy The Elephant National Historic Landmark**	Conspicuous	16.01 mi	No	12:50 PM
	V17	Municipal Beach Park, Bay Front Hist. Dist.	Faint	18.33 mi	Yes	10:50 AM
	V18	**Ocean City Boardwalk**	Conspicuous	15.54 mi	No	7:18 PM
	V19	**Corson's Inlet State Park**	Conspicuous	16.22 mi	No	4:55 PM
SOUTH	V20	Sea Isle City Promenade	Faint	17.36 mi	Yes	1:50 PM
	V21	**Jetty at north end of Avalon beach**	Apparent	17.84 mi	No	10:14 AM
	V22	**Stone Harbor Beach Access (Day)**	Apparent	20.93 mi	No	4:22 PM
	V23	Stone Harbor Beach Access (Night)	Faint	20.93 mi	No	8:49 PM
	V24	**North Wildwood Boulevard Bridge**	Apparent	24.29 mi	Yes	1:54 PM
	V25	**Hereford Inlet Lighthouse**	Apparent	23.61 mi	Yes	3:20 PM
	V26	Wildwood Crest Fishing Pier	Faint	25.95 mi	No	3:49 PM
	V27	Cape May National Wildlife Refuge	Faint	28.45 mi	No	11:16 AM
	V28	Cape May Lighthouse	Faint	33.88 mi	Yes	2:03 PM
Note: Viewpoints in bold are included for further CE analysis. Other viewpoints have been eliminated from CE Analysis						

3. Evaluation of Location and Photo Quality

The location and photographic conditions should represent ideal conditions for seascape visibility.

The remaining KOPs in each group were evaluated based on the photo quality and representative location. The selection of the representative KOP from each group was made based on the following criteria:

- The location was a good representation of the landscape/seascape character in the study area.
- The location is easily accessible and recognizable by the public.
- The photographic conditions represent a clear day with good visibility. This eliminated nighttime conditions and hazy weather conditions.

- The viewpoint does not have a visual obstruction in the foreground or midground (such as a pier or land mass) blocking the view of other projects.

The table below shows the remaining KOPs in each group. All KOP viewpoints with visual obstructions, night lighting, or poor weather conditions were eliminated as representative KOPs.

#	Viewpoint Location	Compatibility Evaluation	Distance to Nearest Turbine	Time of Day	Reason for elimination
V05	Edwin B. Forsythe NWR - Holgate Unit	Apparent	22.58 mi	7:57 AM	Poor weather conditions
V06	**Great Bay Boulevard WMA**	**Faint**	**21.85 mi**	**9:40 AM**	
V09	North Brigantine Natural Area Observation Deck	Conspicuous	16.77 mi	6:33 PM	Evening lighting
V10	16th Street Park Beachfront (Evening)	Conspicuous	16.22 mi	6:09 PM	Evening lighting
V12	Atlantic City Beachfront (Day)	Conspicuous	16.04 mi	2:39 PM	Visual Obstruction (piers)
V13	Atlantic City Beachfront (Night)	Apparent	16.04 mi	10:45 PM	Visual Obstruction (piers)
V14	**Playground Pier**	**Conspicuous**	**15.21 mi**	**12:28 PM**	
V16	Lucy The Elephant National Historic Landmark	Conspicuous	16.01 mi	12:50 PM	Poor weather conditions
V18	Ocean City Boardwalk	Conspicuous	15.54 mi	7:18 PM	Visual distraction in foreground
V19	**Corson's Inlet State Park**	**Conspicuous**	**16.22 mi**	**4:55 PM**	
V21	Jetty at north end of Avalon beach	Apparent	17.84 mi	10:14 AM	Lighting glare on water
V22	**Stone Harbor Beach Access (Day)**	**Apparent**	**20.93 mi**	**4:22 PM**	
V24	North Wildwood Boulevard Bridge	Apparent	24.29 mi	1:54 PM	Visual Obstruction (land mass)
V25	Hereford Inlet Lighthouse	Apparent	23.61 mi	3:20 PM	Visual Obstruction (interior wall)
Note: Viewpoints in bold are included for further CE analysis. Other viewpoints have been eliminated from CE Analysis					

Of the remaining KOPs, the final representative location was based on the overall quality of the photography and the public accessibility of the viewpoint. For the South Group, a KOP with heavy use and easy public access (i.e., Stone Harbor Beach Access) was selected over a KOP with more limited accessibility (i.e., Jetty and North End of Avalon Beach). The remaining viewpoints were also evaluated as a whole to ensure reasonable geographic distribution and viewing distance within the study area.

Based on this methodology, three KOPs were selected as representative viewpoints:

- **V14. Playground Pier, Atlantic City**
- **V19. Corson's Inlet State Park, Ocean City**
- **V22. Stone Harbor Beach Access (Day), Stone Harbor**

Following this section process, BOEM requested a fourth KOP be added to the collection:

- **V06. Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township**

Technical Methodology

Visualizations combine photographs of the view from selected viewpoints with computer-generated models to illustrate how the projects will appear from those viewpoints and the surrounding landscape. These are accurate representations of proposed future conditions that consider topography, vegetation, structures/buildings, and other factors to help reviewers understand the visual effect that the projects may have on the landscape/seascape. The following describe the process used to develop the

visualizations:

Photography. The camera was set to record at a "normal" focal length (i.e., equivalent to that found on a 50mm SLR camera), which closely matches the image seen by the human eye. Cameras were set at the highest quality level and the largest image size. A series of overlapping photographs at 15° increments were taken at each site to create panoramic views that illustrate actual viewing conditions. A GPS unit mounted on the camera recorded the location of each photograph.

Turbine Modeling. 3D models of the proposed project components (offshore turbines) developed using Autodesk 3D Studio Max Design software (3ds Max) based on technical specifications and project layouts or layout criteria provided by BOEM.

For each visualization the turbines in all projects being modeled were positioned in the computer to face southwest in accordance with prevailing winds.[6] This means that the orientation of the turbines will appear differently at each KOP based on the location of individual projects relative to the viewpoint. The turbine blades were also rotated by the computer to various positions to represent the random blade patterns that an observer typically would see at any point in time.

Surface Modeling. The digital surface model (DSM) of the landscape was developed using LiDAR point cloud data taken from The National Map produced by the U.S. Geological Survey (USGS)[7]. The point cloud data was processed in ArcView to create surface models with 3-foot resolution. LiDAR data is limited to land and waterbodies west of the ocean shoreline; there is no LiDAR data for the open ocean. Because the project are located at considerable distance from the mainland, curvature of the earth was taken into account to determine how much of the turbines and substations would be visible above the horizon from each of the viewpoints.

Model-Image Alignment. Photographs used for the visualizations were aligned to the 'camera view' in the 3D computer-generated model. The location of each photograph was set to the coordinates recorded by the camera's GPS device. The 'camera view' was set using the focal length of lens used in the original photograph (50mm for the Nikon D750). The camera height was set by adding five feet to the digital surface terrain (to reflect the height of camera mounted on the tripod). The bearing (view direction) was set to match the photographs by using vertical and horizontal control points (such as fences or lifeguard stands) visible in both the image and aerial photographs. The control points in the photographs were geolocated and modeled to accurately align the bearing of the photograph with the 3D model. The alignment was done in both GoogleEarth Pro and 3ds Max to ensure maximum accuracy and quality control.

Rendering. Project components were rendered in 3ds Max, which accounts for the color and texture of surface materials, sun position and intensity, day of the year, time of day, weather conditions, distance from the observer, and other factors that may affect the appearance and visibility of the projects.

Image merging. The rendered image of the projects was overlaid with the existing photograph in Adobe Photoshop and blended to create the final visualization. The final editing removed turbines or portion of turbines where buildings, vegetation, or other features in the landscape would block the view. In

[6] See wind rose on page 47/428 of the Ocean Wind COP dated September 2020. The data represented in the wind rose is the most accurate we have for all offshore projects in this analysis.
[7] USGS National Map: https://viewer.nationalmap.gov/basic/

addition, portions of turbines below the horizon line (usually the waterline) that are not visible due to curvature of the earth were removed. Minor adjustments were also made to create a highly realistic image that accurately represents project visibility.

Panoramic Images. Original photographs were merged to form a single panoramic image to illustrate the full extent of the projects in a single image. The extent of the panoramic image includes all identified offshore wind projects visible from each representative KOP.

APPENDIX C
Ocean Wind Cumulative Visual Simulations

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VIEWPOINT
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

VISUALIZATIONS

VISUALIZATIONS INCLUDED	
1A	Northeast view: only Ocean Wind 1
1B	Northeast view: all visible projects
1C	Northeast view: all visible projects except Ocean Wind 1
2A	Southeast view: only Ocean Wind 1
2B	Southeast view: all visible projects
2C	Southeast view: all visible projects except Ocean Wind 1

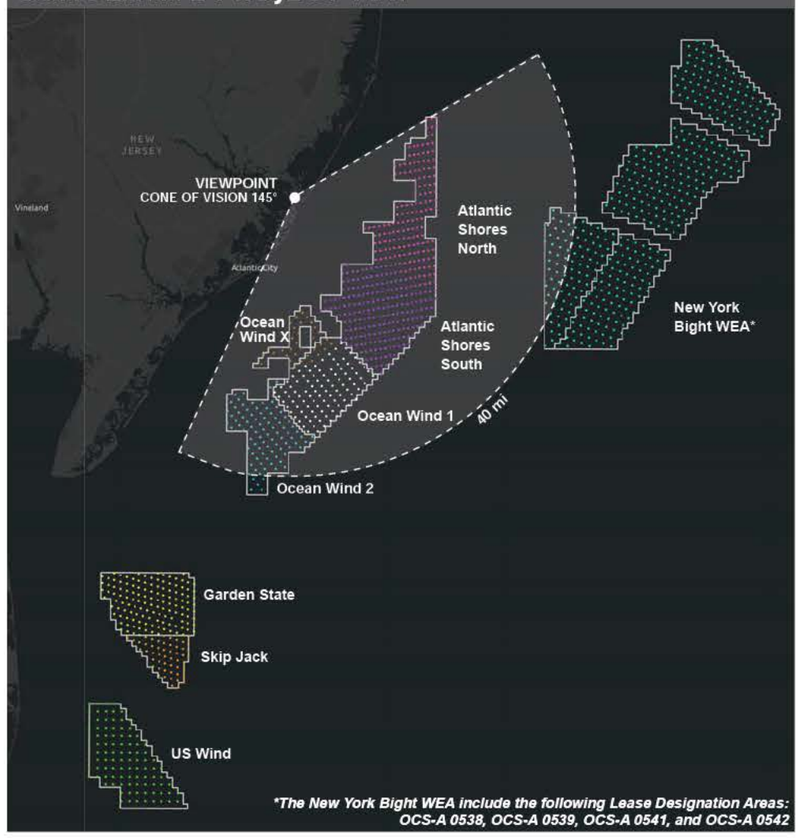
**** New York Bight WEA is not visible from this viewpoint due to the land mass in the foreground.**

CUMULATIVE PROJECT INFORMATION

OFFSHORE WIND PROJECT	THEORETICALLY VISIBLE FROM VIEWPOINT*	DISTANCE TO NEAREST WTG (mi)	DISTANCE TO FARTHEST WTG (mi)	NUMBER OF THEORETICALLY VISIBLE TURBINES	HORIZONTAL FIELD OF VIEW
New York Bight WEA	Yes	36.6	69.7	0**	0°
Atlantic Shores North	Yes	11.2	23.6	131	56°
Atlantic Shores South	Yes	11.9	28.0	202	43°
Ocean Wind 1	Yes	21.9	34.1	69	30°
Ocean Wind 2	Yes	26.3	41.9	24	14°
Ocean Wind X	Yes	16.4	24.0	33	26°
Garden State	No	55.8	66.1	0	0°
Skip Jack	No	64.2	71.6	0	0°
US Wind	No	76.4	89.2	0	0°

*A distance of 40-miles from each viewpoint has been used to define the limits of theoretical visibility. This 40-mile distance aligns with the visual study area used in the Ocean Wind Visual Impact Assessment. For an observation elevation of 25 feet (typical of views from the boardwalks on the coast of New Jersey), the limit of Ocean Wind turbine hub visibility would be 37.3 miles due to earth curvature. While the blade tips are located above the horizon beyond this range, they are unlikely to be detected by observers at these distances due to the limits of visual acuity.

CUMULATIVE PROJECT MAP



WIND DIRECTION

NORTHWEST

Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

VIEWPOINT INFORMATION

LOCATION	
VIA KOP #	V06
Date / Time	09/20/2018 / 9:40am
Latitude / Longitude	39.508809°/ -74.322008°
Direction of View	Northeast to Southeast

PHOTO	
Camera	NIKON D5500
Resolution	300 dpi
Focal Length	50 mm
Viewer Eye Elevation	7 ft

ENVIRONMENTAL	
Temperature	72°
Humidity	73%
Wind Speed	10 mph
Weather Conditions	Overcast

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 145° (based on Nikon D5500 camera lens, where a Normal Photo is 37.26°)

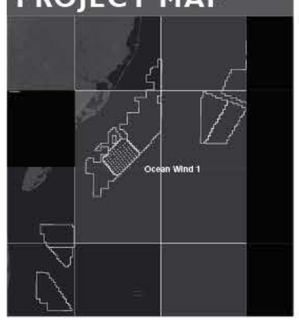
1A: Northeast view showing only Ocean Wind 1

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

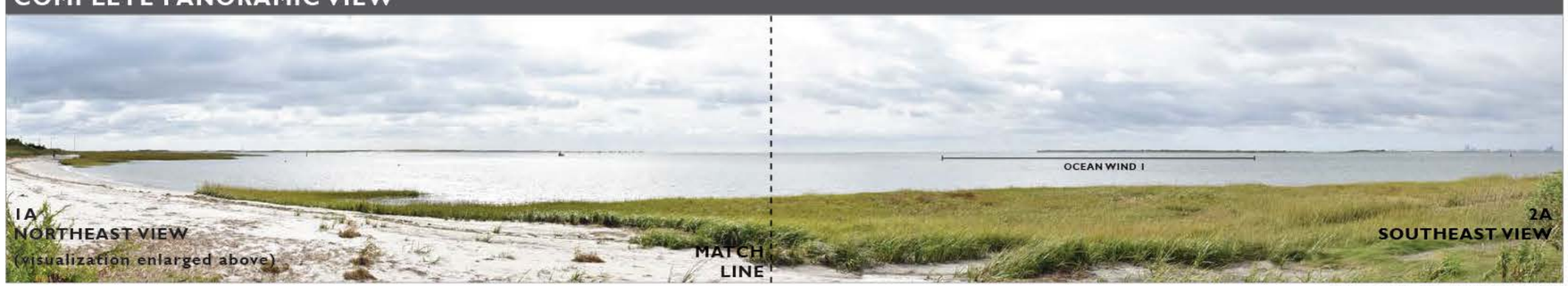
Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

tjd&a

1B: Northeast view showing all visible projects

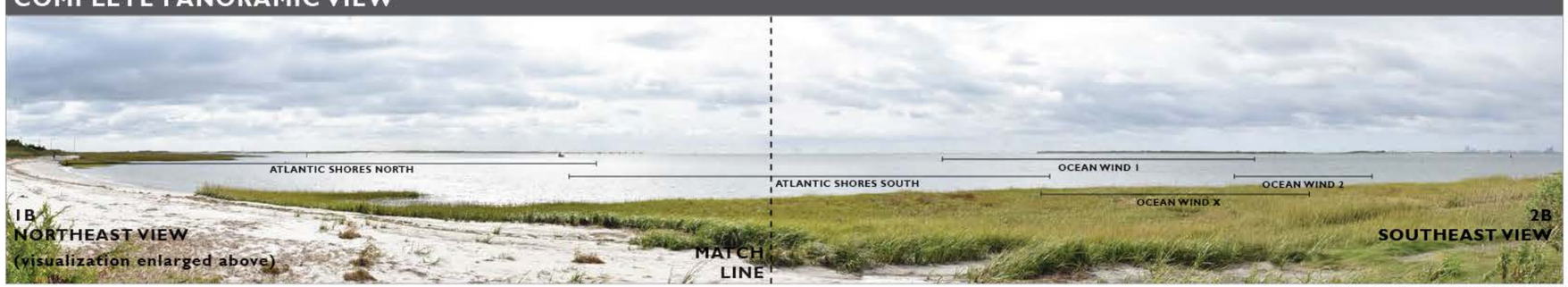
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

NORTHWEST

Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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1C: Northeast view showing all projects except Ocean Wind 1

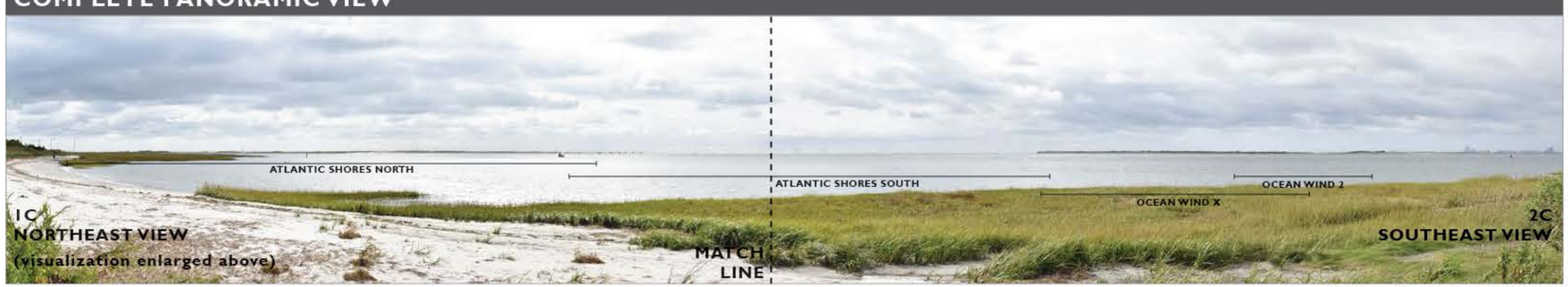
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

NORTHWEST

Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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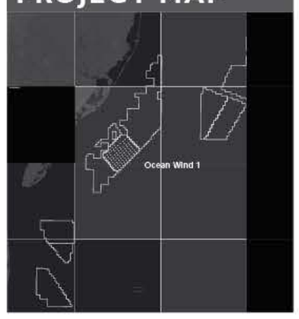
2A: Southeast view showing only Ocean Wind 1

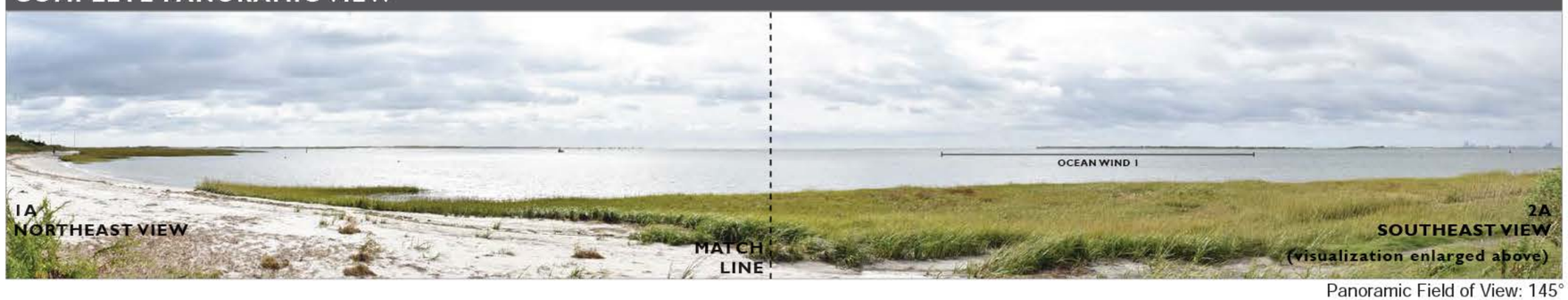
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

NORTHWEST
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Ocean Wind
An Ørsted Initiative

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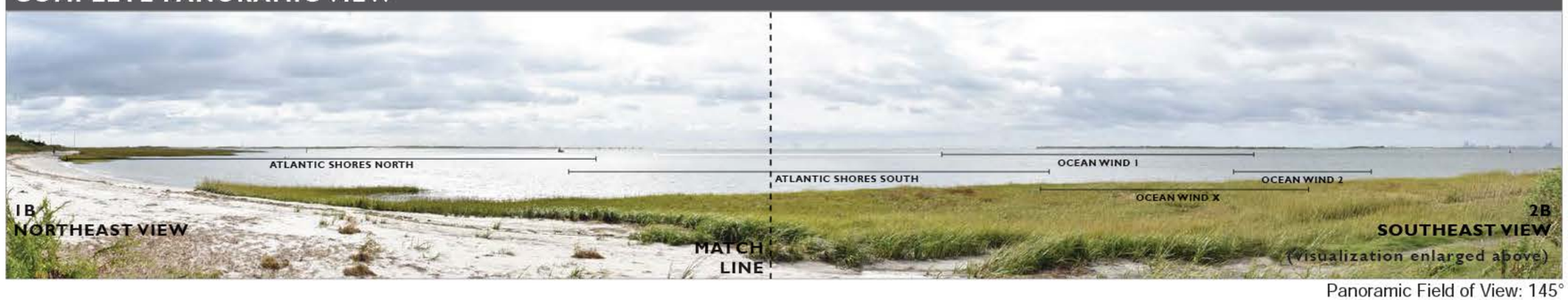
2B: Southeast view showing all visible projects

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Panoramic Field of View: 69°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

NORTHWEST
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Ocean Wind
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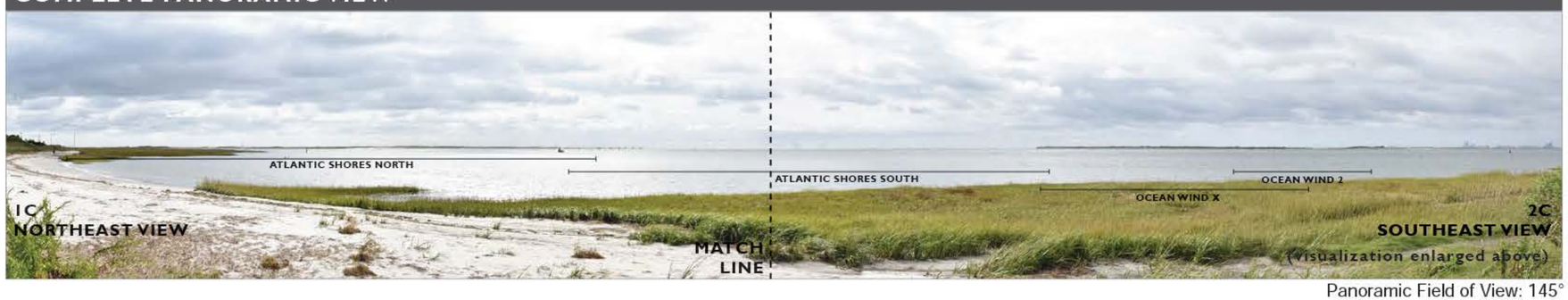
2C: Southeast view showing all projects except Ocean Wind 1

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Panoramic Field of View: 69°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

NORTHWEST
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Ocean Wind
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VIEWPOINT

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

VISUALIZATIONS

VISUALIZATIONS INCLUDED	
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1C	Northeast view: all visible projects except Ocean Wind 1
2A	Southeast view: only Ocean Wind 1
2B	Southeast view: all visible projects
2C	Southeast view: all visible projects except Ocean Wind 1

**** New York Bight WEA is not visible from this viewpoint due to the land mass in the foreground.**

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

CUMULATIVE PROJECT INFORMATION

OFFSHORE WIND PROJECT	THEORETICALLY VISIBLE FROM VIEWPOINT*	DISTANCE TO NEAREST WTG (mi)	DISTANCE TO FARTHEST WTG (mi)	NUMBER OF THEORETICALLY VISIBLE TURBINES	HORIZONTAL FIELD OF VIEW
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Ocean Wind X	Yes	16.4	24.0	33	26°
Garden State	No	55.8	66.1	0	0°
Skip Jack	No	64.2	71.6	0	0°
US Wind	No	76.4	89.2	0	0°

*A distance of 40-miles from each viewpoint has been used to define the limits of theoretical visibility. This 40-mile distance aligns with the visual study area used in the Ocean Wind Visual Impact Assessment. For an observation elevation of 25 feet (typical of views from the boardwalks on the coast of New Jersey), the limit of Ocean Wind turbine hub visibility would be 37.3 miles due to earth curvature. While the blade tips are located above the horizon beyond this range, they are unlikely to be detected by observers at these distances due to the limits of visual acuity.

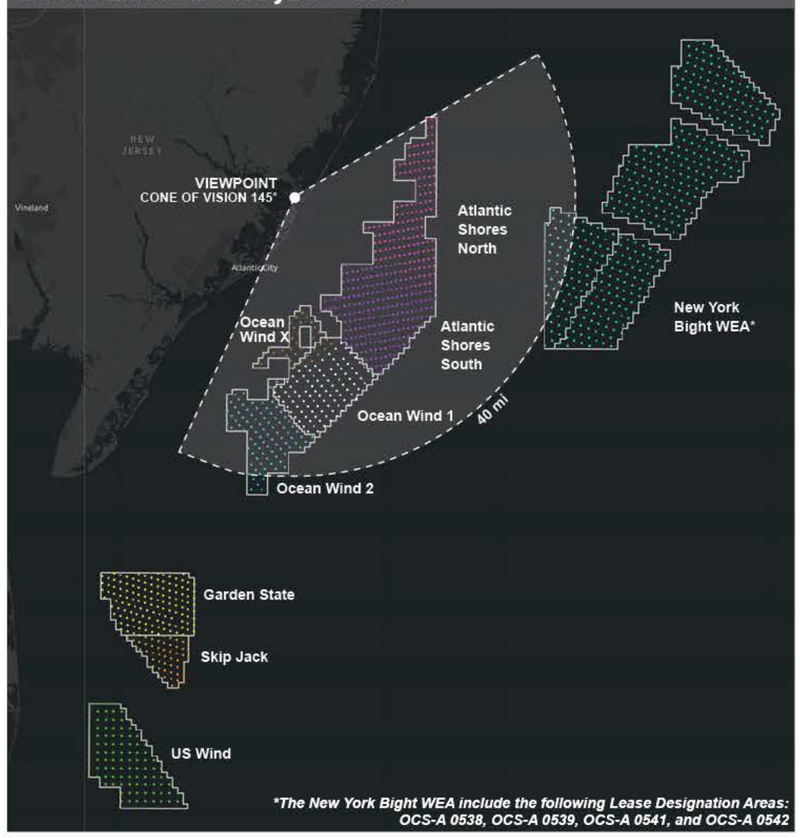
VIEWPOINT INFORMATION

LOCATION	
VIA KOP #	V06
Date / Time	09/20/2018 / 9:40am
Latitude / Longitude	39.508809°/ -74.322008°
Direction of View	Northeast to Southeast

PHOTO	
Camera	NIKON D5500
Resolution	300 dpi
Focal Length	50 mm
Viewer Eye Elevation	7 ft

ENVIRONMENTAL	
Temperature	72°
Humidity	73%
Wind Speed	10 mph
Weather Conditions	Overcast

CUMULATIVE PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 145° (based on Nikon D5500 camera lens, where a Normal Photo is 37.26°)

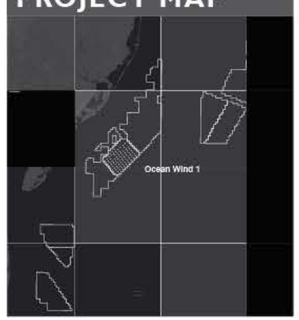
1A: Northeast view showing only Ocean Wind 1

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

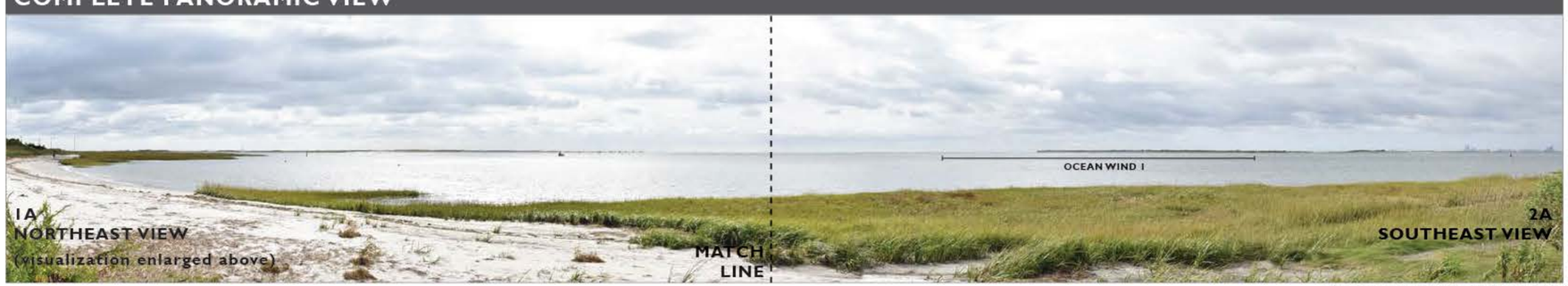
Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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1B: Northeast view showing all visible projects

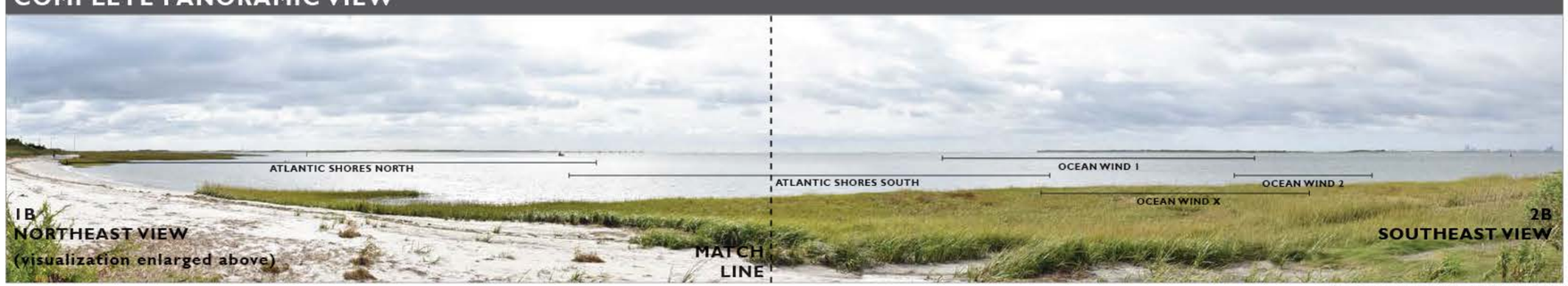
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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1C: Northeast view showing all projects except Ocean Wind 1

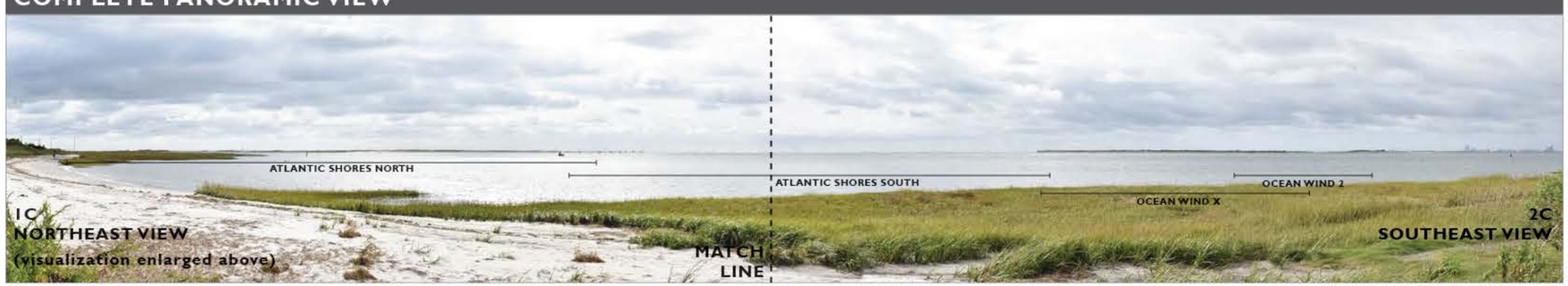
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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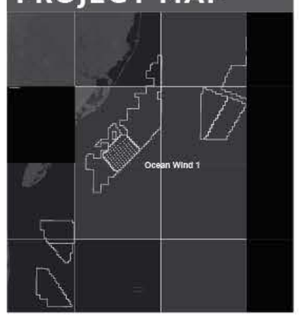
2A: Southeast view showing only Ocean Wind 1

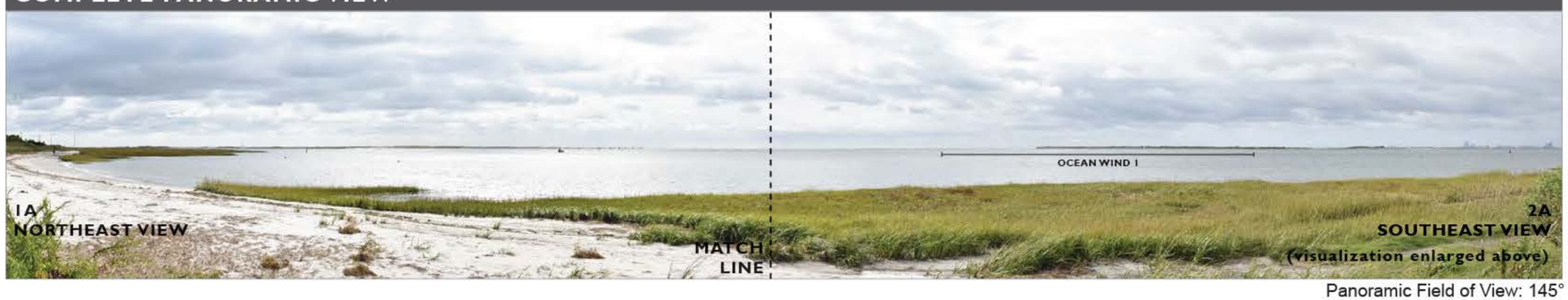
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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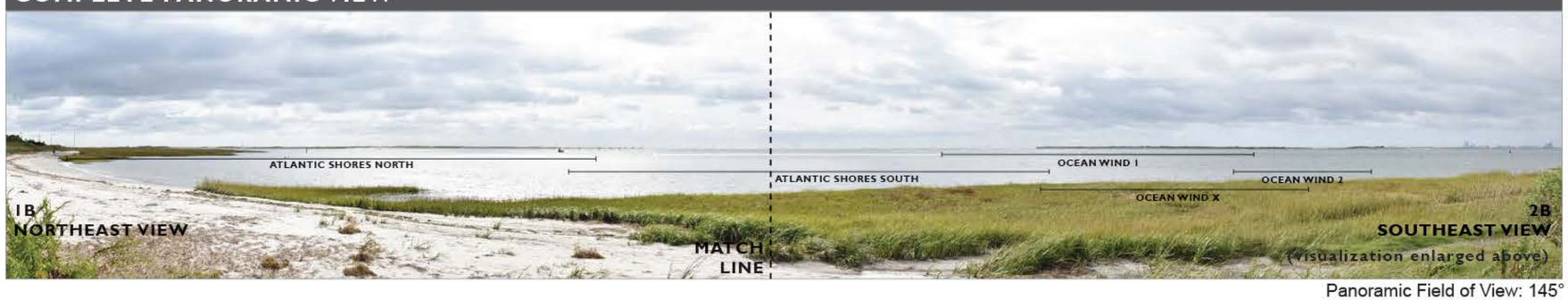
2B: Southeast view showing all visible projects

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Panoramic Field of View: 69°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
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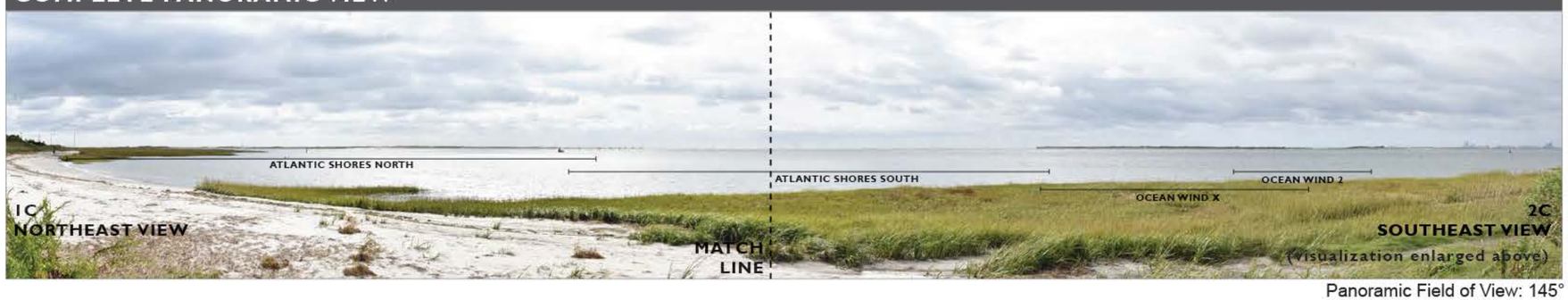
2C: Southeast view showing all projects except Ocean Wind 1

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

Panoramic Field of View: 69°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
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VIEWPOINT
Playground Pier, Atlantic City

VISUALIZATIONS

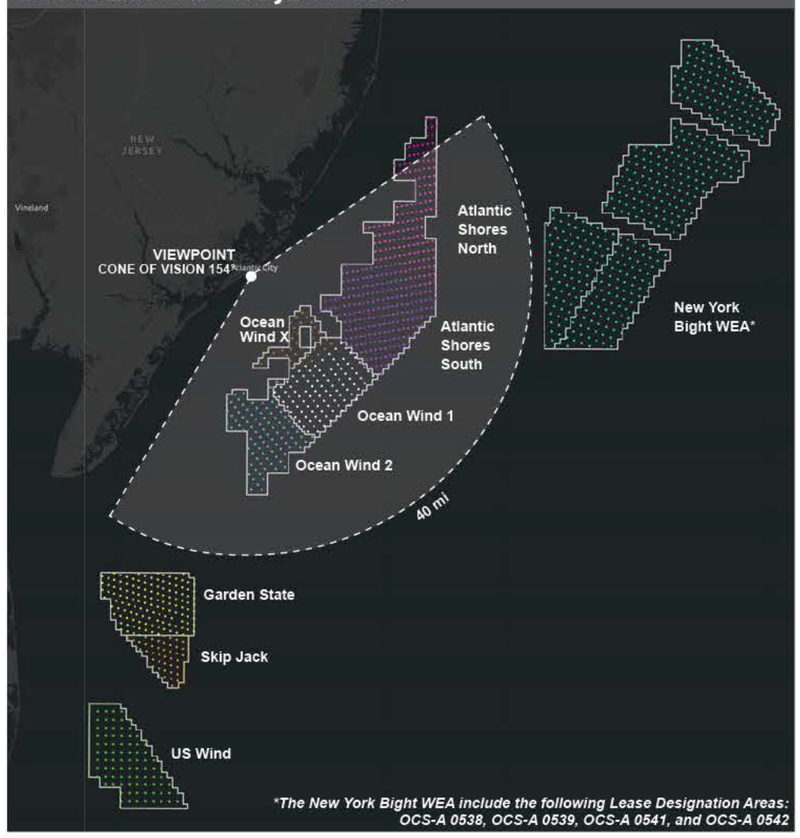
VISUALIZATIONS INCLUDED	
3A	Northeast view: only Ocean Wind 1
3B	Northeast view: all visible projects
3C	Northeast view: all visible projects except Ocean Wind 1
4A	Southeast view: only Ocean Wind 1
4B	Southeast view: all visible projects
4C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

OFFSHORE WIND PROJECT	THEORETICALLY VISIBLE FROM VIEWPOINT*	DISTANCE TO NEAREST WTG (mi)	DISTANCE TO FARTHEST WTG (mi)	NUMBER OF THEORETICALLY VISIBLE TURBINES	HORIZONTAL FIELD OF VIEW
New York Bight WEA	No	42.3	78.0	0	0°
Atlantic Shores North	Yes	17.4	34.5	82	25°
Atlantic Shores South	Yes	11.2	26.6	202	43°
Ocean Wind 1	Yes	15.2	24.7	99	41°
Ocean Wind 2	Yes	15.8	30.7	88	30.6°
Ocean Wind X	Yes	9.0	15.2	33	46.8°
Garden State	No	43.8	53.9	0	0°
Skip Jack	No	52.4	59.8	0	0°
US Wind	No	64.2	77.2	0	0°

*A distance of 40-miles from each viewpoint has been used to define the limits of theoretical visibility. This 40-mile distance aligns with the visual study area used in the Ocean Wind Visual Impact Assessment. For an observation elevation of 25 feet (typical of views from the boardwalks on the coast of New Jersey), the limit of Ocean Wind turbine hub visibility would be 37.3 miles due to earth curvature. While the blade tips are located above the horizon beyond this range, they are unlikely to be detected by observers at these distances due to the limits of visual acuity.

CUMULATIVE PROJECT MAP



WIND DIRECTION

NORTHWEST

Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

VIEWPOINT INFORMATION

LOCATION	
VIA KOP #	V14
Date / Time	09/19/2018 / 12:28pm
Latitude / Longitude	39.35259 / -74.43357
Direction of View	Northeast to Southeast

PHOTO	
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50 mm
Viewer Eye Elevation	24.33 ft

ENVIRONMENTAL	
Temperature	79°
Humidity	77%
Wind Speed	7 mph
Weather Conditions	Broken Clouds

COMPLETE PANORAMIC VIEW

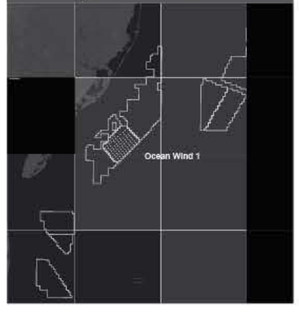
Panoramic Field of View: 154° (based on Nikon D750 camera lens, where a Normal Photo is 39.6°)

3A: Northeast view showing only Ocean Wind 1

Playground Pier, Atlantic City

Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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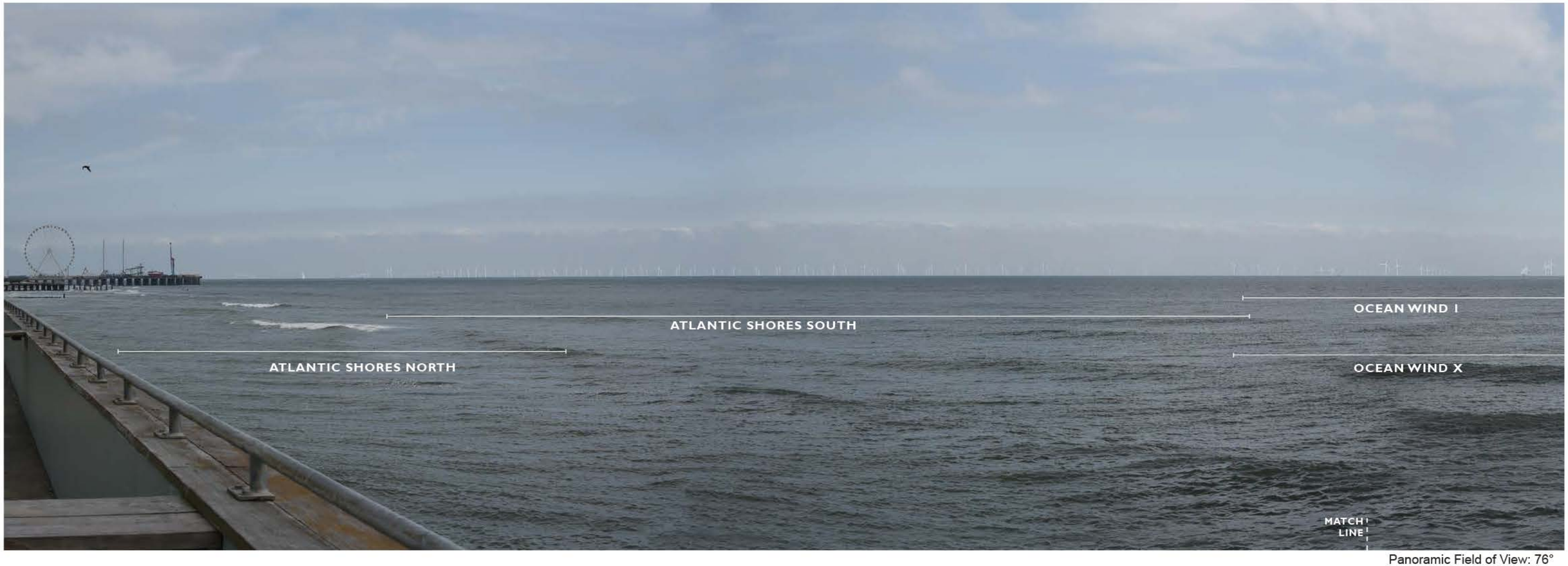
3B: Northeast view showing all visible projects

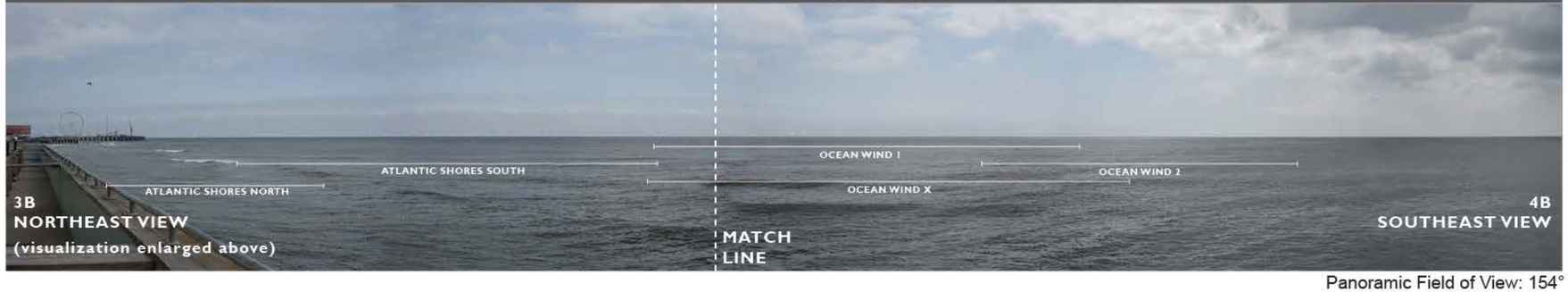
Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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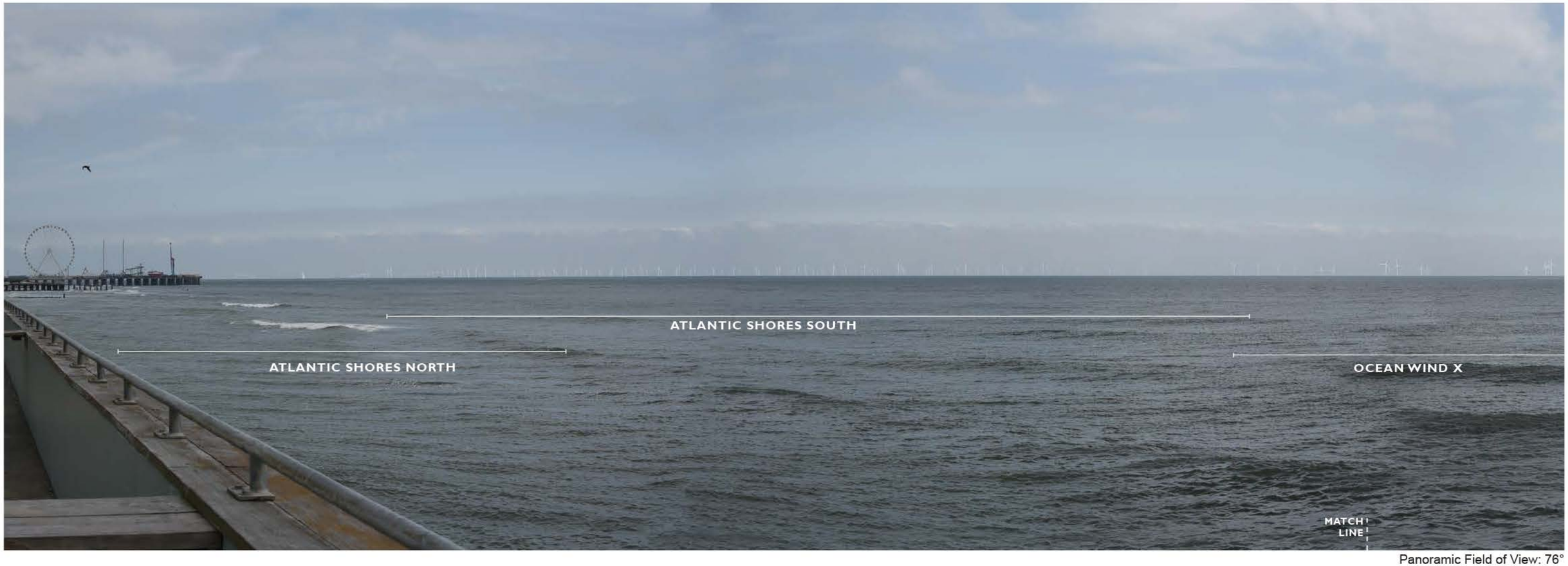
3C: Northeast view showing all projects except Ocean Wind 1

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

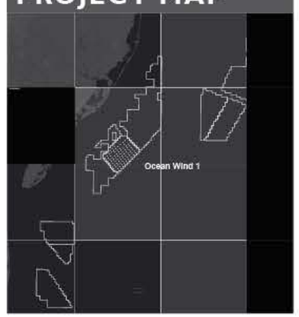
tjd&a

4A: Southeast view showing only Ocean Wind 1

Playground Pier, Atlantic City

Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
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Ocean Wind
An Ørsted Initiative

tjd&a

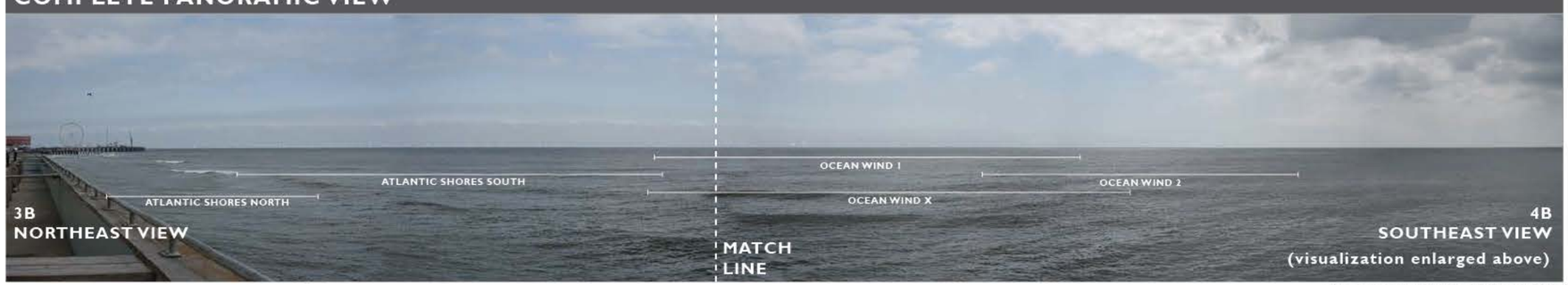
4B: Southeast view showing all visible projects

Playground Pier, Atlantic City

Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST

Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

tjd&a

4C: Southeast view showing all projects except Ocean Wind 1

Playground Pier, Atlantic City

Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

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Ocean Wind
An Ørsted Initiative

tjd&a

VIEWPOINT
Playground Pier, Atlantic City

VISUALIZATIONS

VISUALIZATIONS INCLUDED	
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CUMULATIVE PROJECT INFORMATION

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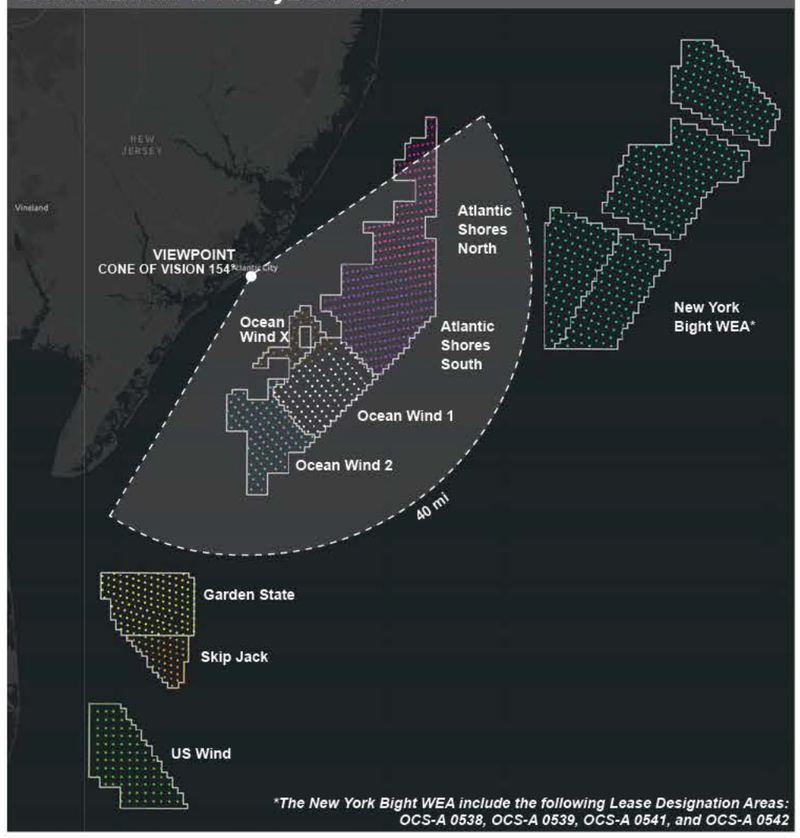
*A distance of 40-miles from each viewpoint has been used to define the limits of theoretical visibility. This 40-mile distance aligns with the visual study area used in the Ocean Wind Visual Impact Assessment. For an observation elevation of 25 feet (typical of views from the boardwalks on the coast of New Jersey), the limit of Ocean Wind turbine hub visibility would be 37.3 miles due to earth curvature. While the blade tips are located above the horizon beyond this range, they are unlikely to be detected by observers at these distances due to the limits of visual acuity.

CUMULATIVE PROJECT MAP



WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

VIEWPOINT INFORMATION

LOCATION	
VIA KOP #	V14
Date / Time	09/19/2018 / 12:28pm
Latitude / Longitude	39.35259 / -74.43357
Direction of View	Northeast to Southeast

PHOTO	
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50 mm
Viewer Eye Elevation	24.33 ft

ENVIRONMENTAL	
Temperature	79°
Humidity	77%
Wind Speed	7 mph
Weather Conditions	Broken Clouds

COMPLETE PANORAMIC VIEW

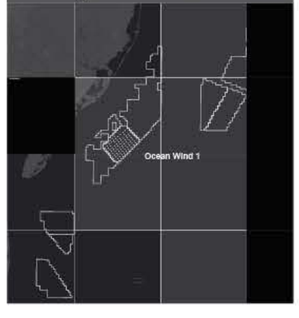
Panoramic Field of View: 154° (based on Nikon D750 camera lens, where a Normal Photo is 39.6°)

3A: Northeast view showing only Ocean Wind 1

Playground Pier, Atlantic City

Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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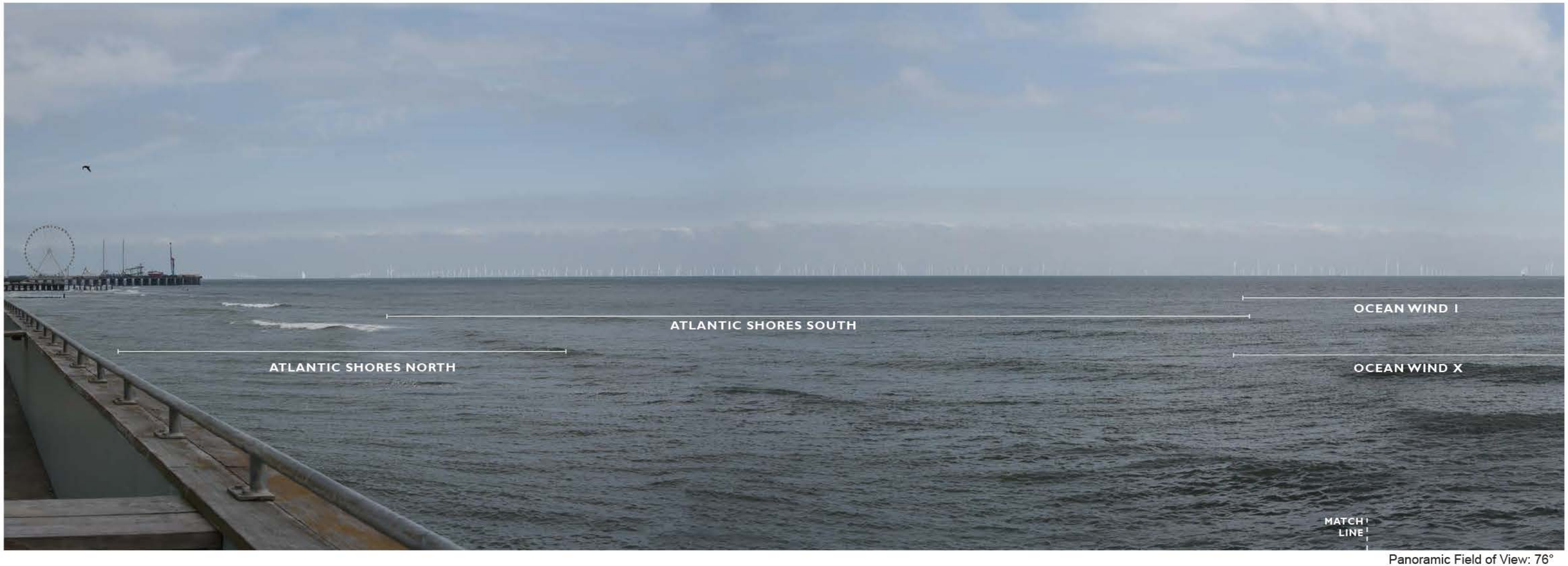
3B: Northeast view showing all visible projects

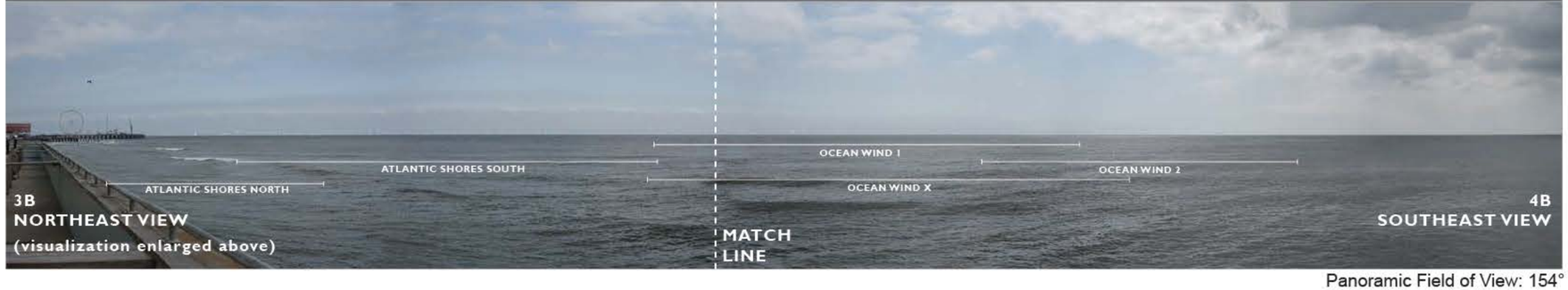
Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
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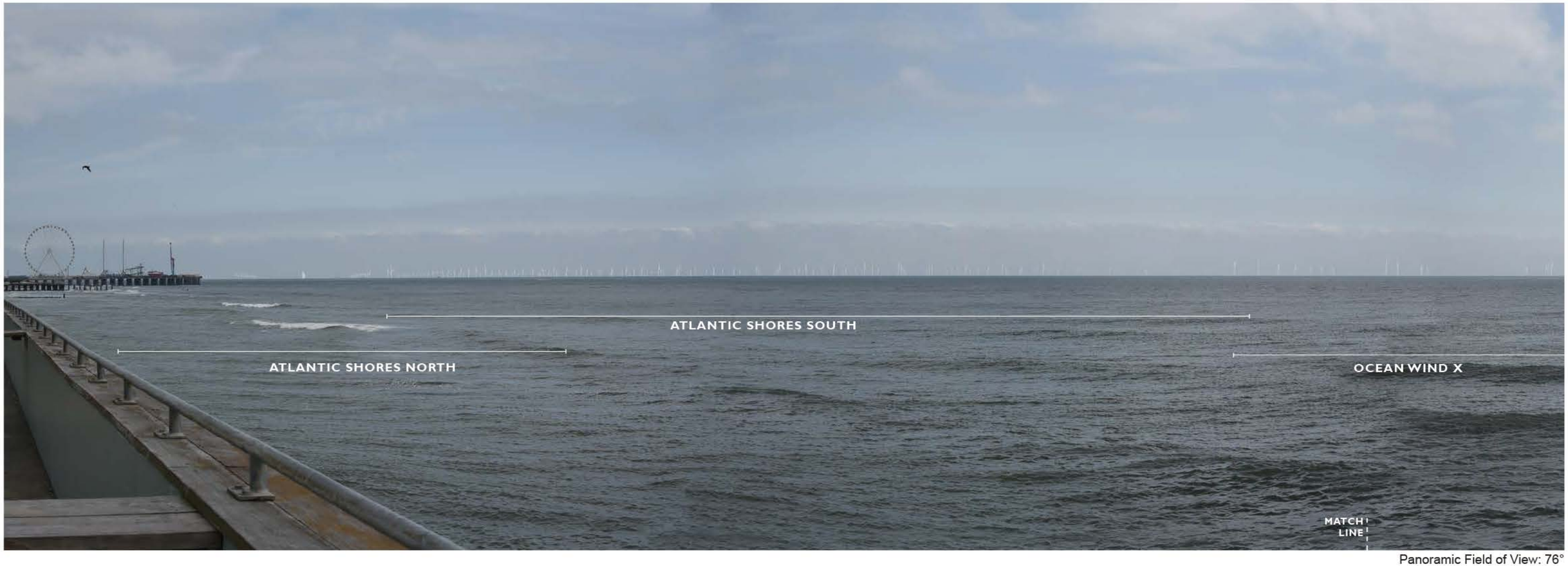
3C: Northeast view showing all projects except Ocean Wind 1

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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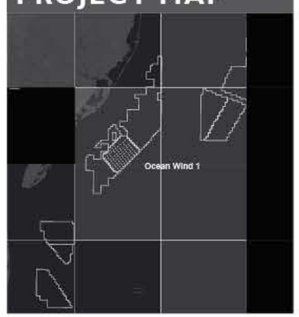
4A: Southeast view showing only Ocean Wind 1

Playground Pier, Atlantic City

Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
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4B: Southeast view showing all visible projects

Playground Pier, Atlantic City

Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
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4C: Southeast view showing all projects except Ocean Wind 1

Playground Pier, Atlantic City

Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
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VIEWPOINT
Corson's Inlet State Park, Ocean City

VISUALIZATIONS

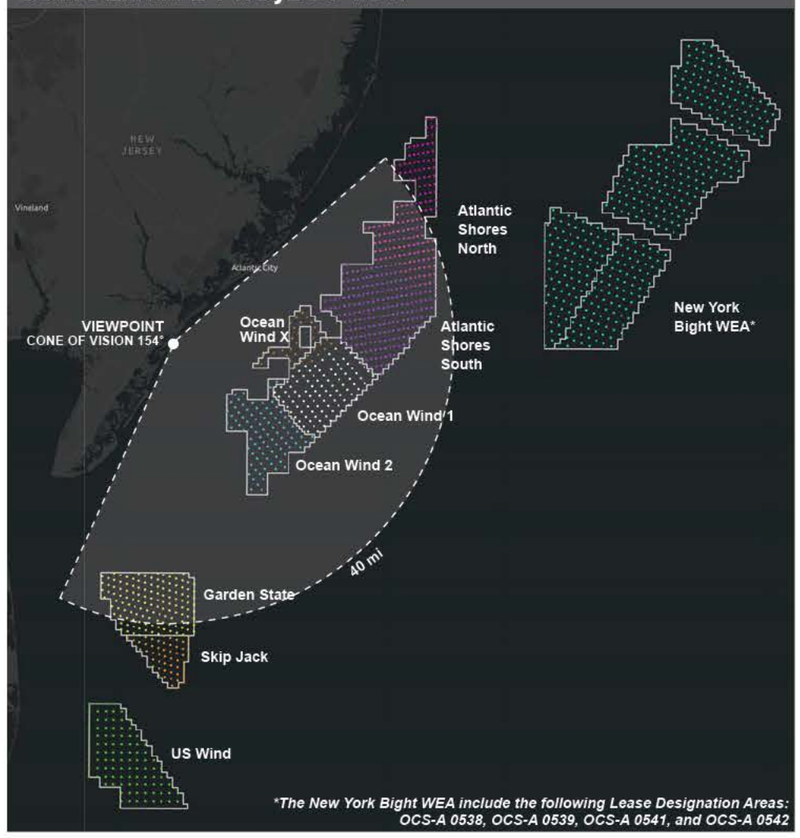
VISUALIZATIONS INCLUDED	
5A	Northeast view: only Ocean Wind 1
5B	Northeast view: all visible projects
5C	Northeast view: all visible projects except Ocean Wind 1
6A	Southeast view: only Ocean Wind 1
6B	Southeast view: all visible projects
6C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

OFFSHORE WIND PROJECT	THEORETICALLY VISIBLE FROM VIEWPOINT*	DISTANCE TO NEAREST WTG (mi)	DISTANCE TO FARTHEST WTG (mi)	NUMBER OF THEORETICALLY VISIBLE TURBINES	HORIZONTAL FIELD OF VIEW
New York Bight WEA	No	53.3	91.7	0	0°
Atlantic Shores North	Yes	31.3	49.2	101	25°
Atlantic Shores South	Yes	21.6	38.2	202	43°
Ocean Wind 1	Yes	16.2	29.1	99	34°
Ocean Wind 2	Yes	11.7	24.6	88	40.8°
Ocean Wind X	Yes	13.0	22.6	33	26.5°
Garden State	Yes	33.0	42.1	112	22°
Skip Jack	No	41.9	49.3	0	0°
US Wind	No	52.2	65.8	0	0°

*A distance of 40-miles from each viewpoint has been used to define the limits of theoretical visibility. This 40-mile distance aligns with the visual study area used in the Ocean Wind Visual Impact Assessment. For an observation elevation of 25 feet (typical of views from the boardwalks on the coast of New Jersey), the limit of Ocean Wind turbine hub visibility would be 37.3 miles due to earth curvature. While the blade tips are located above the horizon beyond this range, they are unlikely to be detected by observers at these distances due to the limits of visual acuity.

CUMULATIVE PROJECT MAP



WIND DIRECTION

NORTHWEST

Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

VIEWPOINT INFORMATION

LOCATION	
VIA KOP #	V19
Date / Time	08/15/2018 / 4:55pm
Latitude / Longitude	39.213474°/ -74.642627°
Direction of View	Northeast to Southeast

PHOTO	
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50 mm
Viewer Eye Elevation	15 ft

ENVIRONMENTAL	
Temperature	90°
Humidity	45%
Wind Speed	12 mph
Weather Conditions	Sunny

COMPLETE PANORAMIC VIEW

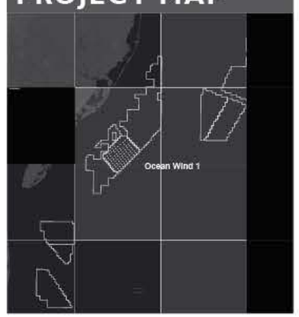
Panoramic Field of View: 154° (based on Nikon D750 camera lens, where a Normal Photo is 39.6°)

5A: Northeast view showing only Ocean Wind 1

Corson's Inlet State Park, Ocean City

Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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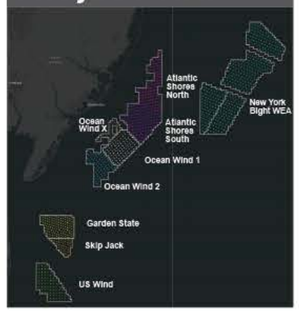
5B: Northeast view showing all visible projects

Corson's Inlet State Park, Ocean City

Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
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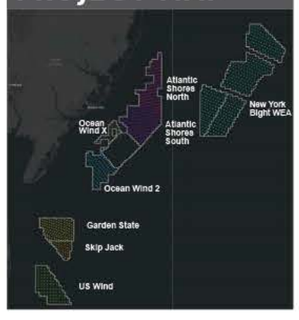
5C: Northeast view showing all projects except Ocean Wind 1

Corson's Inlet State Park, Ocean City

Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
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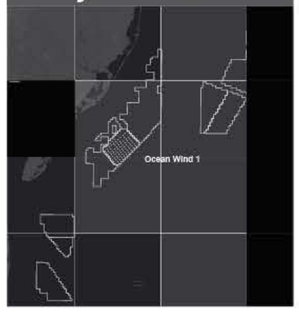
6A: Southeast view showing only Ocean Wind 1

Corson's Inlet State Park, Ocean City

Panoramic Field of View: 80°
Ocean Wind 1 not in view

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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6B: Southeast view showing all visible projects

Corson's Inlet State Park

Panoramic Field of View: 80°
Ocean Wind 1 not in view

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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6C: Southeast view showing all projects except Ocean Wind 1

Corson's Inlet State Park

Panoramic Field of View: 80°
Ocean Wind 1 not in view

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
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VIEWPOINT
Corson's Inlet State Park, Ocean City

VISUALIZATIONS

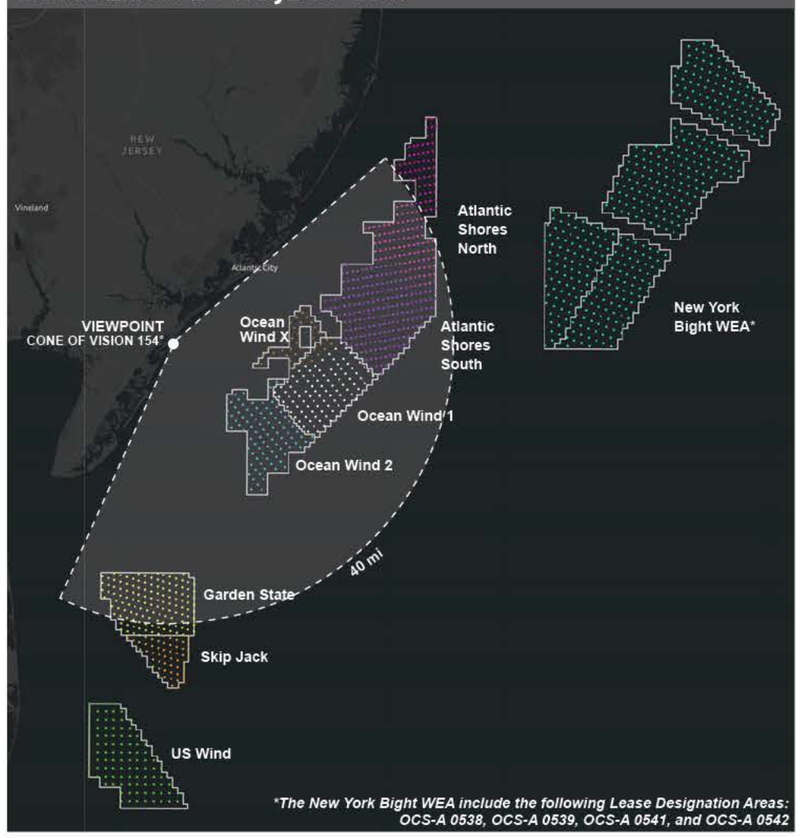
VISUALIZATIONS INCLUDED	
5A	Northeast view: only Ocean Wind 1
5B	Northeast view: all visible projects
5C	Northeast view: all visible projects except Ocean Wind 1
6A	Southeast view: only Ocean Wind 1
6B	Southeast view: all visible projects
6C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

OFFSHORE WIND PROJECT	THEORETICALLY VISIBLE FROM VIEWPOINT*	DISTANCE TO NEAREST WTG (mi)	DISTANCE TO FARTHEST WTG (mi)	NUMBER OF THEORETICALLY VISIBLE TURBINES	HORIZONTAL FIELD OF VIEW
New York Bight WEA	No	53.3	91.7	0	0°
Atlantic Shores North	Yes	31.3	49.2	101	25°
Atlantic Shores South	Yes	21.6	38.2	202	43°
Ocean Wind 1	Yes	16.2	29.1	99	34°
Ocean Wind 2	Yes	11.7	24.6	88	40.8°
Ocean Wind X	Yes	13.0	22.6	33	26.5°
Garden State	Yes	33.0	42.1	112	22°
Skip Jack	No	41.9	49.3	0	0°
US Wind	No	52.2	65.8	0	0°

*A distance of 40-miles from each viewpoint has been used to define the limits of theoretical visibility. This 40-mile distance aligns with the visual study area used in the Ocean Wind Visual Impact Assessment. For an observation elevation of 25 feet (typical of views from the boardwalks on the coast of New Jersey), the limit of Ocean Wind turbine hub visibility would be 37.3 miles due to earth curvature. While the blade tips are located above the horizon beyond this range, they are unlikely to be detected by observers at these distances due to the limits of visual acuity.

CUMULATIVE PROJECT MAP



WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

VIEWPOINT INFORMATION

LOCATION	
VIA KOP #	V19
Date / Time	08/15/2018 / 4:55pm
Latitude / Longitude	39.213474°/ -74.642627°
Direction of View	Northeast to Southeast

PHOTO	
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50 mm
Viewer Eye Elevation	15 ft

ENVIRONMENTAL	
Temperature	90°
Humidity	45%
Wind Speed	12 mph
Weather Conditions	Sunny

COMPLETE PANORAMIC VIEW

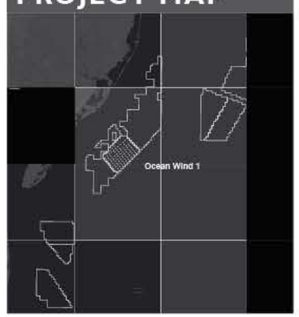
Panoramic Field of View: 154° (based on Nikon D750 camera lens, where a Normal Photo is 39.6°)

5A: Northeast view showing only Ocean Wind 1

Corson's Inlet State Park, Ocean City

Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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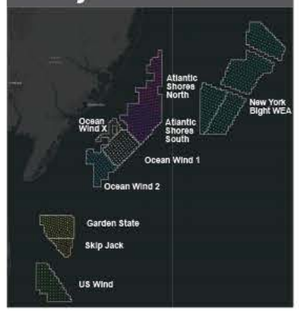
5B: Northeast view showing all visible projects

Corson's Inlet State Park, Ocean City

Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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5C: Northeast view showing all projects except Ocean Wind 1

Corson's Inlet State Park, Ocean City

Panoramic Field of View: 80°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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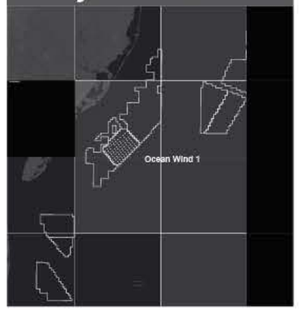
6A: Southeast view showing only Ocean Wind 1

Corson's Inlet State Park, Ocean City

Panoramic Field of View: 80°
Ocean Wind 1 not in view

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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6B: Southeast view showing all visible projects

Corson's Inlet State Park

Panoramic Field of View: 80°
Ocean Wind 1 not in view

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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6C: Southeast view showing all projects except Ocean Wind 1

Corson's Inlet State Park

Panoramic Field of View: 80°
Ocean Wind 1 not in view

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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VIEWPOINT
Stone Harbor Beach Access, Stone Harbor

VISUALIZATIONS

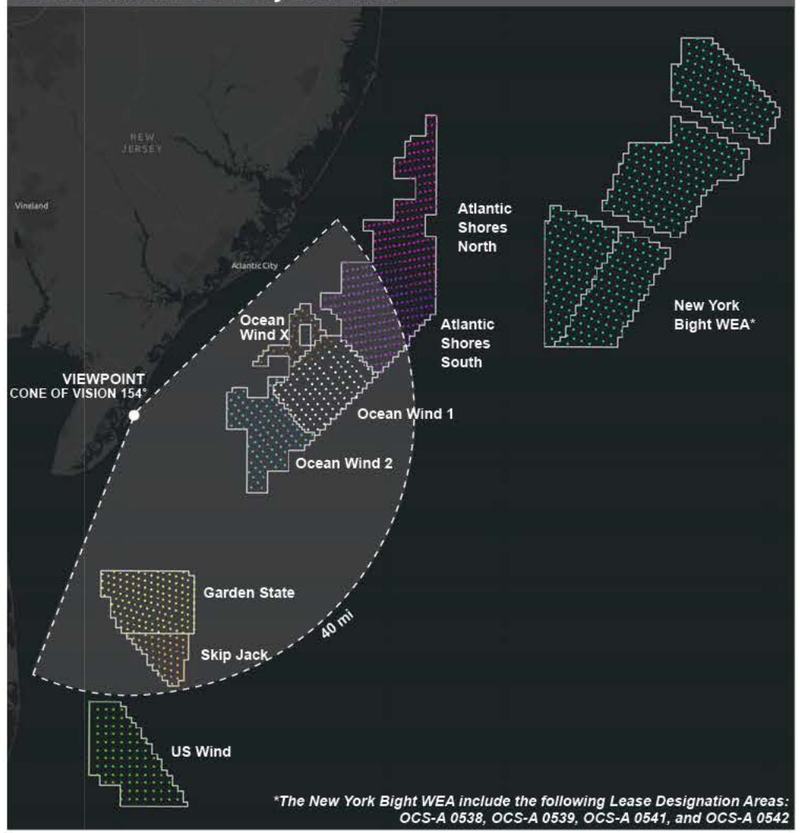
VISUALIZATIONS INCLUDED	
7A	Northeast view: only Ocean Wind 1
7B	Northeast view: all visible projects
7C	Northeast view: all visible projects except Ocean Wind 1
8A	Southeast view: only Ocean Wind 1
8B	Southeast view: all visible projects
8C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

OFFSHORE WIND PROJECT	THEORETICALLY VISIBLE FROM VIEWPOINT*	DISTANCE TO NEAREST WTG (mi)	DISTANCE TO FARTHEST WTG (mi)	NUMBER OF THEORETICALLY VISIBLE TURBINES	HORIZONTAL FIELD OF VIEW
New York Bight WEA	No	60.2	101.6	0	0°
Atlantic Shores North	No	41.8	61.2	0	0°
Atlantic Shores South	Yes	31.3	47.2	184	24°
Ocean Wind 1	Yes	20.9	35.2	99	34°
Ocean Wind 2	Yes	13.7	26.0	88	44.4°
Ocean Wind X	Yes	20.3	30.6	33	13.9°
Garden State	Yes	22.0	31.5	131	32°
Skip Jack	Yes	31.0	38.8	52	16°
US Wind	No	40.5	54.7	0	0°

*A distance of 40-miles from each viewpoint has been used to define the limits of theoretical visibility. This 40-mile distance aligns with the visual study area used in the Ocean Wind Visual Impact Assessment. For an observation elevation of 25 feet (typical of views from the boardwalks on the coast of New Jersey), the limit of Ocean Wind turbine hub visibility would be 37.3 miles due to earth curvature. While the blade tips are located above the horizon beyond this range, they are unlikely to be detected by observers at these distances due to the limits of visual acuity.

CUMULATIVE PROJECT MAP



WIND DIRECTION

NORTHWEST

Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

VIEWPOINT INFORMATION

LOCATION	
VIA KOP #	V22
Date / Time	08/14/2018 / 4:22pm
Latitude / Longitude	39.052389° /-74.754855°
Direction of View	Northeast to Southeast

PHOTO	
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50 mm
Viewer Eye Elevation	13 ft

ENVIRONMENTAL	
Temperature	83°
Humidity	63%
Wind Speed	14 mph
Weather Conditions	Partly Cloudy

COMPLETE PANORAMIC VIEW

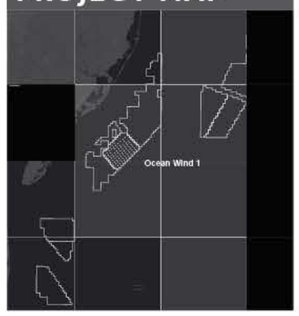
Panoramic Field of View: 154° (based on Nikon D750 camera lens, where a Normal Photo is 39.6°)

7A: Northeast view showing only Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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7B: Northeast view showing all visible projects

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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7C: Northeast view showing all projects except Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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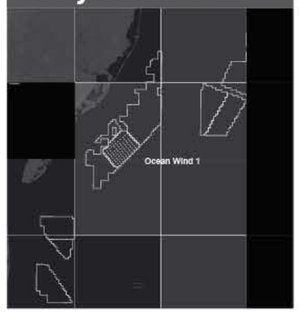
8A: Southeast view showing only Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°
Ocean Wind 1 not in view

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

tjd&a

8B: Southeast view showing all visible projects

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°
Ocean Wind 1 not in view

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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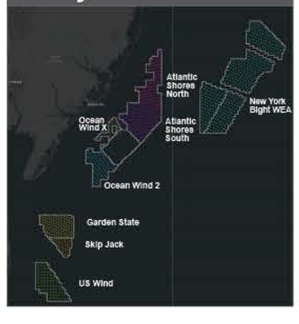
8C: Southeast view showing all projects except Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°
Ocean Wind 1 not in view

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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VIEWPOINT
Stone Harbor Beach Access, Stone Harbor

VISUALIZATIONS

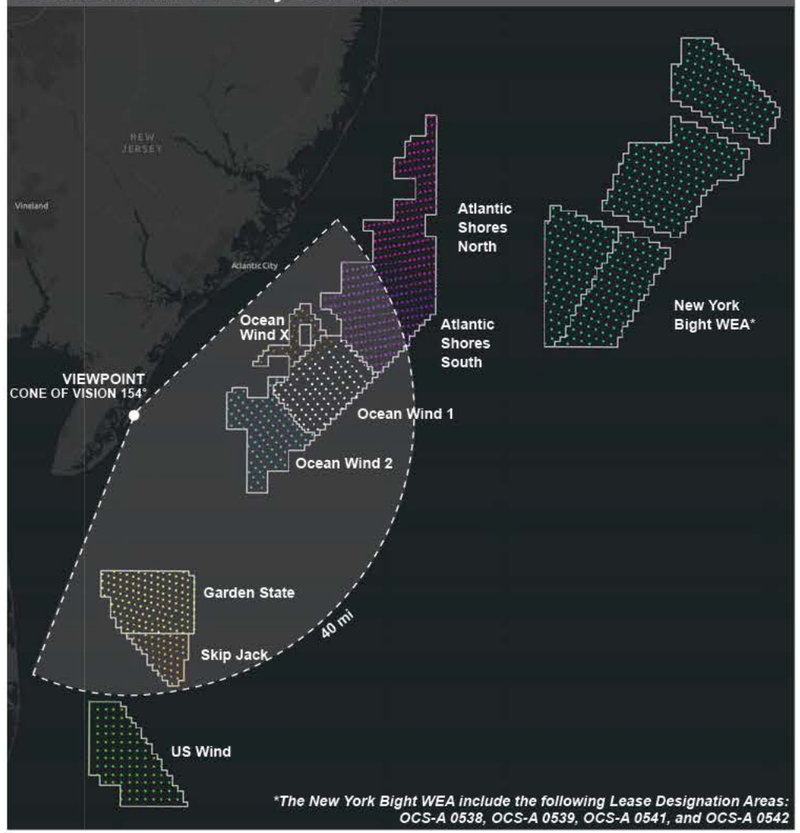
VISUALIZATIONS INCLUDED	
7A	Northeast view: only Ocean Wind 1
7B	Northeast view: all visible projects
7C	Northeast view: all visible projects except Ocean Wind 1
8A	Southeast view: only Ocean Wind 1
8B	Southeast view: all visible projects
8C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

OFFSHORE WIND PROJECT	THEORETICALLY VISIBLE FROM VIEWPOINT*	DISTANCE TO NEAREST WTG (mi)	DISTANCE TO FARTHEST WTG (mi)	NUMBER OF THEORETICALLY VISIBLE TURBINES	HORIZONTAL FIELD OF VIEW
New York Bight WEA	No	60.2	101.6	0	0°
Atlantic Shores North	No	41.8	61.2	0	0°
Atlantic Shores South	Yes	31.3	47.2	184	24°
Ocean Wind 1	Yes	20.9	35.2	99	34°
Ocean Wind 2	Yes	13.7	26.0	88	44.4°
Ocean Wind X	Yes	20.3	30.6	33	13.9°
Garden State	Yes	22.0	31.5	131	32°
Skip Jack	Yes	31.0	38.8	52	16°
US Wind	No	40.5	54.7	0	0°

*A distance of 40-miles from each viewpoint has been used to define the limits of theoretical visibility. This 40-mile distance aligns with the visual study area used in the Ocean Wind Visual Impact Assessment. For an observation elevation of 25 feet (typical of views from the boardwalks on the coast of New Jersey), the limit of Ocean Wind turbine hub visibility would be 37.3 miles due to earth curvature. While the blade tips are located above the horizon beyond this range, they are unlikely to be detected by observers at these distances due to the limits of visual acuity.

CUMULATIVE PROJECT MAP



WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

VIEWPOINT INFORMATION

LOCATION	
VIA KOP #	V22
Date / Time	08/14/2018 / 4:22pm
Latitude / Longitude	39.052389° /-74.754855°
Direction of View	Northeast to Southeast

PHOTO	
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50 mm
Viewer Eye Elevation	13 ft

ENVIRONMENTAL	
Temperature	83°
Humidity	63%
Wind Speed	14 mph
Weather Conditions	Partly Cloudy

COMPLETE PANORAMIC VIEW

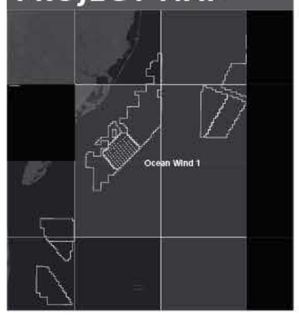
Panoramic Field of View: 154° (based on Nikon D750 camera lens, where a Normal Photo is 39.6°)

7A: Northeast view showing only Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

tjd&a

7B: Northeast view showing all visible projects

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

tjd&a

7C: Northeast view showing all projects except Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

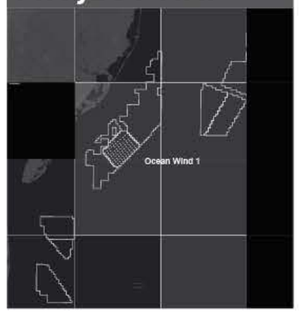
tjd&a

8A: Southeast view showing only Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°
Ocean Wind 1 not in view

PROJECT MAP



COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

tjd&a

8B: Southeast view showing all visible projects

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°
Ocean Wind 1 not in view

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

tjd&a

8C: Southeast view showing all projects except Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor

Panoramic Field of View: 76°
Ocean Wind 1 not in view

PROJECT MAP

COMPLETE PANORAMIC VIEW

Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

Ocean Wind
An Ørsted Initiative

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APPENDIX D
Key Personnel Resumes

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JANUARY M. TAVEL

Senior Manager, Historic Preservation

January Tavel is qualified as a historian and architectural historian under the Professional Qualification Standards of the U.S. Secretary of the Interior (as defined in 36 C.F.R. § 61) with more than twelve years of experience. January produces legally defensible cultural resources technical reports and Environmental Impact Statement (EIS) sections, meeting best practice standards for environmental compliance within local ordinance, and federal and state regulatory frameworks, including National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act (NHPA). January develops technical guidance, programmatic agreement documents, and preservation planning tools for the purpose of enhancing efficient and effective stewardship and regulatory compliance. She specializes in evaluating and guiding management of complex multi-component properties, such as cultural landscapes, traditional cultural properties, and historic districts. January's experience includes intensive research, preservation non-profit administration, heritage interpretation, grant management, and stakeholder outreach. She has been invited to more than a dozen events throughout the country to speak about her work at the intersection of climate resilience planning and historic preservation.

Years of Experience

- Professional start date: 07/2008
- ICF start date: 12/2015

Education

- MHP, Historic Preservation, University of Maryland College Park, School of Architecture Planning and Preservation, 2008
- BA, Journalism, University of Maryland Phillip Merrill College of Journalism, 2002

Selected Project Experience

Embedded Environmental Support for SR 520 I-5 to Medina Bridge Replacement— Washington Department of Transportation (WSDOT), Seattle, WA (07/2017–Present)

Architectural Historian and Project Manager. As embedded architectural historian for the SR 520 program, January supports the WSDOT cultural resources lead with quarterly meetings and reporting to Section 106 concurring parties; tracking completion of PA commitments; analyzing project changes for compliance with Section 106, PA stipulations, and additional applicable federal, state, and local regulations; providing technical support to ensure Section 106 compliance for the Noise Mitigation Pilot Program; and coordinating archaeological monitoring for multiple phases of construction. January's work includes fulfillment of PA mitigation commitments, including leading ICF's preparation of the Portage Bay floating homes survey and evaluation, and creation of interpretive signage content and graphic design for the Montlake historic district and Montlake Lid. 07/2017-Present.

National Historic Preservation Act Section 106 Support, Atlantic Renewable Energy Activities – U.S. Department of Interior, Bureau of Ocean Energy Management (BOEM)

Architectural Historian. In support of BOEM's mission to manage development of renewable wind energy leases in federal waters on the U.S. Outer Continental Shelf, January has provided programmatic Section 106 support services to BOEM as a contributing author to the *Models for Mitigation Fund Programs* and *A Framework for BOEM's Renewable Energy Mitigation Grant Fund* technical briefs. The goal of these documents is to explore feasibility of creating and implementing a mitigation grant fund program that would fulfill BOEM's commitments under Section 106 and support implementation of activities that mitigate for adverse effects to historic properties in ways that are most meaningful for affected communities. 06/2020-Present.

National Historic Preservation Act Section 106 Review for Ocean Wind Offshore Wind Farm Project Construction and Operations Plan – U.S. Department of Interior, Bureau of Ocean Energy Management (BOEM), NJ (01/2020-Present)

Section 106 Lead. January provides support to BOEM for Section 106 review and consultation for the Ocean Wind Offshore Wind Farm Project. She is responsible for preparing consultation plans; coordinating preparation and maintenance of the consulting parties list; preparing Section 106 consultation documents for distribution to SHPOs, THPOs, ACHP, and other consulting parties; and conducting Section 106-specific consultation meetings, as needed. January is lead author for preparation of the cultural resources section of the NEPA Environmental Impact Statement, Finding of Effect, and Cumulative Historic Resources Visual Effects Analysis. 01/2020-Present.

Technical Assistance to Prepare a Draft Historic Highway Bridge Programmatic Agreement—Washington Department of Transportation, Seattle, WA

Historic Preservation Planner. January collaborated with WSDOT Cultural Resources staff to prepare a draft Section 106 programmatic agreement (PA) applicable for undertakings and maintenance on bridges determined eligible for listing in the NRHP. The PA provided a prioritization framework for bridges in the Washington State Historic Highway Bridge Inventory and procedures for WSDOT regions, maintenance staff, and Bridge Office for: maintenance, repair, and rehabilitation consistent with the Secretary of the Interior's Standards; marketing to reuse historic bridges proposed for replacement; and identification of mitigation options. The purpose this guidance is to avoid impacts to historic bridges, and facilitate consistent and efficient application of procedures among WSDOT staff. 04/2019-06/2019.

2017 Heritage Preservation and Climate Change Survey, Findings and Recommendations Report—National Trust for Historic Preservation, U.S. Nationwide

Lead author and project manager. The *2017 Heritage Preservation and Climate Change Survey* was developed to guide the National Trust for Historic Preservation in its development of strategy, policy, and programming to support response to climate change within the context of the organization's heritage preservation mission. Information was gathered via questionnaire and interviews to determine awareness, needs, and priorities among National Trust stakeholders most likely to address climate change impacts on cultural heritage, and historic buildings and places. The *Findings and Recommendations Report* analyzes responses to identify key concerns and recommend methods, tools, and next steps for preservation planning response to climate risks. 11/2016–2/2018.

Environmental Services for the San Francisco Seawall Resiliency Project, San Francisco Waterfront Flood Study—U.S. Army Corps of Engineers, San Francisco, CA

Cultural resources lead consultant. January leads preparation of the Cultural Resources Technical Report and combined Feasibility Report/EIS section for the San Francisco Waterfront Flood Study. This work includes support to U.S. Army Corps of Engineers (USACE) in collaboration with the Port of San Francisco (Port) to develop alternatives for flood risk reduction measures with application of NPS Guidelines on Flood Adaptation for Rehabilitating Historic Buildings, and identification of key constraints for known historic properties. 04/2020–Present.

***Update to the Civil War Sites Advisory Commission Report on the Condition of Americas Civil War Battlefields* and Preservation Planning Grant Administration—National Park Service, American Battlefield Protection Program, Nationwide United States**

Historic Preservation Specialist. January began her career with the National Park Service (NPS) American Battlefield Protection Program (ABPP). She contributed to the *Update to the Civil War Sites Advisory Commission Report on the Nation's Civil War Battlefields*, serving as co-author for 26 statewide battlefield evaluation reports that addressed 386 civil war battlefields. January also administered the ABPP preservation planning grants program, which included grantee application review, jury coordination, and technical assistance for work product delivery. 07/2008-12/2010.

ALEX RYDER

Historic Preservation Specialist

Years of Experience

- Professional start date: September 2016.
- ICF start date: April 2019

Education

- M.S., Urban Studies, University of Wisconsin-Milwaukee, 2016
- B.S., Public History, *cum laude*, University of Wisconsin-Eau Claire, 2010

Alex Ryder is an historic preservation specialist with a multidisciplinary background. He is experienced in evaluating the eligibility of both built and archeological resources for the National Register of Historic Places (NRHP), Washington Historic Register (WHR), and the California Register of Historic Resources (CRHR). He has strong geospatial analysis skills and is proficient with a number of geographic information system (GIS) software platforms. He meets the Secretary of Interior's Professional Qualification Standards for History.

Selected Experience

Bay Corridor Transmission Distribution Project—San Francisco Public Utilities Commission, Aug. 2019 – Present

Alex is providing ongoing research and GIS support for unanticipated archeological discoveries encountered during excavation. He also developed an interpretive panel that was as part of a mitigation measure for the removal of historic Santa Fe Railroad tracks along Illinois Street.

SR-520 Floating Home Survey—Washington Department of Transportation, June 2020 – Present

Alex is completing historic property inventories for 90 floating home properties located along the western shore of Portage Bay in Seattle. To support these evaluations, he prepared a historic context statement for the community that totals more than 120 properties. These evaluations will be submitted into the into the Washington Information System for Architectural and Archaeological Records Data (WISAARD).

Webhouse No. 1—Port of Bellingham, Blaine, Washington, May 2020

Alex evaluated a 1950s warehouse used to store commercial fishing gear for eligibility in the National Register of Historic Places. To support his evaluation, he developed a historic context statement on the history of Blaine's waterfront and the Port of Bellingham's activities in Blaine. This evaluation was submitted into the into WISAARD.

Anderson Creek Restoration Project—City of Bellingham, March – April 2020

Alex evaluated an early 1900s railroad bridge built by the Bellingham Bay & Eastern Railroad Company for eligibility in the National Register of Historic Places. This evaluation was submitted into WISAARD.

XpressWest Passenger Train Project Section 106 Historic Property Evaluations—Federal Railroad Administration, San Bernardino County, California and Clark County, Nevada, Oct. 2019 – Present

Alex evaluated 12 properties for NRHP and CRHP eligibility. He also authored five historic context statements for common property types with the APE. Finally, he applied his GIS skills to identify and

document various linear resources within the APE, including historic-age rail lines, wagon trails, and water conveyance features.

Environmental Services Cultural Assessment for Weatherization Projects—DGS and Department of Community Services and Development Statewide, California, May 2019 – Present

Alex conducts background research on properties throughout California that have reached the 45-year threshold, including assessor records, permits, historic aerials, local ordinances or surveys regarding local historic preservation, to determine if the proposed Weatherization project has an effect on properties eligible for the National Register of Historic Places (NRHP). To date, he has evaluated more than 50 properties.

22 Fillmore Transit Priority Project—San Francisco Public Utilities Commission, July 2019 – Sept. 2019

Alex provided archeological monitoring and research support for a utility line replacement project along a major transportation corridor. His quick researched helped minimize delays to the project associated with unanticipated archeological discoveries. These included a stratum of partially burnt garbage associated with a nearby garbage incinerator and a redwood pipe that was likely associated with a large-scale late 19th or early 20th century gardening operation.

Pier B—Port of Long Beach, California, June 2019 – Nov. 2019

Alex evaluated four structures for NRHP eligibility to inform the Section 106 review process. These evaluations were documented on DPR 523A and 523B inventory forms. He also authored a historic context statement addressing the port's rail history.

Better Market Street—City of San Francisco Department of Public Works / Caltrans, San Francisco, California, Aug. 2018 – Present.

Alex evaluated two buildings for NRHP eligibility for Section 106 review purposes. These evaluations were documented on DPR 523A and 523B inventory forms

San Francisco Cemetery Mapping Project—City and County of San Francisco, San Francisco, California, May 2018 – April 2019

Prior to joining ICF, Alex led efforts to research, document, and map two 19the century cemeteries in San Francisco that were removed in the early 20th century. As part of this project, he developed GIS maps of both cemeteries that are now used to identify or contextualize human remains recovered from these sites.

Recent Employment History

ICF International, Historic Preservation Specialist. San Francisco, California. 04/2019 – Present.

Past Tense Historical Consulting. San Francisco, California. 09/2016 – 04/2019.

Corey Lentz

Historic Preservation Specialist

Corey Lentz is qualified as a historian and architectural historian under the Professional Qualification Standards of the U.S. Secretary of the Interior (as defined in 36 C.F.R. § 61) with more than three years of experience. Corey contributes to legally defensible cultural resources technical reports and Environmental Impact Statement (EIS) sections, meeting best practice standards for environmental compliance within local ordinance, and federal and state regulatory frameworks, including National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act (NHPA). Corey develops historic property documentation, programmatic agreement documents, and preservation planning tools for the purpose of enhancing efficient and effective stewardship and regulatory compliance. Corey's experience includes historic preservation regulatory compliance, preparation of National Register of Historic Places documentation, Federal Historic Tax Credit documentation, intensive research, stakeholder outreach.

Years of Experience

- Professional start date: 04/2018
- ICF start date: 10/2021

Education

- M.S., Historic Preservation, University of Oregon, School of Architecture & Environment, 2018
- B.A., History, Michigan State University, College of Social Science, 2014

Selected Project Experience

Embedded Environmental Support for SR 520 I-5 to Medina Bridge Replacement— Washington Department of Transportation (WSDOT), Seattle, WA (10/2021–Present)

Architectural Historian. As embedded architectural historian for the SR 520 program, Corey supports the WSDOT cultural resources lead with quarterly meetings and reporting to Section 106 concurring parties; tracking completion of PA commitments; analyzing project changes for compliance with Section 106, PA stipulations, and additional applicable federal, state, and local regulations; providing technical support to ensure Section 106 compliance for the Noise Mitigation Pilot Program (NMPP). Corey's work includes the development of Historic Property Inventory documentation for properties included in the NMPP and contributing to ICF's preparation of the Portage Bay floating homes survey and evaluation.

National Historic Preservation Act Section 106 Support, Atlantic Renewable Energy Activities – U.S. Department of Interior, Bureau of Ocean Energy Management (BOEM) (10/2021-Present)

Architectural Historian. In support of BOEM's mission to manage development of renewable wind energy leases in federal waters on the U.S. Outer Continental Shelf, Corey has provided programmatic Section 106 support services to BOEM. Corey has contributed to the preparation of an amendment to the current programmatic agreement that outlines BOEM's commitments under Section 106 and supports implementation of activities that mitigate for adverse effects to historic properties in ways that are most meaningful for affected communities.

National Historic Preservation Act Section 106 Review per Federal Transit Administration (FTA) Program Comment to Exempt Consideration of Effects to Rail Properties within Rail Rights-of-Way – San Francisco Bay Area Rapid Transit (BART), CA (10/2021-12/2021)

Architectural Historian. Corey supported planning and development efforts of the Bay Area Rapid Transit District (BART) by serving as key staff evaluating the significance of the BART system, a regional rail transit network designed and built during the 1960s and 1970s. As BART makes plans for future upgrades to meet rider demand and improve service, its original system facilities are now the age at which they could qualify for listing in historical resource registers. To help BART planning staff understand the historic significance of the system and associated regulatory requirements for future projects, Corey contributed to the survey and

evaluation of 10 pilot properties using the guidance in the historic context and evaluative framework developed by ICF, including a historic district that encompasses the original BART system.

Bullhead Solar Array Project – EDF Renewables and Kern County, California (12/2021 – 1/2022)

Architectural Historian. EDF Renewables (EDFR) is proposing the construction of solar facilities, including the solar array, battery energy storage system and substation, transmission infrastructure, and associated facilities and equipment, in an approximately1,854-acre project area located in unincorporated Kern County. EDFR is pursuing Conditional Use Permits (CUPs) for the project from the Kern County Board of Supervisors. EDFR engaged ICF to assist EDFR in California Environmental Quality Act (CEQA) compliance as part of the permitting process. Corey contributed through the preparation of Department of Parks and Recreation (DPR) 523 Forms to document and evaluate potentially significant properties located within the Bullhead Solar study area as part of CEQA compliance.

Washington State Legislative Campus Modernization Project – Washington Department of Enterprise Services, Olympia, WA (1/2021 – 2/2021)

Architectural Historian. Washington Department of Enterprise Services (WSDES) is proposing the modernization of the Legislative Campus including the demolition and rehabilitation of the Irving R. Newhouse, Joel M. Pritchard, and John L. O'Brien building, as well as the demolition of other minor buildings on the Legislative Campus. WSDES engaged ICF to assist in the preparation of State Environmental Policy Act (SEPA) compliance as part of the permitting process. Corey contributed to the preparation of a SEPA Cultural Technical Memorandum for the Legislative Campus Modernization Project including research of previously documented historic properties within the project area and the analysis of potential adverse effects to NRHP-listed and NRHP-eligible properties within the project area.

Desktop Cultural Resources Analysis for the Bitter Lake Reservoir Covering Replacement Project – Seattle Public Utilities, Seattle, WA (2/2021 – 2/2022)

Architectural Historian. Seattle Public Utilities is proposing to demolish and replace the Bitter Lake Reservoir in Seattle, Washington. SPU retained ICF to determine whether documented cultural resources are present in the project vicinity, to assess the risk of encountering as-yet undocumented archaeological resources, and to evaluate the National Register of Historic Places (NRHP) eligibility of historic-aged (more than 50 years old) built environment resources that have the potential to be affected by the project. ICF performed a desktop analysis for the Project, which included a search of relevant literature on the archaeology, ethnography, and history of the project's study area to provide information on previously identified cultural resources in the vicinity. Corey contributed to the preparation of a technical memorandum outlining the findings of the desktop analysis through the development of Historic Property Inventory documentation for two historic properties within the project area and drafted historic context sections for the property and Seattle Public Utilities.

Green Hills School Recreation Center, Cultural Resources Survey – Washington State Department of Enterprise Services, Olympia, WA (2/2022 – 3/2022)

Architectural Historian. The Washington State Department of Enterprise Services (WSDES) is proposing the demolition and replacement of the Recreation Center on the Green Hills School campus. WSDES engaged ICF to assist in the preparation of State Environmental Policy Act (SEPA) compliance as part of the permitting process. Corey contributed to the preparation of the Green Hills School Recreation Center, Cultural Resources Survey through the development of Historic Property Inventory documentation for three historic properties on the Green Hill School campus and drafted the Built Environment Survey section of the Cultural Resources Survey document.

Weatherization Assistance Program – California Department of Community Services and Development (4/2022-Present)

Architectural Historian. California Department of Community Services and Development (CDS) runs a long-term program that distributed federal funding to non-profits and agencies across the state to weatherize homes of low-income persons. ICF supports CDS in the completion of Section 106 review for funded projects per the agency's programmatic agreement with the California Office of Historic Preservation. Corey contributes to these reviews through routine desktop analysis of projects across California where proposed work has the potential to effect historic properties.