NYSERDA 2022 OFFSHORE WIND SOLICITATION ORECRFP22-1

Chapter 17 Appendices

Public version

Community Offshore Wind LLC

Lease OCS-A 0539

COMMUNITY offshore wind

nationalgrid | RWE

Contents

17-1 Visibility and Viewshed Study

Visibility Study

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Community Offshore Wind Project

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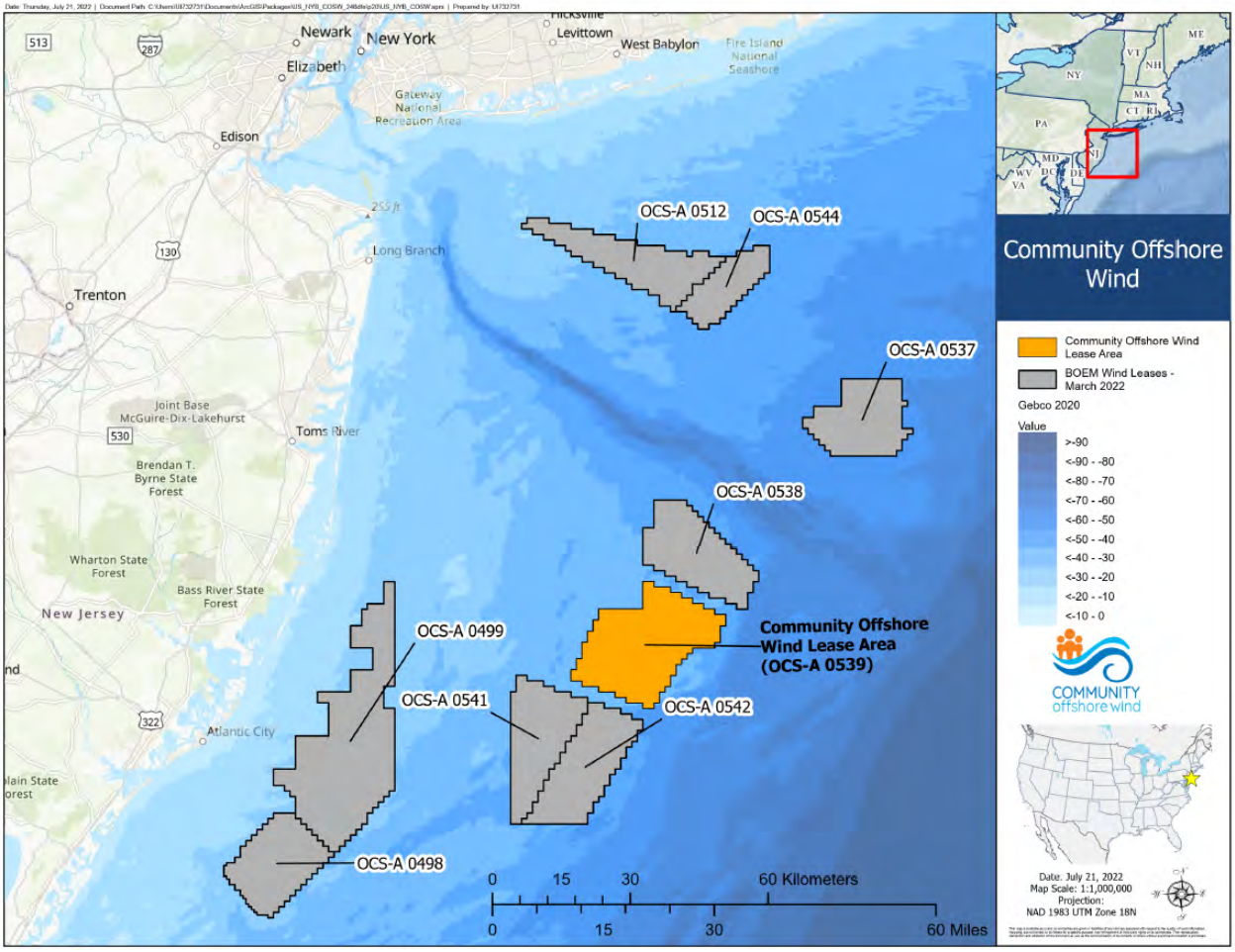
ACRONYM LIST

ADLS	Aircraft Detection Lighting System
ASL	Above Sea Level
BLM	Bureau of Land Management
BOEM	Bureau of Ocean Energy Management
FAA	Federal Aviation Administration
FPM	Flashes per Minute
GIS	Geographic Information System
LSZ	Landscape Similarity Zone
MHHW	Mean Higher High Water
mi	Mile
mm	Millimeter
MSL	Mean Sea Level
MW	Megawatts
NAIP	National Aerial Imagery Program
NLCD	National Land Cover Database
NM	Nautical Mile
NRHP	National Register of Historic Places
OCS	Outer Continental Shelf
OSS	Offshore Substation
SHPO	State Historic Preservation Office
U.S.	United States of America
USCG	United States Coast Guard
USGS	United States Geological Survey
VIA	Visual Impact Assessment
VSA	Visual Study Area
WTG	Wind Turbine Generator

1.0 Introduction

TRC Companies, Inc. (TRC) was retained by Community Offshore Wind, LLC (Community Offshore Wind), a joint venture of RWE Renewables and National Grid, to prepare a Visibility Study (the Study) for the proposed Community Offshore Wind Project (the Project) within Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0539 (the Lease Area). Lease Area OCS-A 0539 encompasses approximately 125,964 acres and is located approximately 37 miles (mi; 59 kilometers [km]), 32 nautical miles [nm]) offshore of Little Egg Harbor, New Jersey and approximately 64 mi (104 km, 56 nm) offshore of Jones Beach, New York. The location of Lease Area OCS-A 0539 is shown on Figure 1, below.

Figure 1. Lease OCS-A 0539



The scope of this Study was designed to meet the requirements of NYSERDA's Offshore Renewable Energy Credits (OREC) Request for Proposals (the RFP), released July 27, 2022; specifically, Section 6.4.17 "Visibility and Viewshed Impacts." This section of the RFP outlines separate and specific requirements for projects that propose turbines within 20 statute miles of shore and for all offshore wind projects, regardless of distance from shore. As the Lease Area is located a minimum of 37 mi (59 km, 32 nm) from the nearest point to New Jersey, and 64 mi (104 km, 56 nm) from the nearest point to New York, this Study addresses the following requirements:

- Identifies the distance in statute miles between the nearest shoreline point and the nearest Offshore Wind Generation Facility turbines;

- Presents visual simulations of the proposed Offshore Wind Generation Facility in a format suitable to be printed or electronically viewed by the public and/or the OREC Scoring Committee. Visual simulations include the following elements:

    - Single frame, photographic images with superimposed simulations of the proposed wind turbine technology configured to represent a commercially-scaled and technically feasible scenario that is consistent with the proposed Project;

    - Detail insets showing operating capacity, wind turbine size, and generic spacing and configuration, as well as visibility metrics such as turbine height visible above the horizon.

    - GIS map insets that depict the nearest coastline, the boundary of the proposed site to be developed and other reasonable reference points (e.g., coastal cities, historic sites, other wind energy areas); and

    - Viewing instructions for the public and/or OREC Scoring Committee.

- Represents within the simulations clear, partly cloudy, and overcast conditions during early morning, mid-afternoon, and late day, as well at night with the turbines lit under clear conditions, although no FAA lighting is visible from shore above the horizon. Visual simulations are presented from two representative vantage points (referred to herein as Key Observation Points, or KOPs) which represent the closest points to shore from any turbine within the Offshore Wind Generation Facility.

- Provides analysis of the percentage of time during which different visibility conditions are expected to occur based on past meteorological data.

1.1 Visibility Study Process

The process and methodology for the Study can be summarized as follows:

1. Determine and describe physical/aesthetic characteristics of the Project components.
2. Establish an appropriate Visual Study Area (VSA) based on theoretical Project visibility.
3. Identify historic properties and visually sensitive resources within the VSA.
4. Identify the Landscape Similarity Zones (LSZs) and User Groups within the VSA.
5. Complete a viewshed analysis of all Project elements (WTGs) across the entire VSA.
6. Photograph the Project location from publicly accessible key observation points (KOPs).
7. Prepare simulations from representative KOPs.
8. Assess the visual impacts associated with the Project.

Additional detail regarding each of the steps above can be found in Sections 2, 3, and 4 below.

2.0 Project Description

2.1 Project Location & Layout

Lease Area OCS-A 0539 is located approximately 37 mi (59 km, 32 nm) southwest of New Jersey, measured from the Barnegat Peninsula and Long Beach Island. The nearest point on the shoreline in New Jersey is at the northern tip of Long Beach Island within the Barnegat Light Borough, followed by the southern tip of the Barnegat Peninsula, part of Island Beach State Park within Lacey Township.

From New York, Lease OCS-A 0539 is located approximately 64 mi (104 km, 56 nm) south of Long Island, measured from Jones Beach. The nearest point to the shoreline in New York is on Short Beach at Jones Beach State Park.

The preliminary design for the Project includes 60 Wind Turbine Generators (WTGs) arranged in a grid pattern within the northern part of the Lease Area, as shown in Figure 2 below. The grid layout consists of rows spaced approximately 1.2 miles apart and oriented roughly NW-SE, and columns spaced approximately 0.9 miles apart and oriented roughly NE-SW.

Figure 2. Project WTG Layout

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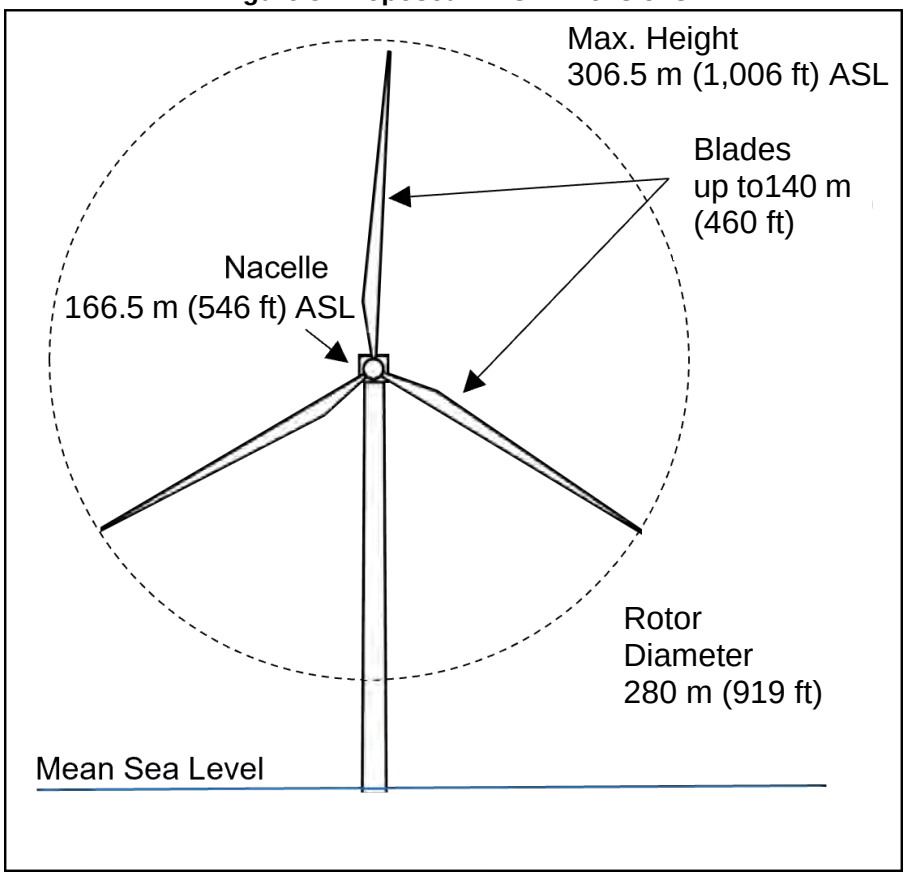
2.2 Wind Turbine Generators

The WTGs proposed as part of the Project are assumed to be uniform in capacity, dimension, color, and design. Up to 60 WTGs are proposed, with a rotor diameter of 280 meters (919 feet),

a maximum blade height of 306.5 meters (1,006 feet) above sea level (ASL), and a center hub height of 166.5 meters (546 feet) ASL (see Figure 3, below). The top of the nacelle, where upper aviation safety lighting will be located, will be 170.5 meters (559 feet) ASL.

Figure 3. Proposed WTG Dimensions



2.3 Offshore Substations

An offshore electrical substation platform will be included as part of the Project's energy delivery system. While these platforms will have visual impact to the surrounding areas, they are unlikely to be visible from shore, with an anticipated maximum height of 60 meters (197 feet), which will be significantly less than that of the WTGs. Therefore, the visibility of these structures is not assessed further in this Study.

2.4 Lighting and Marking

The lighting and marking of any new structures on the OCS is subject to approval by BOEM, the Federal Aviation Administration (FAA), the U.S. Coast Guard (USCG), and other relevant agencies. Lighting and marking of WTGs will be in accordance with the following:

- USCG First District Local Notice to Mariners (LNM) entry 44-20;
- FAA Advisory Circular 70/7460-1L;

- BOEM's Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development (2021); and
- International Association of Marine Aids (IALA) to Navigation and Lighthouse Authorities Recommendation O-139 on The Marking of Man-Made Offshore Structures (IALA 2013).

Lighting and marking will be implemented as described below unless new guidance is issued or an alternative lighting and marking scheme is approved by the applicable agencies prior to construction.

2.4.1 Lighting

Perimeter structures of the Project, located on the corners or other significant peripheral points, will be marked with quick flashing yellow marine lanterns with 360° visibility and an operational range of at least 5 NM. Intermediate perimeter structures, located along the outside boundary, will be marked with 2.5-second flashing yellow marine lanterns with 360° visibility and an operational range of at least 3 NM. Inner boundary structures will be marked with 6 or 10 second yellow flashing marine lanterns with 360° visibility and with a 2 NM operational range. Lights servicing the same structure designation will be synchronized.

Aviation safety lighting will consist of:

- Two medium intensity flashing red obstruction aviation lights, mounted atop the WTG nacelles;
- Four low-intensity flashing red obstruction lights mid-tower, mounted around the tower in a ring; and
- One helicopter hoist status light.

The aviation lights will flash simultaneously at 30 flashes per minute (FPM). The aviation safety lights will be visible in all directions in the horizontal plane.

An Aircraft Detection Lighting System (ADLS) may be used if technically feasible, commercially available, and approved for use by FAA, BOEM, and USCG. With an ADLS, FAA obstruction lighting on the WTGs will only illuminate when aircraft are approaching the Lease Area. When ADLS is activated upon detection of a nearby aircraft, obstruction lighting will be illuminated, but would otherwise be turned off.

In accordance with USCG guidance, WTGs will be marked conspicuously and distinctly for both day and night recognition. Amber flashing navigation beacons of different intensities will be installed on all WTGs. The amber flashing navigation lights will be energized from sunset to sunrise and from sunrise to sunset in restricted visibility. Navigation lights will be visible in all directions from the horizontal.

2.4.2 Marking

The foundation of all WTGs will be painted yellow (RAL 1023) from the level of Mean Higher High Water (MHHW) to 50 feet above MHHW. Ladders at the foundation base of all turbines will be painted in a color that contrasts with the recommended yellow for ease of identification for

operations and maintenance personnel. All major upper WTG components, including nacelles, blades, and towers, will be painted with color no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey. The WTG paint color will be determined in consultation with BOEM, FAA, and USCG. The simulations presented in this Study conservatively use RAL 9010 Pure White.

Each WTG will be designated, marked and charted with a unique alphanumeric designation for quick recognition and reference by mariners and agencies for search and rescue, law enforcement, and other purposes. The bottom of the alphanumeric designation will be located at least 30 feet and no more than 50 feet above MHHW. They will be as near to 9.8 feet in height as practicable, will be visible above any service platforms in a 360-degree arc from the water's surface, and will be applied with retro-reflecting paint to enhance visibility under low light conditions. Each WTG's unique alphanumeric designation will be duplicated below the service platforms.

3.0 Affected Environment

This section describes the physical environment that will potentially be affected by the visual change introduced by the Project, as well as the user groups within the affected environment that may experience views of the Project.

3.1 Visual Study Area

In order to address Project visibility from visually sensitive resources, a Visual Study Area (VSA) was first established. The VSA is the area in which there is a potential for visual impacts associated with the Project.

The Bureau of Land Management (BLM) uses the following range of distance zones when considering land use decisions for managing visually sensitive resources in BLM Resource Management Plans:

- Foreground to middle ground views extend from the viewing location out up to 8 km (5 mi)
- Background views range from 8 to 24 km (5 to 15 mi),
- Views beyond 24 km (15 mi) are classified as the “Seldom Seen” zone (Sullivan et al. 2012).

As the closest point to shore from the Lease Area is approximately 37 miles, all WTGs are within the “Seldom Seen” zone referred to in the BLM guidance. Observability of WTGs at distances in this range are heavily influenced by the curvature of the earth; an observer standing at sea level would be able to see the 1,006-foot-high turbine from a maximum distance of approximately 44.7 miles, at which point the topmost point of the turbine blade would just barely be visible above the horizon.

Based on the BLM zones and the height of the proposed WTG models, a 45-mile radius buffer (applied around each WTG) was determined to be an appropriate distance for the purposes of establishing a maximum visual threshold and to represent the VSA.

The resulting VSA is 7,811 square miles in area and encompasses approximately 20 miles of oceanfront shoreline in New Jersey. Approximately 25 square miles (0.3 percent) of the VSA is landward of the Atlantic shoreline. This much smaller area is also referred to as the “shoreward VSA.” The balance of the VSA is area within the Atlantic Ocean. The shoreward VSA includes portions of the counties and communities listed in Table 1.

Table 1. Communities Within the Visual Study Area

Community	County	State	Within Viewshed
Barnegat Light Borough	Ocean	New Jersey	Yes
Barnegat Township	Ocean	New Jersey	No
Berkeley Township	Ocean	New Jersey	Yes
Harvey Cedars Borough	Ocean	New Jersey	Yes
Lacey Township	Ocean	New Jersey	No
Long Beach Township	Ocean	New Jersey	Yes
Ocean Township	Ocean	New Jersey	Yes
Seaside Heights Borough	Ocean	New Jersey	Yes
Seaside Park Borough	Ocean	New Jersey	Yes
Stafford Township	Ocean	New Jersey	No
Surf City Borough	Ocean	New Jersey	Yes

3.2 User Groups

Viewer sensitivity was established by identifying specific user groups within the VSA that are most likely to observe changes within the surrounding landscape and seascape. User groups were divided into five categories and are described below. Descriptions of sensitivity as high, medium, or low are relative to the other user groups and are based on the differences in familiarity with existing views and activities within the VSA, understanding that sensitivity can also vary due to proximity to shore and intervening terrain or objects. Viewers with higher sensitivity are more aware of existing views and more likely to perceive subtle movement or change to landscape. Viewers with lower sensitivity may be less familiar with existing views or are engaged in activities that do not involve careful observation of the horizon or seascape.

Viewer sensitivity concerning the Project is subjective and may not be easily determined. For example, a user standing on the beach on a clear day would have an unobstructed view of the Project, but three different users could respond differently. One user, with low sensitivity, may not care that the Project is present in their line of sight and ignore it. This would signify a minor change in how they view the landscape, or their landscape experience. A second user, with high sensitivity, may be concerned that there are man-made turbines visible on the open ocean. A third user, also with high sensitivity, may be interested in the turbines and their role in renewable energy. These latter two users with high sensitivity would undergo a major change in their landscape experience, but in either a positive or negative way. To aid in assessing the visibility of the Project to various user groups, Sullivan et al.'s (2012/2013) visibility rating was used as a reference, summarized below in Table 2. It was divided further into categories based on the change in their landscape experience.

Table 2. Visibility Rating from Sullivan et al. (2012) and Sullivan et al. (2013a)

Visibility Level	Visibility Rating	Category
Level 1	Visible only after extended, close viewing; otherwise, invisible	Low
Level 2	Visible when scanning in general direction of project; likely to be missed by casual observer	
Level 3	Visible after brief glance in general direction of project and unlikely to be missed by casual observer	Medium
Level 4	Plainly visible and could not be missed by casual observer, but does not strongly attract visual attention, or dominate view, because of apparent size, for views in direction of project	
Level 5	Strongly attracts visual attention of views in general direction of project. Attention may be drawn by strong contrast in form, line, color, texture, luminance, or motion.	High
Level 6	Dominates view because project fills most of visual field for views in its general direction. Strong contrasts in form, line, color, texture, luminance or motion may contribute to view dominance.	

3.2.1 Commuters and Through-Travelers

Commuters and through-travelers are viewers in vehicles who are typically passing through or within an area to reach a destination with only the occasional opportunity to view the landscape. Drivers would be more focused on the roadway conditions and surroundings in the direction of travel but may occasionally glance at the rest of the surrounding landscape. Passengers are more likely to view their surroundings than drivers as they are not focused on the act of driving. The views available to drivers and passengers can be obstructed by other cars, buildings, infrastructure, vegetation, and weather, depending on which roadway the user group is utilizing to reach their destination. If the user is passing through a state park or a similar undeveloped area (i.e., Island Beach State Park), there may be an unobstructed view of the Project for a period of time. If the user is passing through an urban center, the view of the Project would be blocked by existing buildings.

3.2.2 Local Residents

Local residents are viewers who live, work, and recreate within the VSA. Residents could view the landscape from potentially anywhere within the VSA at a given time. This can include but is not limited to homes, neighborhoods, workplaces, town centers, parks, and waterways. As a result, residents could be anywhere from on the water in the immediate vicinity of the Project, to well inland with no view of the ocean, or in between, with limited or partial views of the ocean or the Project area.

3.2.3 Business Employees

Business employees are viewers who work within the VSA. This user group can encompass many different types of employees, including maritime industry employees, office workers, tourism employees, agricultural workers, commercial workers, and retail workers. The maritime industry employees are discussed in more detail below as a separate user group. In traveling to their place of work, business employees would have limited but occasional chances to view the landscape during their commute. Office workers working within an office building would be focused on work activities and have limited views of adjacent buildings, parking lots, roads, cars, and the occasional landscaped shrubbery. Employees in the coastal tourism industry (e.g., restaurant staff, hotel staff, tour guides) would also be focused on work activities but would likely have more opportunities to view the landscape unobstructed since these businesses are catering to tourists who want the best views possible. Employees within this industry would only be present in significant numbers during the summer season. Agricultural workers would usually be outside in an unobstructed landscape but would be focused on work activities and not the surrounding area. Both commercial and retail workers would likely be inside buildings focused on work activities, but those working in businesses located immediately on the coast would have more opportunities to view an unobstructed landscape.

3.2.4 Recreational Users

Recreational users are viewers, both locals and tourists, who travel to an area for leisure, which could occur anywhere within the VSA. Users could be undertaking a variety of activities, including but not limited to hiking, biking, fishing, boating, swimming, taking in the scenery, looking for wildlife or enjoying a landscape (e.g., Island Beach State Park, numerous public and private beaches). Activities like fishing, boating, and swimming may take place near shore at coastal beaches or offshore from a personal vessel. Other users may be visiting restaurants for a meal, shopping, attending concerts, or other nighttime-based activities. Based on the activity, users may or may not have an unobstructed view of the Project area. For example, a user hiking in a state forest would be unlikely to see the Project area while a boater on the coast or offshore would have a relatively unobstructed view.

3.2.5 Maritime Industry Users

Maritime industry users are viewers who earn a livelihood offshore on the Atlantic Ocean, including commercial fishers, vessel crews, and other offshore workers. These users would be able to view the landscape and the Project from a nearby location, likely adjacent to or in the immediate vicinity of the Project on the Outer Continental Shelf. Obstructions would result mostly from weather (e.g., fog, mist, heavy rain) or large vessels such as tankers or container ships in the direct line of sight rather than from distance from the Project. These users may also view the landscape from a coastal location, such as a local marina, dock, or pier.

3.3 Landscape Character and Visual Setting

To quantify the visual impact a project may have on a VSA, it is helpful to delineate and define the various character defining zones within the VSA. Landscape Similarity Zones (LSZs) are defined as homogeneous geographic areas that exhibit similar vegetation, topography, water resources, and land use patterns. Established visual assessment methodologies (Smardon 1988), such as the use of regional and local knowledge, field observations, and Geographic Information System (GIS) analysis of the U.S. Geological Survey (USGS) National Land Cover Dataset (USGS 2019), were accessed to assist in identifying LSZs within the VSA.

The National Land Cover Database (NLCD) served as the basis for this analysis. Because land cover refers to the actual surface cover of the earth, it is typically analyzed using remote-sensing, or spatial analysis. The NLCD classification system was developed using impervious threshold values resulting from Percent Developed Imperviousness and Percent Imperviousness Change Analysis based on a series of remote-sensing data. The resulting values were hand edited using high resolution National Aerial Imagery Program (NAIP) Imagery to reduce omission and commission error. In total, there are eight (8) NLCD classes that are further categorized into 21 unique classification descriptions, or values (MRLC 2019).

The Project VSA includes 12 unique NLCD classification descriptions or values. TRC further delineated 8 distinct LSZs within the VSA. Table 3, below, lists the individual NLCD classes and delineated LSZs and their prevalence within the VSA.

Table 3. Landscape Similarity Zones and Land Cover Classes

LSZ	NLCD Classes	Square Miles	% of VSA (Total)	% of VSA (Excluding Ocean)	% of VSA (Land Only)
Atlantic Ocean	Open Water	7,786	99.7	-	-
Inland Bays, Lakes, and Ponds	Open Water	16.6	0.2	65.9	-
Beach	Barren Land	2.0	<0.1	8.1	23.6
Open/Low Intensity Development	Developed, Open Space Developed, Low Intensity	0.3	<0.1	1.1	3.3
Medium and High Intensity Development	Developed, Medium Intensity Developed, High Intensity	2.8	<0.1	11.2	32.9
Forest and Forested Wetlands	Deciduous Forest Mixed Forest Woody Wetlands	0.9	<0.1	3.6	10.4
Wetlands	Emergent Herbaceous Wetlands	2.5	<0.1	9.8	28.9
Low Vegetation	Shrub/Scrub Grassland/Herbaceous	0.1	<0.1	0.3	0.9
Total	-	**7,811**	-	-	-

3.4 Visually Sensitive Resources

An inventory of visually sensitive resources was conducted across the entire VSA to identify the potential for visibility of the Project and resulting effects on enjoyment or appreciation of these resources due to the presence of the Project.

These resources include cultural and historic heritage sites, state and national parks, recreational areas, scenic overlooks, and other protected or recognized significant landmarks, with a focus on those areas known to have visitors. KOPs were chosen from among the visually sensitive resources with a particular focus on those resources where sustained ocean views are important to the experience of visitors and other users.

New Jersey State Lands
Three different New Jersey State Parks and Wildlife Management Areas (WMAs) were identified within the VSA. Of these, two state parks fall within the potential viewshed of the Project, as listed in Table 4. These areas are generally accessible to the public and are popular destinations for tourism, hunting, fishing, and other recreational activities such as hiking, birdwatching, and boating.

Table 4. State-Managed Areas with Potential Visibility

Name	Municipality	Managing Agency
Barnegat Lighthouse State Park	Barnegat Light	Division of Parks and Forestry
Island Beach State Park	Berkeley, Long Beach, Ocean	Division of Parks and Forestry

County and Municipal Public Areas
Of the many county- and municipality-owned public areas within the VSA, 85 municipality-owned public areas were identified within the potential viewshed of the Project, as listed in Table 5. These areas predominantly consist of public beaches and similar waterfront open spaces accessible to the public.

Table 5. Municipal Public Areas with Potential Visibility

Name	Municipality	Managing Agency
Atlantic Ocean Beachfront (17 areas)	Barnegat Light	Municipality
White Sands Beach (6 areas)	Berkeley	Municipality
Municipal Beach (35 areas)	Harvey Cedars	Municipality
Loveladies	Long Beach	Municipality
Municipal Beach and Tennis Court (2 areas)	Long Beach	Municipality
Municipal Open Space (3 areas)	Long Beach	Municipality
Casino Pier	Seaside Heights	Municipality
Municipal Open Space (2 areas)	Seaside Heights	Municipality
Seaside Park Beach and Boardwalk (18 areas)	Seaside Park	Municipality

New Jersey Historic Preservation Office (NJHPO) Districts and Properties

Two different historic districts and 89 historic properties designated by NJDEP's Historic Preservation Office (HPO) were identified within the VSA. Of these, one historic district and four historic properties were identified within the potential viewshed of the Project (Table 6).

Table 6. Historic Districts and Properties with Potential Visibility

Site Name	Municipality	Listing Status[1]	Potentially Visible
Historic Districts			
Midway Camps Historic District	Berkeley	Eligible	Yes
Historic Properties			
7 East 5th Street	Barnegat Light	Identified	
Barnegat Lighthouse	Barnegat Light	Listed (Individual)	
Governor's Mansion	Berkeley	Identified	
The Judge's Shack	Berkeley	Eligible (Individual)	

[1] Eligible: Formally determined eligible for listing in the New Jersey and/or National Registers of Historic Places, individually or as part of a historic district.
Listed: Formally listed in the New Jersey and/or National Registers of Historic Places
Identified: No formal SHPO determination

4.0 Visual Impact Analysis

4.1 Project Visibility

A viewshed analysis, field photo documentation, and visual simulations were completed to identify potential Project visual impacts to the identified resources. The process for completing these analyses and the results of each are presented below.

4.1.1 Viewshed Analysis

The viewshed analysis was conducted over the entire VSA for both the maximum blade tip height (1,006 feet ASL) and for the height of the top of the nacelle (559 feet ASL) to refine the study area to include only those areas that would likely have visibility of the WTGs and to provide a geographic extent of visibility. In performing the viewshed analysis, USGS 2018 Southern New Jersey LiDAR elevation data was used to create a Digital Surface Model (includes intervening vegetation and structures) and a Digital Terrain Model (representative of ground and water surface elevations only).

The overall viewshed is shown in Figure 5. The majority of the total viewshed area consists of the open ocean seaward of the Atlantic coast. At least one WTG blade is theoretically visible throughout the entire open ocean portion of the VSA. Project visibility is much more limited in the shoreward portion of the VSA. Potential turbine blade visibility occurs over 2.0 square miles, or approximately 7.9 percent of the shoreward VSA.

Being within the Project viewshed is not synonymous with Project visibility. Areas of actual visibility are anticipated to be more limited due to the narrow profile of the individual WTGs and screening from intervening vegetation and smaller structures not large enough to be accounted for in the viewshed analysis. Actual visibility also depends on weather and lighting conditions, which is especially prevalent when seaward objects are greater than 16 kilometers (10 miles) from the viewer.

4.1.2 Field Photo Documentation

In October 2022, a visual expert visited the Project study area in order to document views in the direction of the Project from the two selected KOPs: Barnegat Lighthouse State Park and the US Lifesaving Station within Island Beach State Park. Weather was generally clear, with occasional cloudy periods over the course of the field photography, with temperatures ranging from 50°F to 72°F. Similar conditions were observed at both KOPs, which are located approximately 9.2 miles apart.

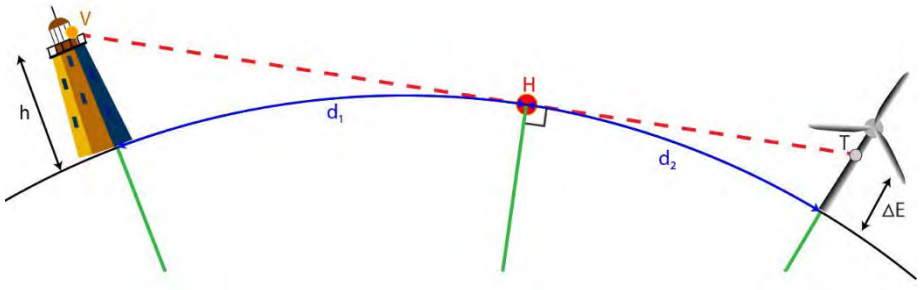
A Nikon D850 full frame digital SLR with a 50mm lens was used to document the existing views. The camera was mounted on a tripod for stability and images were taken at 45.4 megapixels for a resulting image dimension of 8256 x 5504 pixels. GPS positions were also recorded at each photo location.

4.1.3 Visual Simulations

In order to produce the visual simulations, a to-scale model of the proposed WTG was created in a 3D photorealistic modeling software. The 60 identical WTG models were then placed in a 3D modeled environment at the proposed locations within the Lease Area. A virtual camera was also created in the virtual environment to match the exact specifications of the Nikon D850 camera, as well as the field recorded location. The camera bearing in the model was set to match the field recorded bearing line. Next, the field recorded photograph was set as the virtual camera background and the modeled horizon was matched to the actual horizon. The virtual camera was aligned to the baseline photograph using georeferenced flags placed in the field and recreated in the modeled environment. A virtual environment was created to match the sun angle and weather conditions observed in the field.

Using an earth curvature model based on viewing distance and camera elevation, the appropriate elevation for each WTG was set so that it appeared in the correct location beyond the horizon. Figure 4 demonstrates this effect at an exaggerated scale. To determine how much of the turbines would be obstructed by the horizon (point H on Figure 4), a numerical spherical model based on the Haversine Formula was developed to establish the relationships between each observation point, the horizon, and each WTG. The inputs to this model include the geodesic distance between the viewer and the turbines (d1 + d2 on Figure 4), the elevation of the viewer (h on Figure 4), and various fixed inputs including the radius of Earth and the refraction index of the atmosphere, which accounts for the bending of light around the Earth and slightly increases visibility. The output of this curvature model is a vertical distance value that equates to the lowest observable elevation at each WTG site (shown as ΔE in Figure 4). This is used in the visibility assessments and simulations to account for the earth curvature effect.

Figure 4. Earth Curvature Model Diagram



The modeled WTGs were oriented as facing the shore for maximum visibility. Turbine blade rotational positions were randomized to replicate realistic viewing conditions. The view was then rendered, composited, and post-processed to integrate the rendered model into the photograph.

Nighttime conditions were considered to address the potential for nighttime impacts associated with the aviation safety lighting. Observations of existing offshore facilities suggest that night

visibility of aviation hazard signals are visible at distances greater than 24 mi (Sullivan et al. 2013) and onshore wind turbines aviation lighting seen at distances greater than 36 mi (Sullivan et al. 2012). However, due to the curvature of earth at the selected KOPs, all FAA lights would be entirely screened from view in nighttime simulations. LED L-864 and L-810 FAA beacons are not bright enough to create visible light above the horizon when the lights themselves are obstructed by earth curvature. The FAA lights would potentially be visible from elevated structures such as Barnegat Lighthouse observation deck, which is closed to the public at night.

The Visual Simulations are presented in Appendix A.

4.2 Color, Contrast, and Lighting

The Project would be comprised of up to 60 WTGs, primarily viewed from long distances over the expanse of ocean. Although the Project is relatively small compared to the open ocean area, the introduction of man-made moving structures can, depending on distance and meteorological conditions, create a visual contrast to the expanse of the ocean and sky.

Difference in color and contrast between the WTGs, the sky, and the ocean is the main source of visual prominence. Motion of the WTGs is important to consider but becomes much less disruptive to the existing view with increasing distance to the viewer. The vertical scale of the turbines and horizontal extent and arrangement of the overall Project also differentiates impacts at different locations.

Concerns related to visual impacts of WTGs would typically be those presented by the foundation, nacelle, and moving blades (the widest and most substantial portions of the WTG) rather than the relatively slender tower. From coastal vantage points, WTGs appear low on the distant horizon and are difficult to perceive. When detectable, the somewhat regular vertical form of the tubular towers would contrast with the horizontal form of the water/sky horizon. This would only occur at a very small number of elevated viewpoints within the VSA, such as the Barnegat Lighthouse observation deck. For any ground level observer, no part of the WTG tower or nacelle would be visible above the horizon.

The neutral white color of the turbine tower, nacelle and blades would be viewed against the background sky. When the WTGs are backlit (side facing viewer is in shade) the degree of visual contrast is heightened and thus somewhat less compatible with the background sky than if viewed in a more illuminated front- or side-lit condition. Front- or side-lit conditions would cause the turbines to stand out more against a bluer sky, primarily occurring in clear conditions. The sun path for the majority of the viewpoints along the eastern shores of New Jersey is from behind the turbines in the morning (backlit condition) to behind the viewer, in front of the turbines in the evening (front-lit), with a shift to the south during the winter months that creates a more side-lit condition for viewers facing east. Viewers in northern vantage points within the VSA would experience more backlit condition in the winter months when the sun is in the southern sky.

4.3 Meteorological Conditions

Color contrast decreases as distance increases and would diminish or disappear completely during periods of haze, fog, or precipitation. Visibility due to meteorological conditions is addressed in Appendix B. The meteorological analysis shows that clear weather conditions occur

for greater than 50% of daylight hours approximately 236 days per year. On an hourly basis, clear conditions occur an average of 62% of daylight hours over the course of the year. Table 7 below shows the prevalence of each weather condition in each season.

Table 7. Typical Meteorological Conditions

Distribution of Daylight Observations (hourly, 2012-2022)					
Condition	Winter	Spring	Summer	Autumn	Annual
Clear	56%	60%	70%	61%	62%
Foggy	<1%	<1%	<1%	<1%	<1%
Rainy/Snowy	18%	14%	10%	14%	14%
Hazy	<1%	<1%	<1%	<1%	<1%
Cloudy	25%	25%	19%	24%	23%
Days/Year with 50% or More Daylight Observations					
Condition	Winter	Spring	Summer	Autumn	Annual
Clear	57	58	69	52	236
Foggy	<1	<1	<1	1	3
Rainy/Snowy	17	17	12	20	66
Hazy	0	0	0	0	<1
Cloudy	16	17	10	16	59

4.4 Visual Impacts at Selected Viewpoints

Within the views presented in the simulations, the proposed WTGs would be the tallest permanent visible elements on the horizon, although at a far distance. Passing ships closer to shore could appear taller than the WTGs against the horizon. From most foreground and mid-ground vantage points (from vessels on the ocean), the WTGs would be perceived as the main visual element. When viewed from far background vantage points on land, the WTGs' perceived scale and presence would be considerably reduced. For example, the WTG height of 1,006 ft, when viewed from shore at 43 miles, is equivalent in vertical scale to an object just over 5 inches tall viewed from 100 feet away.

From an earth curvature standpoint, the turbine blades are technically visible in clear conditions from sea level at just under 45 miles but would have greatly diminished visibility beyond the point at which the nacelles and towers drop below the horizon at a viewing distance of approximately 34 miles.

Review of the visual simulation images, along with photos of the existing view, allowed for comparison of the aesthetic character of each view with and without the Project.

4.4.1 Viewpoint 1 – Barnegat Lighthouse State Park, Barnegat Light, NJ

Existing View

This view is from beach level at Barnegat Lighthouse State Park, located approximately 43.2 miles west of the nearest proposed WTG location. The photo location, approximately 250 feet east of the lighthouse, provides a vantage point from which a viewer can observe the dunes,

beach, jetties, and ocean beyond. The location is a popular tourist and recreationist destination, particularly for birdwatching, picnicking, trail walking, and fishing along the elevated walkway on the southern jetty. The main visual elements in the foreground are the dunes and beach vegetation; the midground consists of the riprap jetties, railed concrete walkway with benches, and inlet marker structures; and the only background elements are the ocean, horizon, and oceangoing vessels.

Proposed View

The introduction of the proposed WTGs to the view from this KOP would create a subtle change to the view in an approximately 6.9-degree extent, or 6% of the human field of view. The change in this portion of the view due to the project would be the addition of the WTG blades of 17 different WTGs just visible over the horizon, with the other 43 WTGs screened entirely from view. A maximum of 14% of the overall height of the closest WTG would be visible, which only includes the turbine blades, and not the nacelle or tower. Any significant wave activity could obscure views of the WTGs from ground level.

Compared to other vertical elements in this view (e.g., railings, jetty markers, people, vessels, wildlife), the apparent height of the visible WTG blades will be extremely small. The motion and color of the WTG blades may draw an observer's attention, particularly in the late afternoon when the sky and ocean appear darker blue in color as compared to the white turbines. During morning and midday periods and during overcast or cloudy conditions when the sky appears lighter, the turbine blades will be much more difficult to observe. When backlit by the sun during early morning, it is unlikely that the WTG blades would obscure the sun's light enough to be visible to the naked eye.

4.4.2 Viewpoint 2 – Lifesaving Station, Island Beach State Park, Lacey, NJ

Existing View

This beach-level view is from the northern part of the VSA in Island Beach State Park, at the beach entrance adjacent to the U.S. Lifesaving Station No. 14 National Register Site (note: the NRHP site itself would not have ground-level views of the Project due to screening by the dunes but may have views of the Project from upper floors/towers). The location is approximately 44.3 miles northwest of the nearest WTG location. The view is typical of many other beach locations in terms of lighting, visual elements, and expansive (180-degree) ocean views. Foreground elements include only the beach and its users (visitors walking, state park employees driving vehicles across the beach, and wildlife such as seagulls). The midground consists of the ocean, waves, and nearby vessels, while the background includes the distant ocean, horizon, sky, and distant vessels large enough to be seen from shore. During morning hours, these large cargo vessels can be observed in the outbound vessel traffic lane approximately 11 to 16 miles offshore, with a variety of smaller fishing and recreational vessels closer to shore. At midday (high tide during field photography), numerous fishing vessels were observed much closer to shore, becoming the dominant visual element in the midground.

Proposed View

The introduction of the proposed WTGs has the potential to alter the view in a 5.9-degree horizontal extent (5% of the human field of view). Given the distance to the WTGs and elevation

of the viewer, only 17 of the 60 proposed WTGs would be visible at all, with a maximum of 17% of the overall WTG height visible above the horizon. These WTG blades would only be observable under clear, calm conditions. When observable, the WTG blades would stand out against the horizon in the absence of competing visual elements such as vessels, strong wave activity, or wildlife, especially in the later parts of the day when the ocean and sky appear darker and the turbines are strongly front-lit. Fishing and other vessels would periodically dominate views even with WTGs visible, due to the much larger size, similar color contrast, and distinct horizontal motion.

4.5 Other Visibility Considerations

4.5.1 New York Visibility

The nearest point to the Project in New York State is at Short Beach in Jones Beach State Park, approximately 64.7 miles north of the nearest WTG location. At this distance, the WTGs proposed as part of the Project will not be visible. To view the nearest WTG from Jones Beach, an observer would need to be at an elevated viewpoint, approximately 345 feet above sea level; the closest elevated viewpoint, the Fire Island Lighthouse, is approximately 168 feet fall. In either case, the scale and atmospheric effects would likely make the WTGs imperceptible to viewers. As such, this Study considers visual impacts to New York State from structures in the Lease Area to be negligible and the visibility is not assessed further in this Study.

4.5.2 Offshore Viewpoints

Offshore viewers are likely to experience the greatest visual impacts due to the presence of the WTGs, as there are very limited visual elements competing for visual dominance. As proximity increases, the visual extent and scale of the WTGs increases dramatically, especially within 34 miles of the nearest WTG, at which point the nacelle and tower are visible in addition to the WTG blades. The closest areas of concentrated vessel traffic are the inbound Barnegat to Ambrose Traffic Lane, the entrance of which is approximately 17 miles northwest of the Lease Area, and the outbound Ambrose to Hudson Canyon Traffic Lane, approximately 14 miles north of the Lease Area. These lanes are used most frequently by commercial shipping traffic. Recreational and commercial fishing vessels are more likely to operate closer to the WTGs, potentially including within the Lease Area.

4.5.3 Other Proposed Projects

The proposed construction and operations of other wind projects currently under development offshore New Jersey would create much larger visual impacts within the southern portion of the VSA than would the construction of this Project. The Community Offshore Wind WTGs are all greater than 40 miles offshore, whereas Lease Area OCS-A 0549, Atlantic Shores North, is located less than 10 miles offshore Long Beach Island, and assuming a WTG of similar dimensions, would be approximately 97% visible above the horizon at 10 miles, including portions of the foundation, tower, and nacelle in addition to the WTG blades. If fully built out, the Atlantic Shores North Project has the potential to entirely obstruct views of the Community Offshore Wind Lease Area. The combined extent of the other leases in proximity to the Community Offshore Wind Lease OCS-A 0539, including OCS-A 0498, OCS-A 0499, OCS-A 0532, and OCS-A 0549, is over 144 degrees, which is greater than the human field of view. Furthermore, several projects proposed by other developers would lie between onshore viewers and the Community Offshore

Wind Project and would obstruct views of the Project or attract more attention due to the increased proximity.

4.6 Visibility Summary

Overall visual impact on scenic quality at selected viewpoints is likely to be variable between sites but is generally expected to be low due to the low level of visual contrast and relatively small size of the WTGs in the context of the overall oceanfront landscape.

The simulations are conservative in that they include what may be visible on a clear day. Haze, rain, snow, fog, cloudy or overcast skies or sea spray that typically occurs in this location would decrease the overall visibility. The installation and decommissioning of the Project would cause additional temporary impacts to visually sensitive resources in the area, but the only visible elements during operation would be the WTGs. The dominant visual element remains the sky and ocean view.

5.0 Mitigation Options

Mitigation options for reducing the visual impact of the WTGs are imbedded into the Project design through the Lease Area boundaries and distance offshore, dimensions of the WTGs, and BOEM and FAA requirements for nighttime lighting. The following mitigation measures are proposed to reduce or mitigate visual impact of the Project.

- The Project will be located entirely within Lease Area OCS-A 0539, identified by BOEM as suitable for wind power development. The distance of this area offshore Long Beach Island and Barnegat Peninsula, a minimum of 37 miles, reduces the overall visibility of the structures from visually sensitive public resources and populated areas.
- The layout will arrange WTG structures in a uniform grid pattern and maintain consistency in dimensions, color, design, and movement.
- The WTGs will be an FAA-recommended paint color, which generally blends well with the sky at the horizon, for any WTG components visible from shore. The WTG paint color will be determined in consultation with BOEM, FAA, and USCG.
- Incorporate radar activated aviation obstruction lights (such as ADLS) to minimize the amount of time the lights are on, if permitted by overseeing agencies.
- Utilize FAA warning lights with the longest off cycle permitted by the FAA, and incorporate radar activated aviation obstruction lights (such as ADLS) to minimize the amount of time the lights are on, if permitted by overseeing agencies.
- Utilize USCG warning lights with appropriate visible range for mariners (2 to 5 Nautical Miles) and locate USCG lighting on lower structures that will not likely be visible from coastal vantage points.

Based on the anticipated level of visual impact and limitations to mitigation options due to federal requirements, no further mitigation is recommended for this Project.

6.0 Conclusions

Visual impacts are dependent on the distance from shore, the earth curvature, and the atmospheric conditions that could screen some or all the foundation, and portions of the WTG tower, nacelle, and rotor.

As shown in the visual simulations (Appendix A), the widest stationary portions of the WTGs (tower, nacelle/rotor, foundation, and deck) would be below the visible horizon and would not be observable for any WTGs from the assessed KOPs. The narrow width of the turbine blades combined with the distance from the viewpoints would make these elements of the WTG minimally visible by the naked eye in the best visibility conditions (a clear, low humidity day) and hard to see in haze, rain, snow, cloudy or overcast skies, sea spray or fog that typically occurs in this location.

Visibility would rarely occur beyond the southeastern shore beaches and the first row of buildings or houses along Long Beach Island and Barnegat Peninsula. The viewshed analysis suggests that 7.9 percent of the shoreward VSA may have visibility of the WTGs. Much of the visible area occurs over open water in the eastern portion of the VSA.

The visual simulations demonstrate that visibility of the proposed WTGs is present in most coastal areas within the VSA, and the proposed WTGs would likely be distinguishable to the average viewer under clear conditions. The WTG nacelles and FAA lights would only be visible from the elevated structures under clear weather conditions. Therefore, the presence of flashing lights on the WTGs at night would result in very minor, localized impacts (BOEM 2007). However, the use of ADLS would greatly reduce the impacts of lighting, with lights only on and visible when aircraft are present in the area. Weather conditions such as fog, haze, clouds, or precipitation would greatly limit the visibility of the WTGs from the shore during daytime.

Overall, visual impacts to onshore viewers of the WTGs in clear daytime conditions is expected to be minimal to minor in the areas from which WTGs can be seen. Based on the distance from the shoreline, it is unlikely that the installation of the WTGs would diminish the enjoyment of those views or of the resources identified within the VSA.

7.0 References

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Figures

Appendix A. Visual Simulations

Simulations Included:

	Location	Time of Day	Condition[1]	Layout[2]
1	Barnegat Lighthouse State Park	Morning (0836)	**Partly Cloudy**	WTG Overlay
2	Barnegat Lighthouse State Park	Morning (0836)	**Partly Cloudy**	Standard
3	Barnegat Lighthouse State Park	Morning (0836)	Clear	Standard
4	Barnegat Lighthouse State Park	Morning (0836)	Overcast	Standard
5	Barnegat Lighthouse State Park	Noon (1254)	Partly Cloudy	Standard
6	Barnegat Lighthouse State Park	Noon (1254)	**Clear**	Standard
7	Barnegat Lighthouse State Park	Noon (1254)	Overcast	Standard
8	Barnegat Lighthouse State Park	Late Afternoon (1626)	**Partly Cloudy**	Standard
9	Barnegat Lighthouse State Park	Late Afternoon (1626)	Clear	Standard
10	Barnegat Lighthouse State Park	Late Afternoon (1626)	Overcast	Standard
11	US Lifesaving Station	Morning (0816)	Partly Cloudy	Standard
12	US Lifesaving Station	Morning (0816)	**Clear**	Standard
13	US Lifesaving Station	Morning (0816)	Overcast	Standard
14	US Lifesaving Station	Noon (1202)	Partly Cloudy	Standard
15	US Lifesaving Station	Noon (1202)	**Clear**	Standard
16	US Lifesaving Station	Noon (1202)	**Clear**	WTG Overlay
17	US Lifesaving Station	Noon (1202)	Overcast	Standard
18	US Lifesaving Station	Late Afternoon (1703)	Partly Cloudy	Standard
19	US Lifesaving Station	Late Afternoon (1703)	**Clear**	Standard
20	US Lifesaving Station	Late Afternoon (1703)	Overcast	Standard
21	US Lifesaving Station	Night	Clear	Standard

[1]Bold indicates original weather condition during photography, alternate weather conditions are simulated.
[2]Simulations marked “WTG Overlay” include highlighted overlays to demonstrate WTG position below horizon.

Appendix B. Meteorological Conditions Report

Appendix B: Meteorological Conditions Report

Community Offshore Wind Lease Area OCS-A 0539

December 2022

Prepared For:

RWE Renewables

Prepared By:

TRC
404 Wyman Street Suite 375
Waltham, MA 0251

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TABLES

FIGURES

1.0 Introduction

TRC Companies, Inc. (TRC) was retained by Community Offshore Wind, LLC (Community Offshore Wind), a joint venture of RWE Renewables and National Grid, to prepare a Visibility Study (the Study) for the proposed Community Offshore Wind Project (the Project) within Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0539 (the Lease Area). Lease Area OCS-A 0539 encompasses approximately 125,964 acres and is located approximately 37 miles (mi; 59 kilometers [km]), 32 nautical miles [nm]) offshore of Little Egg Harbor, New Jersey and approximately 64 mi (104 km, 56 nm) offshore of Jones Beach, New York.

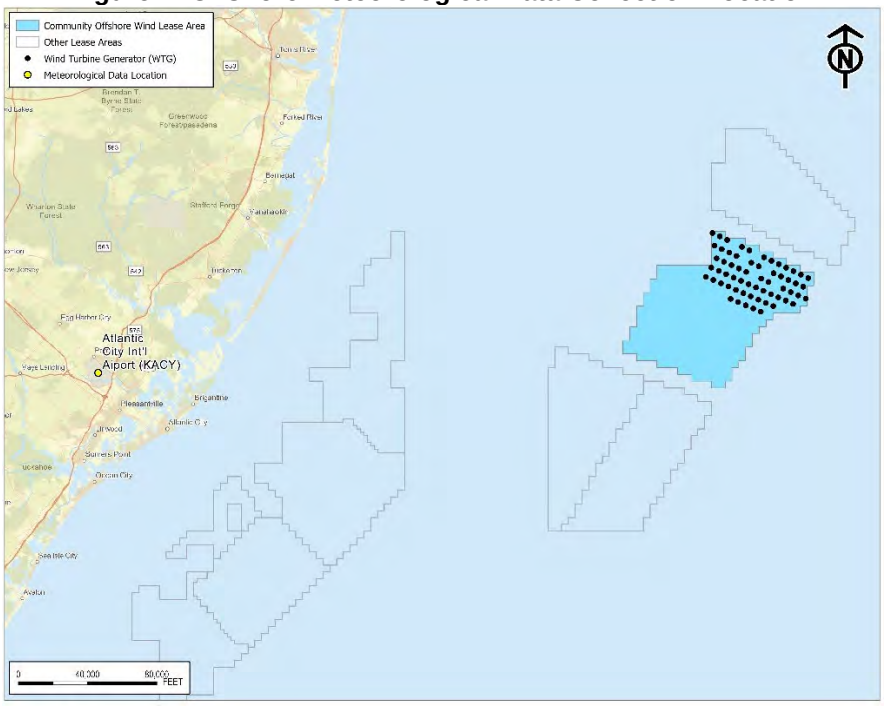
This report provides an analysis of the meteorological conditions associated with the Lease Area, which have the potential to influence visibility of the Project. This report will assist in understanding the meteorological conditions experienced in this area and how they may influence the visibility of a wind energy project. The analysis uses existing meteorological information from an onshore measurement site in close proximity to the Lease Area. Data for visibility at the measurement site is reported to a distance of up to 10 nautical miles (nm) and therefore, visibility beyond 10 nm was calculated as described further below.

2.0 Data Collection

The meteorological assessment utilized hourly meteorological surface data collected at National Weather Service (NWS) measurement site located at the Atlantic City International Airport in Egg Harbor, New Jersey (Figure 1) over the 10-year period of October 1, 2012– September 30, 2022. Local Climatological Data (LCD) surface observations for the site were obtained from NOAA's National Center for Environmental Information.

The hourly observations in the data sets include wind speed, wind direction, cloud cover, cloud ceiling height, visibility, weather codes denoting precipitation, ambient, dew point temperatures, and precipitation amounts.

Figure 1: Onshore Meteorological Data Collection Location



3.0 Meteorological Conditions Assessment

Hourly surface observations were evaluated to determine the following meteorological conditions.

- Average number of days when it is clear, cloudy, foggy, rainy, and hazy during daylight hours in each of the four seasons,
- Average number of days when it is clear, cloudy, foggy, rainy, and hazy for 50% of the daylight hours in each of the four seasons,
- Average percent of daylight hours when it is clear, cloudy, foggy, rainy, and hazy in each of the four seasons, and
- Average percent of nighttime hours when it is clear, cloudy, foggy, rainy, and hazy in each of the four seasons (i.e., the average conditions for nighttime during each of the seasons).

3.1 Definition of Data Parameters

Since the analysis covers daylight and nighttime conditions, it was important to define what constitutes daylight, as it changes in duration over the year. Sunrise and sunset times were obtained from the U. S. Naval Observatory's Astronomical Applications Department.

The data was evaluated for clear, cloudy, rainy, foggy, and hazy conditions during daylight and nighttime hours based upon the following criteria:

- Clear conditions were defined as having an unlimited cloud ceiling height. Unlimited ceiling heights are associated with clear and scattered sky cover (up to 50% of the sky).
- Cloudy conditions were defined as broken or overcast sky cover, greater than 50% of the sky.
- Rainy conditions were defined as any “trace” or measurable precipitation (rain, snow, sleet, etc.) amount. The Integrated Surface Database (ISD) data set includes weather codes that define the type and intensity of different weather conditions. Examples of the codes are BR (mist), RA (rain), SN (snow), FZRA (freezing rain). A complete code list can be found in “Integrated Surface Database (ISD) Documentation” (ncdc.noaa.gov).
- Foggy and hazy conditions are defined only by weather codes. Fog has a weather code of FG. Haze has a weather code of HZ.

Each individual daylight period was characterized as being clear, cloudy, rainy, foggy, or hazy. When examining the five meteorological conditions, it is possible to have multiple conditions occurring concurrently. For example, haze can occur when it is sunny. Fog and rain occur when it is cloudy or there can be light rain during fog events. In order to avoid 'double counting' any of the conditions and maintaining a 100% count, conditions were assigned based on the following:

1. An hour is either clear or cloudy.
2. If clear or cloudy conditions occur for 50% or more of the daylight hours, assign the day based on visibility restriction.
3. Clear conditions are based on unlimited ceiling height and can include haze. A day was counted as hazy before being counted as sunny.
4. Cloudy conditions are based on limited ceiling height and can also include rain and fog. The day classification order was foggy, rainy, and finally cloudy.
5. If clear and cloudy conditions each account for 50% of the daylight hour, the clear condition (sunny, hazy) was assigned 0.5 day as was the cloudy condition (fog, rain, cloud).

This prioritization was also used for evaluating individual hours.

Seasons were defined as follows, using the March and September equinox and June and December solstice as break points:

- Winter = December 22–March 21
- Spring = March 22–June 21
- Summer = June 22–September 21
- Autumn = September 22–December 21

4.0 Meteorological Conditions Results

4.1 Meteorological Conditions

Table 1 presents representative seasonal and annual meteorological conditions observed at the Atlantic City International Airport and the frequency of occurrence and distribution of clear, foggy, rainy, hazy, and cloudy conditions. The data has been rounded to a whole day value. The topmost data group presents the average number of days per season/year that each of the five conditions was observed to occur at least for one hour during the daylight period. These numbers are independent of each other and should not be summed as multiple tallies that could occur in any single daylight period. For example, clouds and fog could occur in the early morning giving way to clear skies later in the morning. A thunderstorm could occur in the late afternoon. In that case, clear, cloudy, rainy, and foggy conditions would all occur for at least one hour.

The second data grouping characterizes days where each day is clear, cloudy, rainy, foggy, or hazy and only a single tally is made for any daylight period. This characterization is based on which of the five meteorological conditions occur for at least 50% of the hours in the daylight period. These numbers can be summed to equal to the number of valid daylight periods occurring during the year.

The third data group presents the distribution of the five meteorological conditions during daylight hours as a percentage. Each hour is characterized as clear, foggy, rainy, hazy, or cloudy. The percentages of the five meteorological conditions can be summed to equal 100%.

The fourth data group presents the distribution of the five meteorological conditions during nighttime hours as a percentage. Each hour is characterized as clear, foggy, rainy, hazy, or cloudy. The percentages of the five meteorological conditions can be summed to equal 100%.

Table 1 Meteorological Conditions Statistics

	Winter	Spring	Summer	Autumn	Annual
Days/Year with 1 or More Daylight Observations					
Clear	78	85	91	81	334
Foggy	3	5	3	3	14
Rainy/Snowy	28	31	27	24	109
Hazy	1	1	1	1	4
Cloudy	47	55	47	46	194
Days/Year with 50% or More Daylight Observations					
Clear	57	58	69	52	236
Foggy	<1	<1	<1	1	3
Rainy/Snowy	17	17	12	20	66
Hazy	0	0	0	0	<1
Cloudy	16	17	10	16	59
Distribution of Hourly Daylight Observations (%)					
Clear	56%	60%	70%	61%	62%
Foggy	<1%	<1%	<1%	<1%	<1%
Rainy/Snowy	18%	14%	10%	14%	14%
Hazy	<1%	<1%	<1%	<1%	<1%
Cloudy	25%	25%	19%	24%	23%
Distribution of Hourly Nighttime Observations (%)					
Clear	58%	58%	72%	60%	62%
Foggy	1%	2%	<1%	<1%	1%
Rainy/Snowy	19%	17%	12%	17%	16%
Hazy	<1%	<1%	<1%	<1%	<1%
Cloudy	21%	24%	15%	22%	21%

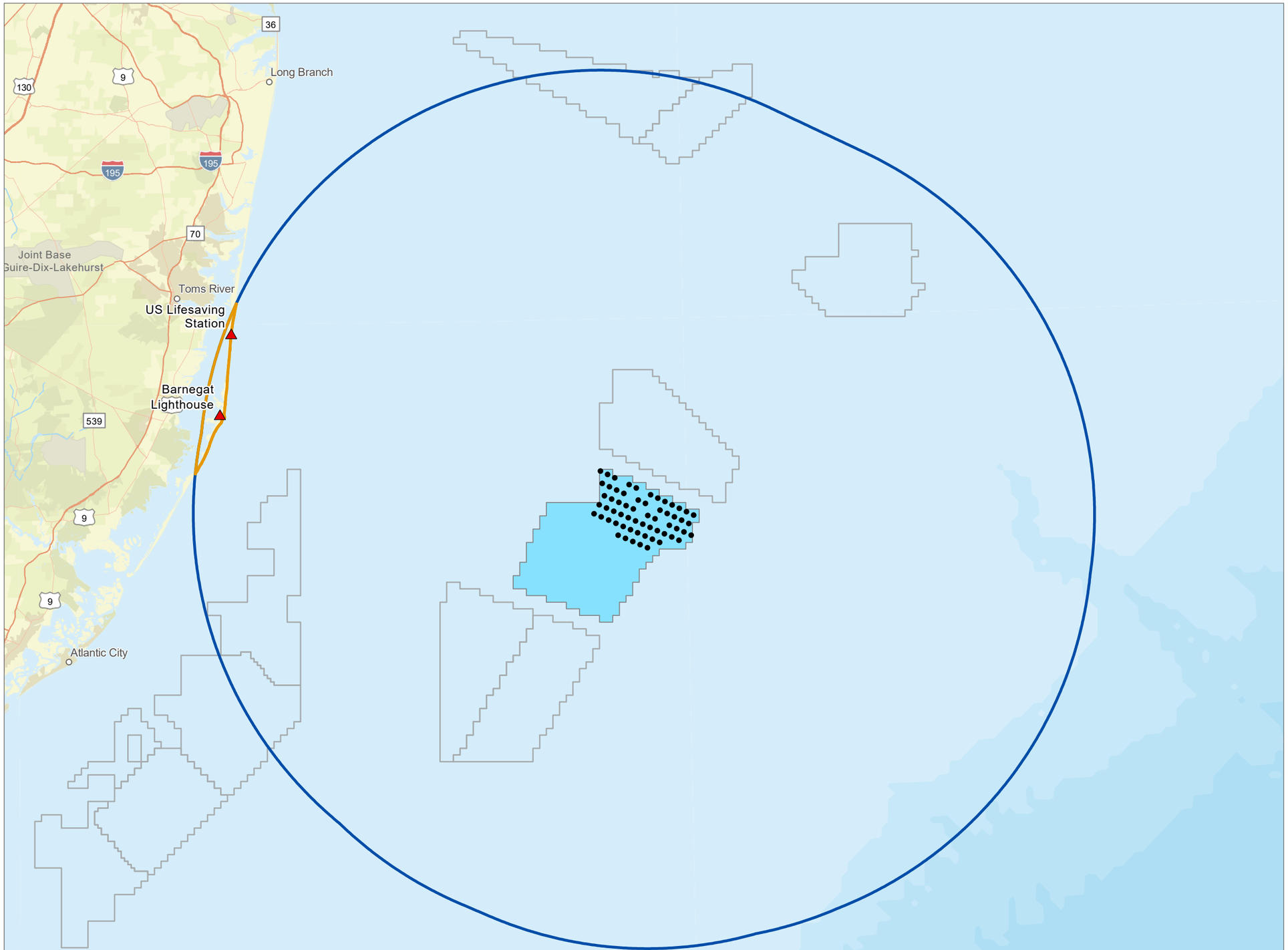
Clear conditions occur at least one hour during daylight 334 days per year with seasonal values ranging from 78 days during winter to 91 days during summer. Fog occurred 14 days per year. Seasonal values range from 3 days in winter, sum, and autumn to 5 days in spring. Rain or snow occurred 109 days per year. Seasonal values range from 24 days in autumn to 31 days in spring. Haze occurred about 4 days per year, on average one day per season. Cloudy conditions occur 194 days per year, with seasonal values ranging from 46 days in autumn to 55 days in spring.

Days were characterized as clear, cloudy, foggy, rainy, or hazy based on an occurrence of the meteorological condition 50% or more of daylight hours. Clear days occurred 236 days per year, with seasonal values ranging from 52 days in autumn to 69 days in summer. Foggy days occurred an average of 3 days per year and ranging from less than one day in winter, spring, and summer to 1 day in autumn. Rainy or snowy days occurred 66 days per year, ranging from 12 days in summer to 20 days in winter. Haze occurred less than one day both annually and seasonally. Cloudy days without associated rain or snow occurred 59 days per year, ranging from 10 days in summer to 17 days in spring.

Clear conditions occurred 62% of the daylight hours over the course of the year, with seasonal values ranging from 56% in spring to 70% in summer. Fog occurred less than 1% of the time, with seasonal values all below 1%. Rain or snow occurred 14% of the time, with seasonal values ranging from 10% in summer to 18% in winter. Haze occurred less than 1% of the time, both

annually and seasonally. Cloudy conditions, without associated fog or rain/snow, occurred 21% of the time, with seasonal values ranging from 19% in summer to 25% in winter and spring.

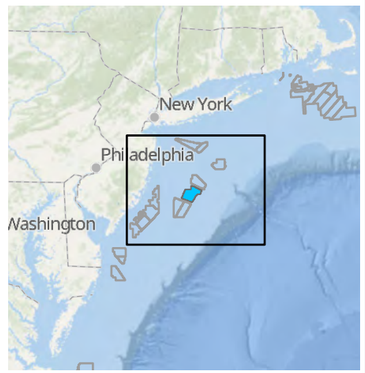
Clear conditions occurred 62% of the nighttime hours over the course of the year, with seasonal values ranging from 58% in winter and spring to 72% in summer. Fog occurred 1% of the time, annually, with seasonal values ranging from less than 1% in summer and autumn to 2% in spring. Rain or snow occurred 16% of the time, with seasonal values ranging from 12% in summer to 19% in winter. Haze occurred less than 1% of the time both annually and seasonally. Cloudy conditions, without associated fog or rain/snow, occurred 21% of the time, with seasonal values ranging from 15% in summer to 24% in spring.



Key Observation Point (KOP)
45-Mile Visual Study Area (VSA)
45-Mile Visual Study Area (VSA)
Wind Turbine Generator (WTG)
Community Offshore Wind Lease Area
Other Lease Areas

NOTES:
1: LEASE AREAS FROM BOEM JUNE 2022

BASE MAP: ESRI "WORLD TOPOGRAPHIC MAP" ONLINE SERVICE LAYER.
DATA SOURCES: TRC



1:720,000
1" = 60,000'

0 60,000 120,000 FEET

PROJECT: COMMUNITY offshore wind

TITLE: **Visual Study Area**

DRAWN BY:	M. ERNSTING	PROJ. NO.:	123456.0000.0000
CHECKED BY:	S, DEHAINAUT		**FIGURE 5**
APPROVED BY:	M. FEINBLATT		
DATE:	JANUARY 2023		

TRC
404 WYMAN STREET
SUITE 375
WALTHAM, MA 02451
PHONE: 781.419.7696

FILE: RWE Visual Impact Study.aprx

Coordinate System: WGS 1984 UTM Zone 18N , Map Rotation: 0
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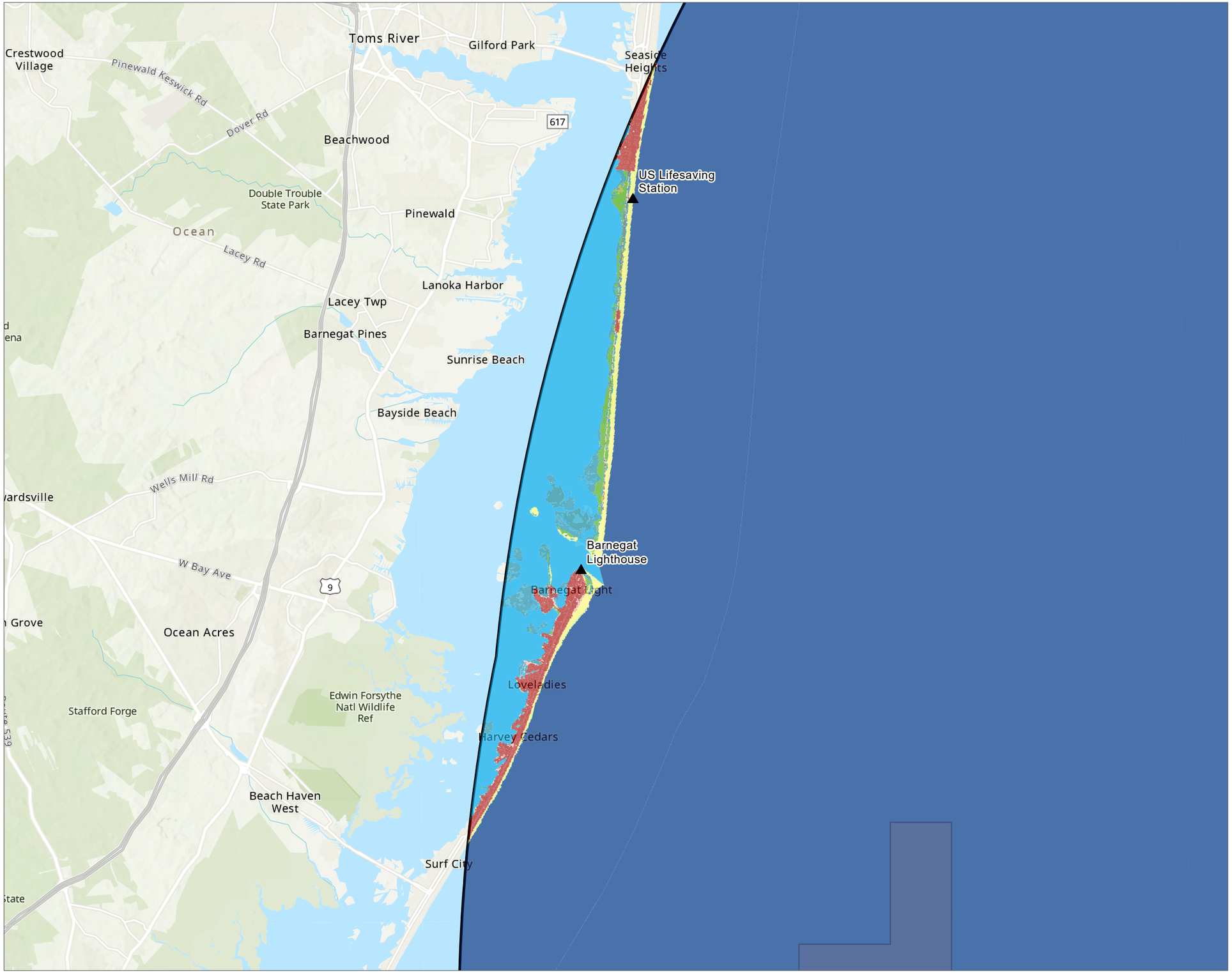


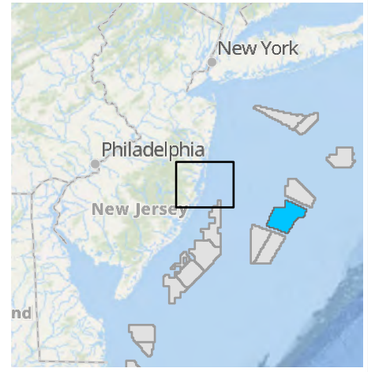
- Key Observation Point (KOP)
- 45-Mile Visual Study Area (VSA)
- Community Offshore Wind Lease Area
- Other Lease Areas

Landscape Similarity Zone (LSZ)

- Atlantic Ocean
- Inland Open Water
- Beach
- Developed Open/Low
- Developed Med/High
- Forest and Forested Wetlands
- Wetlands
- Low Vegetation

NOTES:
1: LSZ AREAS DERIVED FROM NLCD 2019 DATA.
2. LEASE AREAS FROM BOEM JUNE 2022

BASE MAP: ESRI "WORLD TOPOGRAPHIC MAP" ONLINE SERVICE LAYER.
DATA SOURCES: TRC, MRLC (NLCD 2019)



N

1:150,000
1" = 12,500'

0 12,500 25,000 FEET

PROJECT: COMMUNITY offshore wind

TITLE: **Landscape Similarity Zones**

DRAWN BY:	M. ERNSTING	PROJ. NO.:	123456.0000.0000
CHECKED BY:	S, DEHAINAUT		**FIGURE 6**
APPROVED BY:	M. FEINBLATT		
DATE:	JANUARY 2023		

TRC
404 WYMAN STREET
SUITE 375
WALTHAM, MA 02451
PHONE: 781.419.7696

FILE: RWE Visual Impact Study.aprx

Coordinate System: WGS 1984 UTM Zone 18N; Map Rotation: 0
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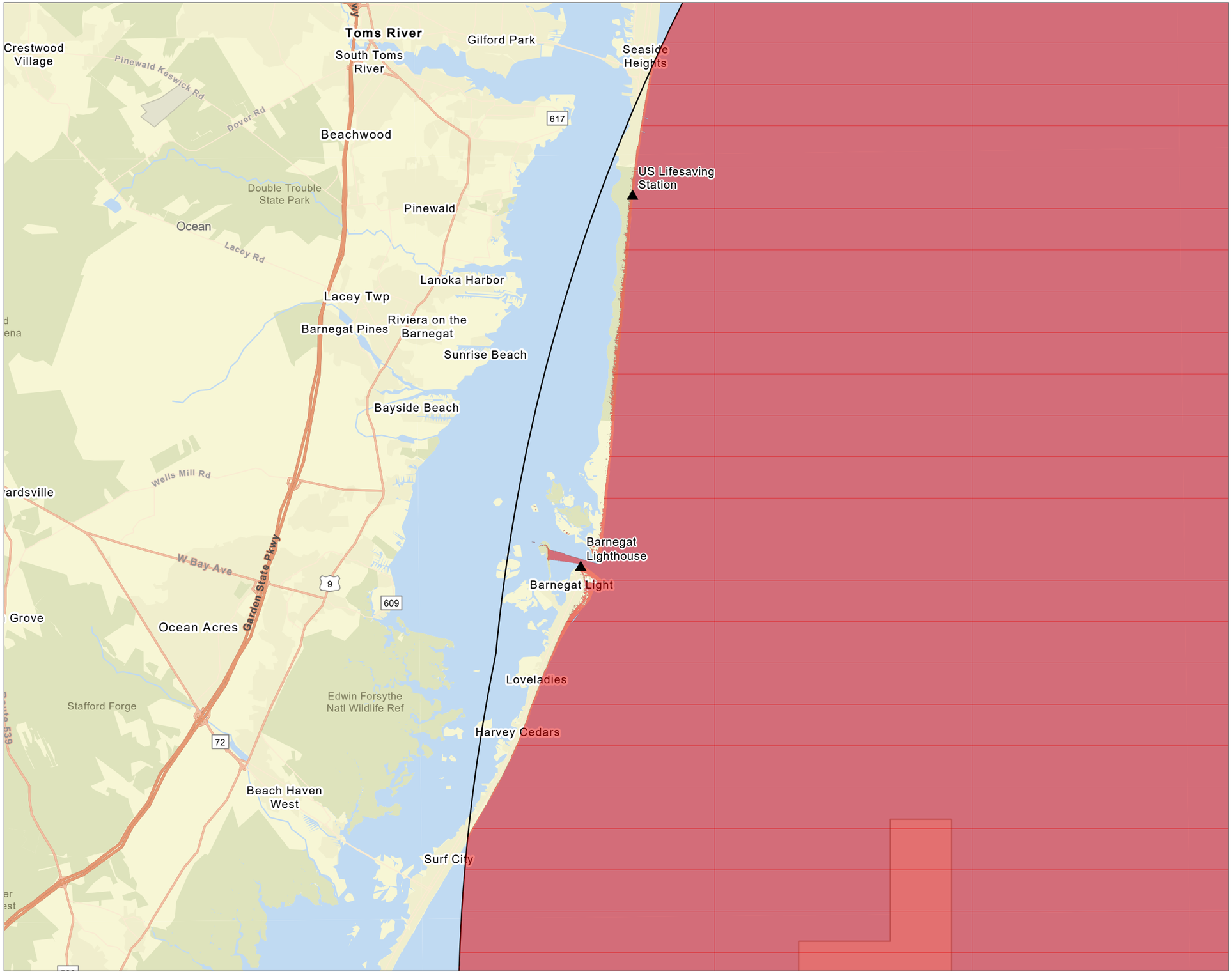


▲ Key Observation Point (KOP)

45-Mile Visual Study Area (VSA)

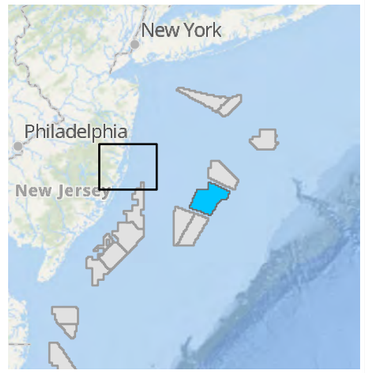
WTG Viewshed Area (1,006-ft Blade Tip)

Community Offshore Wind Lease Area

Other Lease Areas

NOTES:
1: VIEWSHED AREAS BASED ON 2018 USGS SOUTH JERSEY LIDAR-DERIVED DSM AND DTM (BARE EARTH).
2. VIEWSHED MODEL BASED ON 1,006-FOOT MAXIMUM BLADE TIP HEIGHT AND 5.1-FOOT RECEIVER HEIGHT (ABOVE GROUND LEVEL).

BASE MAP: ESRI "WORLD TOPOGRAPHIC MAP" ONLINE SERVICE LAYER.
DATA SOURCES: TRC, USGS



1:150,000
1" = 12,500'

0 12,500 25,000 FEET

PROJECT: COMMUNITY offshore wind

TITLE: **Project Viewshed**

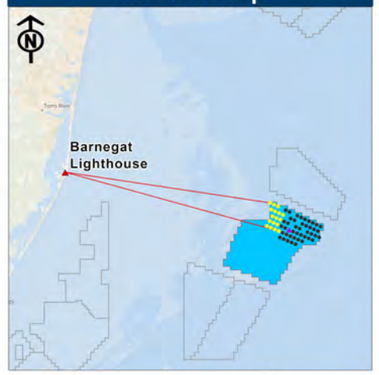
DRAWN BY:	M. ERNSTING	PROJ. NO.:	123456.0000.0000
CHECKED BY:	S. DEHAINAUT		**FIGURE 7**
APPROVED BY:	M. FEINBLATT		
DATE:	JANUARY 2023		

TRC
404 WYMAN STREET
SUITE 375
WALTHAM, MA 02451
PHONE: 781.419.7696

FILE: RWE Visual Impact Study.aprx

17-2 Visibility and Viewshed Impact Simulations

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	4:26 PM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	64°F
Simulated Weather Conditions	Clear
Humidity	81%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from SW
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

Proposed Late Afternoon View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

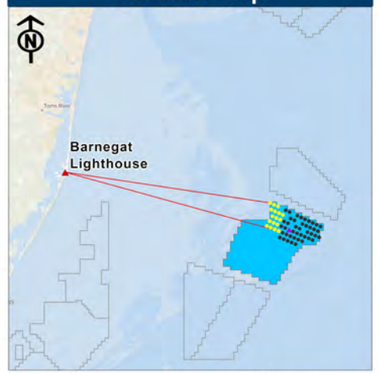
Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

Proposed Late Afternoon View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

Context Map



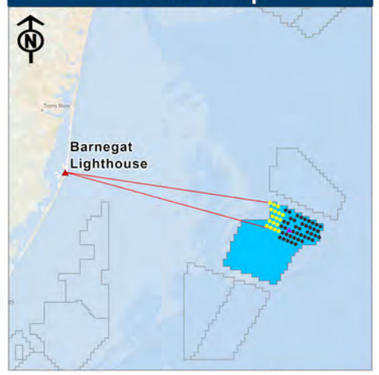
- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	4:26 PM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	64°F
Simulated Weather Conditions	Overcast
Humidity	81%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from SW
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	4:26 PM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	64°F
Weather Conditions	Partly Cloudy
Humidity	81%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from SW
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

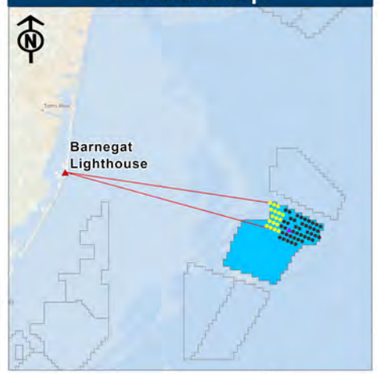
Proposed Late Afternoon View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	8:36 AM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	57°F
Simulated Weather Conditions	Clear
Humidity	87%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from E
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

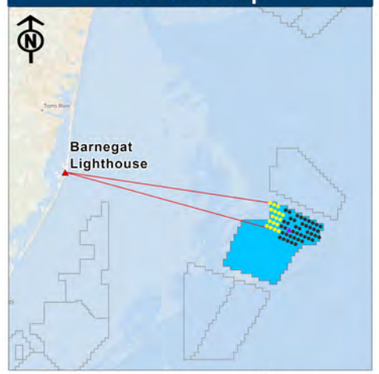
Proposed Morning View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	8:36 AM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	57°F
Simulated Weather Conditions	Overcast
Humidity	87%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from E
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

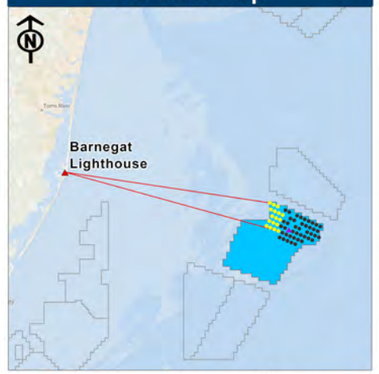
Proposed Morning View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	8:36 AM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	57°F
Weather Conditions	Partly Cloudy
Humidity	87%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from E
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

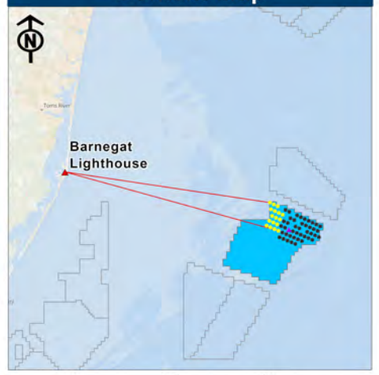
Proposed Morning View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	12:54 PM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	50°F
Weather Conditions	Clear
Humidity	87%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from S
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

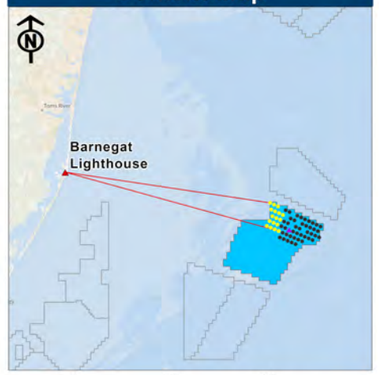
Proposed Mid-Day View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	12:54 PM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	50°F
Simulated Weather Conditions	Overcast
Humidity	87%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from S
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

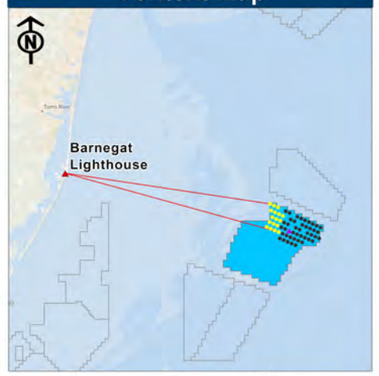
Proposed Mid-Day View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	12:54 PM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	50°F
Simulated Weather Conditions	Partly Cloudy
Humidity	87%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from S
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

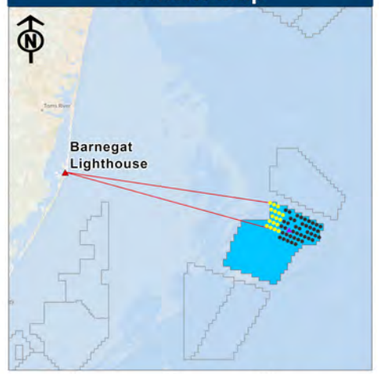
Proposed Mid-Day View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	8:36 AM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	57°F
Weather Conditions	Partly Cloudy
Humidity	87%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from E
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

Proposed Morning View with Shore-Facing Wind Turbine Generators

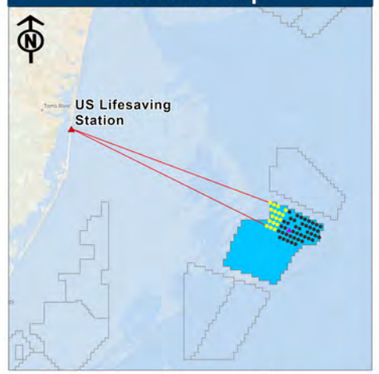
This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries. NCEI records visibility to a maximum of 10 miles, actual visibility may be further.

All 60 WTGs are shown highlighted in this simulation to demonstrate scale and position relative to the horizon. This image does not reflect actual visibility or WTG color.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	5:03 PM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	72°F
Weather Conditions	Clear
Humidity	40%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from SW
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP Berkeley Township, New Jersey

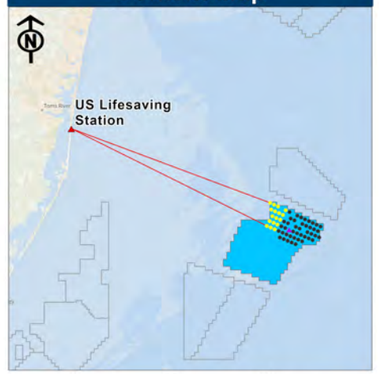
Proposed Late Afternoon View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	5:03 PM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	72°F
Simulated Weather Conditions	Overcast
Humidity	40%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from SW
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP Berkeley Township, New Jersey

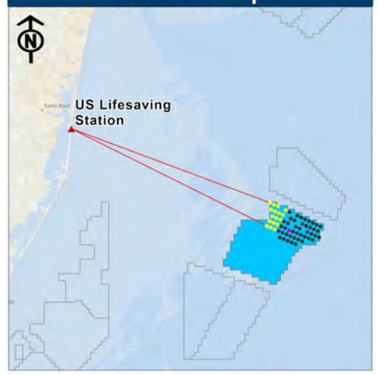
Proposed Late Afternoon View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	5:03 PM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	72°F
Simulated Weather Conditions	Partly Cloudy
Humidity	40%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from SW
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP
Berkeley Township, New Jersey

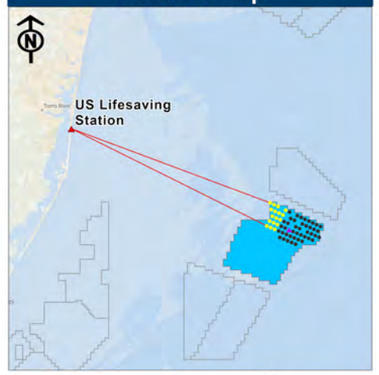
Proposed Late Afternoon View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	8:16 AM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	50°F
Weather Conditions	Clear
Humidity	81%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from E
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP
Berkeley Township, New Jersey

Proposed Morning View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".

TRC

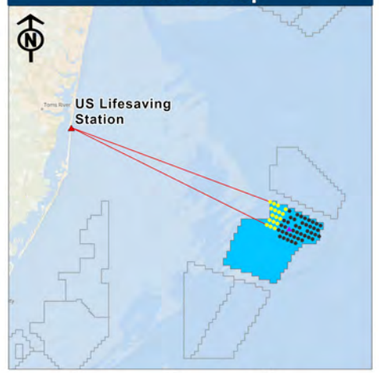
Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP Berkeley Township, New Jersey

Proposed Morning View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

Context Map



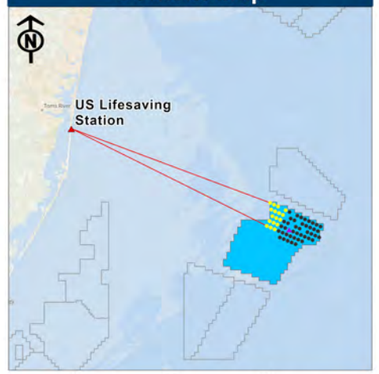
- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	8:16 AM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	50°F
Simulated Weather Conditions	Overcast
Humidity	81%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from E
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	8:16 AM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	50°F
Simulated Weather Conditions	Partly Cloudy
Humidity	81%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from E
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP Berkeley Township, New Jersey

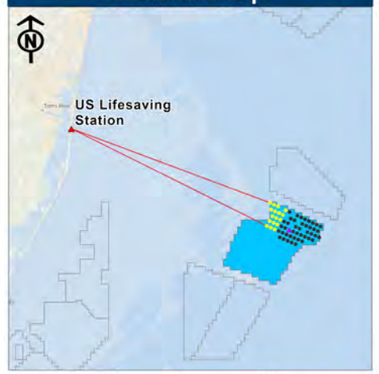
Proposed Morning View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	Night
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	72°F
Weather Conditions	Clear
Humidity	40%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Night
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP Berkeley Township, New Jersey

Proposed Nighttime View with Shore-Facing Wind Turbine Generators

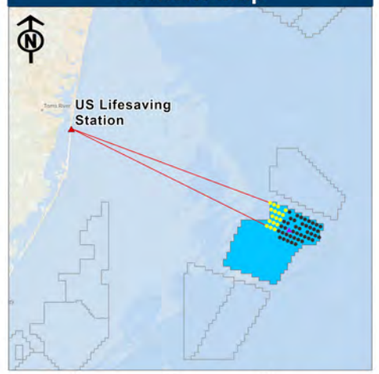
This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".

Simulated nighttime conditions shown. Required FAA and USCG lighting are not visible above horizon.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	12:02 PM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	73°F
Weather Conditions	Clear
Humidity	40%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from S
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP Berkeley Township, New Jersey

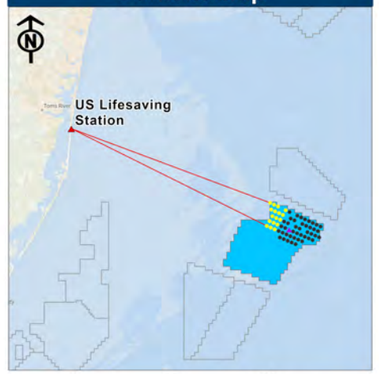
Proposed Mid-Day View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	12:02 PM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	73°F
Simulated Weather Conditions	Overcast
Humidity	40%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from S
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP Berkeley Township, New Jersey

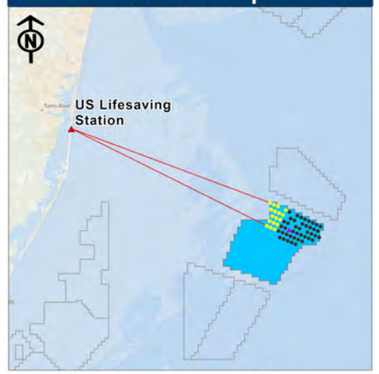
Proposed Mid-Day View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/10/2022
Time	12:02 PM EST
Camera Latitude	39.895724°
Camera Longitude	-74.079812°
Height to Lens	1.55 m
Ground Elevation	5.49 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	73°F
Simulated Weather Conditions	Partly Cloudy
Humidity	40%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from S
Project Area Extent	5.9°
Distance to Closest WTG	44.3 mi
% Visible Closest WTG	17%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	SE (127°)

Key Observation Point #2: U.S. Lifesaving Station, Island Beach SP Berkeley Township, New Jersey

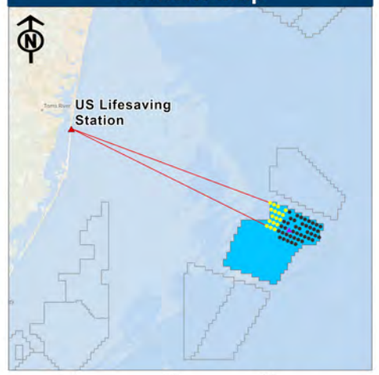
Proposed Mid-Day View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries.
NCEI records visibility to a maximum of 10 miles, actual visibility may be further.
WTG color is determined in consultation with BOEM, the FAA, and USCG; simulations conservatively use RAL 9010 "Pure White".
Weather conditions simulated to demonstrate effect of varying amounts of cloud cover.

TRC

Context Map



- Community Offshore Wind Lease Area
- Other Lease Areas
- Key Observation Point (KOP)
- Offshore Substation (OSS)
- WTG (Blades Visible)
- WTG (No Visibility)
- WTG Extents

KOP & Project Data

Date	10/12/2022
Time	12:54 PM EST
Camera Latitude	39.764364°
Camera Longitude	-74.105390°
Height to Lens	1.55 m
Ground Elevation	2.19 m
Camera Make	Nikon
Camera Model	D850
Lens Focal Length	50mm
Camera Field of View (FOV)	40° x 26°
Temperature	50°F
Weather Conditions	Clear
Humidity	87%
Visibility	10+ Mi
Wave Height	0-1 ft
Lighting Conditions	Lit from S
Project Area Extent	6.9°
Distance to Closest WTG	43.2 mi
% Visible Closest WTG	14%
Number of Turbines	60
Number of Visible Turbines	17
Turbine Overall Height	1,006 ft
Direction of View	ESE (110°)

Key Observation Point #1: Barnegat Lighthouse State Park
Barnegat Light Borough, New Jersey

Proposed Mid-Day View with Shore-Facing Wind Turbine Generators

This simulation represents the field of view taken by a single-exposure camera using a 50 mm lens. It does not represent the full human field of view at this KOP. It is designed to be printed and viewed as an 11" x 17" landscape layout from 18 inches away for the most realistic representation of scale and size.

Atmospheric conditions based on the National Centers for Environmental Information (NCEI) hourly summaries. NCEI records visibility to a maximum of 10 miles, actual visibility may be further.

All 60 WTGs are shown highlighted in this simulation to demonstrate scale and position relative to the horizon. This image does not reflect actual visibility or WTG color.

TRC