Technical Report

Visual Impact Assessment

Wind Turbine Area

Atlantic Shores Offshore Wind

OCS-A 0499

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Table of Contents

Insets and Figures

Attachments

GLOSSARY/LIST OF ACRONYMS AND ABBREVIATIONS

ADLS	Aircraft Detection Lighting Systems
AIS	Automatic Identification System
AMSL	Above Mean Sea Level
AOWL	Aviation Obstruction Warning Lights
BIWF	Block Island Wind Farm
BLM	Bureau of Land Management
BOEM	Bureau of Ocean Energy Management
Character Area	Area of similar landscape/aesthetic character based on patterns of landform, vegetation, water, land use, and user activity.
COP	Construction and Operations Plan
Cross Section	A profile of the terrain that illustrates sources of visual screening along a line of sight between the proposed Project and a specific viewer/resource location.
DEM	Digital Elevation Model
DSM	Digital Surface Model
EDR	Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C.
FAA	Federal Aviation Administration
Ft	Feet
GIS	Geographic Information System
GPS	Global Positioning System.
HRVEA	Historic Resources Visual Effects Analysis
KOP	Key Observation Point
Lidar	Light Detection and Ranging
m	Meter (1 meter = 3.38 feet)
mi	Statute mile (1 mile = 1.61 kilometers = 0.87 nautical miles)
MSL	Mean Sea Level
MW	Megawatt = One million watts

nm	Nautical Mile (1 nm = 1.15 statute mile)
NHPA	National Historic Preservation Act of 1966
NHL	National Historic Landmark
NJDEP	New Jersey Department of Environmental Protection
NJDEP-HPO	New Jersey Department of Environmental Protection - Historic Preservation Office
NLCD	National Land Cover Dataset. Land cover types classified and mapped by U.S. Geological Survey
NNL	National Natural Landmark
NPS	National Park Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NCDC	National Climatic Data Center
OCS	Outer Continental Shelf
OSS	Offshore Substation
The Project	Atlantic Shores Offshore Wind Farm
PDE	Project Design Envelope
RPM	Revolutions Per Minute
RV	Recreational Vehicle
SHPO	State Historic Preservation Offices
SLR	Single Lens Reflex
SQC	Scenic Quality Classification
SRHP	State Registers of Historic Places
Offshore Cable	Atlantic Shores Offshore Wind cable located offshore located beneath the seafloor which connects the Offshore Substation to the landfall site
TNC	The Nature Conservancy
UAS	Unmanned Aircraft System
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard

USDA	U.S. Department of Agriculture
USDOI	U.S. Department of the Interior
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance
VIA	Visual Impact Assessment
Viewshed	Area of potential Project visibility defined by maximum structure height and mapped topography, vegetation, and structures within the study area.
VRAP	Visual Resource Assessment Procedure
WEA	Wind Energy Area
WMA	Wildlife Management Area
WTA	Wind Turbine Area
WTG	Wind Turbine Generator
ZVI	Zone of Visual Influence
3D	Three Dimensional

1.0 INTRODUCTION

Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. (EDR) prepared this Technical Report in support of the Atlantic Shores Construction and Operations Plan (COP) for two offshore wind energy generation Projects, including an Overlap Area that could be used by either Project, within the southern portion of Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0499 for renewable energy generation from offshore wind, comprised of up to 200 wind turbine generators (WTG) and associated offshore substations[1]. Collectively, these two offshore wind energy generation projects, including the Overlap Area, are referred to herein as the Atlantic Shores Offshore Wind Projects, or the Projects (see Inset 1.1-1). The Lease Area, measuring approximately 159.4 sq mi (413 sq km) will contain the major visible components of the Projects and is henceforth referred to as the Wind Turbine Area (WTA). This VIA assesses the visible components of the Projects which are located within the WTA and include 200 WTGs, four mid-sized offshore substations (OSS), and one large OSS[2]. Separate reports have been completed to assess the visible onshore components of the Atlantic Shores Offshore Wind Project (EDR, 2021a and EDR, 2021b). Components of the Projects that will not result in visible infrastructure during operation such as inter-array cables, the submarine export cable, and onshore interconnection cables are not considered in this VIA.

At its closest point, the WTA is approximately 8.7 mi (14 km) from the New Jersey shoreline (as measured from the northernmost edge of Brigantine City in Atlantic County). The WTA is also 9.4 mi (15.1 km) east of Atlantic City, 16.3 mi (26.2 km) east of Ocean City, 25.3 mi (40.7 km) south of Barnegat Light Borough, and 35.7 mi (57.5 km) northeast of Wildwood (Inset 1.1-1). The purpose of the Visual Impact Assessment (VIA) is to analyze the potential visibility of the proposed Projects and determine the difference in landscape and seascape visual quality with and without the Projects in place. Specifically, the study:

- Describes the appearance of the visible components of the proposed Projects.
- Defines the character and visual quality of the landscapes within the Visual Study Area (VSA).
- Defines the types and sensitivity of viewer groups within the VSA.
- Inventories existing visually sensitive public resources within the VSA.
- Evaluates potential visibility of the Projects within the VSA.
- Identifies key views for visual assessment.
- Illustrates what the Projects will look like from representative key observation points (KOPs).
- Assesses the potential visual impacts associated with the proposed Projects.

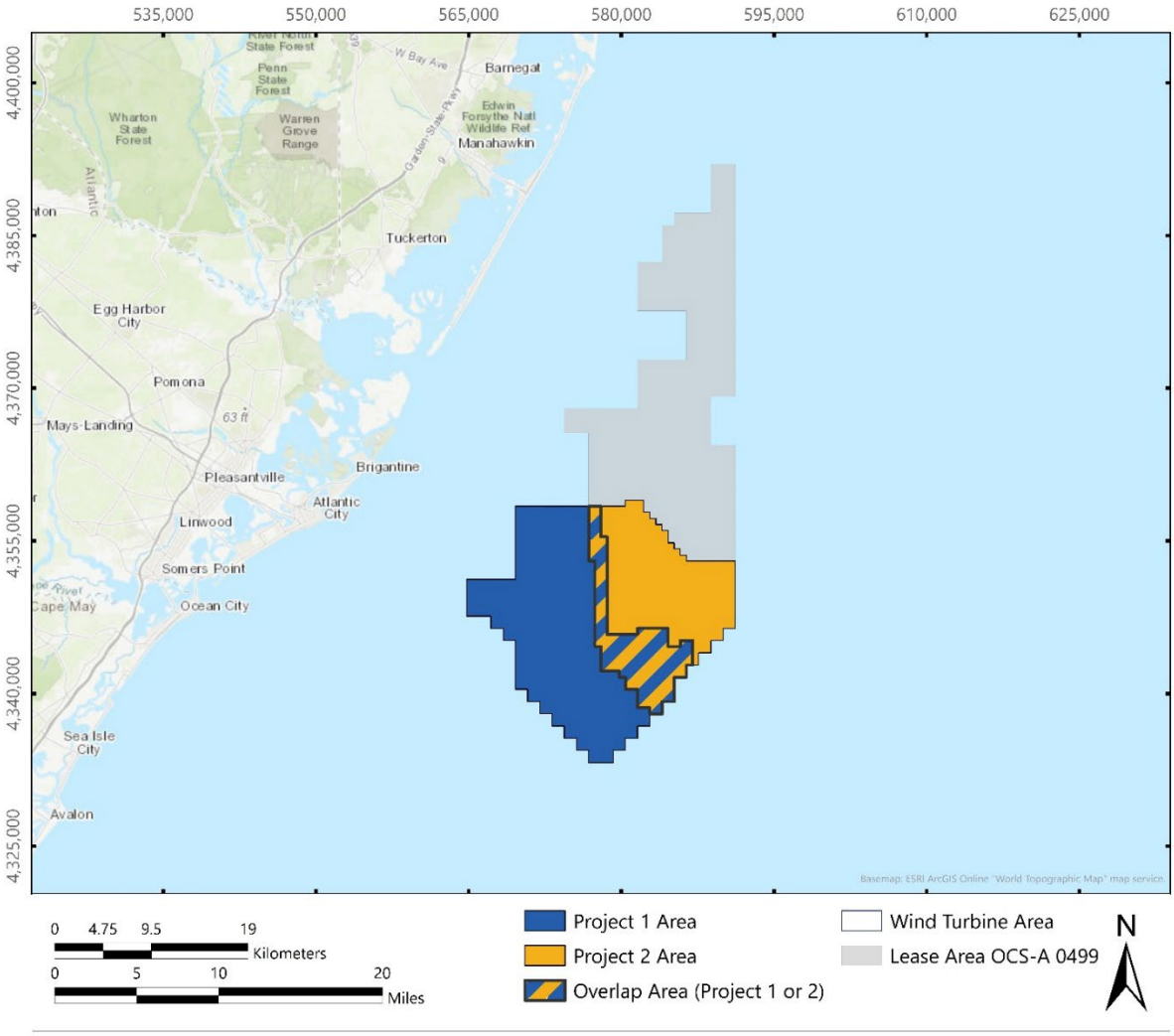
[1] The number of WTGs in Project 1, Project 2, and the associated Overlap Area will not exceed 200 WTG locations. For example, if Project 1 includes 105 WTGs (the minimum) then the Overlap Area would be incorporated into Project 2 which would include the remaining 95 WTGs; and conversely if the Overlap Area is incorporated into Project 1 such that it includes 136 WTGs, then Project 2 would be limited to 64 WTGs. Each Project may also use only part of the Overlap Area.

[2] The PDE considers up to 10 small OSSs. However, the VIA assumes fewer, larger OSSs located closer to shore.

The VIA was prepared with oversight and input provided by landscape architects, planners, and visual experts experienced in the preparation of VIAs. It is also consistent with the policies, procedures, and guidelines contained in established VIA methodologies (see Literature Cited/References section), and in accordance with the Visual Impact Assessment Study Plan – Offshore (Attachment A) prepared in collaboration with, and accepted by, BOEM.

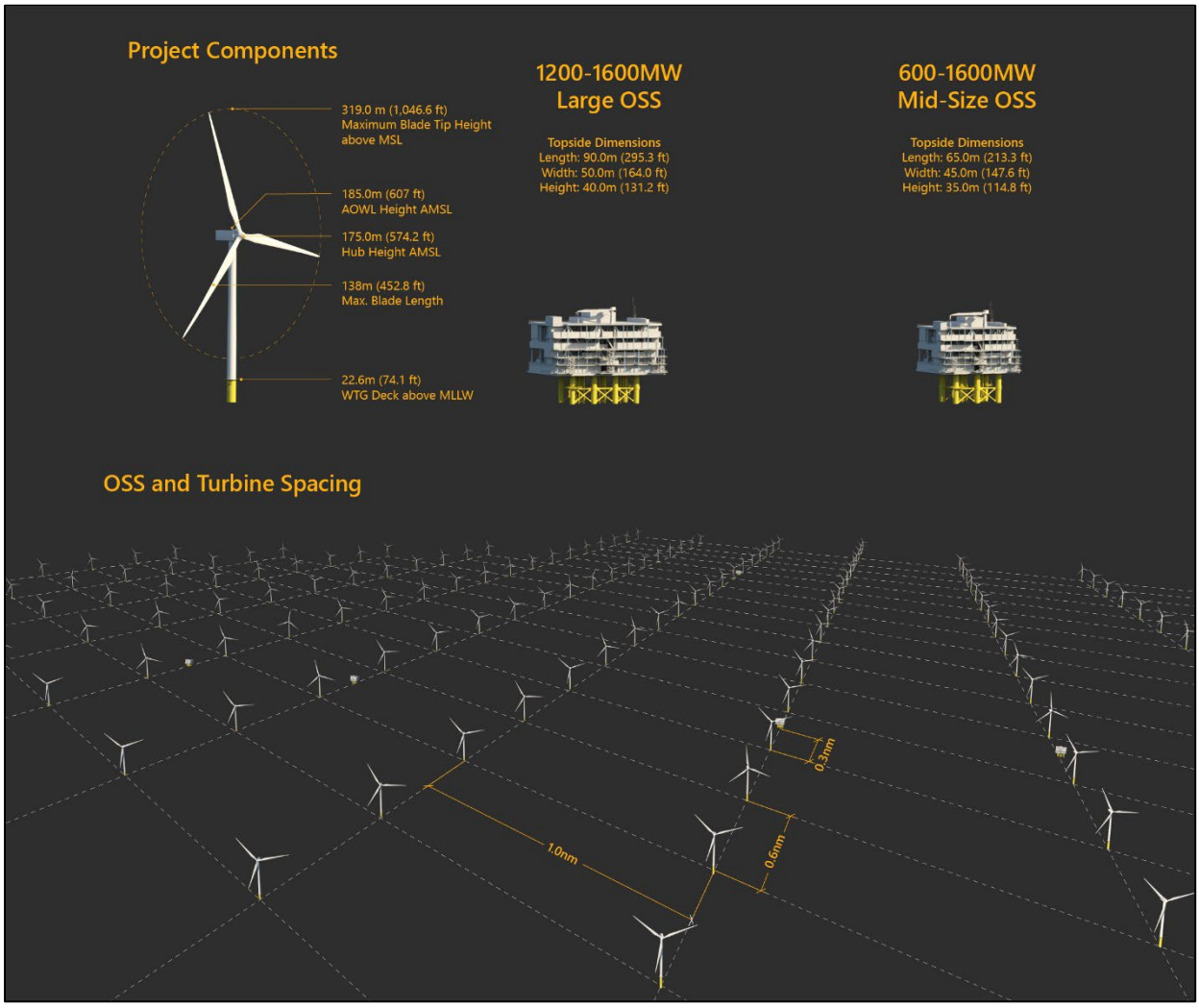
1.1 Proposed Projects

Atlantic Shores has applied a Project Design Envelope (PDE) approach to describe the facilities and activities associated with the Projects. A PDE is defined as "*a reasonable range of project designs*" associated with various components of a project (e.g., foundation and WTG options) (BOEM 2018). In accordance with the PDE evaluation approach, the assessment of project effects must include the maximum design case for all project development scenarios. Consistent with BOEM's *Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan (*2018*)*, this VIA considers a maximum design case layout. The layout represents the largest geographic footprint that could be occupied by visible structures and, therefore, the largest percentage of the visible horizon from shoreline locations that may be affected by the Projects. The maximum design case components are described below.



Inset 1.1-1 – Regional Location of the Projects

illustrates the layout considered in this VIA. The dimensions of all components represented in this VIA are shown in Inset 1.1-2, Tables 1.1-1, and Table 1.1-2.



Inset 1.1-2 Computer Model of Project Components

Table 1.1-1 Proposed WTG Dimensions Envelope

WTG Component/Parameter	Minimum (15 MW)	Maximum (20 MW)
		Considered in VIA
Turbine Height [from Mean Sea Level (MSL)]	**889 ft (271 m)**	**1047 ft (319 m)**
Hub Height (from MSL)	495 ft (151 m)	574 ft (175 m)
Air Gap (MSL) to the Bottom of the Blade Tip	76 ft (23 m)	76 ft (23 m)
Base (tower) Diameter (at the bottom)	26 ft (8 m)	33 ft (10 m)
Base (tower) Diameter (at the top)	20 ft (6 m)	28 ft (8.5 m)
Nacelle Dimensions (length x width x height)	72 ft x 46 ft x 30 ft (22 m x 14 m x 9 m)	82 ft x 52 ft x 39 ft (25 m x 16 m x 12 m)
Blade Length	384 ft (117 m)	453 ft (138 m)
Maximum Blade Width	20 ft (6 m)	33 ft (10 m)
Rotor Diameter	787 ft (240 m)	919 ft (280 m)

Table 1.1-2 Proposed OSS Dimensions Envelope

OSS Component/Parameter	Maximum Design Scenario	
		Considered in VIA
Energy Capacity	1,200-1,600 MW	600-1,600 MW
Number of OSSs Considered in the Array	4	5
Maximum dimension of topside (LxWxH)	295 ft x 164 ft x 131 ft (90 m x 50 m x 40 m)	213 ft x 148 ft x 115 ft (65 m x 45 m x 35 m)
Maximum height of OSS topside above MLLW	74 ft (22.6 m) above MSL	

Each WTG will consist of four major components: the foundation, the tower, the nacelle, and the rotor (Inset 1.1-4). The height of the tower, or "hub height" (height from the water's surface to the center of the rotor) will be approximately 574 feet (175 m) above mean sea level (AMSL). The nacelle sits atop the tower, and the rotor hub is mounted to the nacelle. Assuming a maximum 919 feet (280 m) rotor diameter, the total WTG height (i.e., height AMSL at the highest blade tip position) will be approximately 1,047 feet (319 m).

Foundation: For the purpose of this VIA, it was assumed that each of the WTGs will be supported by a monopile foundation secured with a single steel pile driven into the sea floor. The monopile foundation at MSL is a 39.4-foot (12 m) diameter tubular steel structure, upon which the tower transition will be mounted. The foundation will extend above the water surface, and the exposed portion of the foundation will be yellow in color. A boat landing and hoist will be affixed to the foundation with a stairway connecting the landing to a railed deck at the base of the tower.

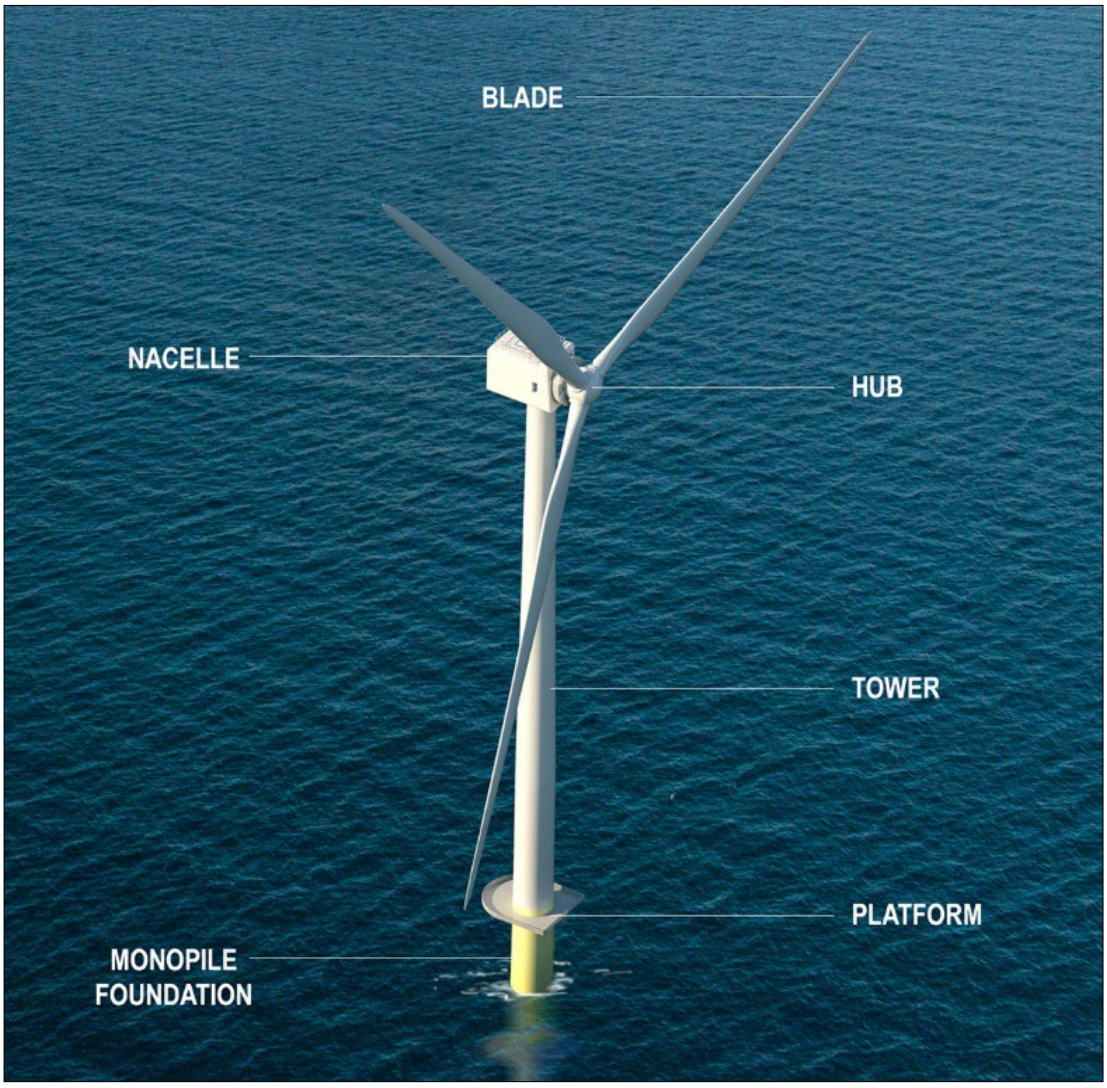
Tower: The towers used for the Projects are tapered hollow steel structures manufactured in three sections. The assembled towers have a diameter of approximately 33 feet (10 m) at the base and 28 feet (8.5 m) at the top. Two amber U.S. Coast Guard (USCG) navigation lights will be mounted on the deck at the base of each tower. In accordance with the BOEM and Federal Aviation Administration (FAA) obstruction marking standards, the turbine will be painted a light grey (RAL 7035) to pure white (RAL 9010). Additionally, the tower will be equipped with a minimum of three low intensity (L-810) red flashing aviation obstruction

warning lights (AOWL) at the approximate mid-section of the tower which will operate during nighttime hours only.

Nacelle: The main mechanical components of the WTG are housed in the nacelle. These components include the drive train, generator, and transformer. For the purpose of this study, the nacelle is assumed to have maximum dimensions of approximately 82 feet (25 m) long, 52 feet (16 m) wide, and 39 feet (12 m) in height. Two AOWL are proposed to be located on top of the nacelle, in accordance with BOEM and FAA guidelines. These will be medium intensity, flashing red lights (L-864) that are operated only at night, and will be synchronized with the L-810 lights located at the mid-tower position, and described above. It is assumed that the nacelle will be the same color as the tower and will not include any obvious lettering, logos, or other exterior markings. Where applicable, the lighting parameters presented in the VIA follow the current BOEM guidance for the lighting and marking of WTGs in order to evaluate the potential nighttime visual impacts associated with the Projects. However, lighting requirements may change based on final BOEM/FAA recommendations.

Rotor: A rotor assembly is mounted on the nacelle to operate upwind of the tower. The rotor consists of three composite blades, each approximately 453 feet (138 m) in length. The three-bladed rotor assembly will be light grey to white in color (consistent with the tower) and will have a maximum diameter of 919 feet (280 m). The rotor blades are rotated along their axis, or "pitched", to enable them to operate efficiently at varying wind speeds. The rotor can spin at varying speeds, but typically rotates at a rate around 10 revolutions per minute (RPM).

The OSSs will be enclosed structures. Currently, three OSS options are under consideration. Depending on the final OSS design there will be up to 10 small OSSs, up to five medium, or up to four large OSSs. In order to illustrate the range of sizing options, this VIA considers both the medium and large OSS options with the medium measuring up to 213 feet long by 148 feet wide and a height of 115 feet (65m x 45m x 35m), and the large measuring up to 295 feet long by 164 feet wide and a height of 131 feet (90 m x 50 m x 40 m). Transition from OSS foundation to OSS topside is expected to occur at approximately 74 feet (22.6 m) AMSL for both OSS options included in the VIA. For the purpose of this VIA, it is assumed that OSSs will be mounted on an 8-legged piled jacket foundation. A diagram illustrating the appearance and dimensions of the WTG and OSS evaluated in this study are presented in Insets 1.1-2 and 1.1-3.



Inset 1.1-3 – Diagram of the Wind Turbine Generator Components

1.2 Existing Visual Character

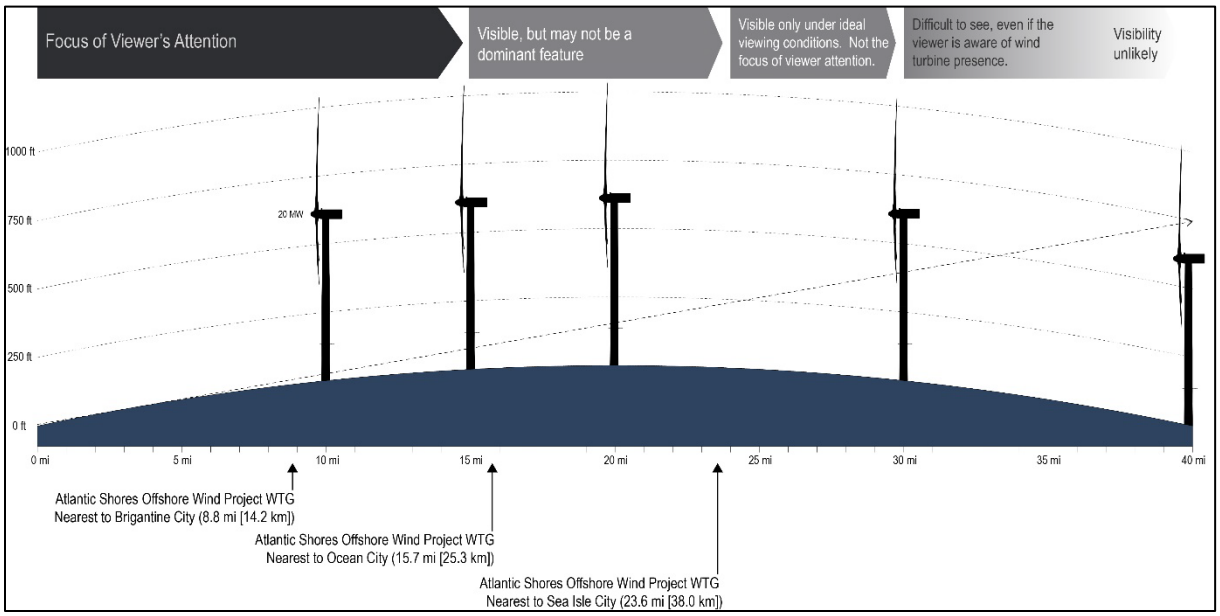
The existing visual character includes the identification of a visual study area (VSA), establishment of distance zones, definition of viewer and user groups, a landscape inventory and identification of character areas, and the identification of visually sensitive resources (VSRs). Additionally, the definition of the existing landscape character relies on the establishment of zones of visual influence (ZVI) which identifies the geographic areas of potential visibility of the Projects. This important step focuses the VIA on locations in which the Projects will be visible and therefore, may present potential visual impacts. Each of these steps and analyses draw from established visual assessment methodologies which have adapted by EDR to suit the unique circumstances associated with offshore wind projects. The unique circumstances considered for

offshore wind farms include the development of very large VSAs which encompass large land areas and a multitude of landscape types and viewers. The methods employed for each analysis and inventory are described below.

Definition of the Visual Study Area and Zone of Visual Influence

Currently, a standard VSA for offshore wind farms has not been expressly defined in regulatory guidance documents. However, *Information Guidelines for a Renewable Energy Construction and Operations Plan* (COP) (BOEM, 2020) indicates that visual impacts should be evaluated using photo simulations from locations within "the onshore viewshed from which renewable energy structures, whether located offshore or onshore, would be visible."

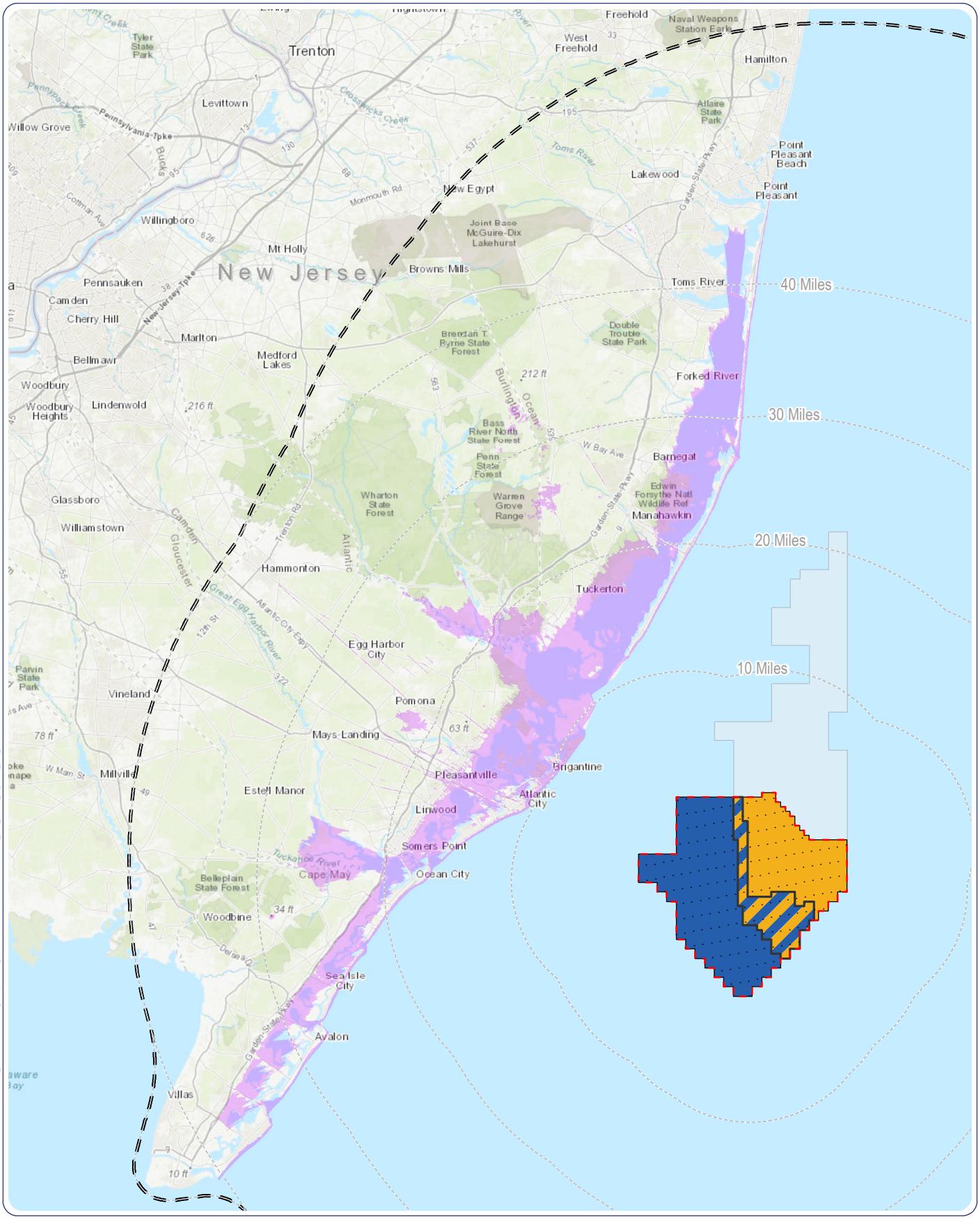
This statement suggests that the VSA should include all areas with any degree of potential visibility of the Projects. The first step in defining the maximum extent of WTG visibility in an offshore setting is to determine the likely physical threshold based on the screening effect of the curvature of the earth and visual acuity of the human eye. Observations of constructed offshore wind facilities are also useful in determining WTG visibility diminishment thresholds, but these studies have only been conducted on projects with smaller WTGs. For example, EDR completed observations of the operational Block Island Wind Farm (BIWF) which utilizes five WTGs with a maximum height of 589 feet (458 feet lower than the WTGs associated with the Projects). These observations suggest that based on this smaller technology, the WTGs will generally become completely screened by curvature of the earth and/or atmospheric perspective at a distance between 35 and 40 miles, depending on the elevation of the viewer. A study completed in Europe, *Offshore Wind Turbine Visibility and Visual Impact Threshold Distances* (Sullivan, et al., 2013) concluded that offshore wind facilities were judged to be a major focus of visual attention at distances up to 10 mi (16 km); were noticeable to casual observers at distances of almost 18 mi (29 km); and were visible with extended or concentrated viewing at distances beyond 25 mi (40 km) (Sullivan et al., 2013). Again, the Projects consider WTGs that are significantly taller than those included in this study and a calibration of this study is not appropriate given the fact it is based on observation and does not include any specific occupational statistics. However, these studies are still relevant in that the most influential limiting factor in WTG visibility from open coastal locations is atmospheric perspective. Moisture and atmospheric particles will always have a significant influence on visibility over the ocean regardless of the size of the technology. However, it is anticipated that when viewed under clear weather conditions, the visual prominence of larger WTGs will extend over a greater distance and could be the focus of viewer attention beyond 10 miles. However, considering the technology under consideration for the Projects, it is anticipated that visibility from beach level will include a portion of the WTG blades at a distance of 40 miles (64 km) (see Inset 1.2-1). As such, it is anticipated that a 40-mile visual study area is a conservative study area for the Projects. This is also supported by standard human visual acuity thresholds. Assuming a maximum resolution of the human eye is conservatively 28 seconds of an arc or 0.008 angular degrees (Deering, 2019) at 40 miles, human vision can resolve an object that is approximately 30 feet in diameter. The WTGs considered in this VIA have a maximum blade width of 33 feet, suggesting that at a distance of 40 miles, they would be near the maximum threshold of potential visibility and would not result in impacts to onshore resources.



Inset 1.2-1 Turbine Visibility

Based on the research described above, it is anticipated that visibility of the proposed WTGs will diminish completely at a distance of 40 miles (64 km) from ground-level vantage points. However, the VSA identified for the Projects was expanded to include the Cape May Lighthouse since this is a prominent, elevated structure and includes a frequently visited viewing platform which offers commanding views of the landscape and ocean. Additionally, rather than generate a buffer of the WTA, the VSA represents an area that is 40 miles (64 km) from the boundary of the entire Lease Area. As such the VSA includes areas beyond the theoretical limits of visibility. This expanded VSA will provide BOEM with a better metric for evaluating potential cumulative visual impacts of future development within the Lease Area. The VSA is illustrated in Figure 1.2-1.

This VSA includes approximately 6,562.1 square miles (16,995.9 sq. km) of open ocean, 2,298.9 square miles (5954.2 sq. km) of land (including inland water bodies), and over 139.4 linear miles (224.4 linear km) of ocean shoreline in New Jersey. The VSA includes all or portions of 109 municipalities in New Jersey. The location and extent of the VSA is illustrated in Figure 1.2-1.



Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-1: Visual Study Area and Zone of Visual Influence

Notes: 1. Basemap: ESRI ArcGIS Online "World Topographic Map" map service. **2.** This map was generated in ArcMap by EDR on February 23, 2022. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

- Wind Turbine
- Project 1 Area
- Project 2 Area
- Overlap Area (Project 1 or 2)
- Zone of Visual Influence
- Wind Turbine Area
- Lease Area OCS-A 0499
- Visual Study Area

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ATLANTIC SHORES offshore wind

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Zone of Visual Influence (ZVI)

Within this VSA, a relatively small portion of onshore locations would actually have open views that would include some portion the WTGs and OSSs. To accurately define an inclusive and reasonable ZVI within the VSA, EDR identified the potential geographic areas of visibility by running a preliminary light detection and ranging (lidar) viewshed analysis within the VSA. The viewshed model considered vegetation, buildings/structures, topography, and the curvature of the earth in order to delineate those areas that may have potential views of the highest portions of the WTGs (i.e., blade tips in the upright position). The viewshed analysis results indicated that, up to 288.3 square miles or 12.5 percent of the land area within the VSA, could have potential views of the Projects from ground-level vantage points. Generally, the areas of potential Project visibility occur along the majority of the eastward facing shoreline defined by the barrier islands. In areas where the barrier islands that lack intensive development, large areas of visibility occur within the inland bays, the adjacent western shore, and throughout portions of the marshes and river deltas west of Great Bay, west of Beach Haven and Great Egg Harbor, West of Ocean City. For the purposes of the VIA, this area was defined as the ZVI and represented the areas in which further analysis was warranted to determine the degree of Project visibility and visual impact. The location and extent of the ZVI is illustrated in Figure 1.2-1. A comprehensive description of the viewshed analysis used to define the ZVI is provided in Section 3.1.

1.2.1 Distance Zones

Three distinct distance zones were defined for the VSA. Based on the Bureau of Land Management (BLM) *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands* (BLM, 2013) these zones include the Foreground-Middle Ground (0-5 miles), Background (5-15 miles), and Seldom Seen (>15 miles). However, it was determined that when considering views of offshore WTGs, Seldom Seen may not be an accurate representation for views beyond 15 miles (since studies show offshore WTGs to be visible out to 25 miles). Therefore, the name of this zone has been changed to "Extended Background". It is important to note that all Foreground-Middle Ground views within the VSA would only be available to those travelling on the open ocean in commercial vessels, passenger boats, or pleasure craft. Consistent with BLM guidance, distance zones for this VIA are described as follows:

- Foreground-Middle Ground: 0 to 5 miles. Within the foreground (0.5 mile), a viewer is able to perceive details of an object with clarity. Surface textures, small features, and full intensity and value of color can be seen on foreground objects. Beyond the foreground (0.5-5miles) a viewer can perceive individual structures and trees but not in great detail. This is the zone where the parts of the landscape start to join together; individual hills become a range, individual trees merge into a forest, and buildings appear as simple geometric forms. Colors will be clearly distinguishable but will have a bluish cast and a softer tone than those in the foreground. Contrast in color and texture among landscape/seascape elements will also be reduced. On the ocean, the majority of discernable features occur within the Foreground-Middle Ground Zone due to the effects of curvature of the earth and due to the fact that nearshore activities tend to be concentrated within this zone.
- Background: 5 to 15 miles. The background defines the broader regional landscape/seascape within which a view occurs. Within this distance zone, the landscape and features on the ocean are simplified; only broad landforms are discernible. Atmospheric conditions often render objects on the landscape/seascape an overall bluish color and they tend to appear unclear causing the objects

to begin to blend with the background colors, giving them a fuzzy appearance. Objects on the ocean, such as boats, buoys, and platforms may become completely screened by curvature of the earth at distances greater than 5 miles. In less frequent circumstances, larger features on the ocean horizon may exhibit the "mirage effect" in which images of the viewed objects appear displaced (floating above the water's surface) and can become very difficult to identify. At these distances, texture has generally disappeared, and color has flattened, but large patterns of vegetation are discernible. Silhouettes of one land mass set against another and/or the skyline are often the dominant visual characteristics in the background. Where landscape features are visible beyond the ocean surface (such as islands and peninsulas), they typically contribute to scenic quality by providing a softened backdrop for foreground-middle ground features, an attractive vista, or a distant focal point.

- Extended Background: Over 15 miles. At distances beyond 15 miles curvature of the earth becomes a significant factor in visibility, and those objects that are visible become less prominent in the overall landscape and seascape due to their relative size, occupation of the horizon, and deterioration of visibility due to atmospheric perspective[3]. For casual viewers, the Projects may be difficult to discern to under less than ideal viewing conditions. During high humidity, fog, and other weather events, visibility at these distances may be significantly diminished or completely eliminated.

1.2.2 Viewer/User Groups

The population potentially affected by the Projects are referred to as viewer/user groups. This VIA identifies four broad categories of users that are likely to experience changes within the landscape and seascape with varying sensitivities. However, invariably there will be overlap within each user group and individuals within a user group may have a wide range of opinions and preferences regarding proposed landscape and seascape changes. Despite a wide range of landscape exposure for each user group, the broad categories presented below describe the types of users that are most likely to be exposed to the Projects. Their sensitivity to visual change, while a personal attribute, is influenced by their activity, duration of view, and exposure to changes in the landscape or seascape. An assessment of potential impacts to viewers is included in Attachment E1 and is discussed in Section 3.2.1.3.

1.2.2.1 Local Residents

Local residents include people who live, work, recreate, and travel within the VSA. They generally view the landscape from their yards, homes, local roads, places of recreation, and employment. Residents are typically concentrated in the inland/beachfront residential areas, and village and town centers, but often enjoy the local beaches, inland bays, forests, and the numerous outdoor recreational resources within the VSA. Except when involved in local travel or recreation, residents are likely to be stationary and have frequent or prolonged views of the landscape. Local residents are also likely to have the greatest awareness of changes to the landscape due to the repeated, long-duration exposure to the landscape and seascape in which they live. This is particularly true for residents that live near the ocean or those that have the opportunity to experience the coastal landscape on a regular basis. While their activity and sensitivity to change in the landscape and seascape may vary, local residents are likely to have greatest personal

[3] Atmospheric perspective refers to the effect the atmosphere has on the appearance of an object as viewed from a distance.

investment in their community and the surrounding landscape, and therefore have the greatest sensitivity to visual change.

1.2.2.2 Through Travelers

Travelers passing through the VSA view the landscape from motor vehicles on their way to other destinations. Through travelers are typically moving, have a relatively narrow field of view oriented along the axis of the roadway, and are destination oriented. Drivers on major roads in the area such as Garden State Parkway and the Atlantic City Expressway will generally be focused on the road and traffic conditions but will have the opportunity to observe roadside scenery. Passengers in moving vehicles will have greater opportunities for prolonged off-road views than drivers, and therefore may be more aware of the quality of surrounding scenery. Through travelers who are not residents of the area or vacationers are less likely to be particularly sensitive to visual change. However, along this portion of the Atlantic Coast, through travel occurs relatively infrequently due to fact that most of the major highways found within the VSA lead to and from the coastal communities. Occasionally, through travelers may also take advantage of the ferry from Cape May, New Jersey to Lewes, Delaware. Passengers on the ferries are likely to have a higher sensitivity to visual change since the viewer is not driving and can be fully engaged with the scenery and surroundings.

1.2.2.3 Tourists/Vacationers

Tourists and Vacationers consist of out-of-town vacationers and seasonal/weekend residents who come to the area for the purpose of experiencing its scenic and recreational resources. These viewers include sightseers, families on vacation, casino visitors, and weekend/seasonal homeowners. They may view the landscape on their way to a destination (i.e., on a roadway or boat) or from the destination itself. Some, such as weekend and seasonal homeowners, may spend extended time in the area. Atlantic City hosts a large number of tourists [116 million tourists annually (Tourism Economics, 2019)] who partake in resort activities such as gambling, dining, and nightlife. Often this category of tourist may spend relatively little time outdoors and as little as 24 hours in the VSA. Other vacationers are typically involved in a variety of outdoor activities, including bird watching, bicycling, swimming, recreational boating, fishing, and more passive recreational activities (such as, picnicking, beachcombing, kite flying, or walking). Recreational users are generally considered to have relatively high sensitivity to aesthetic quality and landscape character. They will often have continuous views of landscape features over relatively long periods of time, and scenic quality generally enhances the quality of any outdoor recreational activity even though these individuals may not be specifically involved in sight-seeing. Therefore, this view/user group may be particularly sensitive to visual change. Vacation homeowners, tourists, and recreational users will be concentrated in and around the ocean shoreline, but also use interior portions of the VSA and public lands on the mainland.

1.2.2.4 Fishing Community

The fishing community is represented by recreation and commercial fishermen who work in and experience the coastal and open ocean environment on a regular basis. The commercial fishing community typically engages in focused activity associated with various methods of catching fish and shellfish, including setting gear such as longlines, trawl nets, and pots or traps. Inshore fishing is restricted to the bays, coves, beaches, and waters along the coast. Offshore fishing occurs many miles offshore along the outer continental shelf, including the Lease Area. The recreational fishing community is active in both inshore and offshore settings. Despite the focused activity associated with harvesting seafood, the fishing community is particularly sensitive to changes to the visual seascape since there is often nothing in their immediate environment

except for open ocean and horizon. The fishing community can have prolonged visual exposure to the seascape and coastal environment, in which fleets spend hours to days setting gear and harvesting fish.

1.2.3 Landscape Inventory

The landscape inventory portion of this VIA defines a broad regional landscape character in terms of the general physiographic setting of the entire VSA. The physiographic setting is then broken into subcategories largely driven by geographic location, but also visual character. As with many coastal locations, there is a distinct character shift as one travels inland from the coast. As such, the VSA is broadly defined by the barrier islands, mainland, inland bay landscapes, as well as the open ocean/seascape. Each of these broad regions includes a diverse range of specific visual components that define the visual character of the VSA. These landscape types, or areas of homogenous visual character are defined as Character Areas. The regional and local landscape character is described below.

Regional Character Areas

Broadly defined, the VSA is entirely contained within the New Jersey Outer Coastal Plain, a subregion of the Embayed Portion of the Coastal Plain Physiographic Province. This region, which covers 4,667 square miles of New Jersey. It is roughly bounded by Trenton to Monmouth Junction in the north, the Delaware River and Delaware Bay on the west, and the Atlantic Ocean to the east (Dalton, 2003). The region is generally defined by excessively drained sandy soils, with relatively low fertility, giving rise to the distinctive pinelands forests, which thrive in these conditions. The Outer Coastal Plain watershed, influenced by the gradual decline in elevation approaching the ocean drains into the back barrier coastal lagoons and directly into the New York Bight Provence of the Atlantic Ocean (USFWS, 1997). Topography within this province consists of gradual sloping terrain from the uplands to a relatively flat level plain near the inland lagoons and the shoreline. Elevations within the Outer Coastal Plain (within the VSA) range from below sea level to approximately 223 ft. (68 m).

Assessment of Seascape, Landscape, and Visual Impacts (SLVIA) of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States (Sullivan, 2021) provides guidance on the definition of landscape, seascape, and ocean character areas (LCA, SCA, and OCA) which broadly characterize the VSA in terms of common components, mainly influenced by the land/water interface. The LCA includes inland areas that do not interface directly with the ocean and therefore, ocean views are not a major character defining feature. SCAs are defined as coastal areas in which there is intervisibility between land and sea and ocean views are a significant component of the character defining features. The OCA is defined by an open expanse of water and secondary SCA and LCA features that may be visible from the water. The OCA is also the character area that contains the offshore project components

According to the 2016 U.S. Geological Survey (USGS) National Landcover Dataset (NLCD) the landward VSA primarily consists of forested land (55.2%) which includes woody wetlands and evergreen, deciduous, and mixed forests. Other prominent landcover types include high, medium, and low intensity development (11.9%), and open water associated with inland and coastal bays (10.3%). The landward study area can be further delineated into mainland, barrier island, and inland bays. Each of these regional landscape types are described below and listed in Table 1.2-1.

Table 1.2-1 Regional Landscapes

Regional Landscape	Total Area within VSA (square miles)	Total Area Within the ZVI (square miles)	Percent of Regional Landscape with Potential Turbine Visibility
Ocean	6,558.7	5,792.6	88.3
Inland Bay	168.2	131.3	78.1
Barrier Island	95.8	46.7	48.7
Mainland	2,037.7	112.1	5.5

Ocean Character Area

The OCA is defined by the Atlantic Ocean and includes the Hudson Shelf Valley and portions of the Delaware Bay. The viewshed analysis results suggest that approximately 88.3 percent of this regional landscape occurs within the ZVI. The OCA is characterized by broad expanses of open water and depending on weather conditions, the texture of the ocean surface can range from smooth to choppy, and its color can range from blue, to silver, to dark gray. The ocean in this area is a working water landscape that supports regular and repeated activity, including recreational and commercial fishing, commercial shipping, ferry transportation, pleasure boating and sailing, and associated maritime activities. These activities are typically visible from the mainland and barrier islands when occurring in nearshore areas and features such as jetties, buoys, channel markers, and warning lights are common features near ports and bay entrances.

Inland Bays

Open water associated with the inland bay portion of the VSA primarily includes the barrier island back bays such as Great Egg Harbor Bay, Great Bay, Absecon Bay, Barnegat Bay, and the rivers that feed them (Great Egg Harbor River and Mullica River). The viewshed analysis results suggest that approximately 78.1 percent of this regional landscape occurs within the ZVI. The open water rivers and bays support emergent wetland salt marshes which are the primary landcover along the mainland coast and are represented by state WMAs such as Tuckahoe, Cape May Coastal Wetland, Absecon, Great Bay Boulevard, and Manahawkin.

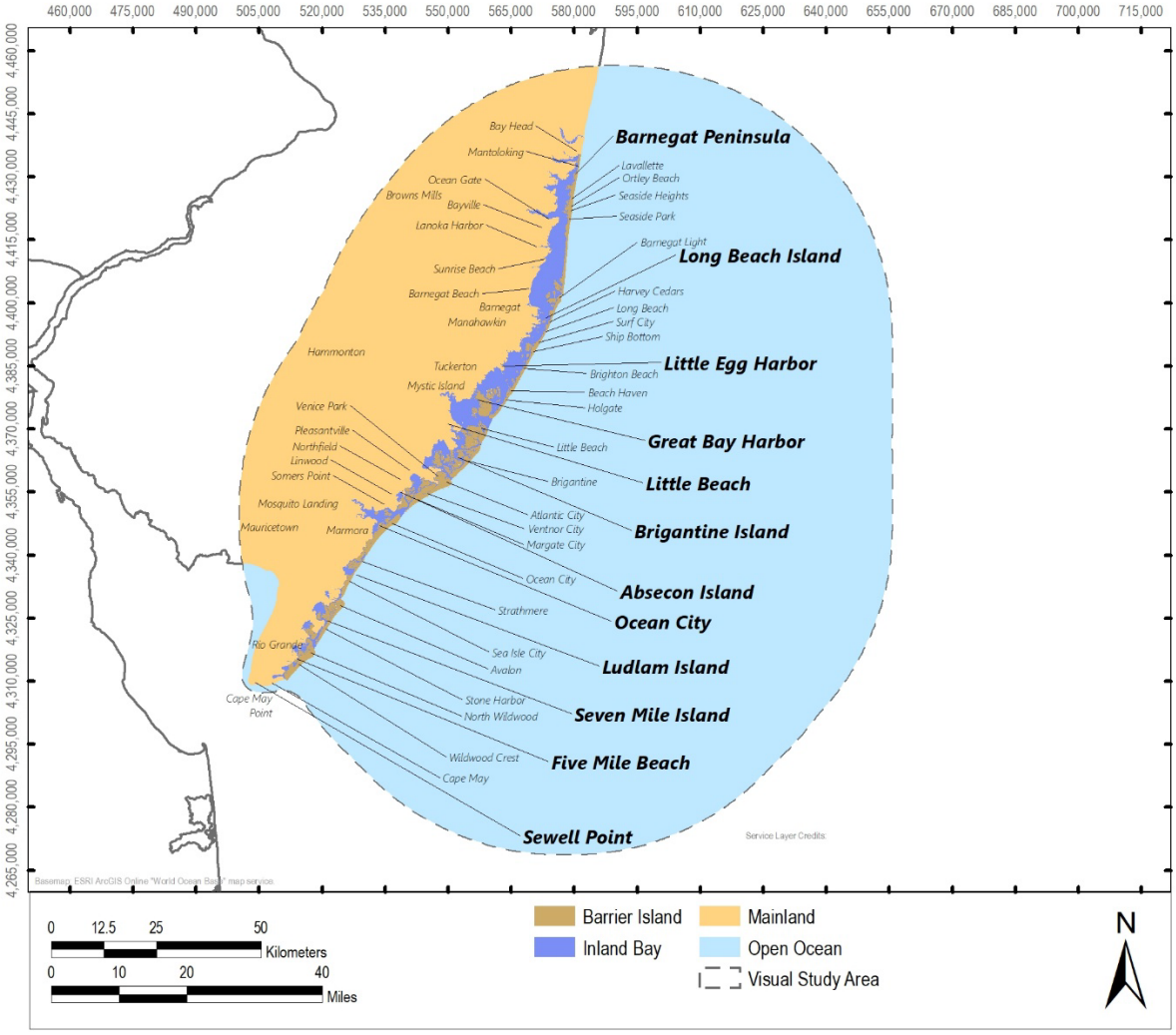
Barrier Islands

Barrier islands make up the majority of the eastern portion of the landward VSA and include the Barnegat Peninsula, Long Beach Island, Little Beach, Brigantine Island, Absecon Island, Ocean City, Ludlam Island, Seven Mile Island, Five Mile Beach, and Cape Island. These areas typically define the majority of the SCA within the VSA. The viewshed analysis suggests that approximately 48.7 percent of this regional landscape occurs within the ZVI. According to the NLCD, the Barrier Islands are primarily made up of emergent wetlands (34%), open water (23%), and low, medium, and high intensity developed land (32%). The remaining areas are typically transitional cover types such as, woody wetlands, scrub/scrub, forest, and

barren land which all occur in very discrete areas throughout the barrier islands. Analysis of the lidar topographic data suggests that elevation within the barrier beaches and islands is relatively flat, and ranges from below sea level to a maximum of approximately 39 ft (12 m) AMSL which occurs on the vegetated dunes in the Borough of Avalon in the southern portion of the VSA. It should be noted that significant efforts are underway to stabilize dunes along the barrier island coast and elevations may fluctuate based on the progression of dune nourishment and storm event destruction. However, elevations generally average approximately 2 ft (0.6 m) regardless of the variable dune topography. Vegetation on the barrier beaches and islands is typically characterized by a mix of scrub forest, grassy dunes, and salt marshes. Developed areas generally include seasonal and year-round homes, villages, roads, boardwalks, and marinas. The barrier island beaches have variable levels of development ranging from large cities with high-rises (Atlantic City on Absecon Island) to small beach communities with vacation homes (Lavallette Borough on Barnegat Peninsula) to undeveloped dune landscapes, beaches, and marshland, including Island Beach State Park, North Brigantine Natural Area, Corson's Inlet State Park, Cape May Coastal Wetlands Wildlife Management Area (WMA), and Edwin B. Forsythe National Wildlife Refuge (NWR).

Mainland

The New Jersey mainland area covers approximately 2,037 sq mi (5277 sq km) and makes up the entire western portion of the VSA. Generally, the Mainland contains all of the LCAs; however, some SCAs occur where the mainland has a direct interface with the ocean. The viewshed analysis suggests that approximately 5.5 percent of this regional landscape occurs within the ZVI. It extends from Asbury Park in the north to Hammonton in the west and Cape May to the south. In inland bay portion of the VSA borders most of the eastern side of the mainland. According to the NLCD, the mainland is primarily composed of forest (62%), developed land (19%), and emergent wetlands (8%). The remaining 11% is relatively evenly distributed between pasture/cultivated crop land, barren land, open water, scrub/shrub, and herbaceous cover which are generally scattered throughout the VSA in small pockets. Within the mainland portion of the study area, elevations range from sea level along the coast to a high point of 226 feet (69 m) AMSL which occurs in the northwestern portion of the VSA at Colliers Mills WMA in Jackson Township, Ocean County. Generally, elevations average approximately 59 ft (18 m) throughout the mainland portion of the VSA with lower elevations occurring near the inland bay and ocean coast. The mainland portion of the VSA is intensively developed on both sides of the Garden State Parkway. The development begins as a narrow band surrounding the highway in the southern portion of the VSA which becomes more expansive in the northern portion of the VSA. Beyond these more densely developed areas forested areas associated with the pine barrens ecosystem are the dominant land cover. In the western portion of the mainland, low intensity development, such as large lot residential use (often times in proximity to cultivated cropland) are interspersed amongst the forested areas. More significant expanses of cultivated cropland are found along the western edge of the VSA with the highest concentration in Hammonton Town and surrounding communities.



Inset 1.2-2 – Regional Landscape Definition

Character Areas

Landscape and/or seascape types, referred to in this report as character areas, are defined based on the similarity of visual features, such as landform, vegetation, water, and land use patterns. While regional landscapes are likely to exhibit diversity across a larger area, CAs should demonstrate a fairly homogenous visual character. Defining and delineating the landscape/seascape types found in the ZVI provides a useful framework for the analysis of existing visual resources and viewer settings.

EDR defined 18 distinct CAs within the ZVI, as listed in Table 1.2-2. The definition of these CAs is consistent with the approach taken in various visual assessment guidance methodologies (Smardon et al., 1988; U.S. Department of Agriculture [USDA] Forest Service, 1995; U.S. Department of Transportation [USDOT] Federal

Highway Administration, 1981; U.S. Department of Interior [USDOI] Bureau of Land Management, 1980) as well as the current BOEM SLVIA guidance document (Sullivan, 2021).

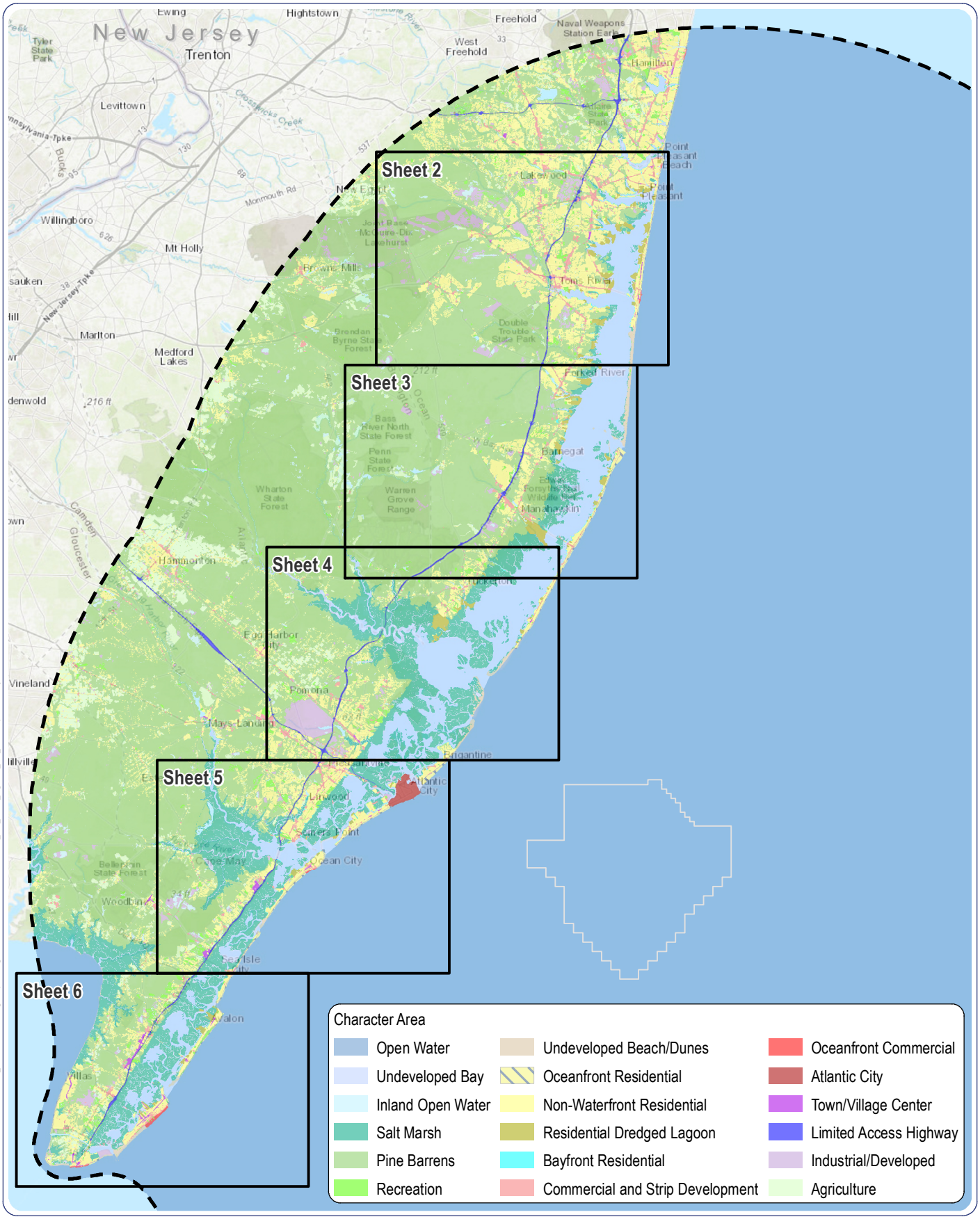
The process of mapping the CAs was based on land use/land cover designations within the New Jersey Department of Environmental Protection (NJDEP) Land Use/Land Cover 2015 (2019 Update) dataset. The designations within this highly granular dataset were grouped and generalized based on common characteristics and adjacency in order to approximate the spatial extent of each CA within the VSA. For example, various types of forest were grouped together into the Forest CA along with small pockets of differing land uses within forested areas (provided they did not match the characteristics of any other CA). The Town/Village Center CA was not readily identifiable based on this dataset alone and was instead delineated based on zoning data for Atlantic, Cape May, Monmouth, and Ocean Counties. The Oceanfront Residential and Bayfront Residential CAs were identified based on their land use designation in combination with their location within 100 feet of qualifying features such as ocean, beach, dunes, bays, or salt marshes. The Atlantic City CA was defined based on geographic location and the presence of specific development types such as large high-rise buildings, dense development, and grided streets, as identified on aerial imagery. The process of delineating and refining all CA boundaries also relied upon review of aerial imagery, street-view photography, and fieldwork data. During final review of CA mapping (which focused on the ZVI), manual corrections were made in locations where the previously described process did not result in the appropriate CA designation. The resulting map is illustrated in Figure 1.2-2 (Sheets 1-7), along with representative photos of each CA provided as part of the CA descriptions below.

The general landscape character, land use, viewer/user groups, and types of views available from each of the CAs that occur within the ZVI are described below. It is important to note that many of these CAs also have an integral seascape component (i.e., views of the ocean) that is a major contributing factor to the visual composition and scenic quality of the CA. Use of these CAs to assist in defining the baseline scenic quality for the VSA and ZVI is an appropriate methodology for projects located offshore but visible from onshore CAs.

Table 1.2-2 Character Area Sensitivity Classification

Character Area	Classification	Total Area within VSA (square miles)	Total Area Within the ZVI (square miles)	Percent of Character Area with Potential Turbine Visibility
Ocean	OCA	6,558.7	5,792.6	88.3
Undeveloped Bay	OCA	213.2	156.2	73.3
Oceanfront Residential	SCA	6.7	3.8	57.4
Salt Marsh	SCA/LCA	203.3	112.0	55.1
Commercial Beachfront	SCA	0.8	0.4	48.6
Undeveloped Beach	SCA	7.1	3.2	45.4

Character Area	Classification	Total Area within VSA (square miles)	Total Area Within the ZVI (square miles)	Percent of Character Area with Potential Turbine Visibility
Atlantic City	SCA	3.4	0.4	12.5
Industrial	LCA	47.7	2.6	5.4
Bayfront Residential	LCA	3.9	0.2	5.3
Dredged Lagoon	LCA/SCA	15.5	0.5	3.0
Limited Access Highway	LCA	11.7	0.3	2.9
Recreation	LCA/SCA	25.3	0.6	2.5
Inland Open Water	LCA/SCA	27.8	0.7	2.5
Commercial Strip Development	LCA	35.4	0.4	1.3
Inland Residential	LCA	277.8	1.1	0.4
Town/Village Center	LCA	2.8	<0.1	0.3
Forest	LCA	1,316.9	2.1	0.2
Agriculture	LCA	95.1	<0.1	<0.1



Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-2: Character Area

Sheet 1 of 6

Wind Turbine Area

Visual Study Area

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ATLANTIC SHORES offshore wind

Notes: 1. Basemap: ESRI ArcGIS Online "World Topographic Map" map service. **2.** This map was generated in ArcMap by EDR on February 22, 2022. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-2: Character Areas

Character Area
- Open Water
- Undeveloped Bay
- Inland Open Water
- Salt Marsh
- Pine Barrens
- Recreation
- Undeveloped Beach/Dunes
- Oceanfront Residential
- Non-Waterfront Residential
- Residential Dredged Lagoon
- Bayfront Residential
- Commercial and Strip Development
- Oceanfront Commercial
- Town/Village Center
- Limited Access Highway
- Industrial/Developed
- Agriculture

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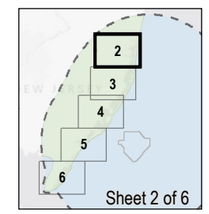

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ATLANTIC SHORES offshore wind

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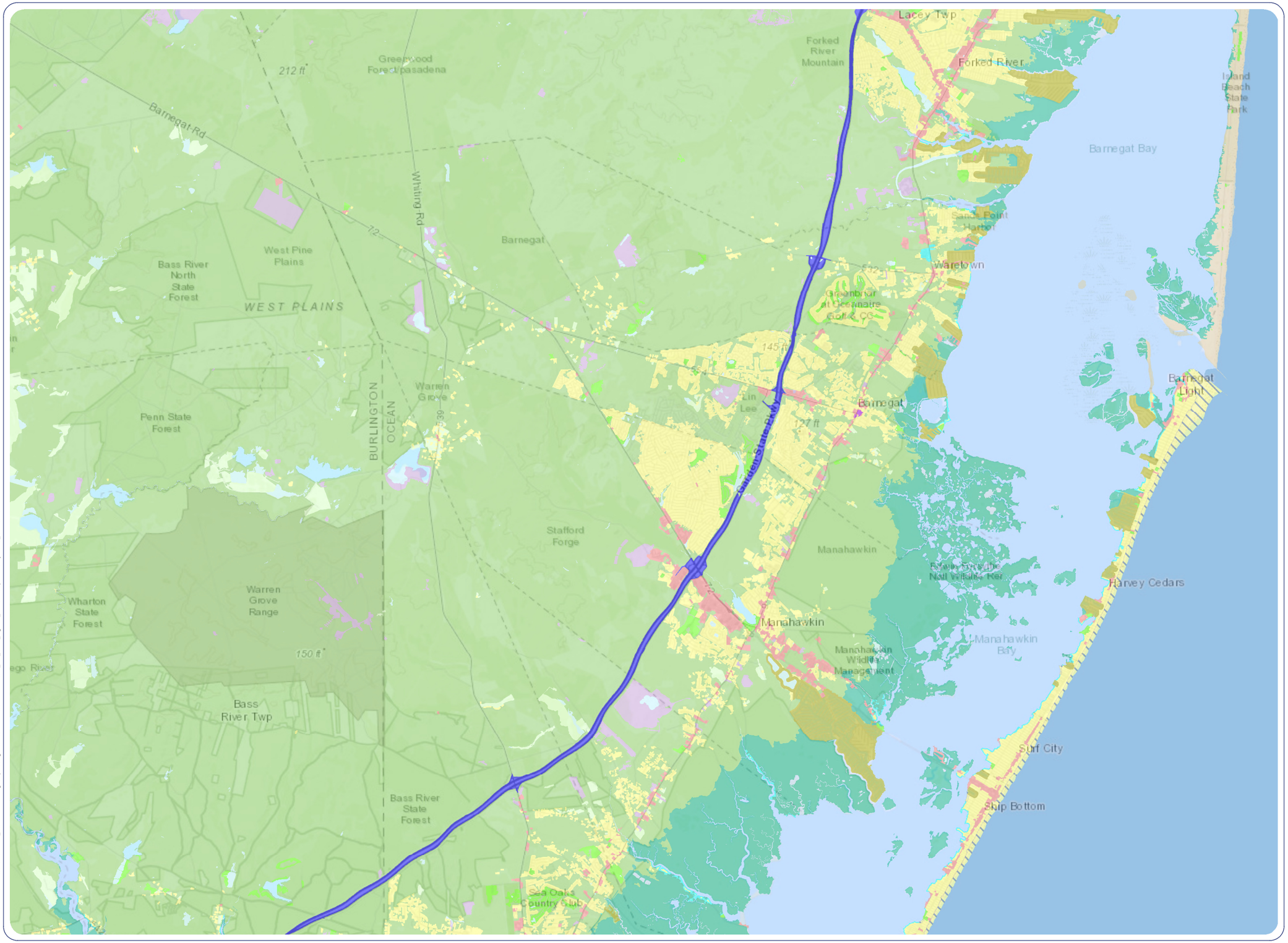
Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-2: Character Areas



Character Area
- Open Water
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- Pine Barrens
- Recreation
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- Non-Waterfront Residential
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- Bayfront Residential
- Commercial and Strip Development
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- Limited Access Highway
- Industrial/Developed
- Agriculture

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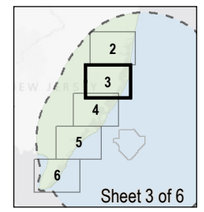

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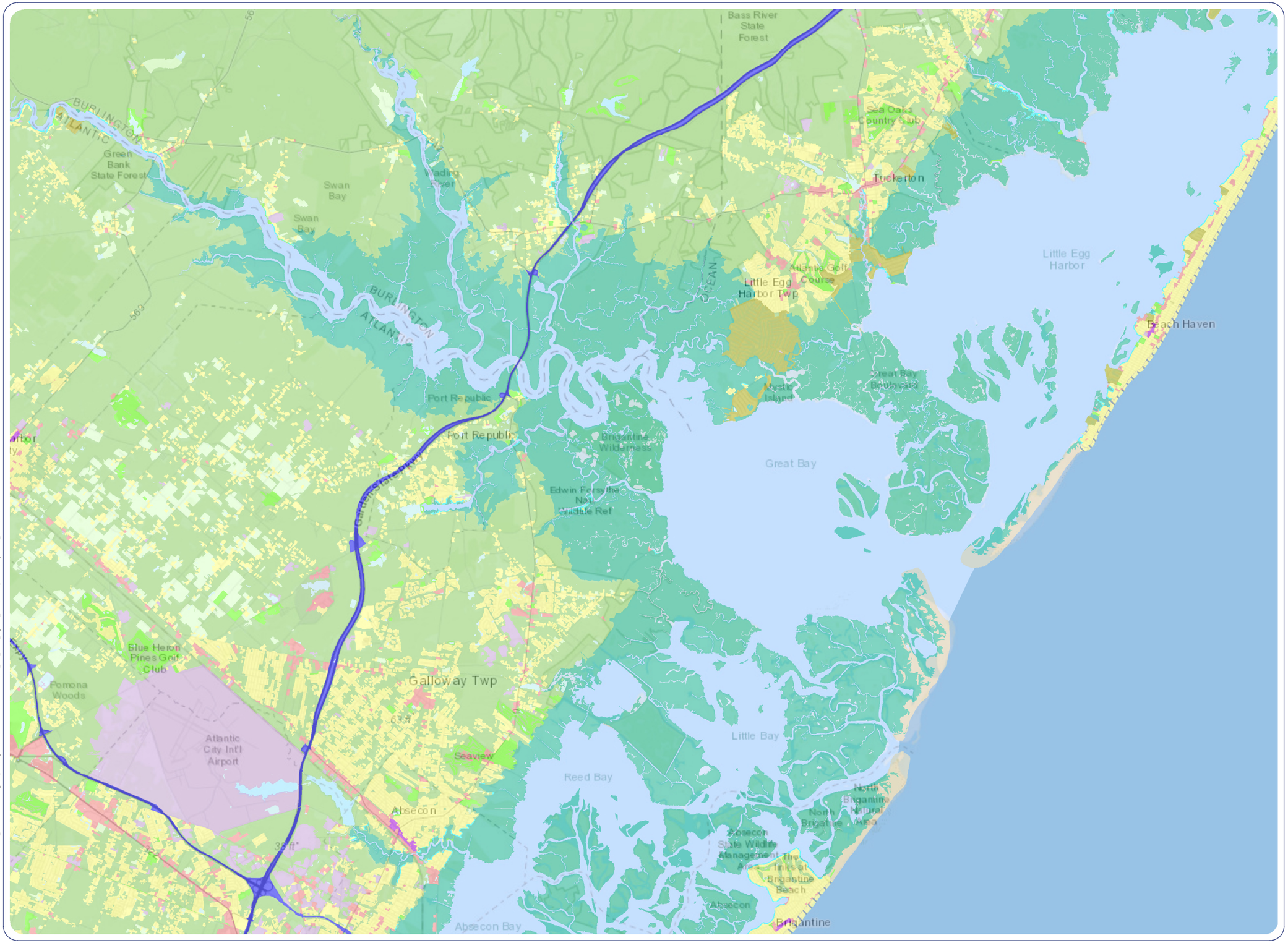
Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-2: Character Areas



Character Area

- Open Water
- Undeveloped Bay
- Inland Open Water
- Salt Marsh
- Pine Barrens
- Recreation
- Undeveloped Beach/Dunes
- Oceanfront Residential
- Non-Waterfront Residential
- Residential Dredged Lagoon
- Bayfront Residential
- Commercial and Strip Development
- Town/Village Center
- Limited Access Highway
- Industrial/Developed
- Agriculture

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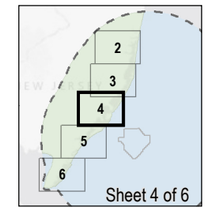

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ATLANTIC SHORES offshore wind

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Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-2: Character Areas

Character Area

- Open Water
- Undeveloped Bay
- Inland Open Water
- Salt Marsh
- Pine Barrens
- Recreation
- Undeveloped Beach/Dunes
- Oceanfront Residential
- Non-Waterfront Residential
- Residential Dredged Lagoon
- Bayfront Residential
- Commercial and Strip Development
- Oceanfront Commercial
- Atlantic City
- Town/Village Center
- Limited Access Highway
- Industrial/Developed
- Agriculture

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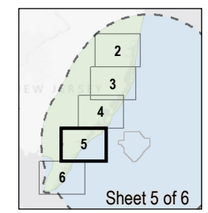

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ATLANTIC SHORES offshore wind

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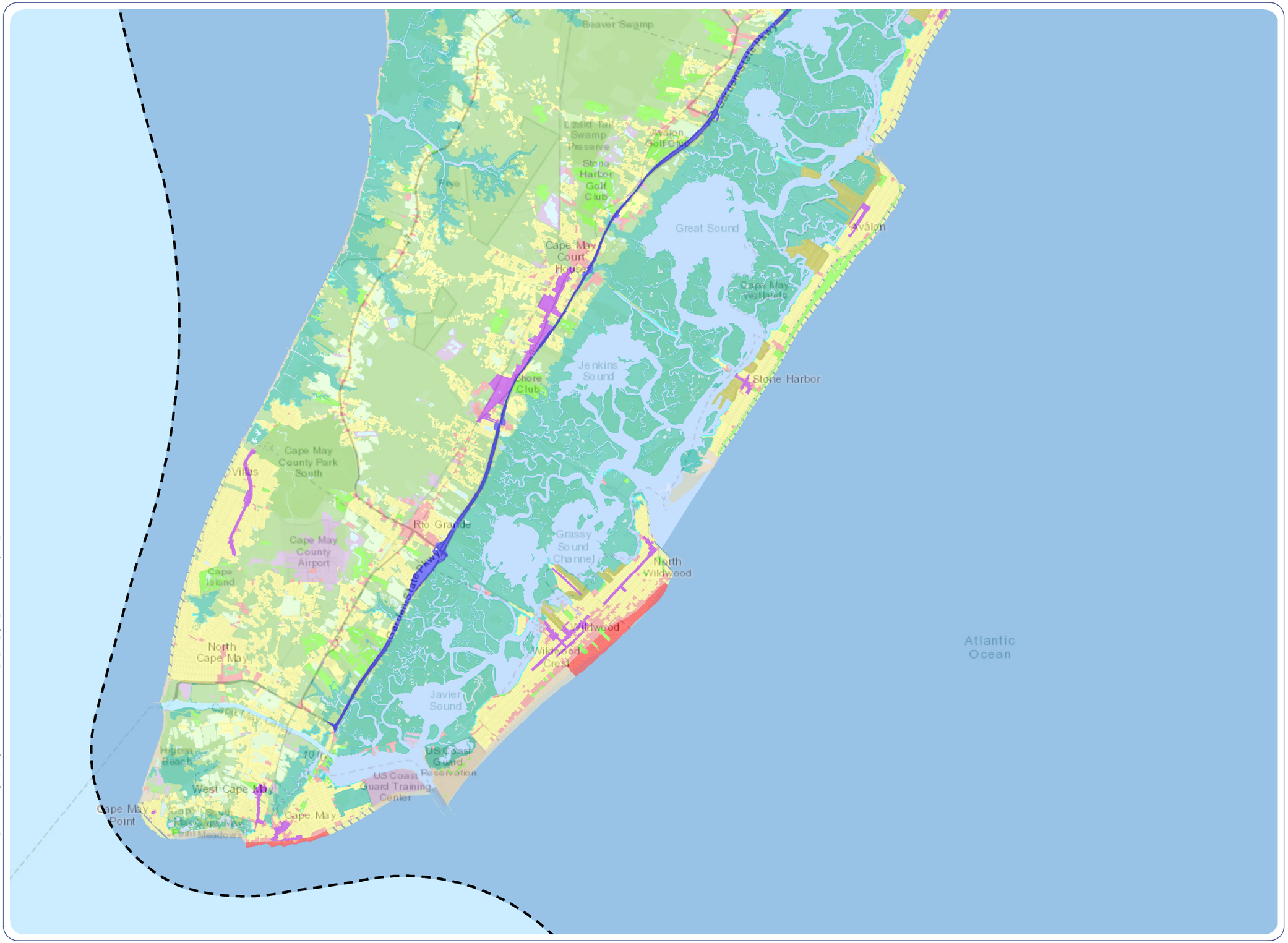
Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-2: Character Areas



Character Area
- Open Water
- Undeveloped Bay
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- Pine Barrens
- Recreation
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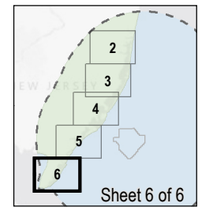

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ATLANTIC SHORES offshore wind

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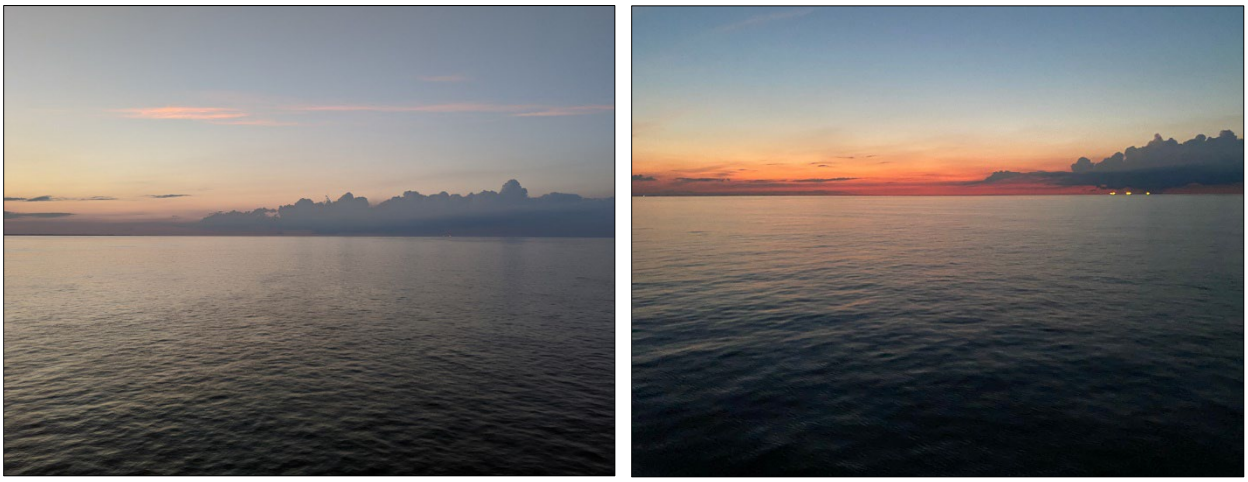
1.2.3.1 Ocean



Inset 1.2-3 – Examples of the Ocean Character Area

Within the ZVI, this zone includes the open water of the Atlantic Ocean off the coast of New Jersey and portions of Delaware Bay. The defining characteristic of this character area is the presence of open water as a dominant foreground element in all directions. The open expanse of water can be relatively calm and flat or may occasionally include rolling swells and white caps. Human-made features in the water are limited but may include occasional jetties, buoys, and boats. Views into this character area cross the open water and often extend to the horizon. Views from within this character area toward shore contain various components of other character areas including undeveloped beach associated with oceanfront parks and natural areas, and human-made features associated with oceanfront residential and oceanfront commercial zones. These can include buildings, boardwalks, amusement parks, and city skylines, particularly those associated with Atlantic City and Ocean City. The open water character area may also include views of character areas occurring further inland, including forested areas and salt marsh. The visibility, breadth, and detail of these features generally corresponds to the viewer's distance from shore. Features such as the Atlantic City's high-rises would likely be visible from significant distances within the open water character area, but visibility of lower profile features such as beaches and forest would likely diminish completely once a few miles offshore. Human activity on the water can be extensive, especially near major ports, inlets, navigation channels, and in proximity to marinas during the recreation season. This activity includes pleasure boating, merchant shipping, commercial and recreational fishing, and various water sports. Activity beyond the nearshore is typically concentrated within the designated shipping lanes located between 4 and 10 miles offshore. It is important to note that the Ocean character area can be a significant contributor to the scenic quality of adjacent SCAs such as undeveloped beach and shoreline residential. Additionally, the proposed action takes place entirely within the Ocean character area. As such, the contribution of this character area to adjacent character areas and the potential change resulting from the Projects is an important aspect of the VIA.

1.2.3.2 Undeveloped Beach

Inset 1.2-4 – Examples of the Undeveloped Beach Character Area

This character area is characterized by shoreline areas with minimal development and includes rolling, vegetated dunes which lead to an open sandy beach that slopes gently to the water line. In some instances, human-made features such as break walls, or stone jetties extend from the beach out into the ocean, but the remainder of the landscape generally lacks evidence of development. The undeveloped beaches within the ZVI are located on both barrier islands and islands within the back bays. Undeveloped beaches include Island Beach State Park on Barnegat Peninsula, portions of the Edwin B. Forsythe NWR such as Holgate Nature Conservatory and Short Island (also known as Pullen Island), North Brigantine State Natural Area, Corson's Inlet State Park, Stone Harbor Point, Cape May NWR, and Malibu Beach WMA. The defining characteristic of this character area is an unobstructed, water-level view up and down the shoreline and across open water as one looks out to sea, with minimal to no encroachment of human-made structures or infrastructure in the foreground view. Views from undeveloped beaches may also overlook inlets with visibility of neighboring islands. Some of the beaches (e.g., Island Beach State Park) are maintained by state or federal agencies, and therefore may include some human-made elements, including signage, fencing, and paved areas. However, these items are mainly clustered around public access points and are often screened by coastal dunes. Viewer activity in this area is primarily recreational, and include swimming, sun-bathing, birdwatching, wildlife observation, walking, beachcombing, fishing, and surfing. The Undeveloped Beach character area provides opportunities for uninterrupted views of the Ocean character area backed by vegetated dunes which minimize the opportunity for inland views. These views over the Ocean character area include 180 degrees or more of uninterrupted ocean, generally extending to the horizon, and are a defining characteristic of the Undeveloped Beach. During the summer season, these views will often include a large number of beach goers and associated beach and ocean activity. However, the undeveloped beaches tend to be less crowded than the Commercial Beachfront character area, or the Atlantic City character area, described below. As such, viewers within the Undeveloped Beach character area have greater opportunities for views without distracting foreground features. Most users of this character area consider the Ocean the character defining element of the beach and the focus of their activities typically relies on the presence of the ocean and ocean views.

1.2.3.3 Undeveloped Bay

Inset 1.2-5 – Examples of the Undeveloped Bay Character Area

Within the ZVI, this character area includes the expansive bodies of water west of the barrier islands and is characterized by an expanse of open water primarily bordered by the Salt Marsh, Dredged Lagoon, Bayfront Residential, and Forest character areas. The Undeveloped Bay character area hosts a diversity of wildlife which often animates the open water and shoreline. The Undeveloped Bay character area typically flows through protected ecological areas such as the Absecon WMA, Cape May NWR, Edwin B Forsythe NWR, Manahawkin WMA, and Great Bay Boulevard WMA. Views from and into the bay are typically framed by the primarily developed barrier islands, natural islands within the bay, or mainland landforms in the distance. These visible landforms may include human-made features such as housing developments, high rise buildings (Atlantic City), lighthouses, bridges, water towers, and utility/communication towers. The waters within this character area receive significant use by motorized and nonmotorized recreational boats, which are generally concentrated within the managed navigation channels of the bays. Areas outside the channels generally have a lower intensity of human activity. Views from within the Undeveloped Bay character area are generally panoramic and extend long distances, out to and sometimes beyond the barrier islands that separate the bays from Ocean character area. Views to the Ocean character area are generally interrupted by development, sand dunes, or vegetation on the intervening barrier islands. At inlet locations in the Undeveloped Bay character area views to the Ocean VA are typically framed by barrier islands. However, as one travels inland on the bays, vegetation within the salt marsh, barrier island development, and even vegetated sand dunes can limit outward visibility due to the lack of elevated vantage points within the bays.

1.2.3.4 Oceanfront Residential

Inset 1.2-6 – Examples of the Oceanfront Residential Character Area

This character area is characterized by year-round and seasonal homes, inns and hotels, and some large multi-unit buildings situated along the ocean shoreline. The defining characteristic of this zone is a broad, often elevated view (particularly from multi-story residences) of the ocean from a residential setting, with direct access to an adjacent beach. It is common for these residences and buildings to be separated from the beach by dunes, characterized by gently undulating sand features dominated by dune grasses and low shrubs in variable stages of succession. Wooden slat sand fencing is often present in this setting to protect the dunes from migration. Homes within this zone tend to be two to three-stories and are typically larger than the nearby homes further inland. However, smaller oceanfront beach cottages occur in older communities such as Beach Haven and Sea Isle City. Housing stock in this zone covers a wide range of styles including shingled cottage cape, Victorian, and modern. Structures in this character area are universally situated and designed to take advantage of beach access and ocean views. Common beachfront architectural elements include decks, awnings, skylights, extensive window banks, complex rooflines, and fencing that separates properties. Properties separated from the beach by dunes and/or vegetation typically include boardwalk or sand paths to the beach, which traverse the dunes. Landforms in this character area are level to gently undulating, and surrounding vegetation includes a mix of coastal scrub, dunes, and maintained residential landscaping. Large trees are generally lacking. Typical user activity within this zone includes a combination of residential and recreational activities, such as home and yard maintenance, local travel, sight-seeing, and beach recreation by members of the public. By its very nature, this character area has open panoramic views of the Atlantic Ocean, primarily from the upper floors of the homes, where balconies and rooftop decks are often situated specifically to take advantage of the ocean views. However, the dunes as well as the often continuous line of shorefront structures limit ground-level views to the ocean. Regardless, the ocean is an integral and defining feature of this character area, through a variety of senses including sight, sound and smell.

1.2.3.5 Bayfront Residential

Inset 1.2-7 – Examples of the Bayfront Residential Character Area

This character area occurs in conjunction with naturally occurring bays, rivers, and coves. It is characterized by seasonal and year-round residences which are situated along the waterfront. The character area is often bordered by an adjacent Salt Marsh character area, or the waterfront at the edge of the neighborhood street grid. This zone is commonly found on the northwest side of the barrier islands, or on the mainland along salt marshes, bays, or the rivers that feed them. The Bayfront Residential character area frequently appears as suburban residential development from the street, incorporating homes and lawns stitched together with sidewalks, street trees, and neighborhood roads. Glimpses of bays or rivers may be available between densely situated homes. Housing types include single family homes, duplexes, and town homes. Often the residential neighborhoods are flanked by sandy beaches, marinas, and/or break-walls. The bay-facing side of properties in this character area are designed to maximize water usage and views by incorporating decks, porches, docks, boat lifts, and other boating facilities. This character area is visually separated from the Ocean by the barrier islands which are typically dominated by the Oceanfront Residential, Undeveloped Beach, Commercial Beachfront, or Atlantic City character areas. Often, oceanfront development becomes a significant feature in the views from the Bayfront Residential character area. These views are typical from within the Bayfront Residential character area along the western shore of Absecon Bay, Reeds Bay, and Lakes Bay. However, where the shoreline is not dominated by development (west of Little Egg Harbor and north of Great Bay), extensive outward views across the bays or rivers can be available from within this character area and often extend over the Undeveloped Bay and occasionally beyond the barrier island dunes to the Ocean. Along with typical residential activities, user activity in this zone includes boating, and recreation activities such as fishing and nature viewing.

1.2.3.6 Dredged Lagoon

Inset 1.2-8 – Examples of the Dredged Lagoon Character Area

This character area typically occurs in conjunction with the Undeveloped Bay or Salt Marsh character areas and is characterized by residential neighborhoods with seasonal and year-round homes situated along an artificial dredged waterway. Marinas associated with the housing developments are sometimes included in this character area. Neighborhoods in this character area are arranged along a tight, well-organized grid of local streets and water channels that run between the backyards of adjacent residences. Individual homes have private docks along these channels which provide access to the adjacent waterway. The separation of land created by water channels and roadways ending in cul-de-sacs allows individual streets to function as discrete neighborhoods, which together, comprise a larger residential community. Consequently, communities within this zone have a more spacious and spread-out character when compared to the neighboring landlocked subdivisions within the ZVI. Depending on a residence's position within the zone, outward views across open expanses of water may be available, but in general views from this character area are screened or tightly framed by nearby residences and moored boats. Properties on the periphery have more extensive views of the bay, salt marsh, and occasionally the ocean beyond the intervening barrier islands. However, outward water-level views from the dredged channels are generally completely screened by the structures that line the channels. Examples of the Dredged Lagoon character area within the ZVI include developments in Beach Haven West, Sunrise Beach, and Windsor Park. Typical user activities in this character area include residential activities, boating, and fishing.

1.2.3.7 Inland Residential

Inset 1.2-9 – Examples of the Inland Residential Character Area

The Inland Residential character area includes residential development located inland of the Oceanfront and Bayfront Residential character areas. This zone is characterized by low-, medium-, and high-density residential neighborhoods which occur throughout the VSA and ZVI. Development patterns in this character area include quaint walkable neighborhoods with sidewalks along streets which typically run perpendicular to the ocean or bays and abut the Oceanfront, Bayfront Residential, or Dredged Lagoon character areas. This character area also includes sprawling suburban subdivisions which primarily occur within the mainland portions of the VSA, where the presence of the ocean and bays becomes less apparent due to the screening provided by adjoining Forest, Village/Town Center, and Commercial Strip Development character areas. While residential structures such as homes and apartments are the main building type in this character area, schools and school grounds, and occasional commercial structures within a neighborhood may also be included. The common visual characteristics of this character area includes relatively closely situated homes and limited outward views. Home types within this character area include single and multifamily residences which vary in size, age, and style. Although outward views from this character area are typically restricted by vegetation and buildings/structures within and surrounding the neighborhood, where this character area occurs closer to the Ocean, views down residential roadway corridors with minimal vegetation may extend to adjacent dunes, and/or the ocean and bays. Typical user activities in this character area include home and yard use/maintenance and local travel.

1.2.3.8 Town/Village Center

Inset 1.2-10 – Examples of the Town/Village Center Character Area

The Town/Village Center character area includes well-defined town/village center areas which occur in small pockets on the barrier islands and larger villages on the mainland. This zone is characterized by moderate- to high-density residential and commercial development occurring along a main street or cluster of mixed use blocks. This human-scale development features ample street trees, detailed streetscape treatments, massed commercial properties featuring vibrant window displays, and public amenities such as benches, water features, and public art. Examples of this character area within the ZVI include town center areas within Sea Isle City and the City of Brigantine. Buildings within the town centers include churches, town halls, libraries, and large mixed use properties. They are generally surrounded by residential buildings which increase in density near the ocean and bay shorelines. In popular beach towns, tightly spaced commercial buildings and structures that cater to seasonal visitors and/or tourists may be the dominant feature within the Village/Town Center character area. Buildings are generally 2 to 3 stories in height and are organized along a grid which focuses views along the streets. Vegetation within this zone is typically limited to regularly placed street trees and successional vegetation associated with vacant land parcels. The landscape is dominated by human-made elements, including buildings, cars, pavement (roads, parking lots, and sidewalks), light posts, and other infrastructure. Long-distance outward views are generally only available along the outskirts of Village/Town Center character area, and these views are usually at least partially screened by existing buildings/structures and/or vegetation. Most of the well-defined Village/Town Center areas within the VSA on mainland New Jersey occur at historic centers of commerce in former villages now consolidated into larger towns with more sprawling commercial and residential development along the periphery. These inland examples of the Town/Village Center character area do not typically occur within the ZVI. However, the aforementioned beach communities in Sea Isle City, Margate City, Ventnor City, and Brigantine occur on the barrier islands and may have discrete, tightly framed outward views toward the ocean. Users within the Town/Village Center character area typically include residents and tourists shopping, dining, and sightseeing. During the summer months, these areas can become crowded with tourists, as the commercial offerings typical of this character area draw tourists and vacationers from nearby beaches and neighborhoods.

1.2.3.9 Commercial Strip Development

Inset 1.2-11 – Examples of the Commercial Strip Development Character Area

This character area typically occurs inland but may be connected to the waterfront by way of the Oceanfront Commercial character area or Oceanfront Residential character area. It includes strip commercial development located along wide boulevards, around the edges of village centers, and sporadically throughout the VSA. The visual character of this character area is generally defined by modern, unadorned strip or stand-alone building stock, on-site parking, and circulation patterns favoring vehicular modes of transportation. Vegetation is limited to landscaped grounds, sparse street tree plantings, and narrow grassy medians and tree plantings within and adjacent to paved areas. Properties within this zone typically include retail businesses, restaurants, convenience stores, automobile dealers, shopping centers, malls, and office buildings. Outdoor commercial uses such as marinas and amusement parks may also be categorized within this character area. Foreground and middle ground views often appear cluttered when multiple properties utilize large, colorful signage along roadways. Views can also look stark, for example, when a series of stand-alone office buildings are set deeply into parking lots. Examples of this character area within the ZVI can be found on the mainland in proximity to the Garden State Parkway as it crosses through the VSA and on the barrier island communities of Seaside Heights Borough, Ship Bottom Borough, Beach Haven Borough, Brigantine City, Margate City, or Wildwood Crest Borough. This character area is typically bordered by the Inland Residential and Town/Village Center character areas. The presence of commercial structures, visual clutter, and the neighboring developed character areas generally eliminates the opportunity for outward views from within this character area. However, when the Commercial strip Development character area borders the Oceanfront Residential character area, discrete, tightly framed outward views may be available from streets oriented toward the ocean. Users within this zone generally include residents and tourists involved in destination driven activities such as dining or shopping.

1.2.3.10 Atlantic City

Inset 1.2-12 – Examples of the Atlantic City Character Area

The Atlantic City character area occurs on Absecon Island within Atlantic City, primarily east of Albany Avenue (US Route 40). This character area is defined by an eclectic mix of large casino/hotel properties, single family homes, multi-family residential complexes, large and small commercial properties, traditional mixed use downtown structures, vacant lots, boardwalk, and beach. A wide range of urban uses are present in a variety of conditions. Traditional or expected city center patterns of development are frequently interrupted by urban renewal demolition, poorly maintained structures, or new construction. There is a general gradient in which casinos located closer to the boardwalk and beach, are backed by large chain hotels and motels, mixed use commercial, then residential townhouses and apartments finally giving way to small lot single-family residences. However, casinos and affiliated tourist accommodations/attractions such as hotels, shopping, and amusement areas are scattered throughout this character area. The resulting scene is visually complicated as multiple land uses and building styles are observable from almost any viewpoint, a condition exacerbated by a high concentration of vacant lots scattered throughout the zone. Human activity is high, especially on the boardwalk and beaches which act as frontage to the large casinos. Large crowds primarily reflect casino visitors, tourists, and those employed to maintain this industry (including a variety of staff and maintenance workers). Activity within this character area, beyond the beach, boardwalk, and casino area, primarily involves city residents conducting the routines of daily living. Outward views from this character area are available from the bayfront shoreline looking out toward the Salt Marsh or Undeveloped Bay character areas, or from the boardwalk, beach, or upper stories of the taller hotel, casino, or apartment complex properties looking out toward the Ocean. The boardwalk area in this character area has a prominent commercial component that not only lines the inland beach front, but also extends across beaches and over the ocean in the form of large adventure piers/amusement parks containing midway areas and a variety of carnival rides accented by flashing and colorful light features. Beaches in this area during the tourist season (Memorial Day to Labor Day) are heavily trafficked with a near constant presence of crowds bringing with them a variety of colorful beach equipment such as beach umbrellas, chairs, towels, and a need for trash receptacles, lifeguard chairs, and maintenance equipment storage sheds. Individual beaches not separated by dunes often blend together due to the high and continuous volume

of users, however, some locations are dedicated to specific activities such as beach volleyball or extensions of hotel bars. These locations generally offer views to the horizon, but these views are frequently interrupted by the presence of large structures and piers that extend up to 800 feet into the ocean, eliminating major portions of the horizon from view. Views within this character area beyond those associated with the ocean/beach and tourist activity are more typical of a city center developed primarily in the late 19th and early 20th century and heavily affected by the policies and practices of Urban Renewal. This translates to 2-3 story mixed use structures with commercial businesses at street level and apartments above on major transit corridors. Tightly spaced two or three family homes occur on the minor cross-streets interspersed with 1950s style public housing, modern infill, and vacant lots. At the outskirts of this dense urban area, single family residences provide transition to a more suburban development pattern. Within the interior areas of the Atlantic City character area outward views are restricted by the dense urban development and typically do not extend beyond the immediate foreground. Views toward the ocean are entirely blocked by the presence of high-rise buildings which crowd the waterfront.

1.2.3.11 Limited Access Highway

Inset 1.2-13 – Examples of the Limited Access Highway Character Area

The Limited Access Highway character area includes primary, high-volume vehicular travel corridors that briefly enter the ZVI and are dominated by automobiles, pavement, guardrails, and signs. Within the ZVI, this zone is represented by fragments of State Route 444/Garden State Parkway and the Atlantic City Expressway. Views from within this character area are generally focused on the roadway and associated traffic. Travel is at moderate to high speed, and outward peripheral views are fleeting. The surrounding scenery is variable but dominated by adjacent buildings/structures and trees, with limited elevated long-distance views available. When this character area passes through the Undeveloped Bay character area via bridges, views of the bays, marshes and surrounding character areas become available, along with long-distance views in the direction of the ocean.

1.2.3.12 Forest

Inset 1.2-14 – Examples of the Forest Character Area

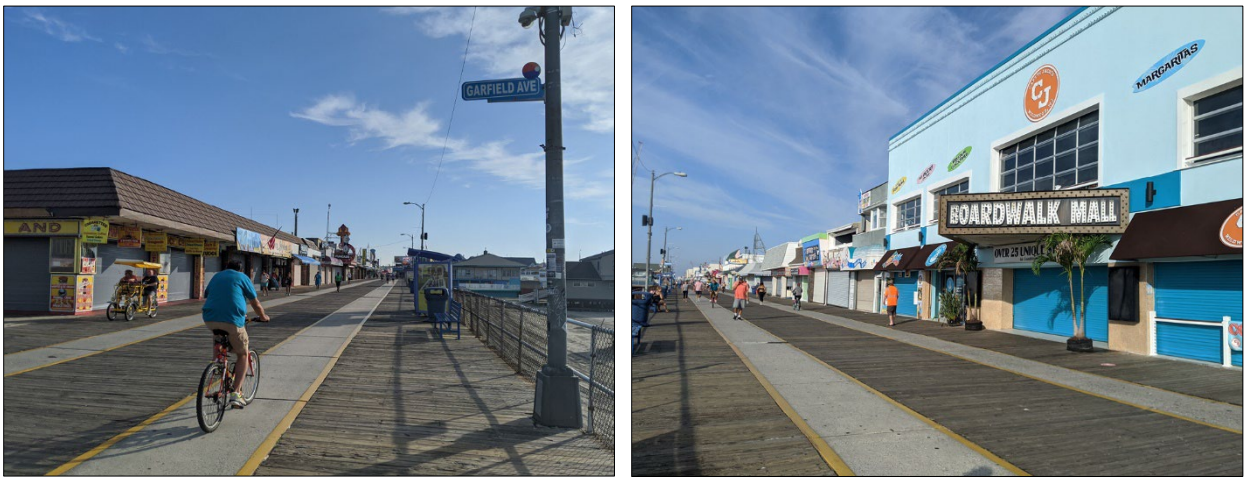
The Forest character area contains tracts of forestland which occur sporadically throughout the ZVI. Within this character area two primary forest types are represented; the New Jersey Pine Barrens (including the Atlantic Coastal pine barrens ecosystem) and the coastal scrub (maritime) forests which typically occur in association with the Salt Marsh character area and provide a transition into the pine barrens. The New Jersey Pine Barrens typically include pitch pine and scrub oak forests. The forest understory is made-up of mixed shrubs, saplings, and herbaceous vegetation including orchids and other unique plant species. Due to environmental protections or lack of development suitability, these forest areas typically occur between inland residential areas and the Undeveloped Bay character area. The Forest character area also frequently coincides with protected lands such as the Tuckahoe WMA and Manahawkin WMA which occur within a small portion of the ZVI. Larger tracts of forestland with public access points typically include maintained recreation areas, such as state parks or nature preserves such as Island Beach State Park in Seaside Park. Scattered residences, local roads, small fields, and wetlands may occur within this zone but are subordinate to the visual dominance of the surrounding forest. Landform within this zone is relatively flat, although gently rolling topography is present in places. Notable areas of forest land within the ZVI include portions of the Swan Bay WMA, Stafford Forge WMA, and Bass River State Forest. The maritime forest is characterized by dense woody and herbaceous vegetation, typically less than 20 feet in height, providing a transition between bayfront salt marshes and taller inland forests. Long-distance views within the Forest character area are generally partially to fully screened by the forest overstory. When present, outward views typically occur on the periphery of the Forest character area. This is particularly true where the Forest character area abuts emergent wetlands or open water associated with the Undeveloped Bay or Salt Marsh character areas where the vegetation becomes more stunted and sparse. Occasional observation towers situated within the Manahawkin WMA also provide opportunities for sweeping views from above the treetops over the bays and to the ocean. Users within the Forest character area include recreationalists and tourists who enjoy activities including hiking, fishing, birdwatching, hunting, and sightseeing.

1.2.3.13 Salt Marsh

Inset 1.2-15 – Examples of the Salt Marsh Character Area

This character area is characterized by coastal ponds and marshes that are connected to inlets or bays with one or more relatively narrow channels allowing tidal water to periodically flood portions of the character area. This character area occurs commonly along the bayside coastlines of the mainland and barrier islands throughout the VSA. Within the ZVI this character area is represented by the Great Bay Boulevard, Absecon, Upper Barnegat Bay, and Cape May Wetlands WMAs, and portions of the Cape May and Edwin B. Forsythe NWRs. These areas are typically characterized by an expanse of low-growing herbaceous wetland vegetation interspersed with pockets of open water. Because these areas are subject to the influence of tides, they can include exposed mud banks and flats along their edges at low tide. The Salt Marsh character area also hosts some coastal scrub vegetation and is frequently bordered by the Forest character area. This transition zone may include infrequent woody shrubs and stunted trees on small upland patches. Views from within the Salt Marsh character area beyond these transition zones often offer sweeping views across the Undeveloped Bay character area. Often these views are interrupted by the barrier island development associated with Atlantic City, Beach Haven Crest, and Margate City in the middle ground or background. However, when the barrier island lacks development in areas such as the Edwin B. Forsythe NWR and Little Beach, the Salt Marsh character area may have views beyond the barrier islands and occasionally out into the ocean. Recreational activity in the form of boating, fishing (including clamming and crabbing), hunting and wildlife observation is common within the Salt Marsh character area. However, these sensitive environments do not offer developed recreational amenities.

1.2.3.14 Commercial Beachfront



Inset 1.2-16 – Examples of the Commercial Beachfront Character Area

This character area typically occurs in the major beach towns on the coast within the VSA. It consists of a wooden boardwalk or walkway, ocean piers, and commercial development bordering a shoreline beach or ocean. Commercial uses include adventure/amusement piers, recreation centers such as the Ocean City Music Pier and commercial structures such as snack shops or bars. Structures in this character area range in size from small single story snack shops to multi-story municipal structures or piers. Use and activity in this character area is similar to that which occurs in the Commercial strip Development character area, although in this case the businesses treat the boardwalk as street frontage to accommodate pedestrian rather than vehicular access. The type and intensity of activities in this character area are largely influenced by tourism and are seasonal in nature. These areas are used heavily during the late spring and summer months, and minimally or not at all during the fall and winter. Topography is typically level along the boardwalk, with beaches that slope gently downward toward the shoreline. Vegetation may be present in the form of ornamental shrubs, but mostly consists of dune grass along the edge of the adjacent beaches. The availability of open views toward the ocean varies within this character area. In some areas, views will be screened by dunes or framed by commercial structures, piers, jetties, signs, and other human-made structures. However, in other areas, such as along the sandy shorelines or looking out from a pier, viewers will be afforded open views of neighboring piers, sandy beaches, and the ocean. One side of this character area is always connected to the Open Ocean character area, with surrounding landscape on the inland side typically within the Commercial Strip Development character area, but also at times including the Recreation, Residential Beachfront, or Inland Residential character areas. Examples of this character area within the ZVI include Wildwood City Boardwalk, Ocean City Boardwalk, Seaside Heights Boardwalk, and Point Pleasant Beach Borough Boardwalk.

1.2.3.15 Agriculture

Inset 1.2-17 – Examples of the Agriculture Character Area

This character area is a minor component of the VSA which is primarily found inland, outside of the ZVI. Locations of this character area within the ZVI include small areas within Galloway Township and Hamilton Township. Larger pockets of this character area located on the western edge of the VSA in Buena Vista, Hammonton, Tabernacle, and Plumsted Townships are not within the ZVI. Outside of these large areas, instances of this character area include smaller farm lots scattered throughout the VSA. This zone is characterized by flat stretches of field which provide open views of crops, hedgerows, livestock, farm buildings, equipment, and homes. Crops include blueberries, corn, and a variety of vegetables. Orchards and equestrian facilities are also common. These areas are viewed by farmers and farm staff working the land, families who inhabit adjacent residences, and drivers and passengers traveling on roads that cross through this character area. The Agriculture character area is most commonly adjacent to the Inland Residential and Forest character areas, which frame or limit outward views depending on their spatial relationship.

1.2.3.16 Recreation

Inset 1.2-18 – Examples of the Recreation Character Area

The Recreation character area encompasses a range of areas intended primarily for outdoor leisure and play. On the mainland, these areas include golf courses, sports fields, athletic complexes, campgrounds, and inland beaches. On the barrier islands these areas include community parks, small athletic complexes their parking areas, and other developed areas within state parks. This character area typically contains landscaped or human-made features which support recreational activities, however the visual character of these features varies widely. Golf courses, viewed by golfers or adjacent residents, feature long, sweeping views of contoured lawns, water features, and sand traps, intentionally framed by forest edge. By contrast, barrier island parks and athletic complexes are viewed by a variety of residents and tourists who use or pass by the site. These areas tend to be more visually cluttered with parking lots, baseball diamonds, tennis and basketball courts, restroom facilities, benches, pavilions, gardens, bike racks, and other auxiliary park structures. Within the ZVI this character area is most commonly represented by shoreline recreation on barrier islands, locations associated with state park structures at elevations rising above the surrounding dunes and beach, and in locations where a recreation area may be situated at the end of a street oriented toward the Projects. On the mainland within the ZVI this character area is most commonly located adjacent to the Undeveloped or Salt Marsh character areas to provide views overlooking the bay. Views from this character area either look out the ocean or bay, or into a densely developed adjacent character area such as Commercial Beachfront, Town/Village Center, Oceanfront Residential or Bayfront Residential.

1.2.3.17 Inland Open Water

Inset 1.2-19 – Examples of the Inland Open Water Character Area

This character area occurs throughout the mainland portion of the VSA. Its dominant visual feature is an open expanse of flat water that is enclosed by a vegetated shoreline. The shorelines are typically dominated by deciduous and coniferous trees but are occasionally interrupted by human-made features, such as homes, boat launches, bridges, and roads. Human activity on these waterbodies and along the shoreline includes boating, kayaking, fishing, and swimming. Shoreline trees define the visible background in most views from inland lakes and ponds. Several waterbodies associated with active or reclaimed extraction mines are also included within this character area. Given their inland locations and extensive vegetative screening, views to the ocean from this character area are rare. As such, very few inland waterbodies within the VSA also occur in the ZVI. Exceptions include, the Atlantic City Reservoir, Hawkins Creek, and several tributaries draining into the extensive network of bays though out the VSA.

1.2.3.18 Industrial/Developed

Inset 1.2-20 – Examples of the Industrial/Developed Character Area

The Industrial/Developed character area includes developed landscapes defined by a variety of utilitarian functions, which are visually linked by a stark, severe aesthetic. Elements commonly found in this zone include expansive open areas, pavement, utility structures and buildings, screening or security fencing, machinery, equipment, and raw materials. Land uses include airports, military grounds, mines, power stations, industrial parks, warehouses, self-storage facilities, municipal maintenance lots and transit stations. This character area is found throughout the VSA at a variety of scales. On the barrier islands, the Industrial/Developed character area is present on very small sites on the interior or bay side of the islands in the form of power stations, maintenance lots, parking areas, and small airports including Ocean City Municipal Airport and Bader Field Airport. Views from this character area can be extensive when the sites are large, open, and adjacent to the Salt Marsh or Undeveloped Bay character area, as in the case of airports. However, it is more typical for views from the Industrial/Developed character area on the barrier islands to be limited because the sites are small, fenced, and adjacent to densely developed character areas such as Inland Residential or Commercial Strip Development. This condition is exemplified by municipal maintenance lots and small industrial businesses and materials storage lots. The USCG Training Center on Cape May is the singular instance of an Industrial/Developed site with available views of the Ocean character area.

On the mainland, the Industrial/Developed character area is found throughout the VSA on larger sites. Substantial instances of this character area include the Monmouth Executive Airport, Joint Military Base McGuire-Dix in Lakehurst, Atlantic City International Airport, Dun Rite Sand & Gravel Mine, Lakewood Industrial Park, Woodbine Municipal Airport, and Cape May County Airport. These large sites are most commonly adjacent to the Forest character area, which buffers their loud, unsightly, or otherwise intrusive nature from neighboring properties. Open industrial sites offer extensive views within themselves, but the views usually extend only to the property's edge, which is typically bordered by dense forest vegetation. Smaller instances of this character area are scattered throughout the mainland and include recycling centers, active and abandoned mine sites, industrial parks, transit stations, military training centers, self-storage

facilities, and industrial fabrication, warehouse, and distribution facilities. These sites are typically screened by Forest character area, except in cases when they are adjacent to the Commercial Strip Development character area as a component of a regional commercial center.

In general, views into and acres the Industrial/Developed character area are interrupted by fencing, trees, and brush, although infrequent glimpses of the stark and utilitarian interior may appear through periodic gaps in the perimeter buffer. Human activity in this zone is limited to training or work by employees of the various military operations or business enterprises. It also includes commuting when the character area takes the form of a transit station or parking area.

1.2.4 Visually Sensitive Resources

Visually sensitive resources (VSRs) include resources that have been identified in publicly available documents and GIS databases provided by national, state, or local governments, organizations, and/or Native American tribes as important sites which are afforded some level of recognition or protection. Avoiding or minimizing impacts to these resources is an important consideration in the planning stages of a project. For the VIA, a desktop inventory of visually sensitive resources was prepared for the entire VSA. Additional resources were also identified through consultation with BOEM, NJDEP, Project stakeholders and during the field verification process. These resources were identified, and requisite GIS layers were compiled into a database for documentation and mapping purposes. A GIS analysis was then conducted to determine how many of these resources occur within the ZVI and would require further evaluation. Attachment C lists all identified VSRs that occur within the VSA and those within the ZVI (as determined by the lidar viewshed analysis). A summary of the results of this GIS analysis for VSRs occurring within the ZVI is presented in Table 1.2-2, below.

Table 1.2-2 Visually Sensitive Resources Within the ZVI

Type of Resource	Source	Occurrences of Resource Within ZVI
National Historic Landmarks	National Park Service Public Database	2
Properties Listed on the National or State Registers of Historic Places	National Park Service Public Database	16
Properties Determined Eligible for National or State Registers of Historic Places		43
National Natural Landmarks	National Park Service Public Database	1
State/Local Designated Scenic Areas and Overlooks	NA	0
Scenic Area of Local Significance	NA	0
State Designated Scenic Overlooks	NA	0
National Wildlife Refuges	U.S. Fish and Wildlife Service Public Database	2
State Wildlife Management Areas	NJDEP Division of Fish & Wildlife -	16

Type of Resource	Source	Occurrences of Resource Within ZVI
	Wildlife Management Areas	
National Parks	NA	0
State Parks	NJDEP Bureau of GIS	3
State Nature and Historic Preserve Areas	NJDEP Bureau of GIS	12
National Forests	NA	0
State Forests	NJDEP Bureau of GIS	3
National Recreation Areas and/or Seashores	NA	0
State Beaches	NA	0
National or State Designated Wild, Scenic, or Recreational Rivers	National Wild and Scenic Rivers System	1
Highways Designated or Eligible as Scenic	NJ Scenic Byways Program	1
National Historic/Recreation/Heritage Trails	NJDEP Bureau of GIS	1
State Fishing and Boating Access Sites	NJDEP Bureau of GIS	9
Lighthouses (not NRHP-Listed or State Historic-Listed)	NJDEP Bureau of GIS	2
Public Beaches	Municipal Document Review	36
Environmental Justice Areas (State and Federal)	EDR EJA Analysis	87
Ferry Routes (Occur across multiple states)	NA	0
Seaports (Commercial Maritime Facilities)	NA	0
Other State Land with Public Access	NA	0
Total		234

The locations of the visually sensitive resources are illustrated in Figure 1.2-3 at the conclusion of this section. Brief descriptions of the types of visually sensitive resources that occur with the ZVI are presented below:

1.2.4.1 Historic Sites and National Historic Landmarks

Authorized by the National Historic Preservation Act of 1966 (NHPA), the National Register of Historic Places (NRHP) is maintained by the National Park Service (NPS) as part of a national program to coordinate efforts to identify, evaluate, and protect historic and archeological resources. According to the NPS website, the NRHP is the official list of designated historic places worthy of preservation, and National Historic Landmarks (NHL) are historic places that hold historic significance and are designated by the Secretary of the Interior. The New Jersey State Register of Historic Places (SRHP) is maintained by the State Historic

Preservation Office (SHPO) and includes resources that the state has determined are worthy of preservation, but which have either not been determined eligible for inclusion or have not been evaluated for listing in the NRHP. A *Historic Resources Visual Effects Analysis* (HRVEA) prepared for the Projects (EDR, 2021) contains additional details on S/NRHP and NHL properties and districts within the VSA.

Within the ZVI, EDR identified 43 historic districts and individual properties listed or eligible for listing on the S/NRHP and two properties or districts listed as National Historic Landmarks (NHL). These properties include historic districts, homes, lighthouses, churches, and government buildings (see also EDR, 2021). The two NHL sites include the Atlantic City Convention Hall in Atlantic City and Lucy the Margate Elephant in Margate City. The resources occur approximately 11.4 mi and 14.4 mi from the Projects, respectively.

1.2.4.2 National Natural Landmarks

The National Natural Landmarks (NNL) Program identifies sites that contain outstanding biological and geological resources and encourages the conservation of these areas (NPS, 2021). Manahawkin Bottomland Hardwood Forest is the only designated NNL within the ZVI and is located approximately 21.0 miles from the Projects.

1.2.4.3 National Wildlife Refuges

The National Wildlife Refuge (NWR) System, managed by the U.S. Fish and Wildlife Service (USFWS), is a system of public lands and waters set aside to conserve the nation's fish, wildlife, and plants (USFWS, 2021). Two NWRs occur within the ZVI. The Edwin B. Forsythe NWR is located along the northern coast of New Jersey, approximately 9.2 miles from the nearest proposed WTG. The Cape May NWR, located in southern New Jersey, is located 22.9 miles from the Projects.

1.2.4.4 State Wildlife Management Areas

There are 16 State Wildlife Management Areas (WMAs) within the ZVI. These state-owned lands are managed to provide wildlife habitat and accommodate wildlife-related recreation (hunting, bird watching, etc.). The closest WMA to the WTGs is the Absecon WMA, located along the central New Jersey coast, approximately 10.3 miles from the nearest proposed WTG.

1.2.4.5 State Parks

Three State Parks occur within the ZVI Corson's Inlet State Park is located along the southern New Jersey Coast, approximately 21.3 miles from the Projects. This oceanfront park offers hiking, fishing, crabbing, boating, and sunbathing (NJDEP, 2020). Island Beach State Park and Barnegat Lighthouse State Park are both located along New Jersey's northern coast at approximately 26.9 miles and 27.2 miles, respectively, from the nearest WTG. Island Beach State Park is a 10-mile-long barrier island between the Atlantic Ocean and Barnegat Bay that offers swimming, picnicking, bicycling, horseback riding, sailboarding, surfing, scuba diving, and hunting (NJDEP, 2020b). Just to the south is Barnegat Lighthouse State Park, which features the Barnegat Lighthouse, as well as recreational opportunities such as hiking trails, fishing, wildlife viewing, and picnicking (NJDEP, 2020c).

1.2.4.6 State Nature Preserves

Twelve State Nature Preserves occur within the ZVI. The closest nature preserve to the Projects is North Brigantine State Natural Area, located approximately 8.9 miles from the nearest proposed WTG. The natural area is located on the central New Jersey coast and is part of the longest stretch of undeveloped barrier

island beach in the state. It provides shorebird habitat, coastal dunes, and rare species habitat. The natural area also provides recreational opportunities such as walking, wildlife viewing, sunbathing, and fishing (NJDEP, 2018).

1.2.4.7 State Forests

Three State Forests occur within the ZVI. Bass River State Forest, located approximately 18.0 miles from the nearest WTG, is the closest State Forest to the Projects. The forest provides recreational opportunities such as hiking, picnicking, camping, and hunting, as well as swimming, fishing, boating, and canoeing on Lake Absegami (NJDEP, 2020d). Wharton State Forest is located approximately 23.7 miles at its closest point from the Projects. The forest is the largest single tract of land within the New Jersey State Park System, totaling 122,880 acres, and includes rivers and streams for canoeing, hiking trails, unpaved roads for mountain biking and horseback riding, and lakes, ponds, and fields for wildlife viewing (NJDEP, 2020e). Belleplain State Forest is located approximately 26.7 miles from the Projects. The forest was established for recreation, wildlife management, timber production, and water conservation and includes Lake Nummy, a popular swimming, boating, and fishing area (NJDEP, 2020f).

1.2.4.8 National or State Designated Wild, Scenic, or Recreational Rivers

The National Wild and Scenic Rivers System was created by the Wild and Scenic Rivers Act of 1968 to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. Congressionally designated wild and scenic rivers are managed by the Department of Agriculture (Forest Service) or Department of the Interior (Bureau of Land Management, Fish & Wildlife Services, National Park Service). Within the ZVI there is one such designated resource, the Great Egg Harbor Wild and Scenic River, located approximately 19.6 miles at its closest point from the Projects.

1.2.4.9 Highways Designated or Eligible as Scenic

One Scenic Byway, the Southern Pinelands Natural Heritage Trail, is located within the ZVI approximately 16.7 miles at its closest point from the Projects. The state-designated scenic byway is a 130-mile route located in the Pinelands National Reserve in southern New Jersey (NJDOT, 2018).

1.2.4.10 National Trails

The New Jersey Coastal Heritage Trail was established by federal legislation under Public Law 100-515 in 1988 to promote awareness, stewardship, and protection of natural and cultural resources along 300 miles of New Jersey's Atlantic coast and Delaware Bay. The trail is managed in cooperation by the National Park Service, the State of New Jersey, and many other public and private organizations. The trail is divided into five regions and links significant natural and cultural sites, with a focus on maritime history, coastal habitats, wildlife migration, historic settlements, and relaxation and inspiration (NPS, 2012). The destinations along the trail have been identified in other VSR categories.

1.2.4.11 State Fishing and Boating Access

Within the ZVI, there are nine state-owned and/or -managed fishing and boating access sites. The majority of these sites provide access to the bays and sounds of the Atlantic Ocean, and all are at least 11.5 miles from the Projects.

1.2.4.12 Lighthouses

There are two lighthouses that are not designated NRHP historic sites within the ZVI. Tucker's Island Lighthouse is the lighthouse located closest to the Projects, at approximately 17.8 miles from the nearest proposed WTG. Sea Girt Lighthouse is located approximately 52.8 miles from the Projects.

1.2.4.13 Public Beaches

There are 36 public beaches within the ZVI (in addition to the previously mentioned State Beaches). The nearest of these beaches, Atlantic City Beach, is approximately 10.4 miles from the nearest proposed WTG.

1.2.4.14 Environmental Justice Areas

Implemented in 1994 by Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations has a purpose of directing attention to a project's environmental and human health effects on minority and low-income populations. While this order addresses actions undertaken by federal agencies, states have additionally identified parameters to define Environmental Justices areas at the state level to mitigate the potential for disproportionately high and adverse human health of environmental impacts on minority, low-income, and/or Indian tribes and indigenous communities and populations from state actions. There are 87 Environmental Justice Areas identified within the ZVI, the closest (340010101052) is located in Atlantic City, approximately 9.9 miles from the nearest WTG.

Although not formally inventoried, it should be noted that the ZVI also includes other public resources that could be considered regionally or locally significant or sensitive due to the type or intensity of land use they receive. These include local park and recreational facilities, campgrounds, golf courses, local nature preserves, tourist attractions, fish and game clubs, schools, churches, cemeteries, areas of concentrated human settlement, and heavily traveled roads. Ocean bays and sounds within the ZVI could also be considered sensitive visual resources. These areas provide recreational opportunities, such as boating, fishing, kayaking, cruising, swimming, and wildlife viewing, and historic villages along these bays offer waterfront dining, shopping, and other tourist attractions and accommodations.

1.2.5 Local Plan Review

Local comprehensive plans, recreation and open space plans, and conservation plans may also identify important visual/aesthetic resources defined by communities. To address potential visual resources identified in these local and state planning documents, EDR first identified municipalities that have greater than 0.5 sq mi within the ZVI and then quantified the extent of potential visibility within each. For those municipalities that have greater than 5 percent of their land area within the ZVI, each of the applicable plans were consulted to determine the existence of resources important to those communities. Appendix B2 includes an inventory of each municipality that includes greater than 5 percent ZVI presence as well as an overview of the types of resources identified in these plans.

Table 1.2-4, below, lists the municipalities that were identified using the criteria listed above.

Table 1.2-4 Municipalities With Greater Than Five Percent ZVI Content

Municipality or County	Total Area (sq miles)	Area Within ZVI (sq miles)	Percent Area within ZVI(%)	Identified Planning Document(s)
Atlantic County				
Atlantic County	610.6	101.1	16.6	Atlantic County, New Jersey Master Plan (2018) Atlantic County, New Jersey Open Space and Recreation Plan (2018)
Absecon, City of	7.2	2.9	40.6	2016 Reexamination Report (2017)
Atlantic City	15.9	9.5	60.0	Atlantic City Master Plan (2008) Master Plan Reexamination Report (2016)
Brigantine, City of	10.7	7.3	68.6	2016 Master Plan Re-examination Report (2016)
Corbin City	9.0	5.2	58.0	None identified.
Egg Harbor Township	75.5	13.0	17.2	Egg Harbor Township Master Plan (2002) Master Plan Reexamination Report (2017)
Estell Manor	55.2	6.7	12.2	None identified.
Galloway Township	111.3	47.1	42.3	Master Plan Reexamination Report (2020)
Linwood, City of	4.4	1.8	40.2	City of Linwood Master Plan (2002) Master Plan Reexamination Report (2018)
Northfield, City of	3.6	0.5	13.1	City of Northfield Master Plan Re-examination (2008)
Pleasantville, City of	7.3	3.0	41.8	Master Plan Elements (2016)
Port Republic, City of	8.6	1.2	13.7	None identified.
Somers Point, City of	5.0	1.0	20.8	Somers Point Master Plan Reexamination (2015)
Ventnor City	2.5	0.6	22.5	2016 Master Plan Reexamination (2016)
Burlington County				
Burlington County	820.3	11.1	1.3	Parks and Open Space Master Plan (2002)
Bass River Township	78.3	6.8	8.7	None identified.
Cape May County				
Cape May County	286.1	38.6	13.5	Cape May County Open Space and Recreation Plan (Adopted 2005, Amended 2007) 2021 Comprehensive Plan - Editorial Draft (2021)

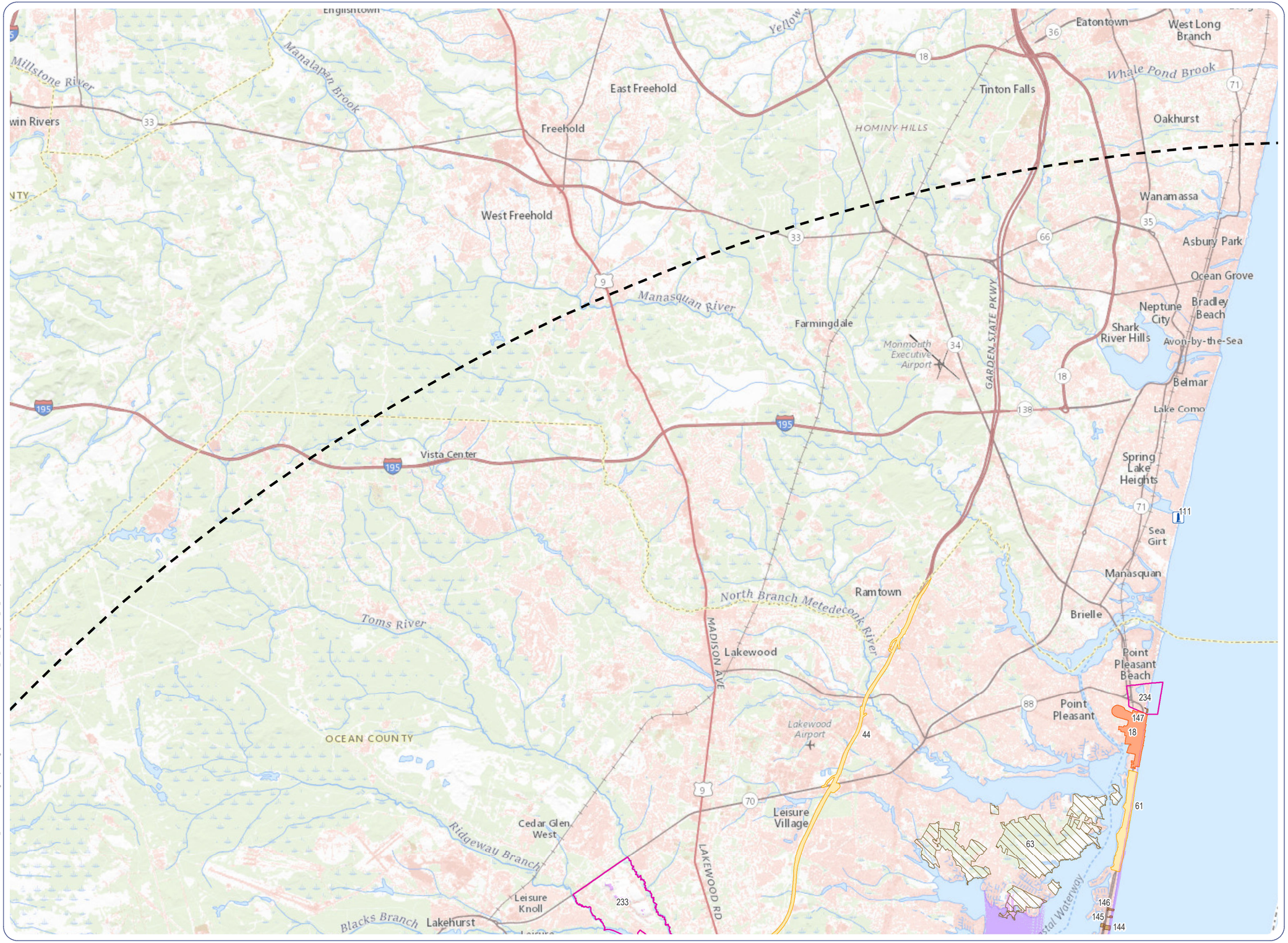
Municipality or County	Total Area (sq miles)	Area Within ZVI (sq miles)	Percent Area within ZVI(%)	Identified Planning Document(s)
Dennis Township	63.8	5.3	8.3	Natural Resources Inventory (Adopted 2007, Revised 2010) Master Plan - Land Use Plan (Adopted 2009, Revised 2012) Community Forestry Management Plan 2009 - 2014, Updated for 2015-2019 (2014)
Middle Township	82.7	12.7	15.3	Natural Resources Inventory (Adopted 2007, Revised 2010) Master Plan Reexamination Report (2010) Master Plan - Land Use Plan Updates (2010)
Ocean City	11.8	4.2	35.8	City of Ocean City Master Plan (Adopted 1988, Revised 2006) Ocean City Open Space & Recreation Plan (2014) Master Plan Reexamination Report (2019)
Sea Isle City	2.8	0.5	17.4	2017 Master Plan Reexamination Report (2017)
Upper Township	68.4	14.2	20.8	Upper Township Master Plan Reexamination Report and Land Use Plan Amendment (2006) Natural Resources Inventory (2006) 2018 Master Plan Reexamination Report (2018)
Ocean County				
Ocean County	757.9	132.8	17.5	2011 Comprehensive Master Plan (2011) Open Space, Parks & Recreation Plan (2020)
Barnegat Township	40.3	8.7	21.7	2011 Barnegat Township Master Plan (2011)
Beach Haven Borough	2.3	1.1	47.4	Beach Haven Borough Comprehensive Master Plan (2017)
Berkeley Township	54.1	10.4	19.1	Berkeley Township Comprehensive Master Plan (1997) Environmental Resources Inventory (2012) General Reexamination of the Master Plan (2019)
Eagleswood Township	18.9	8.4	44.5	None identified.
Lacey Township	99.5	15.3	15.4	Master Plan (1991) Master Plan Reexamination Report (2012) Lacey Township Master Plan Updated - Revised Land Use Element (2016)
Little Egg Harbor Township	74.0	39.0	52.8	1999 Master Plan (1999)
Long Beach Township	23.5	16.7	70.8	Master Plan Update (2017)
Ocean Township	31.8	10.4	32.7	Ocean Township Master Plan (1990) 2019 Master Plan Reexamination Report (2019)

Municipality or County	Total Area (sq miles)	Area Within ZVI (sq miles)	Percent Area within ZVI(%)	Identified Planning Document(s)
Stafford Township	54.7	14.8	27.0	2017 Master Plan Land Use Element (2017)
Toms River Township	52.7	4.6	8.7	Natural Resources Inventory (2016) Township of Toms River Master Plan (2017)
Tuckerton Borough	3.7	1.6	44.8	None identified.

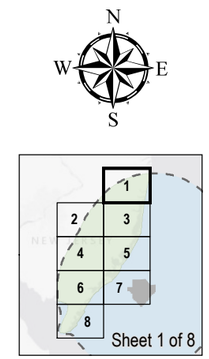
Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-3: Visually Sensitive Resources



- Lighthouse (not S/NRHP-Listed)
- S/NRHP-Listed Resource
- S/NRHP-Eligible Resource
- National Wildlife Refuge
- Public Beach
- Environmental Justice Area
- Zone of Visual Influence
- Visual Study Area



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Notes: 1. Basemap: ESRI ArcGIS Online "USGS Topo" map service. **2.** This map was generated in ArcMap by EDR on February 5, 2021. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

ATLANTIC SHORES offshore wind

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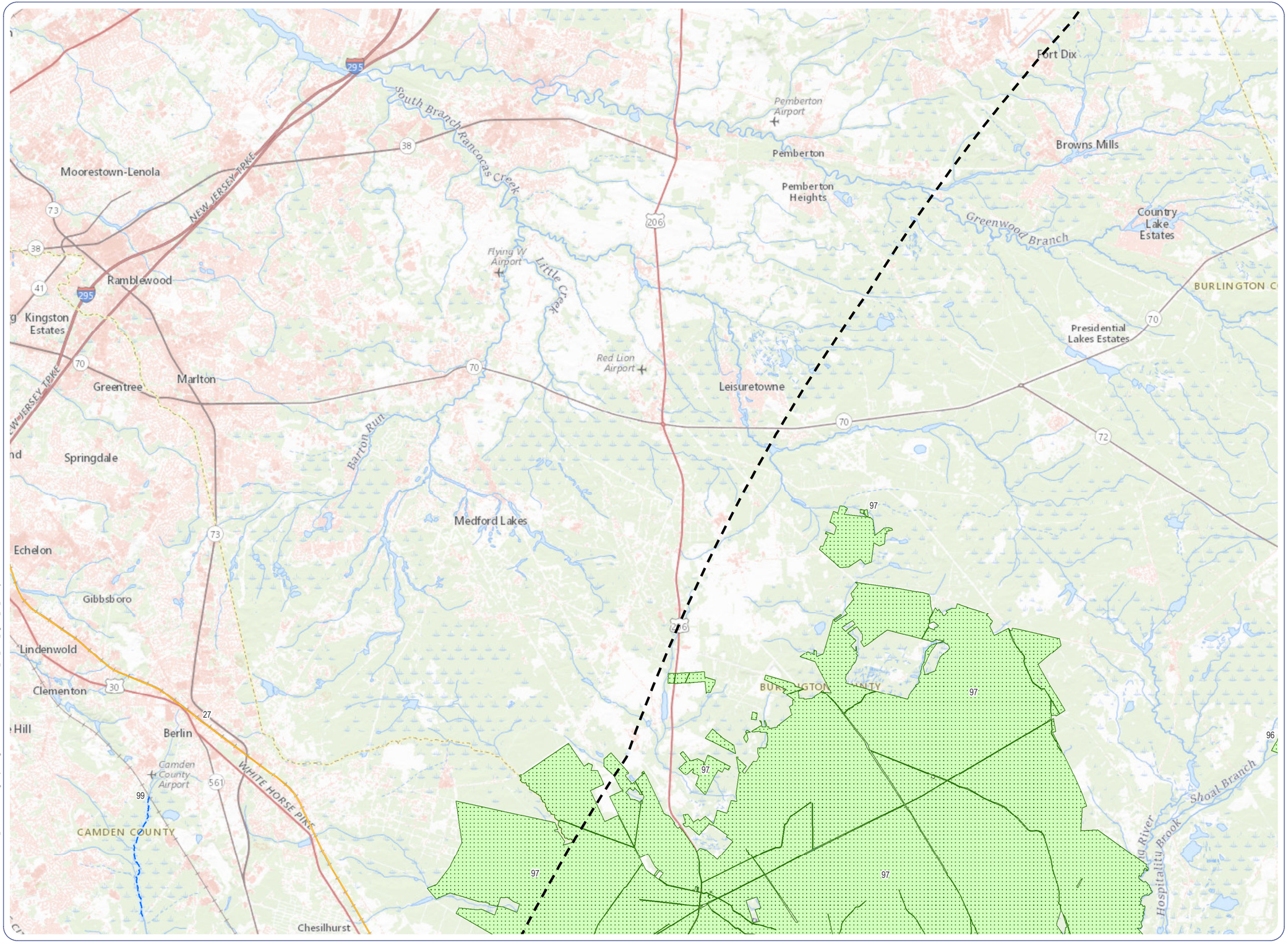
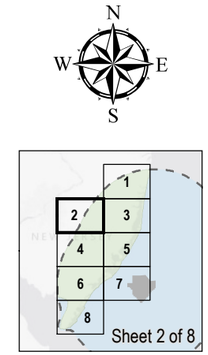
Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-3: Visually Sensitive Resources



- National Wild and Scenic River
- S/NRHP-Eligible Resource
- State Forest
- Zone of Visual Influence
- Visual Study Area



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ATLANTIC SHORES offshore wind

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Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-3: Visually Sensitive Resources

- S/NRHP-Eligible Resource
- National Wildlife Refuge
- State Wildlife Management Area
- State Park
- State Nature or Historic Preserve
- State Forest
- State Fishing and Boating Access
- Public Beach
- Environmental Justice Area
- Zone of Visual Influence
- Visual Study Area

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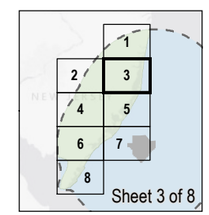

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Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-3: Visually Sensitive Resources

- National Wild and Scenic River
- State Scenic Byway
- S/NRHP-Listed Resource
- S/NRHP-Eligible Resource
- State Wildlife Management Area
- State Nature or Historic Preserve
- State Forest
- Environmental Justice Area
- Zone of Visual Influence
- Visual Study Area

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Notes: 1. Basemap: ESRI ArcGIS Online "USGS Topo" map service. **2.** This map was generated in ArcMap by EDR on February 5, 2021. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

ATLANTIC SHORES offshore wind

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Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-3: Visually Sensitive Resources

- Lighthouse (not S/NRHP-Listed)
- State Scenic Byway
- S/NRHP-Listed Resource
- S/NRHP-Eligible Resource
- National Natural Landmark
- National Wildlife Refuge
- State Wildlife Management Area
- State Nature or Historic Preserve
- State Forest
- State Fishing and Boating Access
- Public Beach
- Environmental Justice Area
- Zone of Visual Influence
- Visual Study Area

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ATLANTIC SHORES offshore wind

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Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-3: Visually Sensitive Resources

- National Wild and Scenic River
- State Scenic Byway
- National Historic Landmark
- S/NRHP-Listed Resource
- S/NRHP-Eligible Resource
- National Wildlife Refuge
- State Wildlife Management Area
- State Park
- State Nature or Historic Preserve
- State Forest
- State Fishing and Boating Access
- Public Beach
- Environmental Justice Area
- Zone of Visual Influence
- Visual Study Area

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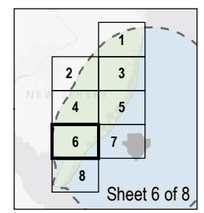

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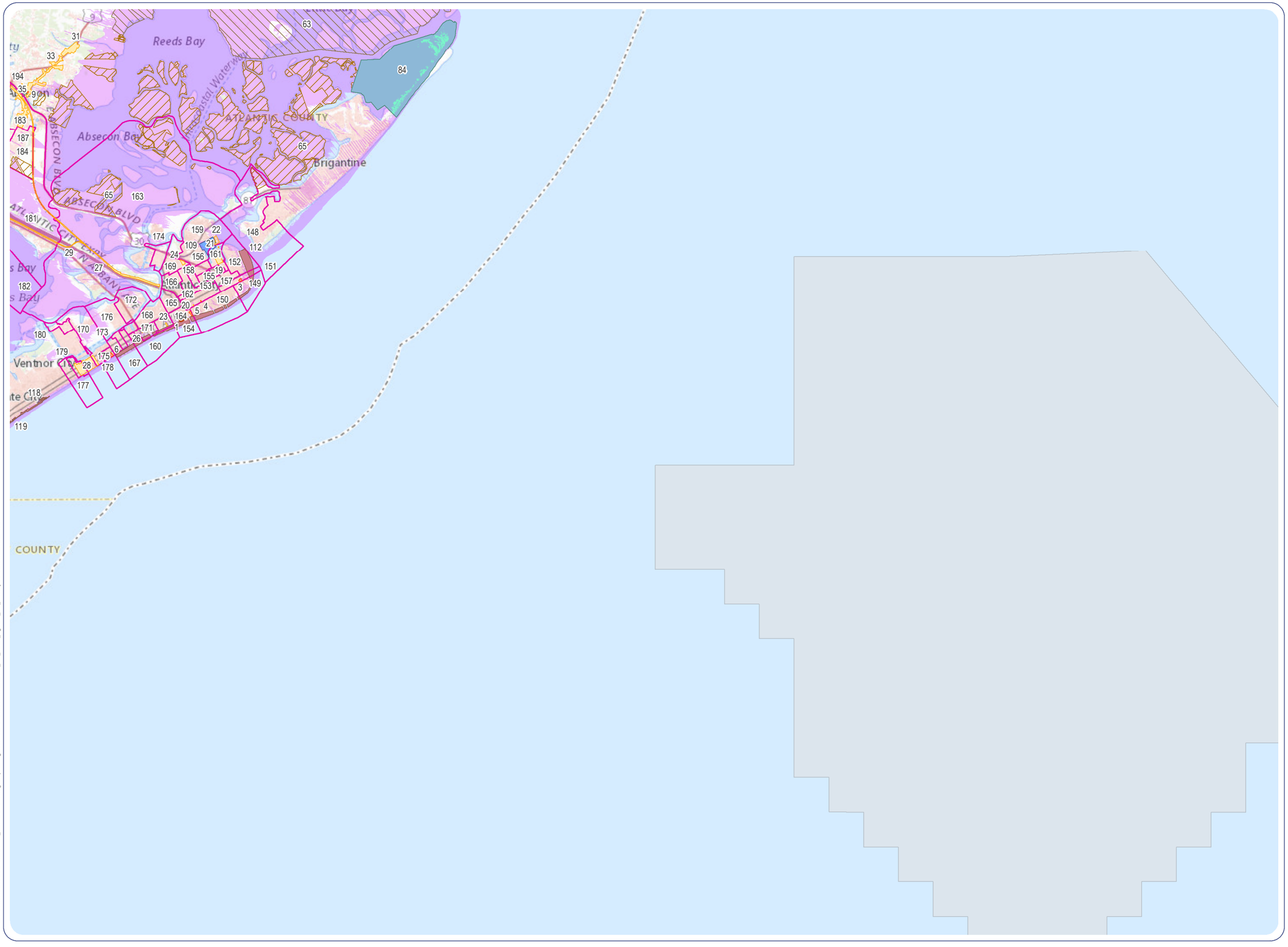

Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-3: Visually Sensitive Resources

- National Historic Landmark
- S/NRHP-Listed Resource
- S/NRHP-Eligible Resource
- National Wildlife Refuge
- State Wildlife Management Area
- State Nature or Historic Preserve
- State Fishing and Boating Access
- Public Beach
- Environmental Justice Area
- Zone of Visual Influence
- Wind Turbine Area
- Visual Study Area

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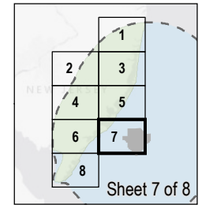

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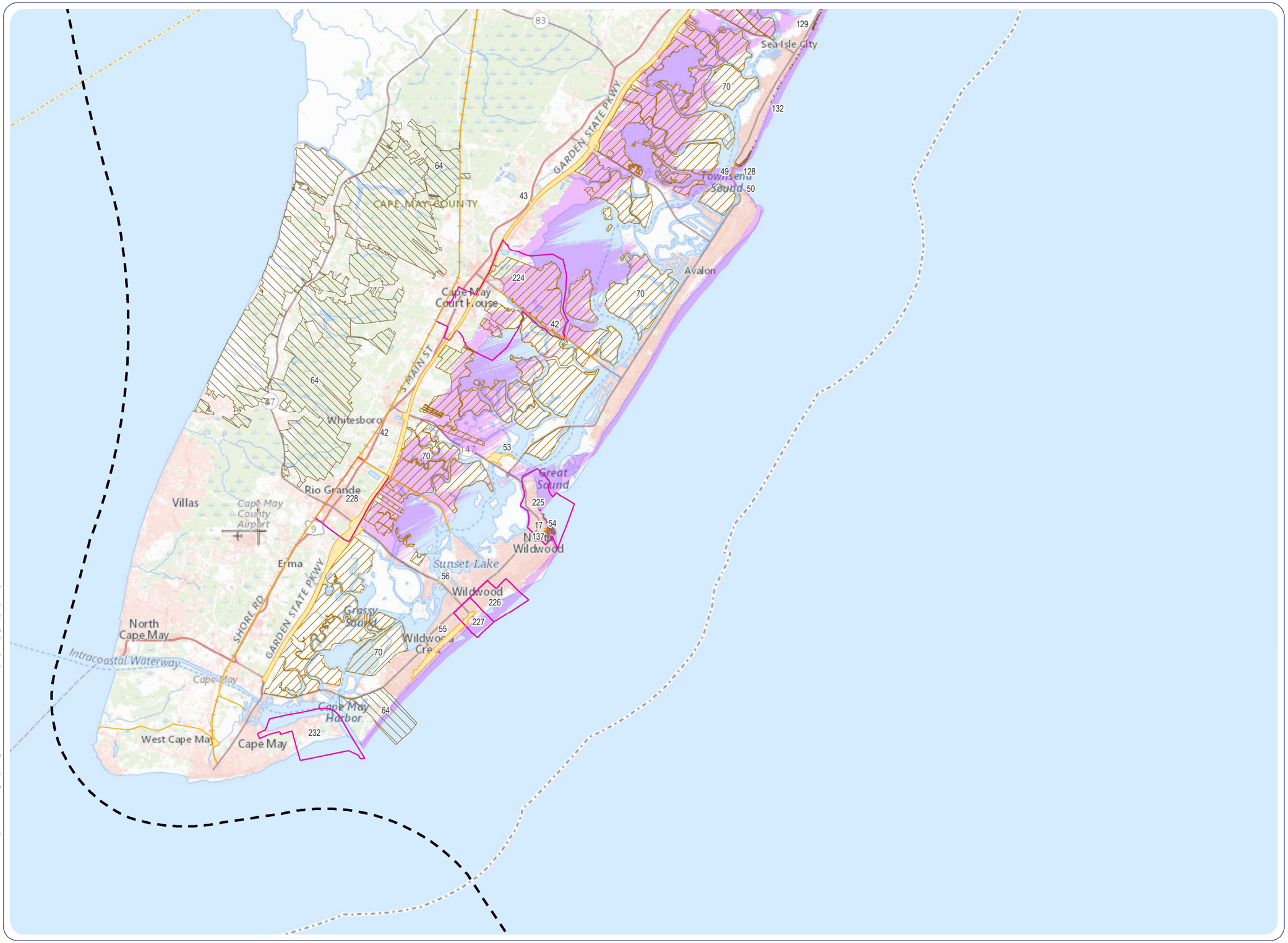
Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 1.2-3: Visually Sensitive Resources



- S/NRHP-Listed Resource
- S/NRHP-Eligible Resource
- National Wildlife Refuge
- State Wildlife Management Area
- Public Beach
- Environmental Justice Area
- Zone of Visual Influence
- Visual Study Area

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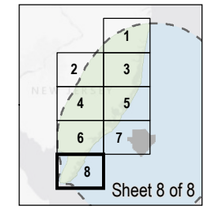

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ATLANTIC SHORES offshore wind

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2.0 ASSESSMENT METHODOLOGY

At the time this study was prepared BOEM had not yet released its guidelines for visual impact assessment for projects under its jurisdiction (BOEM, 2021). The VIA procedures used for this study draw from methodologies developed by various state and federal agencies, including the BLM (1980), USFS (1974), USDOT Federal Highway Administration (1981), the U.S. Army Corps of Engineers (USACE) (Smardon et al., 1988) and the New York State Department of Environmental Conservation (not dated). Methodologies employed to inventory visual resources, analyze the potential viewshed associated with the Projects (i.e., the ZVI), and prepare visual simulations are also generally consistent with European and Canadian guidance developed specifically for onshore and offshore wind farms (University of New Castle, 2002; Enviros Consulting, 2005; Horner & Maclennan and Envision, 2006, Ministry of Forests, Lands, and Natural Resource Operations, 2016).

EDR developed a document titled *Visual Impact Assessment Procedure Atlantic Shores Offshore Wind, LLC* which outlines the assessment procedure included in this VIA. This document was provided to BOEM, NJDEP, and several other permitting agencies and stakeholders for comment. Beginning in May of 2020, EDR and Atlantic Shores entered discussions with BOEMs visual subject matter expert to ensure the VIA procedure would be acceptable to the lead permitting agencies. This comment period extended to January 2021 and resulted in a mutually agreeable procedure for assessing the potential visual impacts associated with the Projects. The procedure document is included in Attachment A of this VIA.

The specific techniques used to assess potential visibility of the Projects and visual impacts are described in the following section.

2.1 Visibility Assessment Methodology

In order to identify and inventory those locations within the VSA where it may be possible to view the proposed WTGs from ground-level vantage points an assessment of potential visibility of the Projects was completed. This visibility assessment included the following two levels of analysis:

1. Viewshed analysis, which is a desktop procedure designed to identify geographic areas of potential visibility of the Projects, and
2. Field verification, which included several visual experts visiting the VSA to determine the validity of the viewshed analysis results, document views from within the ZVI, and confirm the character area boundaries and characteristics.

2.2 Viewshed Analysis

A viewshed analysis was conducted to determine the possible extent of visibility of the Projects (ZVI) within the VSA. This analysis relies on lidar data, the development parameters of the Projects, and the physical limits of visibility to determine areas of potential Project visibility. The viewshed analysis developed for this VIA was based upon a highly detailed digital surface model (DSM) of the VSA generated from lidar data[4], which includes the elevations of land features, buildings, trees, and other objects large enough to be

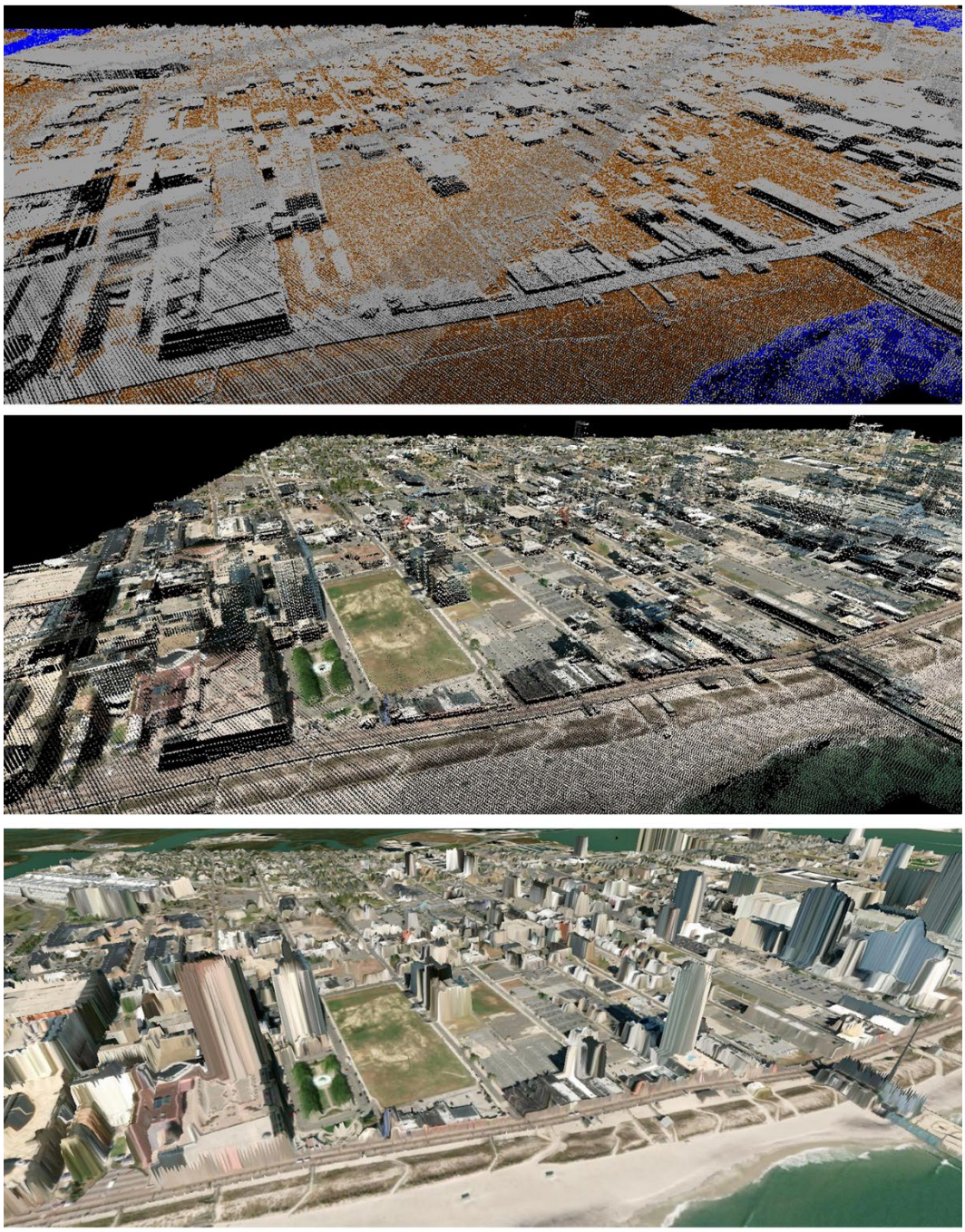
[4] Lidar data availability varies throughout the VSA, requiring the use of more than one data source. The following four lidar datasets were incorporated into the DSM: NOAA 2014, USGS 2015, Cumberland County 2008, and American Recovery and Reinvestment Act (ARRA) 2010.

resolved by lidar technology (Inset 2.1-1). A bare-earth digital elevation model (DEM), representing topography only, was also created in order to make corrections to the DSM and to the initial viewshed result (see discussion below). The DSM and DEM were both created with a horizontal resolution of 9.8 ft (3 m) to allow direct comparison of ground elevation with the elevation of surface features (such as buildings and vegetation).

Transmission lines and road-side utility lines that are reflected in the lidar data are mis-represented in the initial DSM as solid walls/screening features. In order to correct this inaccuracy, DSM elevation values within transmission line corridors and within 50 ft (15 m) of road centerlines were replaced with DEM bare earth elevation values. To account for some small lidar data gaps, USGS 10-meter resolution DEM and NLCD data were used to complete the DSM lidar model. The DSM was then used as a base layer for the viewshed analysis, which was conducted using ESRI ArcPRO® software.

The analysis of potential visibility of the Projects within the VSA was based on 200 points representing the WTG locations currently under consideration (using latitude and longitude coordinates provided by Atlantic Shores), an assumed maximum blade tip height of 1,047 feet (319 m), and an assumed viewer height of 6 feet (1.83 m). This maximum blade tip height was used to define the maximum area of potential visibility, also referred to as the ZVI. An additional viewshed analysis was completed to assess the potential visibility of the AOWL (FAA lights) on the nacelle at a height of 607 feet (185 m).

Once the initial viewshed analysis was complete, a conditional statement was used within ArcGIS® to set visibility to zero in locations where the DSM elevation exceeded the bare earth (DEM) elevation by 6 feet or more, indicating the presence of vegetation or structures that exceed viewer height. This was done because: 1) without this adjustment in locations where trees or structures are present in the DSM the viewshed would reflect visibility from the treetops or building roofs, which is not the intent of this analysis; and 2) ground-level vantage points within buildings or areas of vegetation exceeding 6 feet in height will generally be screened from views of the Projects. The resulting viewshed analysis provides an exceptionally accurate prediction of visibility of the Projects from onshore resources. However, changes to vegetation (such as growth or clearing) earthwork, and the addition or removal of structures since the lidar data were collected may result in minor visibility discrepancies.



Inset 2.1-1 Raw Lidar Point Cloud (top), Colored Point Cloud (center), Processed DSM (bottom)

2.2.1 Field Verification

Potential visibility of the Projects was evaluated in the field between July and September of 2020. The purpose of this exercise was to verify the existence of direct lines of sight to the water in the direction of the proposed Projects from representative KOPs and other sites with potential visibility of the Projects, as

indicated by viewshed analysis. Field review was also used to obtain photographs from selected KOPs for subsequent use in the development of visual simulations. Fieldwork was completed under a range of sky conditions (overcast to clear), but during the KOP photography visibility was recorded as being 10 miles or greater in all instances.

At each of the KOPs, EDR's field crew selected an appropriate photo location based on the availability of an open view toward the WTA, appropriate composition, lighting, and, if possible, the inclusion of distinctive foreground features that allow recognition of the viewpoint by the public. In some cases, photos were taken from multiple viewpoints at a single KOP to cover a range of compositions and perspectives. At each viewpoint, a series of overlapping photos extending from 180 to 200 degrees of the visible seascape and landscape were obtained in five-degree increments. A tripod-mounted, full frame digital single lens reflex (SLR) camera with a resolution of 30.4 megapixels and a 50-millimeter lens was used for all photos. This focal length is the standard used in VIAs because it most closely approximates normal human perception of spatial relationships and scale in the landscape. Additionally, high-resolution video was taken at each of the simulated KOPs for use in video animations demonstrating the WTGs and environment in motion.

For views lacking background alignment features (i.e., identifiable landscape features with known locations), the field crew utilized global positioning system (GPS) equipment with sub-meter accuracy to document the location of each KOP and foreground reference features (e.g., buildings, fences, flag poles) visible in the photos. Where such features were lacking, temporary stakes or flagging were installed, and their locations documented. Precise locations of these features allow accurate camera alignment during the development of visual simulations. It also assures that the resulting simulations have a high degree of accuracy in terms of WTG location and perceived size relative to other landscape features.

Attachment D includes a list and photolog depicting each KOP visited during field review for the Projects. It should be noted that all KOPs are named utilizing the initials of the legal municipal boundary in which they occur. For example, AC04 represents the fourth KOP collected in the City of Atlantic City.

2.3 Visual Impact Assessment Methodology

With the ZVI established, data collected during the inventory process was then used to determine the visual impact of the proposed WTGs on the seascape, landscapes, and viewers within the ZVI. This assessment involved selecting representative KOPs within the ZVI, creating computer models of the proposed WTGs, and preparing computer-assisted visual simulations of the proposed Projects. These simulations were then used to characterize the type and extent of visual impact resulting from construction and operation of the Projects.

The visual impact associated with the Projects was evaluated using a variation of the VIA procedure outlined in the *USACE Visual Resources Assessment Procedure (VRAP)* (Smardon et al., 1988). However, given the nature of offshore wind projects, which largely occur outside of the location where the Projects are being viewed, the VRAP methodology has been modified by EDR in consultation with BOEM. The VRAP Process and modifications applied within this VIA are described in detail below.

2.3.1 Character Area Scenic Quality Rating

In this study, the scenic quality of the character areas was evaluated using a modified version of USACE Visual Resources Assessment Procedure (VRAP) (Smardon et al., 1988). The VRAP is a two-step process, the first of which establishes an assessment framework by defining areas of similar landscape character

(character areas) within the ZVI and evaluating their scenic quality and sensitivity to visual impact. Referred to as the Management Classification System (MCS) procedure in the VRAP, this first step was revised based on BOEM comments to remove the classification and threshold for impact associated with them. The revised version uses the scoring system and forms based on those provided in the VRAP Manual (Smardon et al., 1988), and the evaluation assigned each character area a specific scenic quality rating based on quantitative scoring of various landscape elements/features.

The scenic quality of each of the character areas defined within the ZVI was evaluated by a panel of four visual professionals (see resumes in Appendix F). Each panel member was given access to digital files including the following information:

- Representative photos of each of the defined character areas (see Figure 1.2-2).
- Narrative descriptions of each of the defined character areas (see Section 1.2.3).
- Maps illustrating the ZVI, the location of the Projects, and character areas (see Figure 1.2-2).
- Rating forms (modified Form 4) from the USACE VRAP Manual (see Appendix G).
- Rating panel guidance, including definition of terms (see Appendix G).
- Google Earth Placemarks identifying representative character area locations within the VSA.

In addition, all panel members participated in a meeting (by conference call) to review the information provided to them, receive additional information on the location, extent, and description of the character areas (from team members who had been on-site), and instructions on completing the evaluation forms they had been provided.

Within each character area, the visual quality of six landscape components (landform, water resources, vegetation, land use, user activity, and special considerations) was evaluated by each rating panel member and given a numerical score on a scale of 1-9 (see Appendix G for rating forms used in the VIA). The resulting scores were then converted back to a 1-3 scale to remain consistent with the scoring values established in the VRAP Manual. The complete set of rating panel forms used for the sensitivity rating is provided in Appendix G.

The numerical scores from each evaluator were totaled and averaged to generate a composite rating for each character area. The composite rating placed each character area into one of five classifications as described in Table 2.2-1, below.

Table 2.2-1 Character Area Sensitivity Classifications

Scenic Quality Classification	Total Assessment Value	Description
High	17 & above	These areas are considered to be unique and to have the most distinct visual quality in the region. They are highly valued and are often protected by Federal and State policies and laws. These areas include wilderness areas, some natural areas, portions of wild and scenic rivers, historic sites and districts.
Moderate-High	14-18	These areas are regionally recognized as having distinct visual quality but may not be institutionally protected.
Moderate	11-13	These areas are locally valued for scenic quality attributes but are rarely protected by institutional policies.
Moderate-Low	8-10	These areas are not noted for their distinct qualities and are often considered to be of average visual quality.
Low	Below 8	These areas are noted for their minimal visual quality and are often considered blighted areas.

2.3.2 Selection of Key Observation Points

EDR identified specific viewpoints prior to, and during, the field verification process as representative KOPs with the potential for development of visual simulations. In addition, Atlantic Shores, LLC and EDR had discussions with various agencies and stakeholders prior to and throughout field verification. This included the NJDEP, BOEM, and several local stakeholders. The representative KOPs identified through this process, noted as selected KOP or candidate KOP, are listed in Attachment D.

Based on the consultation described above, the photos captured during field verification, and a review of data regarding viewer activity and sensitive public resources, EDR selected a total of 13 unique KOP locations within the ZVI for the development of the visual simulations. The KOPs were selected based upon the following criteria:

- They were identified as KOPs by federal, state, local, or tribal officials/agencies as important visual resources, either in prior studies or through direct consultation.
- They provide clear, unobstructed views toward the WTA (as determined through field verification).
- They illustrate the most open views available from historic sites, designated scenic areas, and other VSRs within the ZVI.
- They are representative of a larger group of candidate KOPs of the same type or in the same geographic area.
- They illustrate typical views from character areas where views of the WTGs are most likely to be available.
- They illustrate typical views of the proposed Projects that will be available to representative viewer/user groups within the ZVI.
- They illustrate typical views from a variety of geographic locations and under different lighting conditions to illustrate the range of visual change that could occur with the Projects in place.

Additional KOP selection criteria is provided in Table 2.2-2. Locations of the selected KOPs are shown in Figure 2.2-1. Information regarding each of these selected KOPs is summarized in Table 2.2-3.

Table 2.2-2 KOP Selection Criteria

KOP	Selection Criteria
SPB01	This KOP was selected due to the presence of a popular beach and boardwalk and proximity to an eligible historic resource (see VSRs). This KOP was also recommended by the Atlantic Shores Community Liaisons and identified during consultation.
LAT01	This nationally recognized resource was selected to provide a unique perspective from a residential area. It also covers the inland ZVI, views multiple character areas, and represents infrequent visibility from representative LCAs.
LBT03	This KOP represents a heavily utilized residential beachfront and aims to address visual impacts concerns raised by The LBI Coalition for Wind Without Impact.
BRT01	This state recognized resource was selected to provide a unique perspective from an inland location. It provides an illustration of potential visual impacts from a representative LCA, which typically have minimal visibility.
BHB01	This KOP was identified through desktop assessment and subsequent field review. This heavily used beach is adjacent to an NRL Historic District and is representative of commercial and high-intensity oceanfront residential areas.
LEHT02	This state recognized resource was selected to provide a representative view for local residents. It was ultimately selected after three separate site visits and discussions with visitors. This location could be considered a locals "secret spot" for fishing and relaxing away from the summer crowds. It also provides an illustration of potential visual impacts from a representative LCA, which have fewer opportunities for views toward the WTA when compared to the coastline.
BC02	This KOP represents a State recognized resource that is frequently used by locals and repeat visitors who want to escape the crowded beaches to the north and south. It is also one of the nearest land-based viewing opportunities of the Projects. The location was desktop identified by EDR and verified by the Atlantic Shores Community Liaisons.
AC04	This KOP represents an elevated view from the Casino District. This resource is of high importance to Atlantic City. The location was field identified by EDR. The location was desktop identified by EDR and verified by the Atlantic Shores Community Liaisons.
AC02	This KOP is representative of a National Historic Landmark in Atlantic City. The location was desktop identified by EDR and verified in the field. The location was identified by BOEM in the 2012 Evaluation of Visual Impact on Cultural Resources/Historic Properties: North Atlantic, Mid-Atlantic, South Atlantic, and Florida Straits
MC02	This KOP is representative of a National Historic Landmark in Margate City. The location was identified by BOEM in the 2012 Evaluation of Visual Impact on Cultural Resources/Historic Properties: North Atlantic, Mid-Atlantic, South Atlantic, and Florida Straits
OC04	This KOP was selected to provide geographic representation from Ocean City, a popular tourism destination.
SIC02	This KOP was field identified. The field team originally identified Sea Isle Beach during desktop assessment and chose to complete photography from the elevated vantage point after observing pedestrian and bicyclists crossing the bridge.
LT02	Cape May Lighthouse was a desktop identified KOP based on EDRs extensive experience in the MidAtlantic Region. This KOP was chosen to potentially illustrate reasonably foreseeable future development and to assist the VIA to help establish visual thresholds for the 20 MW WTG.

2.3.3 Represented Viewer Groups in KOP Selection

The following describes the variability of viewer groups and viewer activities encompassed by the KOPs selected for visual simulations. Appendix E2 lists the individual KOPs and viewer groups represented. Section 3.2.1.3 describes the potential impacts to viewers from the selected KOPs.

Five of the selected KOPs, including Seaside Park Borough Boardwalk (SPB01), Beach at Long Beach Island Arts Foundation (LBT03), Beach Haven Historic District (BHB01), North Brigantine Natural Area (BC02), and Jim Whelan Boardwalk Hall (AC02) represent residents, tourists, and fishermen. Each of these viewers have ample opportunity for easterly views toward the Projects. Activities include sightseeing, sunbathing, and shore fishing which all involve long-duration, repeated exposure views to the east, over the open ocean. Other activities such as active recreation on the beach result in short-term or even fleeting views over the water. Where applicable, several viewers also engage in boardwalk activities such as walking, dining, and shopping. In these instances, views may be fleeting and occasional where breaks in the dunes offer outward views, but viewers are generally oriented in a north to south direction, parallel to the shoreline.

The KOP from Edwin B. Forsythe NWR at the Woodmansee Estate (LAT01) specifically addresses visibility from a residential neighborhood which has unique viewing circumstances. The Woodmansee Estate does not typically attract tourists or recreation users due to the lack of public amenities for parking. However, the residents of the Woodmansee Estate bordering the Edwin B. Forsythe NWR have opportunities for views over the inland bay and toward the ocean to the south. Views from within this area are typically long duration, stationary, and repeated suggesting an elevated level of viewer sensitivity. This location may also represent numerous boaters that use the inland bay channels to travel to and from the ocean. These viewers are expected to have short-duration and often fleeting views while travelling within the designated channels running north to south.

One KOP from Bass River State Forest (BRT01) will be most frequently used by residents and tourists who come to this location for a variety of activities, including hiking, camping, picnicking, and wildlife viewing (particularly bird watching). However, this KOP is not centered around the hub of accommodated activities which are generally contained to the forested areas north of the KOP. Therefore, this KOP represents a potential view that would be seen by more active recreationalists engaged in bird watching, hiking, or skiing. Views across the backwater bays are limited from within the main state forest and therefore views toward the Projects would be minimal from these locations. This particular KOP is most likely to represent occasional, short duration views oriented in an east-west direction.

Great Bay Boulevard WMA/Rutgers Field Station (LEHT02) represents typical views experienced by residents, tourists, and fishermen. This location is accessed by an informal parking area and woodland trail that ends at this inland beach. No amenities are provided for users of this space, but visitors (typically local residents) use it frequently for shoreline fishing. The viewers that use this space will generally be focused on views to the southeast and south where the Atlantic City skyline is prominent in the background. Views toward the ocean are generally of long-duration and repeated in nature.

The Ocean Casino Resort Sky Garden (AC04) represents typical elevated views experienced residents and tourists that frequent the numerous resources along the Atlantic City coast. Generally, the sky deck is used as a viewing platform and event space for the Ocean Casino Resort which hosts dining, gambling, and sightseeing activities, but may also represent the type of view expected from numerous hotel balconies along the coastline. Viewers that approach this elevated location are typically viewing due east as well as

north and south to observe activity on the boardwalk below. These views can be described as occasional and relatively long duration with concentrated viewing over the ocean.

The view from Lucy the Margate Elephant (MC02) and Cape May Lighthouse (LT02) provide representative views from specific tourist destinations and from which there are no similar public vantage points nearby. Although vastly different elevations, these KOPs represent places where people go to see a view and to explore a very specific place. MC02 has a much more focused viewshed to the east, while Cape May Lighthouse (LT02) has an intermittent panorama spanning 360 degrees and including the Delmarva peninsula. Although, very different views, the user intent and experience are similar. These types of views are generally occasional and of relatively short duration, but the views are experienced by a vast number of tourists throughout the year.

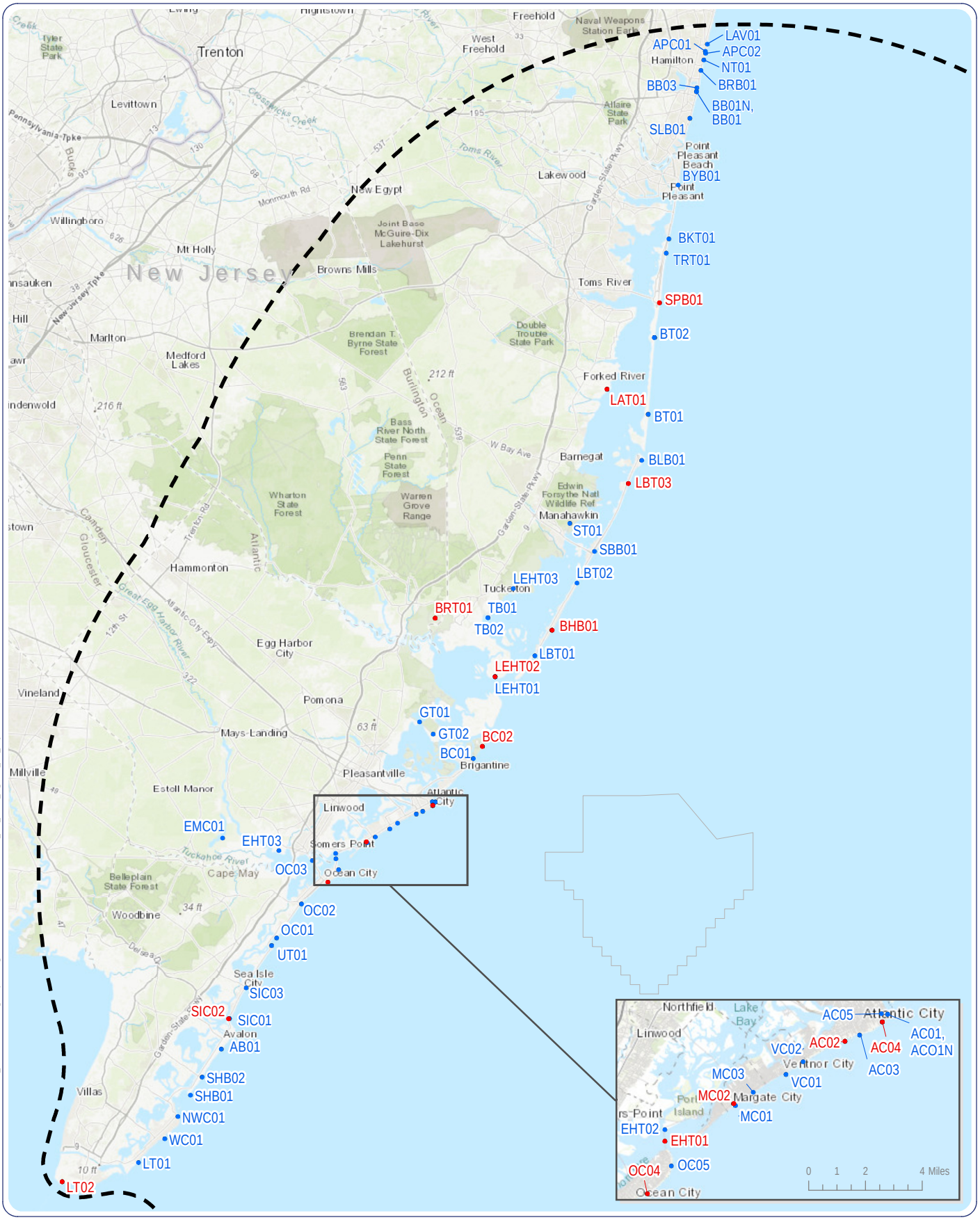
The KOP from Gillian's Wonderland Pier (OC04) provides a unique vantage point that includes residents and tourists who engage in a wide variety of activities, including passive and active recreation at the amusement park and on the beach, shopping, and dining on the boardwalk. These types of activities are likely to result in occasional to fleeting views toward the ocean due to the north and south orientation to the water. Conversely, sunbathers, shoreline fishermen, and sightseers are likely to focus their gaze over the ocean to the east more regularly. Although, the abundant activity on the boardwalk and amusement park are also likely to draw viewer attention frequently during the busiest times of the season.

The KOP from Townsend's Inlet Bridge (SIC02) is a representative view that would be typically experienced by people travelling in cars, running, walking, or riding bikes. This bridge provides an elevated vantage point that is typically fleeting and short duration in nature. Given the high volume of traffic that travels this route, it is not particularly inviting for prolonged viewing. However, nearby beaches below the bridge provide opportunities for sunbathing, passive and active recreation, and shoreline fishing.

Table 2.2-3 KOPs Selected for Visual Simulations

KOP	KOP Name	Location	Latitude, Longitude (WGS 84)	Character Area	Distance to The Projects (Miles/km)
SPB01	Seaside Park Borough Boardwalk	Seaside Park Borough, Ocean County, New Jersey	39.93533° N, 74.07164° W	Commercial Beachfront	39/62.8
LAT01	Edwin B. Forsythe NWR at the Woodmansee Estate	Lacey Township, Ocean County, New Jersey	39.83711° N, 74.15082° W	Dredged Lagoon	32.2/51.8
LBT03	Beach at Long Beach Island Arts Foundation	Long Beach Township, Ocean County, New Jersey	39.72895° N, 74.12058° W	Oceanfront Residential	24.9/40.1
BRT01	Bass River State Forest	Bass River Township, Burlington County, New Jersey	39.57672° N, 74.40830° W	Salt Marsh	18.5/29.8
BHB01	Beach Haven Historic District	Beach Haven Borough, Ocean County, New Jersey	39.56188° N, 74.23540° W	Oceanfront Residential	13.5/21.7
LEHT02	Great Bay Boulevard WMA/Rutgers Field Station	Little Egg Harbor Township, Ocean County, New Jersey	39.50913° N, 74.32038° W	Salt Marsh	11.9/19.2
BC02	North Brigantine Natural Area	Brigantine City, Atlantic County, New Jersey	39.42954° N, 74.33968° W	Undeveloped Beach	9.0/14.5
AC04	Ocean Casino Resort – Sky Garden	Atlantic City, Atlantic County, New Jersey	39.36225° N, 74.41353° W	Atlantic City	10.5/16.9
AC02	Jim Whelan Boardwalk Hall (Atlantic City Convention Center NHL)	Atlantic City, Atlantic County, New Jersey	39.35245° N, 74.43817° W	Atlantic City	11.4/18.3

KOP	KOP Name	Location	Latitude, Longitude (WGS 84)	Character Area	Distance to The Projects (Miles/km)
MC02	Lucy the Margate Elephant NHL	Margate City, Atlantic County, New Jersey	39.32088° N, 74.51170° W	Commercial Strip Development	14.4/23.2
OC04	Gillian's Wonderland Amusement	Ocean City, Cape May County, New Jersey	39.27510° N, 74.56878° W	Commercial Beachfront	17.2/27.7
SIC02	Townsend Inlet Bridge	Sea Isle City, Cape May County, New Jersey	39.11919° N, 74.71579° W	Open Water/Undeveloped Bay	27.4/44.1
LT02	Cape May Point State Park	Lower Township, Cape May County, New Jersey	38.93300° N, 74.96038° W	Recreation	45.0/72.4



Notes: 1. Basemap: ESRI ArcGIS Online "World Topographic Map" map service. 2. This map was generated in ArcMap by EDR on September 13, 2021. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

2.3.4 Photosimulations

The photosimulations were developed by constructing a 3D computer model of the proposed WTGs, Project layout, and OSSs based on design specifications and coordinates provided by Atlantic Shores. The 3D model included 20 MW WTGs, which is the largest technology under consideration for the Projects. Details regarding the WTG and OSS dimensions and a diagram of the 3D model are included in Section 1.1.

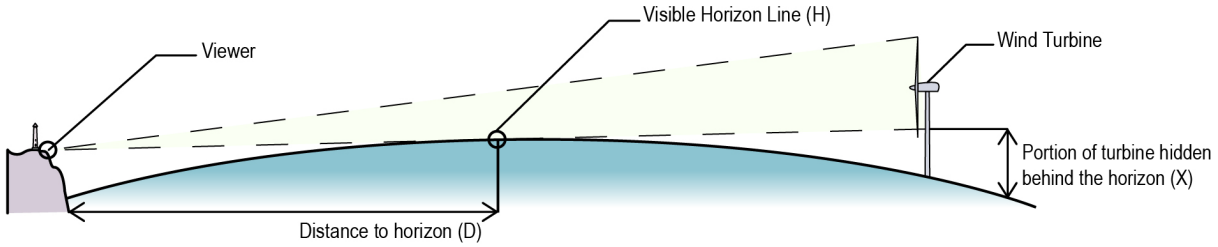
Photographic Alignment Process

To create the visual simulations, the location, bearing, and camera data used to photograph each KOP are entered into a georeferenced 3D workspace to create a virtual camera matching the exact specifications of the field camera. At this point, the GPS survey data collected in the field (Section 2.2.1) are entered into the 3D workspace to establish foreground reference points with known locations. These data were superimposed over photographs as seen through the virtual camera from each of the viewpoints, and minor camera changes (height, roll, bearing) were made as necessary to align all known reference points within the view. In addition, the existing built and natural environment present in the view is constructed in the 3D workspace using aerial photographs, lidar data, and DEM data. This alignment process ensures that Projects are shown in proportion, perspective, and proper relation to the existing landscape elements in the view. Consequently, the alignment, elevation, dimensions, and scale of the modeled components associated with the Projects are accurate and true in their relationship to other landscape elements in each photograph.

Wind Farm Model

The next step involves positioning the WTG layout in each of the aligned views at the appropriate distance in front of, at, or below the horizon (depending on the distance from the viewer). This was done by first determining the distance to the horizon (ocean/sky interface) visible in the photograph. This is accomplished by entering the viewer position and elevation into the Haversine Formula, which uses the radius of the earth (corrected for refraction)[5] to calculate the mathematical distance to the horizon (D), or the point at which the sky meets the water (see Inset 2.3-1, below). This distance is then used to draw a horizontal line (virtual horizon) in the 3D model representing the mathematical horizon line, which is visible through the virtual camera. The virtual horizon is then precisely aligned to the visible horizon (D) in the photograph by making minor adjustments to the virtual camera target on the vertical axis. With the virtual horizon aligned to the photographed horizon, the positions of the individual WTGs are placed relative to this horizon line. The Haversine Formula was then used to determine each turbine's position, relative to the horizon (X). For example, if the WTG appears in front of the horizon, the returned value is zero and the WTG will be placed at the horizon. If the WTG appears behind the visible horizon, the returned value will be a negative number (-X). This value was then applied to the turbine's vertical position in the model so that it appears below the visible horizon at the -X value.

[5] Refraction values assume "typical" viewing conditions and do not account for atmospheric anomalies such as the mirage effect which is typically rare and of short duration but may temporarily increase turbine visibility.



Inset 2.3-1 Curvature of the Earth and Refraction Diagram

Daytime Environmental Conditions

After the model was created, the proposed exterior color/finish of the WTGs was added, and the appropriate sun angle was simulated based on the specific date, time, and location at which each photo was taken. This information allows the computer to accurately illustrate highlights, shading, and shadows for each individual component associated with the Projects is shown in the view. All simulations show the WTGs with rotors oriented toward the viewer, to illustrate the largest potentially visible surface area of the Projects. The simulations illustrate the Projects using a standard 50 mm camera lens which presents an approximately 40-degree horizontal field of view and a 27-degree vertical field of view. As mentioned previously, this is the standard focal length used in VIAs, because it most closely approximates normal human perception of spatial relationships and scale in the landscape. As mentioned in Section 2.3.1, the selection of KOPs was partly based on the availability of a clear, unobstructed view of the proposed Projects. However, even under the clearest possible day, atmospheric perspective (diminishment caused by moisture and particulate matter in the atmosphere) will reduce the visibility of the WTGs and OSSs. Therefore, to account for this visibility diminishment, slight hazing was applied to the simulations to account for the atmospheric conditions present in the existing conditions photograph. To accomplish this, a "z-depth" was created for each of the simulations which simulates the diminishment of visibility over distance. This step is an important consideration for the realism of the visual simulations. However, it should also be noted that the conditions presented in the visual simulations illustrate exceptionally clear conditions, and therefore the applied hazing was generally minimal. It is also worth noting that visibility over 10 miles, as illustrated in the simulations, is not the typical viewing condition within the VSA. Further discussion of atmospheric conditions and their effect of visibility is included in Section 2.5.4. See Table 2.3-2 for a breakdown of the KOPs by time of day, lighting conditions, and simulation type.

Nighttime Environmental Conditions

To prepare nighttime simulations, EDR obtained data on the proposed AOWL from the *FAA Advisory Circular 70/7460-1M*, and the *Draft Proposed Guidelines for Providing Information on Lighting and Marking of Structures Supporting Renewable Energy Development* (BOEM, 2019) which set guidelines for the lighting of WTGs (FAA, 2020). In addition, EDR documented views of the operational BIWF to determine the appearance of the warning lights at night at distances beyond 20 miles. Computer modeling and camera alignment for the nighttime photos were conducted in the same manner described for the daytime simulations. However, modifications of the nighttime photos (e.g., compositing foreground and background images obtained using different shutter speeds) was required in some cases to create a realistic representation of a nighttime view. These modifications included the reduction of "hotspots" which can be caused by the cameras inability

to accurately expose a light source in a very dark scene. Under very dark conditions, the center of a light source may appear light red to white, depending on the camera distance relative to the light source. However, actual observations of the lights suggest that they appear uniform across the entire source of light. To account for this, a lower exposure photograph was taken to represent the lights at each viewpoint. These lights were then transposed to the properly exposed night scene.

It was assumed that all lights will flash in a synchronized manner, as currently set forth by FAA guidelines. Nighttime simulations therefore show all WTGs with their lights on illustrating maximum illumination. However, Section 3.3 discusses technology being considered by Atlantic Shores to reduce the overall activation time of the AOWL. Due to the effects of the curvature of the earth and refraction, USCG navigation lights on the WTGs were only considered in views that had a direct line of sight to the deck at the WTG base, which is approximately where the USCG lights would be located. The complete set of photographic simulations developed for this VIA is provided in Attachment E. See Table 2.3-2 for a breakdown of the KOPs by time of day, lighting conditions, and simulation type.

Video Simulations

As discussed in Section 2.2.1, during the field review EDR recorded 60 seconds of video to capture the motion and sound present at each KOP. EDR then used this footage to produce animated simulations for five KOPs using the same viewpoint alignment process described above for the still simulations. However, rather than rendering a single frame representing a single point in time, multiple frames were rendered while the 3D turbine blades were in motion. Each individual rendering of the WTGs was placed in sequence to give the impression of blade rotation. Additionally, the aviation obstruction lights were animated to flash at a rate of 30 flashes per minute for the nighttime video simulation. The 3D renderings of the Projects were then superimposed over the baseline video. Changes to environmental variables such as sunrise were accomplished by adjusting the color, hue, and saturation of the video to achieve the desired lighting condition for the corresponding time of day. To simulate the path of the sun in each scene, a digital lighting system that replicated the sun was placed into the scene and animated to follow the azimuth and altitude of the sun throughout the day. Links to the video simulations are provided below in Table 2.3-1.

Table 2.3-1 Video Simulation Links

KOP ID	Location	Distance From Project	Link
BHB01	Beach Haven Historic District	13.5	https://vimeo.com/577181478/a2a5e49788
AC03	Atlantic City - Madison Hotel Nighttime	11.1	https://vimeo.com/manage/videos/577181457/ebaeb785ac
AC03	Atlantic City - Madison Hotel Daytime	11.1	https://vimeo.com/manage/videos/577181385/8c736e9768
SPB01	Seaside Park Borough	39.0	https://vimeo.com/manage/videos/577181305/56eec3ebfb
MC03	Huntington Park Margate City,	13.8	https://vimeo.com/manage/videos/577181130/2986a959db

Panorama Simulations

In order to illustrate the full human field of view, panorama simulations representing a 124 degree by 55 degree field of view were produced from three KOPs. These are included in Attachment E1. The panorama

simulations should be printed at full size and viewed according to the instructions on the simulation. See Table 2.3-2 for a breakdown of the KOPs by time of day, lighting conditions, and simulation type.

Table 2.3-2 Photosimulations from KOPs

KOP	KOP Name	Distance to The Projects (Miles/km)	Morning	Noon	Afternoon/ Evening	Night	Lighting	Very Clear	Typical Visibility	Panorama	Video[1]
SPB01	Seaside Park Borough Boardwalk	39/62.8			X		Side	X			X
LAT01	Edwin B. Forsythe NWR at the Woodmansee Estate	32.2/51.8	X			X	Side	X			
LBT03	Beach at Long Beach Island Arts Foundation	24.9/40.1			X		Back	X			
BRT01	Bass River State Forest	18.5/29.8		X			Side	X			
BHB01	Beach Haven Historic District	13.5/21.7	X			X	Back	X	X	X	X
LEHT02	Great Bay Boulevard WMA/Rutgers Field Station	11.9/19.2	X				Back	X			
BC02	North Brigantine Natural Area	9.0/14.5		X			Back	X			
AC04	Ocean Casino Resort – Sky Garden	10.5/16.9	X			X	Back	X		X	
AC02	Jim Whelan Boardwalk Hall (Atlantic City Convention Center NHL)	11.4/18.3		X			Back	X	X		X
MC02	Lucy the Margate Elephant NHL	14.4/23.2			X		Front	X			X
OC04	Gillian's Wonderland Amusement	17.2/27.7	X				Back	X	X	X	
SIC02	Townsend Inlet Bridge	27.4/44.1	X				Back	X			
LT02	Cape May Point State Park	45.0/72.4	X				Side	X			

1. Video simulation KOP locations may differ slightly from the still simulation photo location.

2.3.5 Visual Impact Assessment Procedure

The visual impacts associated with the Projects was evaluated using a modified version of the VIA procedure outlined in the USACE VRAP (Smardon et. Al., 1988).

This evaluation is based on a comparison of existing photographs and visual simulations from each KOP to quantify the potential visual effects resulting from the Projects using a modified scoring system provided in the VRAP Manual (Smardon et al., 1988). The following section describes this assessment procedure and how it was used to complete the following assessments:

1. Establish the *Scenic Quality Classification* (SQC) of each KOP by quantitatively evaluating the baseline (existing) scenic quality of the existing view.
2. Using the same procedure, evaluate the KOPs with the Projects in place (proposed view) to determine the *VIA score*.
3. Compare the existing and proposed views to describe the overall visual effect of the Projects.
4. Evaluate *compatibility and contrast* resulting from the Projects by determining the degree of compatibility, scale contrast, and spatial dominance at each KOP.
5. Determine the *visibility threshold level* (VTL) from each of the KOPs.

The process used to complete each of these procedures is described in detail, below.

2.3.5.1 Scenic Quality Classification

The visual impact of the Projects were evaluated using a modified version of the VIA procedure outlined in the USACE VRAP (Smardon et al., 1988). The VIA uses representative KOPs within each of the LCAs and SCAs in the ZVI to determine the magnitude of potential visual impact associated with the Projects. This evaluation is based on a comparison of existing photographs and visual simulations from each KOP to quantify the effect of the Projects using forms and a scoring system based on those included in the VRAP Manual (Smardon et al., 1988). The scenic quality of the existing and proposed view is determined using the same rating scale applied to the character area scenic quality rating (see Section 2.3.1). The scores determined through the VIA procedure are compared to the scenic quality level (SQL) of the existing view to determine the significance of visual impact at each KOP.

The same panel of four visual professionals that completed the assessment for the LCs also conducted the VIA procedure. Panel members were provided with digital files of the existing conditions photos and simulations of the proposed Projects for each of the selected KOPs, along with supporting information, including the following:

- Rating panel guidance, including definition of terms (see Attachment G).
- Narrative descriptions and maps of each of the defined character areas (see Section 1.2.3).
- Maps illustrating the ZVI and the location of the Projects (see Figure 3.3-1).
- Google Earth Placemarks identifying each KOP within the VSA.
- Existing conditions photos and simulations of the proposed Projects for each of the selected KOPs along with viewing instructions (see Attachment E).
- The distance and direction of the Projects from each of the selected KOPs, and the LCAs/SCAs, viewer groups, viewer activities, and sensitive resources represented by each viewpoint

- Panoramas illustrating the full field, VSRs, character area, distance to the Projects, and the portions of the Projects visible from each KOP (see Attachment E).
- Rating forms to be used for KOP familiarization, SQC scoring, and Visual Impact Assessment (VIA) scoring (modified versions of the USACE VRAP Forms 4 and 6, Attachment G).

The rating panel members viewed the existing conditions photos and visual simulations on screen from a distance of approximately 20 to 22 inches[6]. Each of the images presented to the panel for rating contained a graphic scale measuring one inch long. The rating panel members were instructed to use a measuring device to ensure this scale bar was accurate thus ensuring the proper scale of the simulation. In addition, due to the distance and scale of the Projects in many of the visual simulations, the panel members were instructed to zoom into the visual simulations to a maximum of 150 percent if necessary to locate and view the Projects. The rating panel members then evaluated the before and after views from each KOP and assigned each view quantitative sensitivity ratings. The ratings were based on a 9-point scale representing the scenic contribution of each of six landscape components (landform, water resources, vegetation, land use, user activity, and special considerations) with and without the Projects in place. This 9-point scale specifically represents the following evaluation criteria:

- **Minimal (1-3):** Something that may be looked upon as a liability in the area; meaning it basically lacks any positive aesthetic attributes and may actually diminish the visual quality of surrounding areas.
- **Average (4-6)**: Something that is common in the area and not known for its uniqueness, but rather is representative of the typical landscape of the area.
- **Distinct (7-9):** Something that is considered unique and is an asset to the area. It is typically recognized as a visual/aesthetic asset and may have many positive attributes. Diversity and variety are characteristics in such a resource.

Although not all are explicitly addressed on the evaluation form, the rating panel was directed to consider the following landscape, viewer, and project-related factors in their evaluation of the scenic quality and the visual impact associated with the Projects:

- Landscape/Seascape Composition: The arrangement of objects and voids in the landscape that can be categorized by their spatial arrangement. Basic landscape components include vegetation, landform, water, and sky. Some compositions, especially those that are distinctly focal, enclosed, detailed, or feature-oriented, are more vulnerable to modifications than panoramic, canopied, or ephemeral landscapes. These factors are included in the VRAP methodology and will be rated quantitatively for the existing and proposed view.
- Form, Line, Color, and Texture: These are the four major compositional elements that define the perceived visual character of a landscape/seascape, as well as a project. Form refers to the shape of an object that appears unified, often defined by edge, outline, and surrounding space. Line refers to the path the eye follows when perceiving abrupt changes in form, color, or texture, usually evident as the edges of shapes or masses in the landscape/seascape. Texture, in this context, refers to the visual surface characteristics of an object. The extent to which form, line, color, and texture of a project are similar to or contrast with these same elements in the existing landscape/seascape is a primary determinant of visual impact. Line, form, color, and texture are directly applied to the

[6] The simulations require a high-definition monitor measuring no less than 24 inches of useable area measured on a diagonal.

landscape and seascape composition ratings described above. These factors will be assessed both quantitatively and qualitatively on the rating forms.

- Focal Point: Certain natural or human-made landscape/seascape features stand out and are particularly noticeable as a result of their physical characteristics. Focal points often contrast with their surroundings in color, form, scale, or texture, and therefore tend to draw a viewer's attention. Examples include prominent trees, mountains, or cultural features, such as a distinctive lighthouse. If possible, a proposed project should not be sited so as to obscure or compete with important existing focal points in the landscape/seascape. Focal points in the existing view and how those may be affected by the Projects will be described on the rating form.
- Order: Natural landscapes/seascapes have an underlying order determined by natural processes. Cultural landscapes exhibit order by displaying traditional or logical patterns of land use/development. Elements in the landscape that are inconsistent with this natural order may detract from scenic quality. When a new project is introduced to the landscape or seascape, intactness and order are maintained through the repetition of the forms, lines, colors, and textures existing in the surrounding built or natural environment. The Project's effect on order will be addressed in the rating panel comments.
- Scenic or Recreational Value: Designation as a scenic or recreational resource is an indication that there is broad public consensus on the value of that particular resource. The characteristics of the resource that contribute to its scenic or recreational value provide guidance in evaluating a project's visual impact on that resource. Formally designated scenic or recreational designations will be identified for the panel members. and the panel will be asked to comment on the projects potential effect or scenic or recreational resources.
- Duration of View: Some views are seen as quick glimpses while driving along a roadway or hiking a trail, while others are seen for a more prolonged period of time. Longer duration views of a project, especially from significant aesthetic resources, have the greatest potential for visual impact. Background information for each KOP will contain a description of the user experience in terms of regional visibility and the availability of ocean views from each location. The rating panel will be asked to comment on the duration and frequency of the view presented for each KOP.
- Atmospheric Conditions: Clouds, precipitation, haze, and other ambient air-related conditions which affect the visibility of an object or objects. These conditions can greatly impact the visibility and contrast of landscape/seascape and project components and the design elements of form, line, color, texture, and scale. Rating panel members will be asked to comment on the conditions presented in each view, as well as how visibility of the Projects may be less or greater under conditions different from those illustrated in the selected visual simulation.
- Lighting Direction: Backlighting refers to a viewing situation in which sunlight is coming toward the observer from behind a feature or elements in a scene. Front lighting refers to a situation where the light source is coming from behind the observer and falling directly upon the area being viewed. Side lighting refers to a viewing situation in which sunlight is coming from the side of the observer to a feature or elements in a scene. Lighting direction can have a significant effect on the visibility and contrast of landscape/seascape and project elements. Rating panel members will be asked to characterize each view as illustrating one of three possible lighting conditions (front lit, side lit, and backlit) and comment on potential conditions that may increase or decrease visibility of the Projects.
- Project Scale: The apparent size of a proposed project in relation to its surroundings can define the compatibility of its scale within the existing landscape/seascape. Perception of project scale is likely

to vary depending on the distance from which it is seen and other contextual factors. Project scale contrast will be assessed through quantitative scores built into the VRAP procedure.

- Spatial Dominance: The degree to which an object or landscape/seascape element occupies space in a landscape/seascape and thus dominates seascape composition from a specific viewpoint. The spatial dominance presented by the Projects will be assessed through quantitative scores built into the VRAP procedure.
- Visual Clutter: Numerous unrelated built elements occurring within a view can create visual clutter, which generally has an adverse effect on scenic quality. If present, visual clutter, both existing and as a result of the proposed Projects will be assessed qualitatively in the rating panel comments.
- Movement: Moving project components can attract viewer attention. Rating panel members will be asked to comment on existing elements in the view that may draw viewer attention as well as a potential increase in noticeability of the Projects resulting from the rotation of the turbine blades.

Following the panel's evaluation, each panel member's ratings were compiled to determine individual scores for each KOP. The four individual ratings were then averaged to generate a composite SQC rating for each KOP. Since the ZVI is largely limited to areas that include open water in the view, 10 of the 18 character areas (Commercial Beachfront, Dredged Lagoon, Oceanfront Residential, Salt Marsh, Undeveloped Beach, Atlantic City, Commercial Strip Development, Open Water, Undeveloped Bay, and Recreation) and two distance zones (Background and Extended Background) were represented by the simulations. These simulations show the full range of visibility and visual effect that will be available from publicly accessible vantage points within the ZVI for the proposed Projects.

2.3.5.2 Visual Impact Assessment Rating

Once the SQC of the existing view has been established, the same evaluation procedure was applied to the visual simulations of the operational Projects using the same procedure and evaluation criteria described above. As described above, each of the visual impact scores were totaled and averaged across all four rating panel members. This resulted in a VIA score that was directly compared to the SQL score to determine the magnitude of impact score. The magnitude of visual change is derived from the delta between the SQL and VIA score (see Table 2.3-3).

Table 2.3-3 VIA Scores and Magnitude of Visual Change

Negligible		Low Magnitude			Moderate Magnitude				High Magnitude		
0	-0.4	-0.5	-1	-1.5	-2	-2.5	-3	-3.5	-3.6	-4	< -4

To further define the impact producing factors associated with the Projects, the rating panel also evaluated the Projects' compatibility, scale contrast, and spatial dominance effect on water resources, landform, vegetation, land use, and user activity for each KOP. The rating scale for this evaluation ranged from 1 to 3, as outlined in Table 2.3-4, below.

Table 2.3-4 Factors Influencing Visual Impact

VIA Factor	1	2	3
Compatibility	Compatible	Somewhat Compatible	Not Compatible
Scale Contrast	Minimal	Moderate	Severe
Spatial Dominance	Subordinate	Co-Dominant	Dominant

The rating panel scores were then averaged to determine the extent to which these factors influence the overall magnitude of visual impact.

2.3.5.3 Visibility Threshold Level

To supplement and validate VIA rating results, rating panel members were asked to determine the Visibility Threshold Level (VTL) applicable to each of the KOPs and the broader regional landscape they represent. *Offshore Wind Turbine Visibility and Visual Impact Threshold Distances* (Sullivan et.al., 2013) lists six VTLs used to rate the visual prominence of several operational offshore wind farms in Europe. The VTL scores and descriptions are presented below in Table 2.3-5.

The complete set of rating panel forms is provided in Attachment G.

Table 2.3-5 Visibility Threshold Level Rating Scale

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

Source: Offshore Wind Turbine Visibility and Visual Impact Threshold Distances (Sullivan et.al., 2013)

All of the factors described above were used to determine the overall significance of the Projects' visual impact on the affected landscape/seascape. As shown in Table 2.3-6, the significance of visual impacts are characterized as adverse, potentially adverse, or not adverse depending on the magnitude of visual change and sensitivity of the existing view. If the magnitude of visual change was determined to be negligible, no adverse impacts are anticipated.

Table 2.3-6 Matrix used to Determine the Significance of Impact at each KOP

KOP SQL	Impact Magnitude: High	Impact Magnitude: Medium	Impact Magnitude: Low	Impact Magnitude: Negligible
High	Adverse Visual Impact	Adverse Visual Impact	Potential Adverse Visual Impact	No Adverse Visual Impact
Moderate-High	Adverse Visual Impact	Adverse Visual Impact	Potential Adverse Visual Impact	No Adverse Visual Impact
Moderate	Adverse Visual Impact	Potential Adverse Visual Impact	No Adverse Visual Impact	No Adverse Visual Impact
Low-Moderate	Potential Adverse Visual Impact	No Adverse Visual Impact	No Adverse Visual Impact	No Adverse Visual Impact
Low	No Adverse Visual Impact	No Adverse Visual Impact	No Adverse Visual Impact	No Adverse Visual Impact

Evaluation results for the selected KOPs, which represent the variable geographic positions, elevations, and atmospheric conditions presented within the LSZs and at the VSRs within the ZVI, allow regulators to make reasonable assumptions regarding the type and magnitude of potential visual impacts to the broader range of landscapes/seascapes and viewer types/activities within the ZVI.

3.0 VISUAL IMPACT ASSESSMENT RESULTS

The results of the visual impact assessment are presented below. Section 3.1 presents the visibility assessment results as indicated by the viewshed analysis and field verification, and Section 3.2 summarizes the visual impact assessment results based on the visual simulations and rating panel review.

3.1 Potential Visibility of the Projects

3.1.1 Viewshed Analyses

Potential visibility of the Projects, as indicated by the viewshed analyses, is illustrated in Figure 3.1-1 and summarized in Tables 3.1-1 through 3.1-4. Within the VSA, the lidar-based viewshed analysis indicates that approximately 12.5 percent of the landward VSA could have potential views of some portion of the Projects, based on the availability of an unobstructed line of sight to the tallest components (WTG blade tips in the upright position, see Table 3.1-1) proposed. This suggests that a majority of the VSA (87.5 percent) will not have any potential views of the Projects. This lack of potential visibility occurs in locations where buildings, structures, and vegetation screen views toward the Projects, but from more distant portions of the VSA curvature of the earth and topographic features also contribute significantly to the lack of visibility. Forest land is the dominant land use, covering approximately 55 percent of the landward VSA, and will significantly reduce potential visibility of the Projects throughout the majority of the inland, mainland areas. In areas of concentrated human settlement, such as the barrier islands, and mainland shorelines, closely situated buildings/structures will also significantly screen outward views. Considering the screening provided by buildings, structures, vegetation, and topography, potential landward visibility of the Projects is largely restricted to the ocean shoreline, salt marshes and inland bays west of the barrier islands. Barrier islands that lack shoreline development typically have large areas of contiguous visibility extending across the inland bays and into the marshy, uninhabited areas associated with the mainland river estuaries.

Table 3.1-1 WTG Blade Tip – Land Area Viewshed Results Summary

Distance from The WTA	40-Mile Radius VSA (Units in Square Miles)		
	Total Land Area	Land Area with Potential Visibility (ZVI)	Percent of Distance Zone Within Landward Study Area (%)
0 to 10 Miles	4.6 (11.8 sq. km)	3.8 (9.8 sq. km)	83.1
10 to 20 Miles	266.9 (691.4 sq. km)	155.2 (401.9 sq. km)	58.1
20 to 30 Miles	589.3 (1,526.3 sq. km)	85.7 (222.0 sq. km)	14.5
30 to 40 Miles[1]	1,438.1 (3,724.8 sq. km)	43.7 (113.2 sq. km)	3.0
Total 40 Mile Landward Study Area	2,298.9 (5,954.2 sq. km)	288.3 (746.8 sq. km)	12.5

[1]This includes a small area that is greater than 40 miles from the WTA, which was incorporated for evaluation of potential visibility from Cape May.

Blade Tip Viewshed Analysis Results

Within 10 miles (16 km) of the Projects, the viewshed analysis suggests that 83.1 percent of the landward VSA will have potential visibility of the Projects (See Table 3.1-1). Considering the tallest components of the Projects, the viewshed analysis indicates that potential visibility of the Projects will be available from the majority of the coastline associated with the coastal barrier island of Brigantine (Figure 3.3-1). This includes contiguous areas of concentrated visibility on the northern tip of the island on North Beach, and portions of North Brigantine. However, heavily vegetated portions of Absecon State WMA and the dune system directly adjacent to the beach will likely be screened from views of the Projects, as indicated by a narrow band extending in a northeasterly direction in the viewshed analysis. South of the Absecon State WMA, within developed portions of Brigantine City the viewshed analysis indicates significant screening resulting

from closely situated homes immediately adjacent to the beach. However, potential visibility occurs along roads perpendicular to the shoreline and oriented toward the Projects. These small corridors of visibility occur along the majority of roads in this portion of the VSA and extend between approximately 1,000 ft (305 m) to 3,000 ft (914 m) inland. Generally, these areas are confined to the road rights of way, but occasionally expand outward where open space occurs adjacent to the roads. This condition occurs at the Links at Brigantine Beach Golf Course where discrete corridors of visibility extend from the roads and expand outward across a portion of the fairways.

The backwater bays and salt marshes occurring to the west of the barrier islands and Brigantine Inlet are indicated by the viewshed to have full visibility of the WTG array. This includes portions of Absecon State WMA and the associated uninhabited salt marshes and bays. Detailed results of the viewshed analysis are presented below by distance from the Projects. The viewshed analysis results are illustrated in Figure 3.3-1.

Within 10 to 20 mi (16 to 32 km) of the nearest proposed WTG, viewshed analysis indicates contiguous areas of potential visibility along the immediate barrier island shoreline. Within this zone, 58.1 percent of the landward VSA may have visibility of some portion of the Projects (See Table 3.1-1). However, intense development immediately adjacent to the shoreline largely limits the extent of inland visibility. This condition is particularly apparent in Atlantic City, Ventnor City, Margate City, Long Port, and Ocean City to the west and southwest of the Projects, as well as Beach Haven and Surf City to the Northwest of the Projects. In these locations high density beachfront development, dunes, and vegetation generally restrict visibility to the immediate beach shoreline, and the interior of the barrier islands and back bay shorelines are indicated as being fully screened from view. Notable exceptions occur in the vicinity of undeveloped portions of the barrier islands such as Beach Haven Heights, Island Beach State Park, and Great Egg Harbor Inlet where areas of potential visibility extend across the entire barrier island into the inland bays.

From distances between 20 to 30 miles (32 to 48 km) from the Projects the viewshed analysis indicates that potential visibility will be available from approximately 14.5 percent of the landward VSA (See Table 3.1-1). Again, within this zone, visibility is possible along the immediate barrier beaches in Ocean City, Sea Isle City, and Avalon in the southern portion of the VSA and Surf City, North Beach, Harvey Cedars, and Barnegat Light in the northern portion of the VSA. In these areas intensive beachfront development limits potential visibility of the Projects to the beach, boardwalk, and adjacent dune system. Occasional views occur in open space areas associated with public beach parking lots and parks such as in Southern Ocean City and Barnegat Light, and along roadways oriented toward the Projects and perpendicular to the shoreline which occurs minimally in Ocean City. Similar to other zones, visibility occurs again to the west of the barrier island due to the presence of open water and salt marsh which both lack significant screening features. Significant areas of potential inland bay visibility occur in Sites Sound, Townsend Sound, Ludam Bay, Carson Sound, and Peck Bay in the southern portion of the VSA and Manahawkin Bay in the northern portion of the VSA. Mainland visibility is limited to the immediate inland bay shoreline in most instances. However, exceptions occur in Bass River and Little Egg Harbor Townships where a large area of contiguous visibility is indicated in a predominantly forested area. Review of online databases and maps suggest that this visibility is the result of low growing forest vegetation associated with the pinelands and actual visibility of the Projects from this area would be very unlikely. The open area associated with the Atlantic City International Airport also includes a large area of ZVI along with the Mullica, Great Egg Harbor, Tuckahoe, and Middle Rivers including the surrounding undeveloped wetlands and marshes.

From distances between 30 to 40 miles (43 to 64 km) potential visibility of the Projects is generally limited to the barrier island shoreline and typically extends as far as the vegetated dunes before diminishing completely within the inland portions of the islands. Within this zone, potential visibility of the Projects was indicated within 3 percent of the landward VSA. This visibility primarily occurs along the southern VSA beaches of Stone Harbor, Wildwood, and Diamond Beach and diminishes completely at the jetty north of Cape May Harbor. In the northern portion of the VSA, potential visibility of the Projects occurs along portions of South Seaside Park, Seaside Heights and along undeveloped portions of the beach in the remainder of Berkeley Township. Within the 30 to 40 miles zone large areas of visibility occur beyond the barrier islands in the inland bays and adjacent mainland shoreline. The visibility from inland bay areas is consistent throughout the VSA and include portions of Richardson Sound, Cape May Wetlands, and Great Sound in the Borough of Middle Township in the southern portion of the VSA and Barnegat Bay in the northern portion of the VSA. Mainland visibility within this zone is limited to the immediate inland bay shoreline with the exception of a few very small areas of potential visibility in the vicinity of Coyle Airfield in Woodland Township.

Aviation Obstruction Warning Light (FAA) Viewshed Analysis Results

As discussed in Section2.2, an additional viewshed analysis was completed to assess the potential visibility of the AOWL affixed to the WTG nacelle at a height of 607 feet. The FAA viewshed analysis (Figure 3.1-1) suggests that visibility of the AOWL could be available from approximately 9.0 percent of total land area within the VSA (Table 3.1-2). This reduction in visibility can be attributed to the lower height of the lights (relative to the blade tips) combined with the screening effects of curvature of the earth for more distant areas within the VSA. Generally, the FAA viewshed indicated visibility in a majority of the areas indicated as having blade tip visibility, but the actual footprint of the ZVI in these areas is significantly smaller and typically extend over a smaller portion of the inland bays and the more distant barrier island beachfront. This condition is most apparent in the northern and southern extent of the VSA in which the FAA viewshed visibility ends approximately 3 miles (5 km) short of the blade tip viewshed analysis. In the inland bays and mainland this same condition is apparent in the vicinity of Cape May where visibility indicated by the FAA viewshed analysis ends 10 miles (16 km) short of the visibility indicated by the blade tip viewshed analysis.

Table 3.1-2 Aviation Obstruction Light – Land Area Viewshed Results Summary

Distance from WTA	40-Mile Radius VSA (Units in Square Miles)		
	Total Land Area	Land Area with Potential Obstruction Light Visibility	Percent of Distance Zone Within Landward Study Area (%)
0 to 10 Miles	4.6 (11.8 sq. km)	3.6 (9.3 sq. km)	79
10 to 20 Miles	266.9 (691.4 sq. km)	140.1 (362.9 sq. km)	52.5
20 to 30 Miles	589.3 (1,526.3 sq. km)	51.0 (132.0 sq. km)	8.6
30 to 40 Miles[1]	1,438.1 (3,724.8 sq. km)	11.8 (30.5 sq. km)	0.8
Total 40 Mile Landward Study Area	2,298.9 (5,954.2 sq. km)	206.5 (534.8 sq. km)	9

[1]This includes a small area that is greater than 40 miles from the WTA, which was incorporated for evaluation of potential visibility from Cape May.

In addition to the land area visibility, visibility of the Projects from the open ocean was also considered separately in the viewshed analysis. The blade tip viewshed analysis revealed that up to 88.3 percent of the

water surface in the VSA could have some level of potential visibility of the Projects (Table 3.1-3). Areas indicated as screened by the viewshed analysis include Delaware Bay on the west side of Cape May and the northern portion of the VSA where visibility diminishes due to curvature of the earth.

Table 3.1-3 Blade Tip – Water Area Viewshed Results Summary

Distance from The WTA	40-Mile Radius VSA (Units in Square Miles)		
	Total Water Area	Water Area with Potential Visibility (ZVI)	Percent of Distance Zone Within Water Study Area (%)
0 to 10 Miles	957.0 (2,478.6 sq. km)	957.0 (2,478.6 sq. km)	100
10 to 20 Miles	1,164.3 (3,015.5 sq. km)	1,164.3 (3,015.5 sq. km)	100
20 to 30 Miles	1,468.6 (3,803.7 sq. km)	1,468.6 (3,803.7 sq. km)	100
30 to 40 Miles[1]	2,972.2 (7,698.1 sq. km)	2,202.8 (5,705.1 sq. km)	74.1
Total 40 Mile Water Study Area	6,562.1 (16,995.9 sq. km)	5,792.6 (15,002.9 sq. km)	88.3

[1]This includes a small area that is greater than 40 miles from the WTA, which was incorporated for evaluation of potential visibility from Cape May.

Based on the height of the AOWL, the FAA viewshed analysis reduced visible areas to approximately 69.3 percent of the water surface (Table 3.1-4). This reduction in visibility can be largely attributed to the curvature of the earth, which will screen views of the lights at distances beyond 35 miles when viewed from water level.

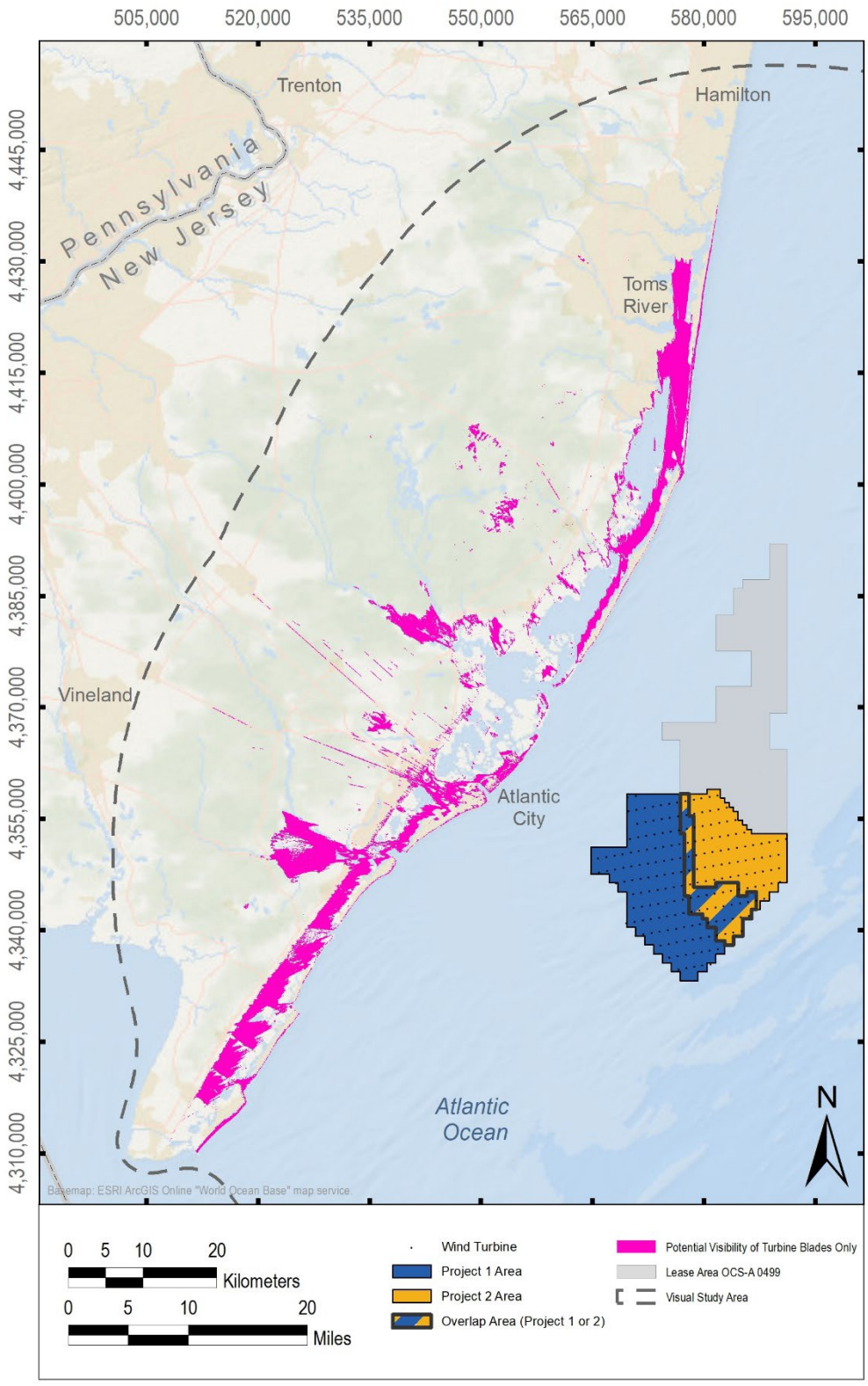
Table 3.1-4 Aviation Obstruction Light – Water Area Viewshed Results Summary

Distance from The WTA	40-Mile Radius VSA (Units in Square Miles)		
	Total Water Area	Water Area with Potential Obstruction Light Visibility	Percent of Water Study Area (%)
0 to 10 Miles	957.0 (2,478.6 sq. km)	957.0 (2,478.6 sq. km)	100
10 to 20 Miles	1,164.3 (3,015.5 sq. km)	1,164.3 (3,015.5 sq. km)	100
20 to 30 Miles	1,468.6 (3,803.7 sq. km)	1,468.6 (3,803.7 sq. km)	100
30 to 40 Miles[1]	2,972.2 (7,698.1 sq. km)	960.0 (2,486.5 sq. km)	32.3
Total 40 Mile Water Study Area	6,562.1 (16,995.9 sq. km)	4,549.9 (11,784.3 sq. km)	69.3

[1]This includes a small area that is greater than 40 miles from the Project WTA, which was incorporated for evaluation of potential visibility from Cape May.

It should be noted that the viewshed analysis treats all buildings/structures and vegetation as if they are completely opaque. Therefore, small woodlots and hedgerows are indicated as fully blocking views of the Projects. It is possible that views will be available from forest edges and through thin/sparse forest vegetation. However, these views will typically be at least partially obstructed by branches (even under leaf-off conditions) and would require focused, concentrated attention to see the WTGs. It is likely that at distances beyond 20 miles, even partial screening will be effective in minimizing or eliminating visibility of the Projects. It is also important to note that the lidar data used in this analysis is from multiple years, with the latest being captured between 2008 and 2014. Therefore, the analysis does not reflect any changes that may have occurred since that time. However, any such changes are likely to be minor and could include the addition of new obstructions (new buildings and taller trees) as well as the removal of obstructions (tree cutting).

As mentioned previously, factors such as the acuity of the observer, the effects of distance, the occurrence of overcast and hazy weather conditions, and the white color and slender profile of the WTGs (especially the blades, which make up the top 453 ft [138 m] of each WTG) are not considered in this analysis. Given the narrow dimensions and limited visibility of the WTG blades, a separate analysis was completed to determine geographic areas of visibility of the blades excluding the nacelle and tower portion of the WTG. The results of the analysis suggest that 3.6 percent of the landward VSA (28.4 percent of the ZVI) would only have potential visibility of the WTG blades (see Inset 3.1-1). At distances beyond 35 miles, even if not fully screened by curvature of the earth, the blades will generally be difficult to see due to atmospheric perspective and can even be obscured by surface waves and large ocean swells. Therefore, it is unlikely that the Projects will be readily noticeable in views that only include the WTG blades (i.e., the tower and nacelle is screened from view by curvature of the earth) which, from ground level vantage points occurs beyond 35 miles under generally clear weather conditions (see Section 3.2.2). With these factors considered, areas and duration of actual visibility will likely be more limited than indicated by the viewshed analyses. The areas where only potential WTG blade visibility is indicated include the majority of inland bays and adjacent mainland shoreline between 10 and 40 miles from the Projects, including bays west of Atlantic City, Margate City, Ocean City, Sea Isle City, Avalon Borough, Wildwood, North Haven, Ship Bottom, Surf City, Barnegat Light, and Seaside Heights. Additionally, the majority of inland visibility indicated on the viewshed analysis will only include turbine blades. This includes the major river basins of the Mullica, Great Egg Harbor, and Tuckahoe Rivers and associated wetlands and marshes (see Inset 3.1-1).



Inset 3.1-1 – Portions of the ZVI that only include WTG blades

Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 3.3-1: Viewshed Analysis Results

- Blade Tip Potentially Visible
- Blade Tip and FAA Light Potentially Visible
- Blade Tip, FAA Light, and Midtower Potentially Visible
- Blade Tip, FAA Light, Midtower, and Platform Potentially Visible
- Wind Turbine Area Distance Marker
- Visual Study Area

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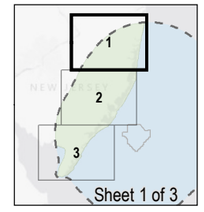

0 1 2 4
Miles

Notes: 1. Basemap: ESRI ArcGIS Online "World Topographic Map" map service. **2.** This map was generated in ArcMap by EDR on March 3, 2021. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

ATLANTIC SHORES offshore wind

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Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 3.3-1:
Viewshed Analysis Results

- Blade Tip Potentially Visible
- Blade Tip and FAA Light Potentially Visible
- Blade Tip, FAA Light, and Midtower Potentially Visible
- Blade Tip, FAA Light, Midtower, and Platform Potentially Visible
- Wind Turbine Area
- Wind Turbine Area Distance Marker
- Visual Study Area

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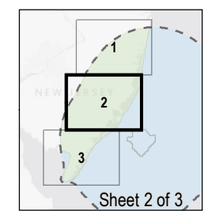

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ATLANTIC SHORES offshore wind

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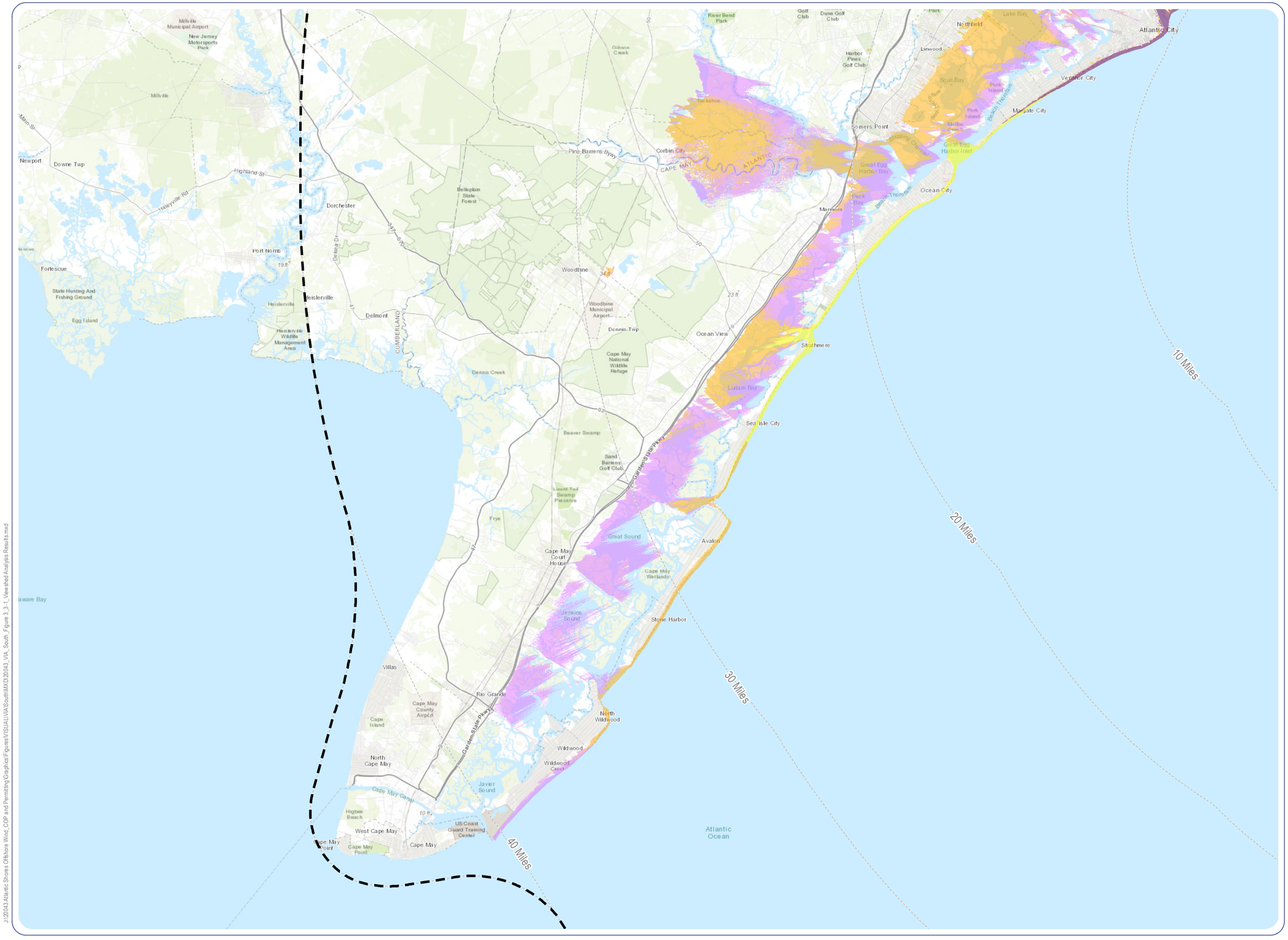
Atlantic Shores Offshore Wind Project

Outer Continental Shelf

Figure 3.3-1:
Viewshed Analysis Results



- Blade Tip Potentially Visible
- Blade Tip and FAA Light Potentially Visible
- Blade Tip, FAA Light, and Midtower Potentially Visible
- Blade Tip, FAA Light, Midtower, and Platform Potentially Visible
- Wind Turbine Area Distance Marker
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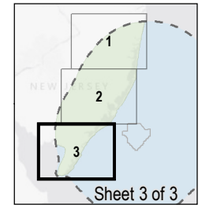

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Notes: 1. Basemap: ESRI ArcGIS Online "World Topographic Map" map service. **2.** This map was generated in ArcMap by EDR on March 3, 2021. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

ATLANTIC SHORES offshore wind

J:\20043 Atlantic Shores Offshore Wind_COP and Permitting Graphics\Figures\VIS\ALWA\South\MXD\20043_VIA_South_Figure 3.3-1_Viewshed Analysis Results.mxd

3.1.2 Field Verification

Field verification was conducted at 67 surveyed KOPs within the ZVI. Results of the viewshed analysis were confirmed from majority of these KOP locations. However, a few of the KOP locations were determined to not have any visibility of the Projects based on subsequent survey alignment of the KOP. In addition, it was determined during field verification that elevated structures that are situated on or near the shoreline would offer views of the Projects in some areas that were not included in the ZVI.

Practically, there are a number of factors that will influence the visibility and visual prominence of the WTGs that are not considered in the viewshed analysis. For example, a KOP from the Tuckahoe WMA (See Attachment D, Page 29) occurs within a very narrow band of visibility of the Projects (as suggested by the viewshed analysis). However, field review and 3D alignment (see Section 2.3.2) of the view revealed that minute portions of a few WTG blade tips appeared amongst background vegetation and the Projects would be indistinguishable from these screening features at this location. Similar results were revealed at the Manahawkin WMA (Attachment D, Page 12). This KOP was photographed and surveyed from an inland salt marsh overlooking the inland bay portion of the VSA. In this location the viewshed analysis suggested large areas of contiguous visibility of the Projects. However, subsequent review of the survey data suggested that WTG visibility was limited to very small portions of the turbine blades amongst a background of intensive development associated with Atlantic City, the Garden State Parkway, and other intervening features. At a distance of 21.6 miles (34.8 km) from the Projects, a casual observer would not be capable of distinguishing the WTGs from this location. As discussed in Section 3.1.1, it was assumed that the turbine blade tips would be very difficult to perceive at distances of 10-40 miles. This was confirmed during field review and subsequent 3D alignments. Therefore, while the viewshed analysis provides an exceptionally accurate model of theoretical visibility of the Projects, field review determined that this analysis generally overstates visibility of the Projects, particularly from inland locations. This is particularly the case when the Projects are viewed from distant viewing locations that only include potential visibility of the WTG blade tips.

As mentioned in Section 2.2, the viewshed analysis did not consider potential turbine visibility from human-made elevated positions throughout the VSA. An example would be an observation tower in the Edwin B. Forsythe NWR (Attachment D, Page 24), which offers an elevated view of the barrier islands, ocean, and surrounding landscape. Field review of this KOP, while not contradictory to the viewshed analysis results, suggests that a greater portion of the Projects would be visible as a result of elevated viewer position. The same is true for heavily developed areas within the barrier islands. Particularly in Atlantic City, where several high-rise buildings offer commanding views of the ocean and the Projects. In these instances, it is reasonable to assume that if the viewshed indicates visibility around a tall building, visibility will also occur within or on the building. This condition is illustrated in the KOP from the Ocean Casino Resort (Attachment D, Page 19). While the viewshed analysis suggests the Projects will not be visible from ground level at this location (due to the presence of intervening screening features), field review determined that the Sky Garden on the 11th floor offered an open, elevated view of the Projects. This condition was also observed in Margate City where an elevated view is available from Lucy the Margate Elephant (Attachment D, Page 25). From this location, the viewshed analysis correctly anticipated a lack of ground level views toward the Projects due to screening provided by buildings, infrastructure, and topography associated with the beach dunes. However, from the elevated deck of this NHL, these screening features become less effective, and the ocean came into view.

Despite the anticipated limitations of the viewshed analysis, field verification confirmed that the ZVI provides an accurate and reasonable representation of the areas that could potentially be impacted by the Projects.

Attachment D lists each of the locations visited during field review along with their distance to the Projects.

3.2 Visual Impact Associated with the Projects

3.2.1 Visual Impact Assessment Results

To illustrate anticipated visual changes associated with the proposed Projects, 22 photographic simulations from 13 unique KOPs were used to evaluate the Projects appearance within the ZVI. As indicated in Section 2.3.1, these KOPs were selected based on various factors including proximity to identified VSRs, range of geographic location within the ZVI, and stakeholder input. These KOPs were also selected because they provide a clear, unobstructed view toward the Projects from VSRs, and they represent the various CAs, user groups, viewing distances, and lighting conditions that occur within the ZVI. In addition, the selected photos illustrate typical high visibility conditions where the proposed WTGs would not be obscured by atmospheric haze or fog. Consequently, simulations developed from these locations are representative of a conservative worst-case assessment of Project visibility and potential visual impact within the ZVI. As described in Section 2.3.3, review of the visual simulations, along with photos of the existing view, allowed for comparison of the aesthetic character of each view with and without the proposed Project in place. The results of the rating panel evaluation are described below and the rating forms, KOP impact determinations, and simulations are provided in Attachment E.

The simulations are described in detail in Attachment E along with an analysis of the rating panel results. These results are summarized in Table 3.2-1, below. Inset 3.2-2, below illustrates the existing and proposed SQC scores, the visual impact score, VTL, and distance from the Projects for each KOP. A summary of the rating panel results is presented below for daytime and nighttime conditions.

3.2.1.1 Daytime Visual Impact Results

Rating panel impact scores indicated that the Projects would result in adverse visual impacts at six of the 13 KOPs under clear viewing conditions. The Project would result in potentially adverse visual impacts at four KOPs and three views would not experience visual impacts (see Table 3.2-1 and 3.2-2). The VIA scores ranged from minus 0.1 to minus 4.9. With the exception of three KOPS, the visual impact scores suggest that as the viewing distance increases, the potential visual impact (as expressed in the VIA score) decreases (see Inset 3.2-1). For example, the lowest impact score of minus 0.1 was from Cape May Point State Park (LT02) which is approximately 45 miles (72 km) from the Projects. The highest score of minus 4.9 was applied to the North Brigantine Natural Area (BC02) which represents the Projects' closest point to the New Jersey shoreline, at a distance of 9 miles (14 km). This trend is also expressed in the Visual Threshold Limit (VTL) score. The most distant KOPs received VTL scores between 1 and 2 and the closest KOPs received the highest achievable VTL of 6.

Table 3.2-1 – Daytime Visual Impact Assessment Rating Panel Results

ID	KOP	Distance to the Projects (Miles/km)	View	Rating Panel Member				Average	SQL	Delta	Magnitude of Visual Change	VTL
				KAC	KAV	JMG	SMB					
SPB01	Seaside Park Beach	39/62.8	Existing	12.0	11.3	14.0	13.0	12.6	Moderate	-0.3	Negligible	1
			Proposed	12.0	11.3	13.7	12.3	12.3	Moderate			
LAT01	Edwin B. Forsythe NWR at the Woodmansee Estate	32.2/51.8	Existing	13.3	12.3	14.0	14.3	13.5	Moderate-High	-1.8	Low Magnitude	4
			Proposed	12.3	11.3	10.3	13.0	11.8	Moderate			
LBT03	Beach at Long Beach Island Arts Foundation	24.9/40.1	Existing	10.5	9.8	13.0	14.8	12.0	Moderate	-4.2	High Magnitude	5
			Proposed	10.2	8.2	7.3	5.8	7.9	Low			
BRT01	Bass River State Forest	18.5/29.8	Existing	11.2	11.2	10.8	10.2	10.8	Moderate	-0.3	Negligible	2
			Proposed	11.2	10.8	10.2	10.2	10.6	Moderate			
BHB01	Beach Haven Historic District	13.5/21.7	Existing	11.7	12.3	13.7	13.0	12.7	Moderate	-4.5	High Magnitude	5
			Proposed	10.7	10.0	7.3	4.7	8.2	Low			
LEHT02	Great Bay Boulevard WMA/Rutgers Field Station	11.9/19.2	Existing	11.7	16.0	13.7	13.0	13.6	Moderate-High	-4.3	High Magnitude	6
			Proposed	10.3	12.0	6.7	8.0	9.3	Low-Moderate			
BC02	North Brigantine Natural Area	9.0/14.5	Existing	11.2	13.5	13.8	12.5	12.8	Moderate	-4.9	High Magnitude	6
			Proposed	9.5	9.5	6.8	5.5	7.8	Low			
AC04	Ocean Casino Resort Sky Deck	10.5/16.9	Existing	12.0	10.0	12.7	16.0	12.7	Moderate	-4.8	High Magnitude	6
			Proposed	10.0	8.3	6.7	6.7	7.9	Low			
AC02	Jim Whelan Boardwalk Hall (Atlantic City Convention Center NHL)	11.4/18.3	Existing	9.5	9.2	11.8	13.5	11.0	Moderate	-4.6	High Magnitude	6
			Proposed	9.2	7.8	5.5	3.2	6.4	Low			
MC02	Lucy the Margate Elephant NHL	14.4/23.2	Existing	11.0	11.0	9.3	11.7	10.8	Moderate	-2.2	Moderate Magnitude	5
			Proposed	9.7	9.3	6.0	9.3	8.6	Low-Moderate			

ID	KOP	Distance to the Projects (Miles/km)	View	Rating Panel Member				Average	SQL	Delta	Magnitude of Visual Change	VTL
				KAC	KAV	JMG	SMB					
OC04	Gillian's Wonderland Amusement	17.2/27.7	Existing	12.2	10.2	13.2	14.8	12.6	Moderate	-3.6	Moderate Magnitude	5
			Proposed	11.5	9.5	6.2	8.8	9.0	Low-Moderate			
SIC02	Townsend Inlet Bridge	27.4/44.1	Existing	11.7	9.3	13.0	10.3	11.1	Moderate	-2.5	Moderate Magnitude	5
			Proposed	11.0	8.7	6.0	8.7	8.6	Low-Moderate			
LT02	Cape May Point State Park	45.0/72.4	Existing	13.3	14.3	12.7	16.0	14.1	Moderate-High	-0.1	Low Magnitude	2
			Proposed	13.3	14.3	12.3	16.0	14.0	Moderate-High			

Table 3.2-2–Significance of Impacts at KOPs

KOP SQL	Impact Magnitude: High	Impact Magnitude: Medium	Impact Magnitude: Low	Impact Magnitude: Negligible
High	**Adverse Visual Impact**	**Adverse Visual Impact**	**Potential Adverse Visual Impact**	**No Adverse Visual Impact**
Moderate-High	**Adverse Visual Impact** *LEHT02 - Great Bay Boulevard WMA/Rutgers Field Station*	**Adverse Visual Impact**	**Potential Adverse Visual Impact** *LAT01 - Edwin B. Forsythe NWR at the Woodmansee Estate (Day)*	**No Adverse Visual Impact** *LT02 - Cape May Point State Park*
Moderate	**Adverse Visual Impact** *LBT03 - Beach at Long Beach Island Arts Foundation* *BHB01 - Beach Haven Historic District (Day & Night)* *BC02 - North Brigantine Natural Area* *AC04 – Ocean Casino Resort – Sky Deck (Day & Night)* *AC02 - Jim Whelan Boardwalk Hall NHL*	**Potential Adverse Visual Impact** *MC02 - Lucy the Margate Elephant NHL* *OC04 - Gillian's Wonderland Amusement* *SIC02 - Townsend Inlet Bridge* *LAT01 - Edwin B. Forsythe NWR at the Woodmansee Estate (Night)*	**No Adverse Visual Impact**	**No Adverse Visual Impact** *SPB01 - Seaside Park Beach* *BRT01 - Bass River State Forest*
Low-Moderate	**Potential Adverse Visual Impact**	**No Adverse Visual Impact**	**No Adverse Visual Impact**	**No Adverse Visual Impact**
Low	**No Adverse Visual Impact**	**No Adverse Visual Impact**	**No Adverse Visual Impact**	**No Adverse Visual Impact**

An exception to this trend occurs at the KOP from Lucy the Margate Elephant (MC02) which is approximately 14 miles (23 km) from the Projects and received a VIA score of minus 2.2, which is lower than scores received at more distant KOPs. This is due to the fact that a portion of the turbine array is screened by existing

buildings in the view, and the existing view received a relatively low SQC score (10.8) due to the presence of visual clutter resulting from a buildings, overhead utilities, and other built forms in the view. Additionally, it was noted by the rating panel that the white color of the WTGs did not contrast with these built forms in the foreground of the existing view. The VTL score for this KOP was 5, suggesting that the Projects strongly attract viewer attention. This demonstrates that despite the visual prominence of the WTG's, existing scenic quality strongly influences the potential visual impact level resulting from the Projects.

Another deviation in the distance versus visual impact trend occurs at Bass River State Forest (BRT01). From this KOP, the distance to the Projects is approximately 18.5 miles and the impact score is minus 0.3 (indicating negligible magnitude of visual change) and a VTL of 3. This score deviates from its nearest neighbor, Gillian's Wonderland Amusement Park (OC04) which is approximately 17 miles (27 km) from the Projects and received an impact score of minus 3.6 (moderate magnitude of visual change) and a VTL of 5. This variation is largely the result of the visual setting associated with BRT01. At this mainland KOP, the lower portions of the WTGs are screened by intervening vegetation and structures. As such, the turbine blades and a few nacelles are the only visible components of the Projects in the view. Rating panel members suggested that the WTGs were difficult to see due to the screening features, their narrow blades, and distance from the Projects. The rating panel also noted that although blade movement could draw viewer attention, it would not detract from the foreground and middle ground features in the view. It was also noted that seasonal growth of the salt marsh grasses could result in the Projects being completely obscured.

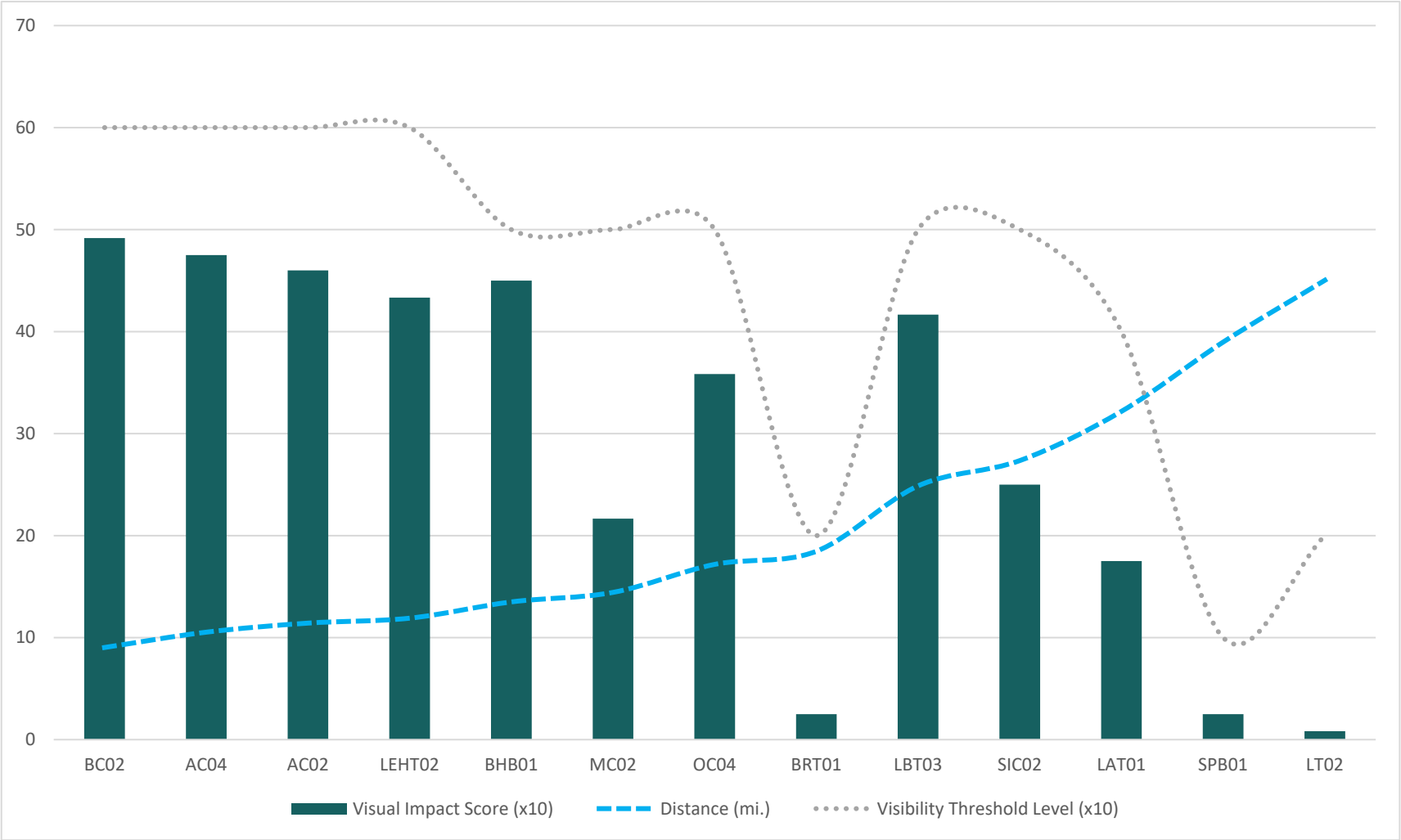
Six KOPs received scores indicating high magnitude of visual change and a decrease in scenic quality resulting in adverse visual impacts. These KOPs included Beach Haven Historic District (BHB01), North Brigantine Natural Area (BC02), the Ocean Casino Resort Sky Deck (AC04), Beach at Long Beach Island Arts Foundation (LBT03), Jim Whelan Boardwalk Hall NHL (AC02), and Great Bay Boulevard WMA/Rutgers Field Station (LEHT02). These KOPs are relatively close to the Projects (ranging in distance from 9 miles [14 km] to 24.9 miles [40 km]) and averaged 13.5 miles. These KOPs received visual impact scores ranging from minus 4.2 to minus 4.9. The SQC score of these views was between 11.0 to 13.6 which corresponds with moderate-high to moderate scenic quality. It is anticipated that the visual impacts presented by the Projects may result in adverse visual impacts to viewer when viewed under clear conditions such as those presented in the visual simulations. This conclusion is generally supported by the VTLs of 5 and 6 assigned to these KOPs. However, it is important to note the potential frequency of the viewing conditions presented in the visual simulations. For example, the KOP from BHB01 was taken during the month of August 2020. A meteorological study of 2019 visibility conditions, suggests that this exceptionally clear condition would occur during approximately 6.3% of the month of August. Two variable conditions photosimulations were produced to illustrate more typical viewing conditions in August. The first condition occurred over approximately 19% of the month during which visibility is limited to 18 (29 km) miles. In this photosimulation, the WTGs become very difficult to see. It is anticipated that the visibility under this more representative condition can be characterized by a VTL of 1. The next condition occurred during 15% of the month and represents a maximum visibility distance of 20 (32 km) miles. During this atmospheric condition the simulation illustrates very faint WTGs on the horizon that would likely only be visible if the viewer is scanning the horizon. This visibility condition is characteristic of a VTL of 2. This variability in WTG visibility is expected to occur throughout the entire ZVI, resulting in highly variable magnitude of visual change depending on atmospheric perspective and lighting conditions. Additional discussion of atmospheric perspective is provided in Section 3.2.3.

The Edwin B. Forsythe NWR at the Woodmansee Estate (LAT01) KOP located approximately 32 miles ([51 km] from the Projects) received an elevated VIA score relative to its SQC. The existing view received an SQC score of 13.5 which corresponds to Moderate-High SQC and suggests relatively high scenic quality. With the turbines in place, the SQC was reduced from 13.5 to 11.8, which constitutes a reduction of minus 1.8 (indicating a low magnitude of visual change) and reduction in SQC to moderate. This instance suggests that even from significant distances, KOPs with a perceived high scenic quality may be more susceptible to visual impacts resulting from the Projects. This is the only KOP beyond 30 miles that received an elevated visual impact score due to the high contrast lighting conditions presented in the visual simulation. This KOP was assigned a VTL of 4 which suggests that the Projects are plainly visible to casual observers but does not strongly attract viewer attention. The relatively high existing scenic quality and low magnitude of visual change indicate that potentially adverse visual impacts are expected during exceptionally clear viewing conditions.

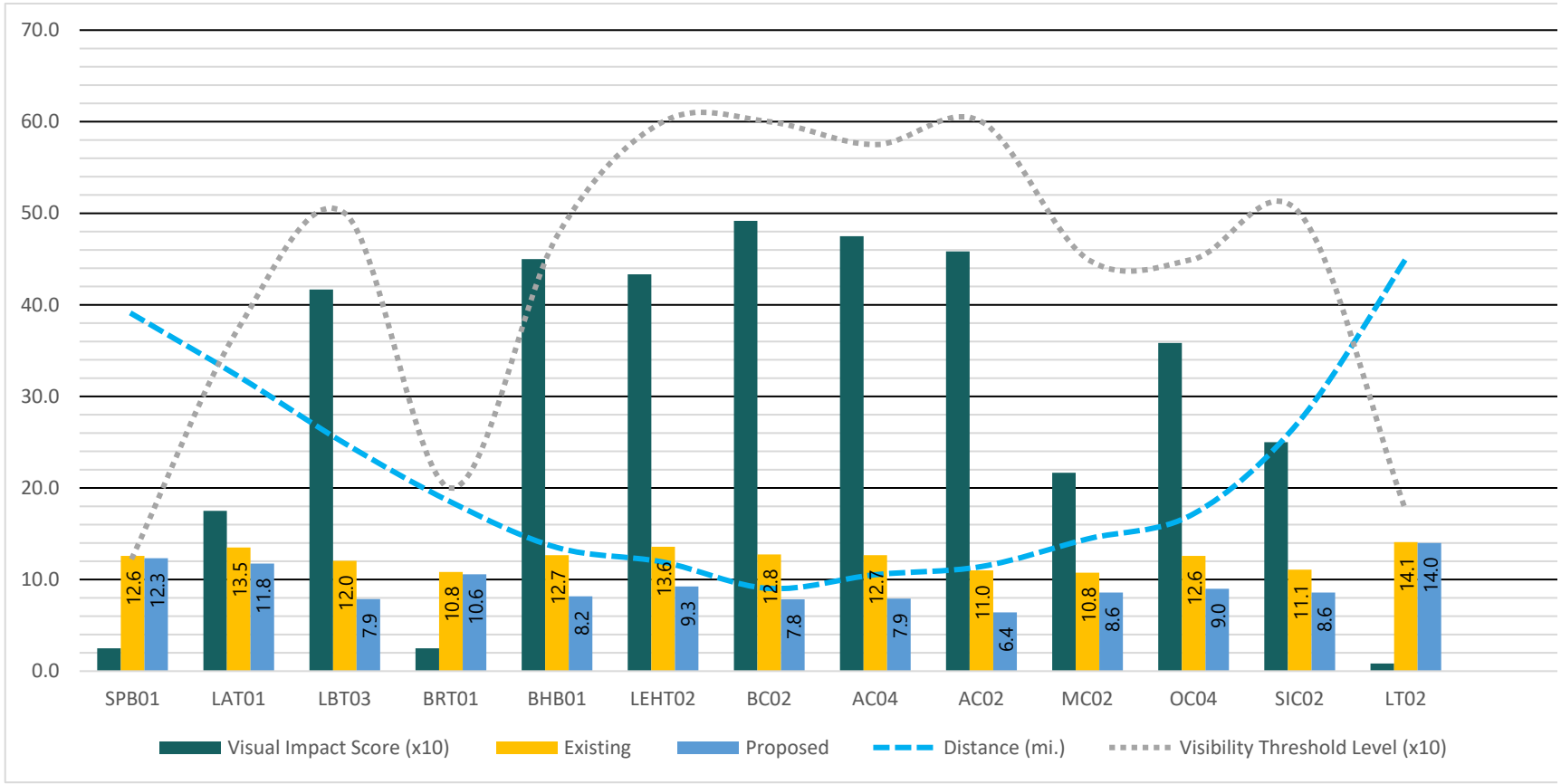
The Projects resulted in adverse visual impacts from the KOP at Great Bay Boulevard WMA/Rutgers Field Station. Rating panel scores for the existing conditions photographs ranged from 11.7 to 16.0 (average SQC score = 13.6) and members commented on the serene, unspoiled character of the view which has a strong horizon that holds the viewers' attention. With the Projects in place, rating panel members had a variable range of reactions to the impact, with the VIA scores ranging from 6.7 to 12 (average score = 9.3). Rating panel members noted that the horizon occupation (43 degrees) of the WTGs and their relative proximity to the viewer make the Projects appear large, and the WTGs become focal points of view. Other contributing factors included the stacking/overlap of turbines in some rows, which increases their visibility and visual mass, and movement of the rotor blades which will attract viewer attention. Supporting these conclusions, the KOP from LEHT02 was assigned a VTL of 6 which suggests that the Projects will dominate the view due to a majority presence on the horizon.

The variation in visual impact scores indicates that the degree of visibility of the Projects, lighting conditions, and scenic quality of the existing view can influence the degree of potential visual impact presented by the Projects. Inset 3.2-2, below illustrates the visual impact trend with the KOPs organized from north to south (left to right on the graphic). Generally, this graphic illustrates the trend of increasing scores as the KOPs get closer to the Projects (in the middle of the graph) and then begin to drop again as the KOPs increase in distance to the south of the Projects. As demonstrated in Inset 3.2-2 and described above a few KOPs deviate from the distance/impact trend due to partial screening or particularly high contrast lighting conditions.

A detailed description of each KOP with and without the Projects in place, along with the detailed rating panel results, including spatial dominance and scale contrast factors are presented in Attachment E.



Inset 3.2-1 – Relationship between distance and Visual Impact Rating Score and VTL



Inset 3.2-2 – Summary of Visual Impact Scores and VTL for each KOP.

3.2.1.2 Nighttime Visual Impact Results

Nighttime visual simulations were produced from a subset of three KOPs used in the production of daytime simulations. The rating panel results are present in Table 3.2-2 below. Each of the nighttime views received an SQC between 11.4 and 11.8 which corresponds with the moderate scenic quality. The simulations of the operational Projects received rating panel scores between 7.3 and 7.7, resulting in average decreases between minus 3.8 and minus 4.4, reducing the SQC to low scenic quality for all three nighttime views. The rating panel assigned a VTL of 5 for all three KOPs which suggests that the AOWL and navigation lighting could strongly attract viewer attention. Rating panel members commented that light from the AOWL is prominent and will draw viewer attention in a setting that normally appears dark and undeveloped. Further the alternating blinking associated with the navigation lights and AOWL will be distracting to viewers. However, an Aircraft Detection Lighting System (ADLS) would significantly reduce the amount of time the AOWL would be activated by detecting the presence of aircraft. Assuming the use ADLS nighttime visual impacts associated with the aviation obstruction lights would become intermittent and minor (see Section 3.3).

Table 3.2-3 – Nighttime Visual Impact Assessment Rating Panel Results

ID	KOP	Distance to the Projects (Miles/km)	View	Rating Panel Member				Average	Impact Score	SQC	VTL
				KAC	KAV	JMG	SMB				
AC04 Night	Ocean Casino Resort Sky Deck	10.5/16.9	Existing	10.2	10.3	11.5	15.2	11.8	-4.4	Moderate	5
			Proposed	9.5	8.0	6.8	5.2	7.4		Low	
BHB01 Night	Beach Haven Historic District	13.5/21.7	Existing	9.8	12.3	11.8	12.0	11.5	-4.3	Moderate	5
			Proposed	9.5	9.7	5.2	4.7	7.3		Low	
LAT01 Night	Edwin B. Forsythe NWR at the Woodmansee Estate	32.2/51.8	Existing	10.2	12.7	11.3	11.5	11.4	-3.8	Moderate	5
			Proposed	9.8	9.0	5.3	6.5	7.7		Low	

3.2.1.3 Impacts to Viewers

Viewers and the activities they are engaged in can be affected by changes in the visual environment. In this case, the proposed action located within the OCA can ultimately result in a change in viewer experience in other CAs, if the Projects are visible and if views of the ocean are an important component of the viewer activity and experience. This VIA assesses the impacts to viewers by defining the viewer activities, viewer experience, and the importance of ocean views at each KOP. Next, the VTL score from the rating panel (see Section 3.2.2.1) is used to determine the degree of visibility and magnitude of visual change associated with the Projects from each KOP. In most cases, the visual simulations illustrate a single weather condition and a single time of day at each KOP. From all KOPs, the single condition illustrated in the visual simulations represents the worst case in terms of atmospheric clarity and, in many cases, the high contrast lighting conditions. To provide a balanced assessment, the frequency and duration of these conditions is noted for three KOPs, including BHB01, AC02, and OC04. In addition, two alternative conditions simulation are included for each of these three KOPs to illustrate the WTGs under more typical/frequently occurring atmospheric conditions. The alternative conditions simulations for the three KOPs provide an illustration of visibility of the Projects during typical atmospheric conditions. It is reasonable to assume that KOPs which occur within similar or greater in distance from the Projects, will have similar or more intensive screening, respectively. As such, Table 3.2-4, below provides color coding for KOPs that are likely to have similar atmospheric perspective screening to the three typical conditions simulations.

Table 3.2-4 – KOP Distance and VTL Scores

ID	KOP	Distance to the Projects (Miles/km)	VTL	KEY[1]
SPB01	Seaside Park Beach	39/62.8	1	Atmospheric effects stronger than illustrated in OC04
LAT01	Edwin B. Forsythe NWR at the Woodmansee Estate	32.2/51.8	4	Atmospheric effects stronger than illustrated in OC04
LBT03	Beach at Long Beach Island Arts Foundation	24.9/40.1	5	Atmospheric effects stronger than illustrated in OC04
BRT01	Bass River State Forest	18.5/29.8	2	See OC04
BHB01	**Beach Haven Historic District**	**13.5/21.7**	**5**	Alternative conditions photosimulations included
LEHT02	Great Bay Boulevard WMA/Rutgers Field Station	11.9/19.2	6	See BHB01
BC02	North Brigantine Natural Area	9.0/14.5	6	See AC02
AC04	Ocean Casino Resort Sky Deck	10.5/16.9	6	See AC02
AC02	**Jim Whelan Boardwalk Hall (Atlantic City Convention Center NHL)**	**11.4/18.3**	**6**	Alternative conditions photosimulations included
MC02	Lucy the Margate Elephant NHL	14.4/23.2	5	See BHB01
OC04	**Gillian's Wonderland Amusement**	**17.2/27.7**	**5**	Alternative conditions photosimulations included
SIC02	Townsend Inlet Bridge	27.4/44.1	5	Atmospheric effects stronger than illustrated in OC04
LT02	Cape May Point State Park	45.0/72.4	2	Atmospheric effects stronger than illustrated in OC04

1. Key - Green – Similar of greater atmospheric perspective compared to OC04. Yellow – Similar atmospheric perspective to BHB01. Blue – Similar or greater atmospheric perspective to AC02.

3.2.1.3.1 Seaside Beach Park

Viewers at Seaside Beach Park are engaged in a multitude of activities that include direct but variable experiential interaction with the ocean. For example, some beachgoers were observed in the ocean wading, swimming, and playing along the surf-line, while sunbathers were facing away from the water to maximize their sun exposure. Other beachgoers situated their chairs specifically toward the water and were enjoying views of the ocean and nearshore activity. To these individuals, the ocean (including its sound, smell and/or feel), is an integral part of their experience, whether it is visible or not. Beyond the shoreline dunes, a bustling outdoor bar and restaurant scene was observed. Patrons of these establishments were engaged in social interaction but were often specifically situated to take advantage of views beyond the sand dunes and out to the ocean and horizon. Throughout the height of the summer season, it is likely that large numbers of tourist, vacationers, and residents take advantage of the beach and nearby shops, restaurants, and bars along Ocean Terrace and the boardwalk. During the off-season the number of potential viewers drops sharply, as the population decreases by up to 2000 percent to just 2,200 full time residents (Mansnerus, 1999). During the winter season, the harsh winter weather dramatically reduces the number visitors at the beach and many businesses close their doors for the season.

The rating panel determined that even with concentrated viewing, the proposed WTGs are nearly indiscernible at a distance of 39 miles from this KOP. The rating panel scores indicate a VTL of 1, which suggests that the WTGs are at the extreme limit of visibility and are unlikely to be noticed even with concentrated viewing. It is also worth noting that the west-southwesterly view presented in the visual simulation is not a typical primary view for users of this KOP, who are likely to be focused on views directly offshore. Sunset conditions may increase the potential visibility of turbine blades extending above the horizon. However, even under the highest contrast conditions, the proposed WTGs are not anticipated to detract from the viewer experience and will not be obviously visible to casual viewers from this distance. Therefore, the Projects are unlikely to result in a change to the viewer experience at this KOP.

3.2.1.3.2 Edwin B. Forsythe NWR at the Woodmansee Estate

Viewers at Edwin B. Forsythe NWR at this location are exclusively made up of residents and visitors to the Woodmansee Estate neighborhood. The homes within the development are situated along a dredged lagoon to take advantage of inland views across the salt marsh and undeveloped bay bordering the development. The view presented in the VIA, would only be available to residents on the southernmost and easternmost boundary of the neighborhood. In most cases, the homes on this stretch of road do not have specific outdoor accommodations for views to the south toward the Projects. However, the selected KOP is one of the few exceptions. Near the selected KOP, a few homes have outdoor seating, pools, and decks specifically situated to take advantage of views over the marsh and bay toward the ocean and the Projects.

Under the lighting conditions illustrated in the visual simulation from this KOP, the WTGs were determined to be a VTL 4, which indicates that the Projects could potentially compete with existing landscape elements in the view but would not strongly attract viewer attention. While it was noted that blade movement could potentially attract viewer attention, perception of such movement is unlikely to occur at a distance of 32 miles. Generally, given the fact that residents have the opportunity for stationary focused viewing when outdoors and relaxing, there will be instances when the Projects are noticeable. The degree of WTG visibility is likely to be highly variable, but given the effects of atmospheric perspective, clear views to a distance of 32 miles will be infrequent (see Section 3.2.3) and therefore the WTGs are generally unlikely to affect viewer appreciation of the view from this KOP.

During nighttime conditions, the rating panel assigned a VTL of 5 to the KOP at the Woodmansee Estate. This suggests that the AWOLs associated with the Projects would result in a significant contrast with the existing landscape elements and the night sky and could attract and hold viewer attention. In this instance, the residents would notice a significant change to the night sky when the AWOLs are active during clear weather conditions. This is likely to affect their perception of an undeveloped ocean view and the quality of their experience when outdoors, stationary, and looking toward the ocean at night. However, as with the daytime visual simulation, there are relatively few viewers at this location and atmospheric perspective is likely to minimize the visibility of the AWOLs under typical nighttime viewing conditions (see Section 3.2.3). Additionally, if an Aircraft Detection Lighting System (ADLS) is implemented, nighttime visual impacts associated with the Projects would be essentially eliminated from this KOP (See Section 3.3).

3.2.1.3.3 S Long Beach Island Arts Foundation

The Township of Long Beach is typically known as a family-oriented beach area. Viewers at this KOP are likely to include year-round residents that live nearby, or vacationers that rent properties on the oceanfront or bay side of Long Beach Island. The beaches in this location are known for their lack of large crowds and evoke a more relaxed and solitary beach experience than other locations along the Jersey shore. The

neighboring CAs consist mainly of Waterfront Residential and Inland Residential, with minimal commercial retail businesses in the area. People were observed walking along the sparsely populated beach, sunbathing, or socializing in small groups. It is likely that these users accessed the beach from nearby residential properties utilizing dune walks that occur at regular intervals. There are no major parking accommodations nearby, making the beach somewhat exclusive to property owners or vacation property renters. For all visitors and residents, the ocean is an important part of the user experience. For some, it offers opportunities for recreation such as surf casting, swimming, and paddleboarding. For others, it is a viewshed that offers a serene and simple view of open ocean meeting the sky.

The simulation from this KOP is looking due south. While this is not the primary view for people relaxing and looking out over the water, individuals walking south will see the WTGs on clear days. At a distance of 24.9 miles, the rating panel indicated that the WTGs would result in a VTL of 5, which suggests it could be the major focus of viewer attention during clear viewing conditions. Atmospheric perspective is anticipated to minimize the WTGs contrast during most summer days, but when visible, the Projects could result in a modification of the simple horizon line, resulting in a visual disruption and adding a more complex focal point for some beach users. This could result in a change in the viewer's perception of the ocean as a pristine, undeveloped viewshed and as such, could impact the value they place on this ocean view. Under lower contrast lighting conditions, or if partially obscured by atmospheric perspective, the Projects would result in reduced change to viewer perception. In views looking east, which is the primary field of view that does not include the Projects, the motion of the WTG rotors could attract the viewers' attention, compelling the viewer to look south. However, it is important to note that visibility extending to a distance of 24.9 miles is an exceptionally rare occurrence (see Section 3.2.1.3.5) and does not constitute typical or normal viewing conditions. On a typical humid summer day (when the majority of viewers are present) the turbines are likely to be partially or completely obscured by atmospheric perspective.

3.2.1.3.4 Bass River State Forest

Viewers at the Bass River State Forest are likely to be engaged in hiking, picnicking, and wildlife observation. The simulation from this KOP is from a small side trail that extends into the salt marsh before becoming impassible due to wet, boggy conditions. This KOP represent views that would only be experienced by adventurous bird watchers or other nature enthusiasts. The majority of individuals using the state forest, would have minimal outward views toward the ocean due to vegetative screening.

The rating panel assigned this view a VTL of 2, which suggests that the WTGs are very faint, but noticeable to viewers scanning the horizon. At 18.5 miles, the WTGs are significantly screened by intervening vegetation and human development on the intervening barrier islands. While viewers at this location are likely to see the turbine blade movement, it will not result in a significant change in the viewer's perception of the landscape due to the obvious presence of human intervention on the horizon. The majority of the WTGs in the simulation are backlit by the sun and appear slightly darker than they would during other times of day. As such, there will be times, such as early and late afternoon during which the WTGs would be more difficult to see. Additionally, atmospheric perspective is likely to completely obscure the blades during humid days and/or precipitation events.

3.2.1.3.5 Beach Haven Historic District

The beach view illustrated in this visual simulation is experienced by users and viewers that live or vacation along this very popular stretch of beach. The view is slightly elevated due to its position on the dune ramp approaching the beach. This ramp extends from a beach pavilion and comfort station at the top of the

dunes to a large parking area. As with many of the popular beaches, user activities range from stationary sunbathing to active recreation such as running, walking, and swimming. Multiple beachfront bars and restaurants also attract visitors throughout the day and into the evening. While the beach and ocean are important experiential components to these activities, ocean views become less prevalent and available while viewers are in shoreline bars and restaurants. Viewers at this KOP are likely to have variable attitudes toward the importance of ocean views, but the ocean is an integral part of their beach experience.

The presence of the WTGs in this view resulted in a VTL of 5 which indicates that they could result in a significant degree of visual contrast with the surrounding seascape/ocean and could be the major focus of viewer attention when visible. For some viewers, engaged in stationary viewing of the ocean horizon, the WTGs may affect the viewer's perception of a pristine, undeveloped ocean horizon and may impact their enjoyment of the ocean views. For others, the WTGs will minimally affect the enjoyment of their activities and may even evoke some degree of visual interest. At a distance of 13.5 miles to the nearest WTG, atmospheric perspective is likely to reduce the visibility and visual contrast experienced by viewers, particularly during the height of the summer season (see Section 3.2.3). However, due to the southern orientation of the view, midday viewing under clear conditions may result in a higher degree of visual contrast due to backlighting of the WTGs. Based on the 2019 meteorological data, the atmospheric conditions represented in this photosimulation (visibility extending to 32 miles) only occurs during approximately 7% of the daylight hours in August. Two additional photosimulations were created to illustrate atmospheric conditions that occur during 15% and 20% of the daylight hours in August to show more typical visibility conditions. During 15% of daylight hours in August visibility extends to a distance of 20 miles and during 20% of daylight hours in August visibility extends to 18 miles. As illustrated in the 15% scenario, only the first few rows of WTGs are faintly visible on the horizon and their prominence is significantly reduced due to a reduction in color contrast and less visible stacking or layering of multiple rows of WTGs. During the 20% scenario, even the nearest WTGs become difficult to see though the atmospheric haze. It is important to note that during these atmospheric condition scenarios, weather conditions on the shore are still perceived as clear and viewers would likely characterize the day as "very clear".

The nighttime view from this location is most likely to be experienced by homeowners and vacationers in rental properties with beach views. The rating panel assigned the nighttime simulation a VTL of 5. This suggests that the AWOLs associated with the Projects would result in a significant contrast with the existing landscape elements and the night sky and could attract and hold viewer attention. In this instance, the viewers would notice a significant change to the night sky when the AWOLs are active during clear weather conditions. AWOL visibility is likely to be highly variable based on atmospheric conditions. In addition, other light sources associated with homes, businesses, and on very clear nights, Atlantic City will likely compete for viewer attention when viewing in this direction at nighttime. Additionally, if ADLS is implemented (See Section 3.3), nighttime visual impacts associated with the AWOLs would be essentially eliminated from this view and only a very small portion of the navigation lights would be barely visible on clear nights. Due to the relatively low number of navigation lights that occur above the visible horizon from this KOP, it is possible that viewers could mistake the navigation lights for buoys on the water. With ADLS, it is anticipated that the Projects would not result in impacts to viewers at night.

3.2.1.3.6 Bay Boulevard WMA/Rutgers Field Station

Viewers within the Undeveloped Bay and Salt Marsh character area represented by this KOP primarily include residents and other locals that either work at the Rutgers Field Station or fish along a stretch of

public beach along the Great Bay ocean estuary. The KOP is also located at a public kayak launch site, so viewers may also engage in recreational kayaking at this location. The site does not have formal parking accommodation and does not appear to be a destination for tourists or visitors to the area. Therefore, the site appears to receive fairly regular, but low volume use. However, this site is also located in proximity to the intracoastal waterway and likely receives significant boater traffic throughout the warm seasons. Of the range of activities occurring at this KOP, the recreational boater and fishermen are likely to have the greatest exposure visual change associated with the Projects. These viewers have opportunities for extended, concentrated viewing of the landscape and seascape and this visual environment is an important component of their recreational experience. Additionally, boaters are typically aware of visual changes since it is an integral part of their navigation on the water. It is important to note that, on clear days, Atlantic City, at a distance of 11.3 miles, is also within the viewshed of this KOP. As such, when Atlantic City is visible, the tall buildings and developed horizon minimize any sense of a pristine ocean viewshed.

The presence of the WTGs in this view resulted in a VTL of 6 which suggest that at a distance of 11.9 miles the WTGs would result in a significant degree of visual contrast with the surrounding seascape/ocean and would be a major focus of viewer attention under the clear conditions illustrated in the simulation. Additionally, VTL 6 suggests that the WTGs occupy a majority of the field of view and viewers would have to turn away from the Projects to eliminate it from their view. During several visits to this site, Atlantic City was used as an indicator of adequate viewing conditions. For example, when Atlantic City is not visible from this location, it is reasonable to conclude that the WTGs will also be obscured by atmospheric perspective. This is supported by the atmospheric conditions analysis photosimulations completed from Beach Haven Historic District which is only 1.6 miles greater in distance from the Projects. Field review also confirmed that these are common and frequent conditions at this location. However, during clear days, as illustrated in the visual simulation, the Projects will likely result in a significant change to the existing view. Some viewers (particularly those engaged in passive activities) may feel the presence of the WTGs impacts to their enjoyment of the activities in which they are engaged. Others may perceive the presence of WTGs as an environmental benefit, particularly juxtaposed with the intensive shoreline development associated with Atlantic City.

3.2.1.3.7 North Brigantine Natural Area

This KOP represents a view from the Undeveloped Beach character area, which is a relatively rare occurrence on this stretch of New Jersey coastline. Users at this location are likely to include residents and tourists engaged in beachcombing, running, fishing, and wildlife viewing. Due to the lack of nearby access to parking and comfort stations, the number of visitors at this location is relatively low. However, those with the will to walk, or ability to drive, to this more remote location likely do so to enjoy a quiet, undeveloped beach. For these users the ocean will be an important component of their experience.

The nearest WTG is approximately 9 miles from this location. Due to their proximity to the viewer, the WTGs resulted in a VTL of 6. This reflects their degree of horizon occupation and scale contrast with existing seascape features. While atmospheric perspective may reduce the number of WTGs visible from this location, thus minimizing the perceived visual clutter, viewers will frequently see the nearest rows of turbines. The presence of the WTGs truncates the openness of the view and disrupts the clean ocean/sky horizon line. As such, the WTGs are likely to become the primary focus of viewer attention. While the viewer activities may not be directly affected by the Projects, there will be an experiential change associated with an ocean view that has changed from undeveloped to substantially developed.

3.2.1.3.8 Ocean Casino Resort – Sky Garden

The Ocean Casino Resort Sky Garden is an outdoor space used exclusively by the patrons of the casino and hotel. During several visits it was apparent that the space is most heavily utilized during special events. Aside from those events, guests occasionally come out to sit at the tables to enjoy a drink and socialize. Even if not actively viewing the ocean horizon, the ocean is still an important aspect of the space due to the sound and scent. Viewers also walk to the edge of the glass-fenced garden specifically to take in the elevated ocean view.

At a distance of 10.5 miles, the rating panel scores indicate that the WTGs would result in a VTL of 6, which suggests the WTGs would be the major focus of viewer attention during clear viewing conditions and would be a major source of contrast with the line, form, color, and texture of existing landscape and seascape features in the view. Atmospheric perspective is anticipated to reduce the number of visible WTGs and resulting visual clutter during most summer days (see 3.2.1.3.9), but for users of this space, the Projects would result in a modification of the simple horizon line, resulting in a visual disruption and the addition of more complex focal points. This could result in a change in the viewer's perception of the ocean as a pristine, undeveloped viewshed and could impact the value they place on this view. However, for some viewers in this highly developed setting, the WTGs could be a significant draw and subject of interest. Given the complexity of development along this section of coast, some viewers may not see the baseline condition of the ocean as pristine or undeveloped. For most casino guests, the primary attractions occur indoors where views of the greater Atlantic City environment are not possible, and they may not even venture out to the Sky Garden. Additionally, the visual simulation provides a view that is heavily backlit by the rising sun, representing the highest contrast conditions. Once the sun is higher in the sky, the WTGs are likely to become lighter grey or white in color which would minimize their color contrast with horizon.

At nighttime, the visual simulation from the Ocean Casino Sky Deck received a VTL of 5, suggesting it could become the major focus of viewer attention and contrast with the character of the existing seascape/ocean view. For nighttime viewers, it is important to note the context of the existing nighttime view, which is very bright and heavily modified by lights from surrounding development. As such, it is likely that viewers and users of this space will place less value on the nighttime ocean view as they are unlikely to expect dark skies in this highly developed casino setting. However, a small portion of viewers may place a higher value on the contrast between the dazzling shoreline and the dark ocean horizon. In these cases, the WTG AWOLs would change the viewer's perception of the night sky and could give the sense of a heavily modified ocean view. Additionally, if an Aircraft Detection Lighting System (ADLS) is implemented (See Section 3.3), nighttime visual impacts associated with the AWOLs would be essentially eliminated from this view and only a portion of the navigation lights would be visible on clear nights. Given the proximity of these lights to the ocean surface, it is anticipated that the navigation lights would result in minimal visual prominence but could still attract viewer attention from this elevated view.

3.2.1.3.9 Atlantic City Convention Center NHL

Viewers at along the beach at the Atlantic City Convention Center are engaged in sunbathing, socializing, swimming, wading, and walking. The beach at this location often hosts very large crowds of people engaged in a multitude of activities. For the majority of users, the ocean is an integral part of their experience. Beyond the shoreline, the adjacent boardwalk hosts many activities and presents an overwhelming degree of sensory stimuli, including billboards, large digital screens, music, and a wide array of human activity and

architectural styles. This area of the Atlantic City character area is accepted as a heavily modified seascape and people come to the location to take advantage of its multitude of commercial and social offerings. Throughout the height of the summer season large numbers of tourists, vacationers, and residents take advantage of the beach and nearby shops, restaurants, and bars along the boardwalk. Sixty five percent of visitors who come to Atlantic City come with the express purpose of gambling (27%) or vacationing (38%) and stay for two days or less. Eighty one percent of these visitors frequent the boardwalk nearby this KOP (Posner, 2013). As such, it is anticipated that this view would be experienced by a large number of visitors during the summer season. In most cases, these viewers accept that this is not a natural or serene landscape and intensive development is a part of the draw and viewer experience. However, for some, the juxtaposition of the largely undeveloped ocean and the highly developed adjacent land uses may contribute to their visual experience.

The WTGs, as viewed at a distance of 11.4 miles from this KOP, dominate the ocean view as indicated by a VTL score of 6. However, the Projects are not completely out of character with the shoreline development, which in this location extends out into the ocean via a large multistory pier, truncating the available ocean horizon and screening a portion of the Projects. At this time of day, during a holiday weekend, the beach would be at its most crowded. Despite this, the presence of the Projects would likely draw viewer attention and may be seen as an extension of the shoreline development by some, and a visual disruption of the horizon by others. The motion of the rotors would likely draw viewer attention despite the intensely developed shoreline. However, the density of WTGs would be significantly reduced during most summer days due to atmospheric perspective. In fact, in 2019 (model year) the availability of views as presented in the visual simulation would only occur over approximately 1.6% of the month of July. Two other conditions are also presented in Attachment E. These simulations illustrate the appearance of the WTGs when visibility is limited to within a distance of 18 and 20 miles. These conditions occurred during 13% and 12% of the month of July, respectively. While the nearest WTGs are still visible on the horizon, under these conditions, the visual clutter associated with stacking and massing is absent, making the Projects appear significantly less dominant.

3.2.1.3.10 Lucy the Margate Elephant National Historic Landmark

Viewers at this attraction will primarily include tourists and visitors to Atlantic City and Margate City. This famous attraction brings up to 35,000 visitors per year for guided tours, and over 100,000 visit the site annually. The focus of these tours is mainly centered on the interior design elements within the elephant, but the tour typically ends on the howdah, or the uppermost viewing platform. The view from this platform provides an elevated vantage point that allows the viewer to see a relatively narrow enclosed view of the ocean. A view to the ocean is not available from ground level due to closely situated buildings along the street. Viewers tend to take in a brief view, take a photograph, and tour guides typically offer to take group photographs with the ocean as the backdrop. The duration of the view is relatively short, but the frequency may be considered high based on the number of visitors. Generally, visitors to this attraction are focused on the fact that they are inside this massive architectural depiction of an elephant and less concerned about the narrow ocean view.

Rating panel results indicate that the WTGs would result in a VTL of 5 from this location suggesting that they would be a significant draw of viewer attention and would contrast with line, form, color, and texture of features present in the existing view. Given the nature of viewer activity and the composition of the existing view, it is unlikely that the WTGs would result in any diminishment of enjoyment of this resource. However, on clear days there would likely be a change in the perception of an undeveloped ocean horizon.

This is somewhat accentuated by the narrow field of view, flanked on both sides by tall buildings. As mentioned previously, the majority of activities occur inside the elephant where views of the ocean are restricted to small windows representing the eyes of the elephant. However, as illustrated in the video simulation from Huntington Park Margate City (MC03), viewers have the opportunity to experience views with less visual clutter and development. From these locations, the Projects are expected to have a greater impact on users, similar to those described in BHB01.

3.2.1.3.11 Gillian's Wonderland Pier

Viewers at Gillian's Wonderland Pier will include tourists and vacationers, as well as residents. Typical of a commercial waterfront, this area has a beach separated by recently restored sand dunes, a boardwalk, and commercial storefronts, restaurants, and amusement parks. As such, users will be engaged in a wide variety of activities. Some of these activities such as sunbathing, swimming, and fishing have distinct connections to the ocean which enhances or is essential to the viewer's experience. Activities that take place on the boardwalk and nearby amusement parks are less dependent on the presence of the ocean, but it is still a significant draw to this area. Users will be engaged in focused activities such as shopping, eating, or riding roller coasters which are the strong focus of their attention and leaves little opportunity for viewing the ocean. It is likely that sound and smell from the ocean contribute to their experience while engaged in these activities, but is not central to user enjoyment The users at Gillian's Wonderland recognize that this environment is a heavily manipulated seascape and accept that it could not be mistaken for a pristine or serene setting. However, when users are not engaged in amusement park activities and are standing at the water's edge and looking out to the ocean horizon, the scene can feel more peaceful and undeveloped. For users that engage in concentrated viewing, the ocean may be the most important component of the viewer's experience.

The rating panel scores indicated a VTL of 5 from this KOP, which is approximately 17.2 miles from the nearest WTG. As such, during very clear conditions, the WTGs could be the major focus of attention for viewers concentrating on the ocean view and would contrast with the line, form, color, and of the ocean horizon in the existing view. It is important to note that the waves present in the photosimulation are particularly large and a calmer ocean could reveal more of the Projects. However, the visibility and perceived density of WTGs would be significantly reduced during most summer days due to atmospheric perspective. The 2019 meteorological data suggests that the availability of views to that presented in the visual simulation would only occur over approximately 4.6% of the month of September. Two other conditions are also presented in Attachment E and these simulations illustrate the appearance of the WTGs when visibility is limited to within distances 18 and 20 miles. These conditions occurred during 31% and 27% of the month of September, respectively. Simulations under these conditions illustrate that all but the closest WTGs are completely obscured from view, and even the visible portions of the Projects are difficult to perceive on the horizon. While visible, it is not anticipated that the WTGs will result in any significant effects on viewer enjoyment of Gillian's Wonderland Pier.

3.2.1.3.12 Townsend's Inlet Bridge

The Townsend Inlet Bridge is the only direct route to and from Sea Isle Inlet and Avalon, New Jersey. In the summertime recreationalists walk, run, and bike over the bridge from parks on either side. Additionally, the bridge is crossed by over 1,000 cars per day in the offseason and approximately 7,800 vehicles during the summer season (NJDOT, 2018). Drivers on this bridge are likely to be focused on the road and will not have the opportunity for extended ocean viewing. In the height of the summer season, it is possible that traffic may slow or stop allowing for short duration observations of the ocean horizon. Similarly, bikers will be

concentrated on negotiating traffic. Although, their travel speed is significantly lower than vehicular traffic and allows for some degree of detailed observation, bikers and drivers using the bridge will need to keep their focus on the road and other vehicles. Walkers and runners have greater opportunities to stop and take in views from the two observation platforms located on opposite sides of the bridge. These users are likely to be the most sensitive to changes in the landscape, seascape, and ocean. However, this iconic bridge serves as a gateway between two barrier islands, so the presence of the ocean as a background feature is an important component of any method of travel.

With the Projects in place, the WTGs resulted in a VTL of 5 from this location. At a distance of 27.4 miles, this elevated perspective combined with the morning sun, results in WTG contrast with the line, form, color, and texture of the ocean surface due to the high contrast lighting conditions. Under the conditions illustrated in the photosimulation, the WTGs will likely be recognized by most users, regardless of their mode of transportation. However, the ocean horizon is interrupted on both sides of the inlet by multistory buildings and human development. The WTGs may draw viewer attention due to the rotor movement, but the entire view is animated by human activity in the foreground, which is much more likely to attract and hold viewer attention. Due to the abundance of vehicular traffic, the viewshed would not be considered serene or undeveloped, but the WTGs could add visual clutter in a place where it did not previously exist. Under exceptionally clear conditions, the presence of the WTGs could detract from the viewer's experience which was a previously undeveloped ocean horizon. However, under more typical weather conditions atmospheric perspective is likely to drastically minimize the visibility of the WTGs at this distance. During typical summer viewing conditions, it is likely the drivers on the bridge would not see the WTGs and stationery or slow-moving observers would likely only perceive a few faint WTGs on the horizon. The reduction in stacking or layering of visible WTGs under these conditions would likely minimize their visual prominence and the impact to viewers would be minimal. This is supported by the typical conditions simulations produced from Gillian's Wonderland Amusement Park (OC04), which indicated minimal visibility of the WTGs and OSSs during typical atmospheric conditions. Since the Townsend Inlet Bridge is just over 10 miles greater in distance from the Projects than OC04, it is anticipated that visibility under typical conditions would conceal an even greater portion of the Projects if not completely obscuring them from view.

3.2.1.3.13 Cape May Point State Park

Viewers at Cape May Lighthouse mostly consist of tourists and vacationers whose numbers may exceed 100,000 per year. Most visitors climb to the viewing platform of the lighthouse to take in elevated views of the ocean extending across 270 degrees of the horizon. Viewers specifically climb this lighthouse to see the seascape and landscape from a rare, elevated perspective. The ocean and views to the ocean horizon are integral to the viewer experience due to the inherent function of lighthouses and the unique view it provides.

Rating panel results indicated a VTL of 2 from this KOP, suggesting that the WTGs are very small and faint, but may be detected by scanning the horizon. At a distance of 47 miles, this degree of visibility would be extremely rare and atmospheric perspective is likely to completely eliminate WTG visibility, over the majority of the year. As such, it is unlikely that the Projects will result in any adverse impacts to the viewers experience from this resource.

3.2.2 Character Area Scenic Quality

The scenic quality of each character area within the ZVI, as determined by the rating panel using the rating procedure, is presented in Table 3.2-1, below. The completed rating forms are included in Appendix D.

Table 3.2-1 Character Area Scenic Quality Assessment Results

Character Area	Rating Panel Members					Scenic Quality
	KC	JG	KV	SB	Average	
Commercial Strip Development	7.5	8.2	8.2	5.3	**7**	Low
Industrial/Developed	6.7	5	6.3	4.8	**6**	Low
Limited Access Highway	10	9	9	8	**9**	Low-Moderate
Agriculture	10.5	11.2	102	10	**10**	Low-Moderate
Inland Open Water	10.3	11.7	11.7	8.2	**10**	Low-Moderate
Ocean	11.3	14.7	14	9.3	**12**	Moderate
Bayfront Residential	13	14	11.3	11	**12**	Moderate
Dredged Lagoon	11.3	13	9.7	10.3	**11**	Moderate
Inland Residential	11.8	12.2	10.2	9.7	**11**	Moderate
Town/Village Center	13.2	14.8	10.2	13	**13**	Moderate
Atlantic City	10.3	13	11.3	11.7	**12**	Moderate
Forest	11.8	11.8	13.2	12	**12**	Moderate
Commercial Beachfront	10.3	10.7	10	13.3	**11**	Moderate
Recreation	11	10	11.3	12.5	**11**	Moderate
Undeveloped Beach	12.7	16.7	15	13.3	**14**	Moderate-High
Undeveloped Bay	14	16	14.3	12	**14**	Moderate-High
Ocean Front Residential	13.3	15.3	12	13.7	**14**	Moderate-High
Salt Marsh	14.7	15	14.3	11.7	**14**	Moderate-High

As summarized in Table 3.2-1 the average score of four rating panel members classified four of the CAs as Moderate-High scenic quality. These include the Undeveloped Beach, Undeveloped Bay, Salt Marsh, and Oceanfront Residential. These CAs received average scores ranging from 11.7 to 16.7.

Nine CAs, including Town/Village Center, Open Water/Ocean, Bayfront Residential, Forest, Atlantic City, Recreation, Dredged Lagoon, Commercial Beachfront, and Inland Residential CAs received average scores between 11 and 12, which is consistent with moderate scenic quality.

Three CAs, including Agriculture, Inland Open Water, and Limited Access Highway received scenic quality scores of 9 to 10 indicating average visual quality.

Two CAs, including Commercial/Strip Development and Industrial/Developed received scenic quality scores of 6 and 7, indicating areas are noted for their minimal visual quality and are often considered blighted areas.

Drawing from the VIA results, KOP impacts characterized as high magnitude of visual change were generally concentrated within a 20 mile range of the Projects. One KOP, located 24.9 miles from the nearest WTG also received high magnitude of visual change suggesting that, in existing scenic quality, lighting, clear atmospheric conditions, and viewer sensitivity and high scenic quality of the of the views may result in

elevated visual impacts at these more distant KOPs. To determine where impacts are likely to occur within the individual character areas, Table 3.2-2 below provides a breakdown of visibility by character area in 10-mile increments.

Table 3.2-2 Landscape Similarity Zone Visibility by Distance Zone

Character Area (CA)	0-10 Miles		10-20 Miles		20-30 Miles		Greater Than 30 Miles	
	Total CA Area (Acres)	Area of ZVI within CA (Acres and % of CA)	Total CA Area (Acres)	Area of ZVI within CA (Acres and % of CA)	Total CA Area (Acres)	Area of ZVI within CA (Acres and % of CA)	Total CA Area (Acres)	Area of ZVI within CA (Acres and % of CA)
Open Water/Ocean	612,671	612,671 (100%)	745,964	745,962 (100%)	940,853	940,847 (100%)	1,903,200	1,410,227 (74.1%)
Undeveloped Bay	568	560 (98.5%)	59,015	53,608 (90.8%)	33,564	24,841 (74.0%)	43,276	20,892 (48.3%)
Oceanfront Residential	93	76 (80.9%)	1,532	1,098 (71.7%)	1,284	890 (69.3%)	1,377	394 (28.6%)
Salt Marsh	1,157	1,087 (94.0%)	49,082	41,277 (84.1%)	45,081	24,634 (54.6%)	34,798	4,669 (13.4%)
Commercial Beachfront	-	-	47	41 (86.8%)	-	-	482	216 (44.9%)
Undeveloped Beach	555	409 (73.8%)	750	541 (72.2%)	766	322 (42.1%)	2,503	801 (32.0%)
Atlantic City	-	-	2,176	272 (12.5%)	-	-	-	-
Industrial	-	-	2,338	141 (6.0%)	8,006	1,351 (16.9%)	20,215	167 (0.8%)
Bayfront Residential	8	4 (57.0%)	724	88 (12.2%)	610	25 (4.0%)	1,153	16 (1.4%)
Dredged Lagoon	-	-	2,116	182 (8.6%)	2,428	53 (2.2%)	5,397	64 (1.2%)
Limited Access Highway	-	-	1,076	130 (12.1%)	2,653	81 (3.1%)	3,763	7 (0.2%)
Recreation	3	1 (58.1%)	1,782	197 (11.1%)	4,757	133 (2.8%)	9,651	76 (0.8%)
Inland Open Water	-	-	903	34 (3.8%)	4,229	413 (9.8%)	12,659	<0.1 (<0.1%)

Character Area (CA)	0-10 Miles		10-20 Miles		20-30 Miles		Greater Than 30 Miles	
	Total CA Area (Acres)	Area of ZVI within CA (Acres and % of CA)	Total CA Area (Acres)	Area of ZVI within CA (Acres and % of CA)	Total CA Area (Acres)	Area of ZVI within CA (Acres and % of CA)	Total CA Area (Acres)	Area of ZVI within CA (Acres and % of CA)
Commercial Strip Development	12	4 (31.6%)	3,766	208 (5.5%)	3,931	39 (1.0%)	14,927	33 (0.2%)
Inland Residential	273	68 (24.8%)	21,258	492 (2.3%)	32,232	114 (0.4%)	124,007	24 (<0.1%)
Town/Village Center	10	3 (31.1%)	131	1 (0.8%)	445	1 (0.1%)	1,175	<0.1 (<0.1%)
Forest	30	3 (9.4%)	22,908	185 (0.8%)	226,222	996 (0.4%)	593,646	137 (<0.1%)
Agriculture	-	-	435	2 (0.4%)	10,007	16 (0.2%)	50,408	2 (<0.1%)

As illustrated in Table 3.2-2, impacts to character areas will be most significant in those portions that occur within the ZVI and the 0-10 mile zone. Notable character areas with significant areas of potential project visibility include, the Ocean, Undeveloped Beach, Oceanfront Residential, Salt Marsh, Commercial Beachfront, Atlantic City, and Undeveloped Bay. These areas of potential visibility within the various distance zones are described in greater detail, below.

Due to the fact that the Projects are being proposed within the Ocean character area and there is a distinct lack of screening features on the water 100% of its area within 30 miles will have views of the WTGs and OSSs. While the Ocean character area within these distance zones is currently pristine and undeveloped, views from within it may contain a heavily manipulated and developed shoreline in some directions. On the other hand, some views bring a sense of vast, openness that would be altered by the presence of the WTGs and OSSs when viewing the ocean from within the WTA or from nearshore areas. Portions of the Ocean character area extending beyond 30 miles, occur outside of the ZVI (26%) and would not have visibility of the Projects. The majority of these area occurs near the inlet to the Delaware Bay and to the east of the Projects where curvature of the earth eliminates visibility of the WTGs.

Within 10 miles of the Projects, 94% of the Salt Marsh character area could have views of the proposed WTGs and OSSs. This constitutes multiple areas covering a total of approximately 1,087 acres and includes the large salt marshes in Galloway Township and Brigantine. In most instances, views from these areas are visually disconnected from the ocean by the presence of the barrier islands. From 10-20 miles, there is a considerably larger portion (41,000 acres) of the Salt Marsh character area within the ZVI. The KOP from the Bay Boulevard Rutgers Field Station (LEHT02) provides an example of potential visibility of the Projects from within this character area. This KOP represents one of the most open, unobstructed views from within this character area and the Projects resulted in a VTL 6, suggesting that the presence of the WTGs and OSS could, at times, result in a significant change to the horizon when viewed from within the Salt Marsh character area. Visibility begins to drop significantly in the 20-30 mile zone due to significant screening provided by the barrier islands to the northwest and southwest of the Projects. In this zone 24,000 acres or 54.6% of the Salt Marsh occurs within the ZVI. Beyond 30 miles, this visibility drops to 4,700 acres and 13.4%.

Similar to the Salt Marsh character area, the Undeveloped Bay character area also has visibility of the Projects from within the 10-mile zone. In this case, 560 acres occurs within the ZVI constituting approximately 99% of the Undeveloped Bay within 10 miles. While portions of the bays occurring behind the barrier islands have direct connections to the ocean, the majority of this zone is distinct from the ocean and rarely includes ocean views. However, the turbines extend well above the barrier islands and would become a highly visible component of the seascape during clear conditions. Within 10-20 miles, the portion of Undeveloped Bay within the ZVI drops to 91% but makes up a vast 54,000 acres. Within 20-30 miles this number drops to 25,000 acres and 74% and 21,000 acres and 48% beyond 30 miles.

The ZVI contains 409 acres or 74% of the Undeveloped Beach character area within 10 miles of the Projects. As illustrated in the photosimulation from North Brigantine Natural Area (BC02), this character area contains some of the closest land-based viewing opportunities of the Projects. The ocean is a significant contributor to the visual character and sense of place of this character area and the presence of the WTGs and OSSs changes the undeveloped character of the ocean horizon by adding large, manmade infrastructure, a portion of which would be visible from shore on most clear days and some partially obscured days. Within 10-20 miles, the portion of Undeveloped Beach within the ZVI drops to 72% but makes 541 acres. Within 20-30 miles this number drops to 322 acres and 42% acres and then increases again to 801 acres and 32% beyond 30 miles, at which point the Projects are expected to have less influence on visual character.

Seventy six acres of land area or 80.9% of the Oceanfront Residential character area occur within the ZVI within 10 miles of the Projects. The ocean is a significant contributor to the visual character and sense of place of with the Oceanfront Residential character area. Homes were placed here for the purpose of the

oceanfront setting. The presence of the WTGs and OSSs changes the undeveloped character of the ocean horizon by adding large, manmade infrastructure, a portion of which would be visible from shore on most clear days. This change to the Ocean character area indirectly alters the character of ocean views from within the Oceanfront Residential character area. The majority of these properties within 10 miles of the Projects will experience this change in character during clear viewing conditions. Considering distances from 10 to 20 miles, the area of potential visibility increases to 1,532 acres which consists of 72% of Oceanfront Residential areas. Between 20 and 30 miles, 890 acres or 69% of the Oceanfront Residential areas are indicated as having potential visibility of the Projects. Beyond 30 miles, 29% or 394 acres occur within the ZVI.

Visibility from within the Commercial Beachfront character area only occurs within the 10-20 mile and greater than 30 mile zone. This can be directly attributed to visibility from Ocean City and Wildwood. In these areas approximately 41 acres or 87% of the Ocean City Commercial Beachfront could have some degree of visibility of the Projects from 10-20 miles distant and 216 acres or 45% of the Wildwood Commercial Beachfront from a distance of greater than 30 miles.

Visibility from the Atlantic City character areas occurs within the 10-20 mile zone and includes 12.5 percent or 272 acres. This area of visibility is generally limited to the beachfront and boardwalk and is illustrated in KOPs from the Jim Whelan Boardwalk Hall (Atlantic City Convention Center NHL – AC02) and Ocean Casino Resort – Sky Garden (AC04). Atlantic City is a distinct character area in that the oceanfront is heavily developed and in areas this development spills out into the ocean for hundreds of feet. This seascape is unlike others within the VSA and it sense of place is characterized by large shiny buildings, digital signs in constant motion, large restaurants on the beach. While the Ocean is an important adjacent character area to viewers, the presence of the WTGs and OSSs does little to alter the character within the thick of Atlantic City. The presence of build elements on the ocean is not without precedent here and the effects produced by additional development would not detract from this area's sense of place.

In addition to the seascape character areas described above, some landscape character areas also had notable visibility of the Projects from inland locations. For example, 68 acres or 25% of the Inland Residential character area within 10 miles of the Projects could have visibility of the WTGs and OSSs. This area is mainly concentrated in Brigantine where narrow bands of visibility extend inland along residential streets that are aligned with some portion of the Projects. However, it is anticipated that these views will not include the ocean and would likely only include a portion of the Projects due to tightly framed views constrained by dense residential development. Given the degree of competing foreground development and relatively small portions of the Projects that would be visible, it is not anticipated that the Projects would result in a significant change to the character of the Inland Residential character area. From 10 to 20 miles, the area of potential visibility increases to 492 acres which only consists of 2.3% of Inland Residential areas in this distance zone. Between 20 and 30 miles, less than 1% of Inland Residential areas would have visibility of the Projects. This is likely due to distance and the screening effects of shoreline topography and development. Beyond 30 miles, visibility of the Projects from Inland Residential areas diminishes to less than 0.1%.

3.2.3 Other Factors Affecting Visibility and Visual Impact

As discussed in Section 3.2.1, the Projects could result in appreciable visual impacts to several onshore visual resources due to scale contrast, spatial dominance, and compatibility with existing elements in the landscape/seascape. However, it is important to note that most of the visual simulations were photographed during exceptionally clear conditions and in many instances were also backlit by the sun, making the WTGs appear dark against a light, cloudless horizon. While the simulations generally illustrate minimal atmospheric haze and screening, actual visibility of the Projects will be limited by several other factors not

specifically illustrated in the visual simulations evaluated in this VIA. As mentioned previously, these include weather conditions, waves on the ocean surface, humidity, and air pollution.

A study completed by the Rutgers School of Environmental and Biological Sciences for the Atlantic Shores Wind Project titled, *Initial Visibility Modeling Study for Offshore Wind for New Jersey's Atlantic Shores Offshore Wind Project* provides relevant data regarding offshore visibility frequency and trends as influenced by meteorological conditions. Forecast Systems Laboratory (FSL) predictive models were used to determine visibility distance using past meteorological data from Atlantic City International Airport and Ocean City Municipal Airport. The FSL predictive model uses inputs such as temperature, relative humidity, and dew point temperature to determine the potential distance and frequency of specific viewing conditions (Rutgers, 2020). The results of this study are summarized below.

- Initial observations suggest that visibility to a distance of 8 and 10 miles (13 and 16 km) from Atlantic City International Airport occurred over 73% and 89% of daylight hours, respectively, in any given year. These same observations from Ocean City Municipal Airport suggest that visibility frequencies were 6% and 12% lower than those observed at Atlantic City International Airport.
- The higher visibility at Atlantic City International Airport can be attributed to the drier inland air, compared to the more humid coastal air around Ocean City Municipal Airport. Additionally, considering offshore visibility, higher humidity and larger temperature differences between the air and ocean surface cause haziness and marine clouds/fog to occur more frequently offshore.
- Although inland visibility is relatively high, there will be lower visibility when looking offshore toward the Atlantic Shores Lease Area. Between Atlantic City International Airport and the Lease Area, a distance of roughly 25 miles, the percentage of daylight hours with a calculated visibility of 10 or more miles (16+ km) decreases from 78% to 41% based on past meteorological studies.
- Over the ocean, the average visibility in April, May and June ranged from 2.5 to 10 miles (4 to 16 km), which is consistent with lower frequencies above 10 miles in the Ocean City Municipal Airport observations.
- Over the ocean, the average visibility in July and August, (when visibility frequencies over 10 miles in Ocean City are above 75%) ranges from 5 to 12 miles (8 to 19 km).
- The yearly, monthly, and summer average visibility each share a trend of increasing visibility from the morning to the late afternoon. Higher visibility over the land appears to extend out into the ocean throughout the day. This is consistent with warmer temperatures during the day lowering the relative humidity and causing higher visibility.

Based on the results of the Rutgers visibility analysis, it is reasonable to conclude that the VIA presents worst-case visibility conditions in which the entirety of both Projects are visible when viewed from significant distances. While it is very important to illustrate the greatest potential visibility and visual prominence to understand greatest potential visual impacts associated with the PDE, the frequency of these conditions is a relevant and mitigating consideration. As shown in Inset 3.2-3, the average frequency of visibility to 10 miles could occur during as little as 41% of daylight hours. As described in Section 2.3.1 and 3.2.1, only one of the visual simulations, and a very small portion of the VSA and ZVI occurs within 10 miles of the Projects. Consequently, during up to 59% of the daylight hours in a given year, it is anticipated that all, or the vast majority of WTGs will not be visible from onshore resources.

As an example, from the closest KOP included in the visual simulations (and the closest onshore location within New Jersey) the nearest WTG is approximately 8.8 miles (14 km) offshore, but the most distant WTG is located approximately 24 miles (39 km) from the KOP. Based on the results of the Rutgers meteorological study, the first row of WTGs would be visible from this KOP over approximately 50% of the year, the first two rows would be visible over approximately 40% of the year, and portions of the nearest four rows could be visible during approximately 25% of the year during daylight hours (see Inset 3.2-3). Under these weather conditions it would likely be difficult to discern WTGs beyond the initial four rows which would substantially decrease the perceived scale contrast, horizon occupation, and overall density of WTGs. The mitigating effects of atmospheric perspective could serve to reduce the potential visual impacts associated with the Projects during significant portions of the year, and during these low visibility periods, would likely eliminate visibility of the Projects entirely from most shoreline locations within the ZVI.

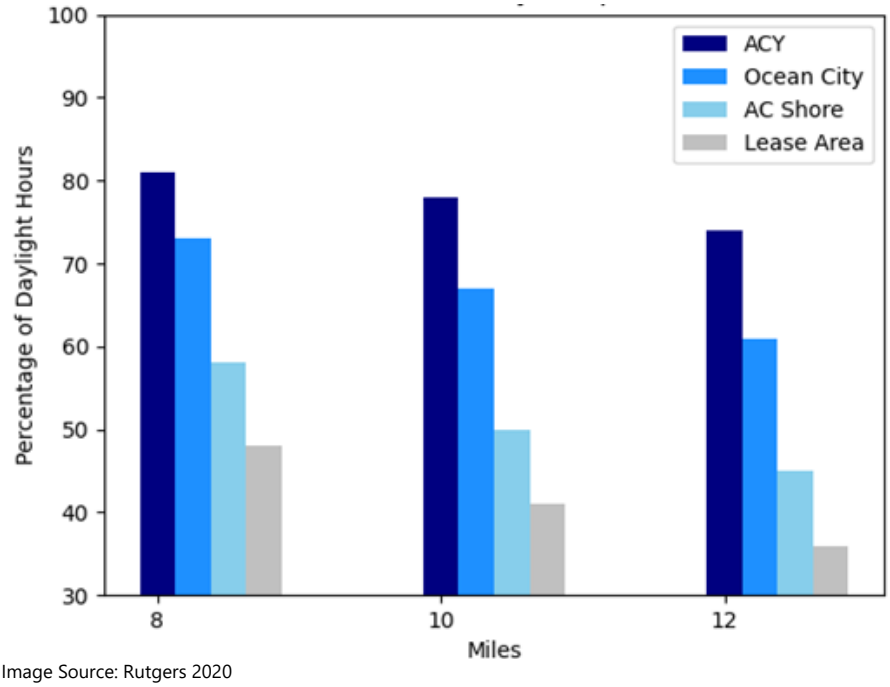


Image Source: Rutgers 2020

Inset 3.2-3 FSL Visibility Distance/Frequency Comparison of Onshore and Offshore Receptors

Considering the mitigating factors associated with atmospheric perspective, Atlantic Shores intends to supplement this VIA with visual simulations illustrating variable conditions and a detailed meteorological analysis to predict the frequency of each visibility condition. While the VIA and simulations currently illustrate and analyze the maximum range of potential visual impact throughout the ZVI, the supplement to this analysis will investigate more likely viewer experience and more typical frequency of Project visibility.

3.3 General Mitigation

As currently proposed, the Project introduces a large scale, renewable energy generating development to a largely undeveloped seascape. Even though portions of the shoreline and inland areas within the VSA are highly developed or disturbed, according to the evaluation conducted as part of this study, the Project has the potential to result in adverse visual impacts to some onshore resources occurring within the ZVI. However, the Project has incorporated several mitigation measures which effectively reduce the potential

visual impacts to the greatest extent practicable given the nature of the technology and the geographic areas deemed suitable for offshore wind energy development. The mitigation measures incorporated into the Project design include the following:

- The Project is located in a designated offshore wind developed area that has been identified by BOEM as suitable for development.
- The WTGs will have uniform design, height, and rotor diameter.
- The white color of the WTGs (required by BOEM) generally blends well with the sky at the horizon, even under clear sky conditions, and eliminates the need for daytime warning lights or red paint marking of the blade tips.

The WTGs will be equipped with AOWL and operated in accordance with FAA Advisory Circular 70/7460-1M (2020), as recommended by BOEM's Draft Proposed Guidelines for Providing Information on Lighting and Marking of Structures Supporting Renewable Energy Development (BOEM 2019). In order to minimize the potential visual impacts at night, Atlantic Shores will use ADLS to limit visual impact pursuant to technical feasibility and approval by the FAA and BOEM.

An analysis was completed by Capitol Airspace titled, *Aircraft Detection Lighting System (ADLS) Efficacy Analysis* to determine the likely activation time of the FAA light if ADLS is implemented. This study reviewed information included in the FAA National Offload Program (NOP), which indicates the location of aircraft based on existing radar systems throughout the country. The NOP data were collected and analyzed to determine when and for how long aircraft traverse the Project airspace during a given year, requiring the aviation obstruction lights to be activated (Capitol Airspace, 2021). The results of this analysis are presented in Table 3.3-1, below.

As illustrated in Table 3.3-1, based on past flight data, the AOWL would be activated for a total of approximately 10.9 hours over a 1-year period. The maximum monthly activation time would occur in November when past flight data suggest activation times would increase to approximately 2 hours and 45 minutes over the entire month. April, May, June, August, and September had the lowest activation frequency with average activation time of 21 minutes per month. Considering the low frequency of light activation, nighttime visual impacts associated with the aviation obstruction lights would become intermittent and minor.

Table 3.3-1 Typical Monthly Duration of AOL Activation

Month	Nighttime Observed (HHH:MM:SS)	Light System Activated Duration (HH:MM:SS)
January	479:05:44	01:08:24 (0.24%)
February	405:38:51	01:26:57 (0.36%)
March	410:56:29	01:01:29 (0.25%)
April	359:01:19	00:23:44 (0.11%)
May	337:05:53	00:20:34 (0.10%)
June	309:35:09	00:22:24 (0.12%)
July	328:20:35	01:07:35 (0.34%)
August	357:52:21	00:22:54 (0.11%)
September	383:14:51	00:19:04 (0.08%)
October	435:42:32	00:40:48 (0.16%)
November	455:22:55	02:45:37 (0.61%)
December	488:44:19	00:51:46 (0.18%)
TOTAL	**4750:40:58**	**10:51:16 (0.23%)**

Table Source: Capitol Airspace, 2021

Additional mitigation measures were also considered. While some of these mitigation considerations could serve to incrementally reduce potential visual impacts associated with the Project, some mitigation options may not be feasible due to regulatory requirements. The feasibility and possible benefits of such measures are described below:

- Relocation: Project site and/or individual turbine relocation is not under consideration. The Project is already located offshore in water depths suitable for offshore wind energy development, reflecting the substantial effort that has been expended in identifying suitable wind energy areas on the OCS. It is unlikely that changes to the orientation or arrangement of the turbines could reduce visual impact by eliminating the perception of stacked turbines on the horizon, as this perception will vary from viewpoint to viewpoint within the ZVI. Substantially reducing the perception of WTG stacking would likely require a significant reduction in developable area. It is possible that a reduction in the total number of WTGs could result in a reduction of visual impacts from some of the closest KOPs, but not without adversely affecting the generating capacity of the Project.

- Camouflage: Alternate color selection or attempts at camouflaging the WTGs are not effective or feasible in mitigating visual impacts of offshore wind turbines. Under most conditions, the white color of the WTGs generally minimizes contrast with the sky and the yellow foundation is barely perceivable or not visible due to screening provided by atmospheric perspective and/or curvature of the earth. This is demonstrated by simulations prepared under a variety of sky conditions and distances from the Project. Additionally, the white color of the WTGs is necessary to comply with FAA guidance and avoid daytime lighting.
- Scale: While a reduction in turbine height could lessen scale contrast, this reduction would have to be considerable before it would be perceived from shoreline viewpoints. In addition, the line, form, and texture of shorter turbines (which contribute to their contrast with the existing seascape) would remain essentially the same, and more WTGs would be required to maintain the Project's generating capacity.

4.0 CONCLUSIONS

An important consideration in visual impact assessment is to avoid the assumption that project visibility automatically equates to an adverse visual impact. The degree of project visibility will vary greatly depending on the distance of the viewer from the project; meteorological conditions; degree of screening from structures, vegetation, and curvature of the earth; visual acuity of the viewer; and the ability of the viewer to recognize the WTGs. Projects that are located offshore, relatively far from the viewing public may go completely unrecognized, due to the fact that their visibility is obscured by atmospheric perspective, and if visible at great distances, are perceived as secondary to the larger visual landscape. Water, trees, lighthouses, and other natural and built features often remain the focus of attention. Results from a study in which offshore wind farms were viewed at various distances and conditions in Europe, suggest that small to moderately sized offshore wind farms may be visible to the unaided eye at distances greater than 26 miles (42 km) (the maximum distance considered in that study). However, these same facilities were determined to be the focus of viewer attention when viewed at distances within 10 miles (16 km), noticeable to casual observers at distances of up to 18 miles (29 km), and only visible after concentrated viewing when viewed from greater than 25 miles (40 km) (Sullivan et. al. 2012). As mentioned previously, the Projects are proposing WTGs that are larger than the turbines evaluated in this study. As such, under clear conditions and strong lighting contrast (i.e., backlit or strongly front lit against a dark sky) the turbines are likely to be noticeable at distances over 30 miles (48 km), but visibility and visual prominence will diminish significantly between 30 miles (48 km) and 40 miles (60 km) as illustrated in the visual simulations. The Edwin B. Forsythe NWR at the Woodmansee Estate (LAT01) is 32 miles (52 km) from the Projects and received a VTL 4, suggesting that the WTGs are plainly visible and would not be missed by casual observers. However, the KOP from Seaside Beach Park (SPB01) which is 39 miles (63 km) from the Projects received a VTL 1, which suggests the WTGs would only be visible after extended, concentrated viewing. As such, the simulations support the conclusion that 40 miles (60 km) is an appropriate VSA, and beyond a distance of 35 miles prominence and visual impact will be negligible.

The following additional conclusions can be drawn from the VIA:

- The viewshed analysis and field verification indicate that the Project has potential visibility from a relatively small portion of the land area within the VSA. The lidar viewshed analysis suggests that views of the WTGs will be available from approximately 12.5 percent of the land area within the VSA, which defines the Project ZVI. Three percent of the landward VSA (28 percent of the ZVI) will only include views of the turbine blades which is generally the result of partial screening provided by the barrier islands from inland bay and mainland viewing locations. The majority of landward Project visibility (155 sq. mi.) occurs within 10-20 miles (16-32 km) of the Project over uninhabited inland bays. Visibility diminishes significantly between 30 and 40 miles (48-64 km), contributing only 44 sq. mi. to the ZVI. The viewshed analysis also indicated potential visibility along the majority of the eastern shore of the barrier beaches.
- The lidar viewshed suggests that views of the AOWL on the WTGs will be available from approximately 9 percent of the land area within the VSA. This reduction in visibility is largely the result of the lower height of the lights (as compared to the blade tips), combined with the screening effects of curvature of the earth at distance between 30 and 40 miles (48-64 km). The geographic areas that indicated visibility of the AOWL were generally a smaller subset of greater ZVI, particularly over portions of the inland bays and mainland. The FAA viewshed analysis indicated that AOWL

visibility from the barrier islands would completely diminish beyond 35 miles due to curvature of the earth.

- Field verification generally confirmed the results of the viewshed analysis with the exception of a few locations in which it was determined that visibility of the Project, while theoretically possible, would actually be mostly obscured by middle ground and background features. This condition was most often observed from mainland locations where barrier island development and forest vegetation served to substantially screen the majority of the Project. Field verification also confirmed that visibility will be available from some elevated positions outside the ground level ZVI, particularly along the barrier island shore. As discussed in Section 3.1.1, because structures are classified as screening features, the ZVI does not predict visibility from elevated human-made structures. This condition is most prevalent in Atlantic City and Ocean City, but very rare from inland areas. In conclusion, it was determined that the ZVI is an accurate and reasonable representation of the areas in which the Project may be visible, but likely a conservative representation.
- Six KOPs received elevated visual impact scores that resulted high magnitude of visual change and decrease in scenic quality resulting in adverse visual impacts. These KOPs included Beach Haven Historic District (BHB01), North Brigantine Natural Area (BC02), the Ocean Casino Resort Sky Deck (AC04), Beach at Long Beach Island Arts Foundation (LBT03), Jim Whelan Boardwalk Hall NHL (AC02), and Great Bay Boulevard WMA/Rutgers Field Station (LEHT02). These KOPs are relatively close to the Projects (ranging in distance from 9 miles [14 km] to 24.9 miles [40 km]) and averaged 13.5 miles. These KOPs received visual impact scores ranging from minus 4.2 to minus 4.9.
- Considering the view from LBT03, which is approximately 25 miles (40 km) from the Projects, the elevated score can be attributed to the exceptionally clear conditions and low afternoon sun angle presented in the visual simulation. It is anticipated that, based on the meteorological study completed for the Project by Rutgers University, this lighting and visibility condition will be relatively rare along this portion of the coast.
- The Projects would result in potentially adverse visual impacts at four KOPs, including Edwin B. Forsythe NWR at the Woodmansee Estate (LAT01), Lucy the Margate Elephant NHL (MC02), Gillian's Wonderland Amusement (OC04), and Townsend Inlet Bridge (SIC02). These KOPs range from 14.4 miles (23 km) to 32.2 miles (52 km) and average 22.8 miles (37 km) from the Project.
- The rating panel results from LAT01, which is approximately 32 miles (52 km) is the most distant KOP that received potential adverse visual impacts. In this instance, the existing view's scenic quality was moderate to high, suggesting that the KOP is more sensitive to visual change even when the action occurs at a significant distance from the KOP.
- Rating panel results suggested visual impact scores of minus 3.8 to minus 4.4 for the three nighttime views. The rating panel indicated that the AOWL and navigation lights would become the focus of viewer attention and could change the character of the nighttime skies. However, the implementation of ADLS would eliminate the impact of the AOWL for all by 10.9 hours per year. Given infrequent activation time, it is anticipated that visual impacts associated with the AOWLs would be insignificant.
- The meteorological study also predicts that visibility over the water during July and August (the height of the tourism season when the most people will view the Project) will typically range from 5 to 12 miles (8 to 19 km). This finding would suggest that the Project would be substantially

obscured from view even from those areas on the coast closest to the Project. In the spring and early summer (April, May, and June), average visibility predictions suggest that visibility over the ocean will be 2.5 to 10 miles (4 to 16 km) suggesting that visibility of the Project would be even more limited during this period.

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ATTACHMENT A

VISUAL IMPACT ASSESSMENT STUDY PLAN – OFFSHORE

ATTACHMENT B

VISIBILITY FROM MUNICIPALITIES WITHIN THE VISUAL STUDY AREA

ATTACHMENT C

VISIBILITY FROM VISUALLY SENSITIVE RESOURCES

ATTACHMENT D

PHOTOLOG OF KEY OBSERVATION POINTS

ATTACHMENT E (SEPARATE FILE ATTACHMENT)

VISUAL SIMULATIONS AND RATING PANEL RESULTS

ATTACHMENT F

RESUMES OF RATING PANEL MEMBERS

ATTACHMENT G

VISUAL IMPACT ASSESSMENT GUIDANCE & RATING FORMS

ATTACHMENT H

VISIBILITY MODELING STUDY