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Ocean Wind 1 Offshore Wind Farm Final Environmental Impact Statement Volume 3

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BOEM
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Appendix I. Supplemental Information

I.1. Climate and Meteorology

The National Climatic Data Center defines distinct climatological divisions to represent geographic areas that are nearly climatically homogeneous. Locations within the same climatic division are considered to share the same overall climatic features and influences. New Jersey's north-south orientation, with the highest elevations in the northern portion and lower coastal plains in the south and along the bays and the ocean, contributes to climatic differences between the northern and southern portions of the state. Temperature differences between the northern and southern parts of the state are greatest in the winter and least in summer (Rutgers University 2020). New Jersey has four well-defined physiographic belts that parallel the Atlantic Coast—the Coastal Plain, Piedmont, Highlands, and the Valley and Ridge Province (New Jersey Geological Society 2003). The Proposed Action is within the New Jersey Coastal Plain climatic division (NOAA 2021).

I.1.1 Ambient Temperature

The Onshore Project area is characterized by mild seasons and storms that bring precipitation (rain and snow) to the region; the mild seasons are influenced by sea winds that reduce both the temperature range and mean temperature while providing humidity (NJDEP 2010). Air temperatures in the Project area are generally moderate. Air temperature data collected from the Office of the New Jersey State Climatologist, Rutgers University, which averaged the annual, seasonal, and monthly means in southern and coastal areas of New Jersey for 1985–2009, indicate that the annual mean air temperature was 53.2°F (11.8°C) (NJDEP 2010). The mean seasonal air temperature between 1985 and 2010 during the winter ranged from approximately 32–43°F (0–6°C) and in the spring from 54–64°F (12–18°C). The mean seasonal air temperature during the summer ranges from approximately 68–75°F (20–24°C) and during the fall from 53–65°F (12–18°C). The lowest average air temperatures occur in January and the highest in July (NJDEP 2010; NCDC 2021a). Recent offshore air temperature data were downloaded from NOAA buoys near the Offshore Project area. Data between the years 2014 and 2018 were downloaded from Atlantic City, New Jersey (Buoy No. ACYN4). Table I-1 summarizes average temperatures at the Atlantic City buoy.

Table I-1 Representative Temperature Data for the Project Area

NOAA Station	Year	Annual Average °F/°C	No. of Observations
Atlantic City Buoy (No. ACYN4)	2014	53.8/12.1	86,432
	2015	55.4/13.0	86,357
	2016	55.6/13.1	81,252
	2017	55.9/13.3	85,57
	2018	52.9/11.6	63,856

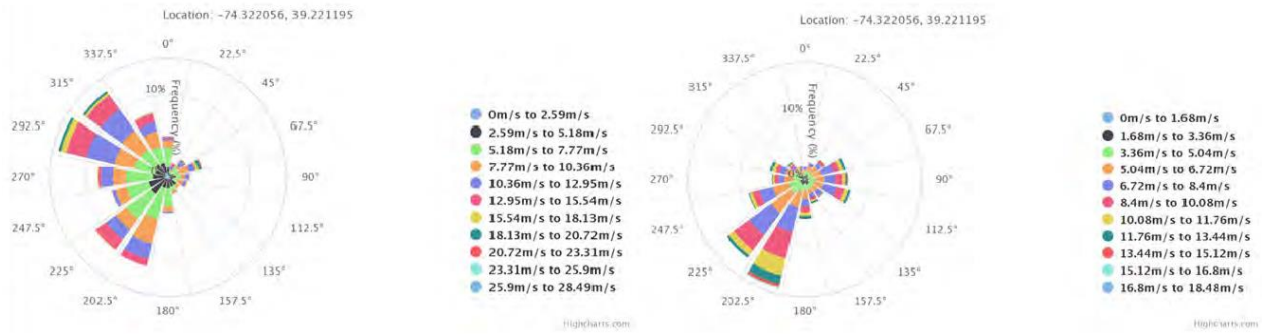
Source: Ocean Wind 2023

I.1.2 Wind Conditions

Prevailing winds in the middle latitudes over North America flow mostly west to east ("westerlies"). Westerlies within the Lease Area vary in strength, pattern, and directionality. Winds during the summer are typically from the southwest and flow parallel to the shore, and winds in the winter months are

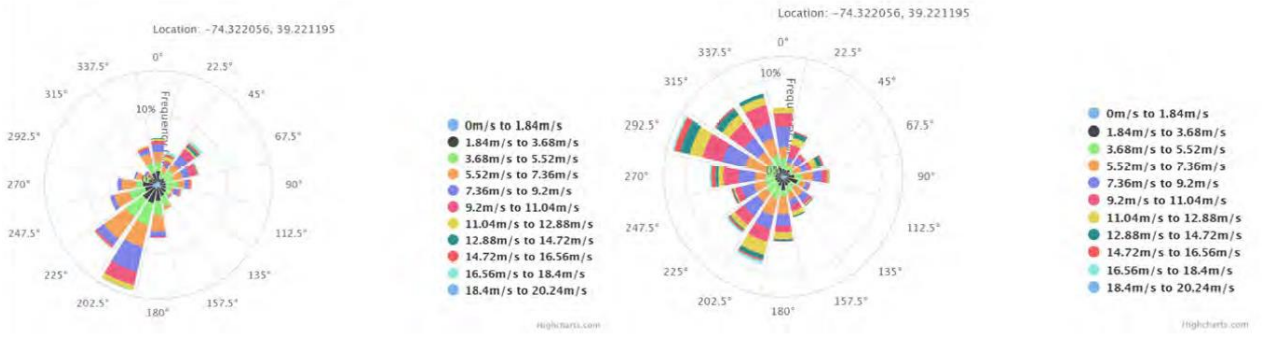
typically from the northwest and flow perpendicular to the shore. Spring and fall are more variable, with winds from either the southwest or northeast (Schofield et al. 2008). Ocean Wind has been collecting wind and wave data from two stations in the Lease Area: stations F220 and F230. In addition, the Metocean Data Portal, maintained by the Danish Hydrological Institute, provides wind data for the entire U.S. East Coast that has been generated through numerical models (Danish Hydrological Institute 2018). Data for the Project were generated using a location within the Lease Area. Data from 2017 indicate wind speeds reached 63.8 miles per hour (28.5 m/s). The highest-frequency wind directions generally were from south-southwest to northwest. Throughout the year, wind direction is variable. However, seasonal wind directions are primarily from the west/northwest during the winter months (December through February) and from the south/southwest during the summer months (June through August). Figure I-1 and Figure I-2 show 3-month wind roses for January through June 2017 and July through December 2017, respectively, for a location within the Lease Area (-74.322056, 39.221195). Top wind speeds within the Lease Area peaked between the months of January and March at 18.13 m/s to 20.72 m/s from the northwest.

Extreme wind conditions on the U.S. East Coast are influenced by both winter storms and tropical systems. Several northeasters occur each winter season, while hurricanes are rarer but potentially more extreme. The tropical systems therefore define the wind farm design, based on extreme wind speeds (those with recurrence periods of 50 years and beyond).



Source: Danish Hydrological Institute 2018

Figure I-1 Wind Rose Graphs for the Lease Area: January through March 2017 and April through June 2017



Source: Danish Hydrological Institute 2018

Figure I-2 Wind Rose Graphs for the Lease Area: July through September 2017 and October through December 2017

Table I-2 summarizes wind conditions in the region. This table shows the monthly average wind speeds, monthly average peak wind gusts, and hourly peak wind gusts for each individual month. Data from 1984 through 2008 show that monthly mean wind speeds range from a low of 10.9 miles per hour (17.6 kilometers per hour) in July to a high of 17.4 miles per hour (28.0 kilometers per hour) in January. The monthly wind mean peak gusts reach a maximum during January at 24.1 miles per hour (38.7 kilometers per hour). The 1-hour average wind gusts reach a maximum during September at 63.3 miles per hour (101.9 kilometers per hour) (National Data Buoy Center 2018).

Table I-2 Representative Wind Speed Data

Month	Monthly Average Wind Speed		Monthly Average of Hourly Peak Gust		Monthly Maximum Hourly Peak Gust	
	mph	km/hr	mph	km/hr	mph	km/hr
January	17.4	28.0	24.1	38.7	61.6	99.1
February	16.2	26.1	21.9	35.2	56.8	91.5
March	15.5	25.0	20.5	33.0	57.5	92.6
April	14.0	22.6	19.0	30.6	56.8	91.5
May	12.7	20.4	16.2	26.1	60.2	96.9
June	11.5	18.5	15.3	24.6	47.6	76.7
July	10.9	17.6	14.7	23.7	50.1	80.6
August	11.2	18.0	15.2	24.4	48.6	78.2
September	13.0	20.9	18.0	28.9	63.3	101.9
October	14.8	23.9	20.5	33.0	60.6	97.6
November	16.3	26.3	21.8	35.0	57.3	92.2
December	17.1	27.6	23.8	38.3	56.2	90.4
Annual	14.0	22.6	19.1	30.7	63.3	101.9

Source: National Data Buoy Center 2018
Note: Data presented are for National Data Buoy Center buoy station #44009 (southeast of Cape May, New Jersey).
km/hr = kilometers per hour; mph = miles per hour

I.1.3 Precipitation and Fog

Data from a study conducted by the NJDEP indicate the Lease Area is characterized by mild seasons and storms throughout the year, with precipitation in the form of rain and snow being most common (NJDEP 2010). Average monthly precipitation data from the National Climatic Data Center are presented in Table I-3.

Table I-3 Monthly Precipitation Data[1]

Month	Precipitation (inches/centimeters)	
	Atlantic City Marina, New Jersey	Brant Beach, Beach Haven, New Jersey
January	3.08/7.82	3.25/8.26
February	2.87/7.29	2.86/7.26
March	4.02/10.21	3.97/10.08
April	3.39/8.61	3.26/8.28
May	3.22/8.18	2.78/7.06
June	2.68/6.81	3.05/7.75
July	3.31/8.41	3.92/9.96

Month	Precipitation (inches/centimeters)	
	Atlantic City Marina, New Jersey	Brant Beach, Beach Haven, New Jersey
August	3.92/9.96	3.71/9.42
September	3.08/7.82	2.78/7.06
October	3.47/8.81	3.65/9.27
November	3.35/8.51	2.91/7.39
December	3.62/9.19	3.36/8.53
Annual Average	3.33/8.47	3.29/8.36

Sources: NCDC 2021a, 2021b
[1] Precipitation is recorded in melted inches (snow and ice are melted to determine monthly equivalent).

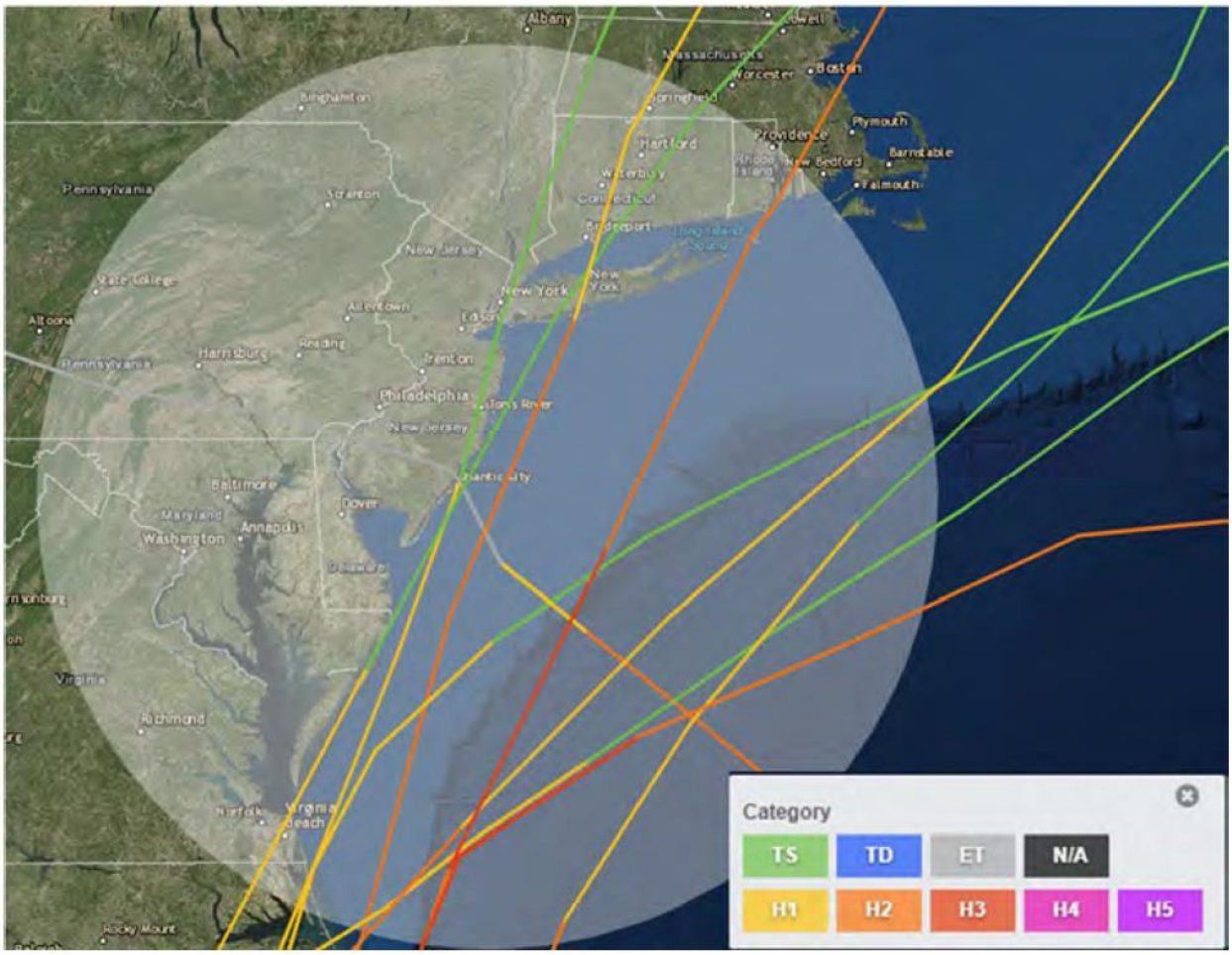
Snowfall amounts can vary quite drastically within small distances. Data from Lewes, Delaware show that the annual snowfall average is approximately 12 inches (30.5 centimeters), and the month with the highest snowfall is January, averaging around 4 inches (10.2 centimeters) (WRCC 2020).

Given the cold air temperatures experienced during many Mid-Atlantic winters, there is potential for icing of equipment and vessels above the water line in the Lease Area. Cook and Chatterton (2008) analyzed icing events in Delaware Bay for winters from 1997 to 2007 and found that icing events are a common occurrence during the months of January, February, and March. The worst winter, as far as icing is concerned, experienced by the Delaware Bay region from 1997 through 2007 was in 2002 to 2003, during which 21 icing events occurred. Delaware Bay experiences approximately eight events annually where the variables favoring icing are consistent for 3 or more hours.

The occurrence of fog in the Mid-Atlantic states is driven by regional-scale weather patterns and local topographic and surface conditions. The interaction between various weather systems and the physical state of the local conditions is complex. Ward and Croft (2008) found that high-pressure systems result in heavy fog over the Delaware Bay and nearby Atlantic coastal areas. During the 2006–2007 winter season (December–February), Sussex County Airport reported 45 fog events, four of which were described as dense fog (Ward and Croft 2008).

I.1.4 Hurricanes and Tropical Storms

Coastal New Jersey is subject to extratropical and tropical storm systems. Records of cyclone track locations, central pressures, and wind speeds are documented by several government agencies. Extratropical storms, including northeasters, are common in the Lease Area from October to April. These storms bring high winds and heavy precipitation, which can lead to severe flooding and storm surges. Most hurricane events within the Atlantic generally occur from mid-August to late October, with the majority of all events occurring in September (Donnelly et al. 2004). On average, hurricanes occur every 3 to 4 years within 90 to 170 miles of the New Jersey coast (NJDEP 2010). Figure I-3 identifies the hurricane tracks within the Lease Area and surrounding areas since 1979 (NOAA 2018). The category for each storm is designated by a color for each track. Extratropical storms are captured by gray line segments, tropical depressions are captured in blue, tropical storms are depicted in green, Category 1 storms are yellow line segments, Category 2 storms are in light orange, and Category 3 storms are dark orange.



Source: NOAA 2018

Figure I-3 Overview of Storm Tracks Since 1979 in the Vicinity of the Lease Area

Although data on tropical systems go back to 1851, the quality and consistency of the data are lacking the further back one looks. The storm period was selected based on the availability of consistent wind data for tropical and extratropical systems. The majority of historical cyclones affecting the Project area are tropical storms, and storms as powerful as Category 3 hurricanes have affected the area.

Regional storm events are recorded in NOAA's National Centers for Environmental Information Storm Events Database (NOAA 2018). Notable events are recorded when there is sufficient intensity to cause loss of life, injuries, significant property damage, or disruption to commerce. Storms that have occurred within 200 nm of the Lease Area since 1979 are indicated in Table I-4.

Table I-4 Named Storms that Have Occurred within 200 nm of the Lease Area Since 1979

Storm Name	Date	Storm Category (Within 200 nm of Lease Area)
Gloria	1985	Category 1 and Category 2 Hurricane
Bob	1991	Category 2 and Category 2 Hurricane
Emily	1993	Category 2 and Category 2 Hurricane
Charley	1998	Tropical Storm and Category 1 Hurricane

Storm Name	Date	Storm Category (Within 200 nm of Lease Area)
Floyd	1999	Tropical Storm and Category 1 Hurricane
Earl	2010	Tropical Storm and Category 1 Hurricane
Irene	2011	Tropical Storm and Category 1 Hurricane
Sandy	2012	Extratropical Cyclone, Category 1 and Category 2 Hurricane
Arthur	2014	Category 1 Hurricane

Source: NOAA 2018

Hurricane Sandy occurred in 2012 and caused the highest storm surges and greatest inundation on land in New Jersey. The storm surge and large waves from the Atlantic Ocean meeting up with rising waters from back bays such as Barnegat Bay and Little Egg Harbor caused barrier islands to be completely inundated (Blake et al. 2013). In Atlantic City and Cape May, tide gauges measured storm surges of 5.8 feet and 5.2 feet, respectively (Blake et al. 2013). Atlantic City International Airport recorded maximum sustained wind speeds of 44.3 knots (51 miles per hour) and a peak wind speed of 55.6 knots (64 miles per hour) on the coast (Ocean Wind 2023 citing NOAA 2012). Marine observations at the Cape May National Ocean Service (CMAN4) recorded sustained wind speeds at 52 knots and an estimated inundation of 3.5 feet (Blake et al. 2013).

I.1.5 Mixing Height

The mixing height is the altitude above ground level to which air pollutants vertically disperse. The mixing height affects air quality because it acts as a lid on the height pollutants can reach. Lower mixing heights allow less air volume for pollutant dispersion and lead to higher ground-level pollutant concentrations than do higher mixing heights. Table I-5 presents atmospheric mixing height data from the nearest measurement location to the Project area (Atlantic City, New Jersey). As shown in the table, the minimum average mixing height is 390 meters (1,279 feet), while the maximum average mixing height is 1,218 meters (3,996 feet). The minimum average mixing height is much higher than the height of the top of the proposed WTG rotors (262 meters [860 feet]).

Table I-5 Representative Seasonal Mixing Height Data

Season	Data Hours Included[1]	Atlantic City, New Jersey Average Mixing Height (meters)
Winter (December, January, February)	Morning: no-precipitation hours	624
	Morning: all hours	617
	Afternoon: no-precipitation hours	774
	Afternoon: all hours	390
Spring (March, April, May)	Morning: no-precipitation hours	545
	Morning: all hours	640
	Afternoon: no-precipitation hours	1,196
	Afternoon: all hours	499
Summer (June, July, August)	Morning: no-precipitation hours	511
	Morning: all hours	566
	Afternoon: no-precipitation hours	1,218
	Afternoon: all hours	695

Season	Data Hours Included[1]	Atlantic City, New Jersey Average Mixing Height (meters)
Fall (September, October, November)	Morning: no-precipitation hours	484
	Morning: all hours	649
	Afternoon: no-precipitation hours	988
	Afternoon: all hours	476
Annual Average	Morning: no-precipitation hours	539
	Morning: all hours	620
	Afternoon: no-precipitation hours	1,052
	Afternoon: all hours	508

Source: USEPA 2021
[1] Missing values are not included.

I.2. Finfish and Other Species of Commercial Importance

Three finfish species of particular commercial importance known to occur within the Project area include summer flounder, black sea bass, and striped bass. Additional discussion of these species is provided below.

I.2.1 Summer Flounder

Summer flounder occurs in both nearshore and offshore waters along the East Coast of North America from Nova Scotia, Canada to Florida; however, their greatest abundance occurs in the Mid-Atlantic region between Cape Cod, Massachusetts to Cape Fear, North Carolina (ASMFC 2021). Adult summer flounder occur at the sea bottom where they burrow into sandy substrates. Juveniles begin migrating offshore from nearshore nursery habitats after their first year of life.

As recently as 2018 and 2021 stock assessment, summer flounder was determined to not be overfished or experiencing pressure from overfishing, which represents an improvement from the 2016 stock assessment where summer flounder stock was determined to not be overfished but is experiencing overfishing (ASMFC 2021, 2017). Currently, spawning stock biomass is estimated at 104 million pounds, which is 86 percent of the target of 122 million pounds (ASMFC 2021). Based on the 2021 ASMFC Stock Assessment for summer flounder, total fishing mortality was estimated at 0.340, which is below the fishing mortality threshold of 0.422. Recruitment was estimated at 49 million fish at age 0, below the time series average of 53 million fish at age 0. Data analyzed by NEFSC for the assessment indicate an expanded age structure relative to the stock observed in the 1980s and 1990s. However, the data also indicate that recruitment has remained generally below average this past decade, and the reason is not known. Additionally, the last benchmark stock assessment found the spatial distribution of the resource is continuing to shift northward and eastward (ASMFC 2023).

I.2.2 Black Sea Bass

Black sea bass occurs in coastal waters along the eastern United States from the Gulf of Maine to the Florida Keys, with the greatest abundance occurring in the area from Cape Cod, Massachusetts to Cape Canaveral, Florida. This species prefers to occupy rocky-bottom habitat, especially near pilings, wrecks, and jetties (ASMFC 2021). Distribution of this species has been expanding northward since the mid-2000s as a result of rising ocean temperatures; this trend would be expected to continue as a result of climate change (ASMFC 2018). Eggs are larvae for this species are found in mid-shelf coastal waters from late spring to late summer (ASMFC 2018).

A recent stock assessment that was peer reviewed in August 2019 found that black sea bass stock was not overfished and overfishing was not occurring in the stock north of Cape Hatteras, North Carolina (ASMFC 2021). In 2018, the spawning stock biomass for black sea bass stock was estimated at 73.6 million pounds, which was considerably higher than the biomass target of 31.07 million pounds (ASMFC 2021). Consistent with this, average fishing morality in 2018 was 0.42, which was 91 percent of the fishing mortality threshold of 0.46 (ASMFC 2021).

I.2.3 Striped Bass

Striped bass occurs along the eastern coast of North America ranging from the St. Lawrence River in Canada to the Roanoke River and tributaries of the Albemarle Sound, North Carolina (ASMFC 2019). Striped bass is an anadromous fish species, spending the majority of its adult life in ocean waters and returning to natal rivers to spawn in during the spring season. Two major spawning grounds include rivers feeding into Chesapeake Bay and the Delaware and Hudson Rivers (ASMFC 2019).

Based on the 2018 stock assessment, striped bass is overfished and subject to pressure from overfishing (NOAA 2019). Female spawning stock biomass estimates were at 151 million pounds, which was considerably less than the spawning stock biomass threshold of 202 million pounds. Fishing mortality was estimated at approximately 0.307, which was higher than the fishing morality threshold of 0.24 (ASMFC 2019). Striped bass recruitment in 2017 was estimated at 108.8 million age-1 fish, which was below the time series average of 140.9 million fish (ASMFC 2019).

I.2.4 Impacts

Impacts from the Project are unlikely to affect these commercially and recreationally important species, as offshore habitat requirements are widely available throughout the geographic analysis area as well the region of the Project. Additionally, permanent ground disturbance could result in a loss of 231 acres of WTG foundation scour protection and 55 acres of new hard protection atop cables. Loss of habitat would primarily be limited to sandy-bottom habitat, which is considered suitable for summer flounder; however, this habitat type is among the most common throughout the geographic analysis area. More complex habitat such as rocky outcrops would experience little loss; moreover, addition of new complex structures as a result of the Project could result in a net increase in suitable complex habitat for black sea bass and striped bass.

I.2.5 Common Finfish Species

The following finfish species are considered to have moderate to high likelihood of occurrence within the Project area based on EFH analysis as well as studies of nearby areas, including Barnegat Bay, New Jersey. Table I-6 includes a list of the finfish species that have been documented within or near the Project area, whether the species has EFH within or in the vicinity of the Project area, and if the species has commercial or recreational importance.

Table I-6 Common and Federally Managed Finfish Species Known to Inhabit the Project Area

Common Name	Scientific Name	EFH Presence by Life Stage	Commercial/ Recreational Importance
Atlantic angel shark	*Squatina dumeril*	N, J, A	--
Atlantic butterfish	*Peprilus triacanthus*	E, L, J, A	X
Atlantic cod	*Gadus morhua*	E, L, A	X
Atlantic croaker	*Micropogonias undulatus*	--	--

Common Name	Scientific Name	EFH Presence by Life Stage	Commercial/ Recreational Importance
Atlantic herring	*Clupea harengus*	L, J, A	X
Atlantic mackerel	*Scomber scombrus*	E, L, J, A	X
Atlantic menhaden	*Brevoortia tyrannus*	--	X
Atlantic moonfish	*Selene setapinnis*	--	--
Atlantic needlefish	*Strongylura marina*	--	--
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	A	--
Atlantic silverside	*Menidia menidia*	--	--
Basking shark	*Cetorhinus maximus*	N, J, A	--
Blackcheek tonguefish	*Symphurus plagiusa*	--	--
Black drum	*Pogonias cromis*	--	X
Black sea bass	*Centropristis striata*	L, J, A	X
Bluefin tuna	*Thunnus thynnus*	J, A	X
Bluefish	*Pomatomus saltatrix*	E, L, J, A	X
Bluegill	*Lepomis macrochirus*	--	X
Blue shark	*Prionace glauca*	N, J, A	--
Bluntnose stingray	*Dasyatis say*	--	--
Clearnose skate	*Raja eglanteria*	J, A	X
Cobia	*Rachycentron*	E, L, J, A	X
Common thresher shark	*Alopias vulpinus*	N, J, A	--
Cunner	*Tautogolabrus adspersus*	--	--
Dusky shark	*Carcharhinus obscurus*	N, J, A	--
Feather blenny	*Hypsoblennius hentz*	--	--
Flathead grey mullet	*Mugil cephalus*	--	--
Flying gurnard	*Dactylopterus volitans*	--	--
Gag grouper	*Mycteroperca microlepis*	--	X
Green goby	*Microgobius thalassinus*	--	--
Hogchoker	*Trinectes maculatus*	--	--
Inland silverside	*Menidia beryllina*	--	--
Inshore lizardfish	*Synodus foetens*	--	--
King mackerel	*Scomberomorus*	E, L, J, A	X
Little skate	*Leucoraja erinacea*	J, A	X
Lookdown	*Selene vomer*	--	--
Mangrove snapper	*Lutjanus griseus*	--	X
Monkfish	*Lophius americanus*	E, L, J, A	X
Mummichog	*Fundulus heteroclitus*	--	--
Naked goby	*Gobiosoma bosc*	--	--
Northern kingfish	*Menticirrhus saxatilis*	--	X
Northern pipefish	*Syngnathus fuscus*	--	--
Northern puffer	*Sphoeroides maculatus*	--	--
Northern searobin	*Prionotus carolinus*	--	--

Common Name	Scientific Name	EFH Presence by Life Stage	Commercial/ Recreational Importance
Ocean pout	*Macrozoarces americanus*	E, J, A	X
Oyster toadfish	*Opsanus tau*		--
Pinfish	*Lagodon rhomboides*	--	--
Pollock	*Pollachius pollachius*	L	X
Rainwater killifish	*Lucania parva*	--	--
Red hake	*Urophycis chuss*	E, L, J, A	X
Sandbar shark	*Carcharhinus plumbeus*	N, J, A	--
Sand tiger shark	*Carcharias taurus*	N, J	--
Scup	*Stenotomus chrysops*	J, A	X
Seaboard goby	*Gobiosoma ginsburgi*	--	--
Shortfin mako shark	*Isurus oxyrinchus*	N, J, A	--
Silver hake	*Merluccius bilnearis*	E, L, J, A	X
Skilletfish	*Gobiesox strumosus*	--	--
Skipjack tuna	*Katsuwonus pelamis*	J, A	X
Smoothhound shark complex (Atlantic stock)	*Mustelus canis*	N, J, A	--
Smooth dogfish	*Mustelus canis*	--	--
Spanish mackerel	*Scomberomorus maculatus*	E, L, J, A	X
Spiny dogfish	*Squalus acanthias*	J, A	--
Spot	*Leiostomus xanthurus*	--	--
Spotfin killifish	*Fundulus luciae*	--	--
Spotted hake	*Urophycis regia*	--	--
Striped bass	*Morone saxatilis*	--	X
Summer flounder	*Paralichthys dentatus*	E, L, J, A	X
Swordfish	*Xiphias gladius*	J	X
Tautog	*Tautoga onitis*	--	X
Tiger shark	*Galeocerdo cuvieri*	J, A	--
Weakfish	*Cynoscion regalis*	--	--
White hake	*Urophycis tenuis*	A	X
White mullet	*Mugil curema*	--	--
White perch	*Morone americana*	--	X
White shark	*Carcharodon carcharias*	N, J, A	--
Windowpane flounder	*Scophthalmus aquosus*	E, L, J, A	X
Winter flounder	*Pseudopleuronectes americanus*	E, L, J, A	X
Winter skate	*Leucoraja ocellata*	J, A	X
Witch flounder	*Glyptocephalus cynoglossus*	E, L, A	X
Yellow perch	*Perca flavescens*	--	X
Yellowfin tuna	*Thunnus albacares*	J	X

A = adult; E = egg; L = larvae; J = juvenile; N = neonate; -- = not applicable

I.3. Invertebrates

Invertebrate resources assessed in this section include the planktonic zooplankton community and megafauna species that have benthic, demersal, or planktonic life stages. Macrofaunal and meiofaunal invertebrates associated with the benthic resources are assessed in Section 3.6. Studies specific to the offshore wind lease areas that either focused on or included the Lease Area are described below.

- Inspire 2021: Geophysical data were collected by multibeam echosounder and sidescan sonar. Five surveys covering 217 sites within the Wind Farm Area and export cable routes were conducted to collect site-specific benthic data from 2017 through 2020 to verify the multibeam echosounder and sidescan sonar results. Survey methodologies included bottom grabs for grain size analysis and benthic invertebrate community characterization, as well as drop-camera footage for habitat characterization. Geophysical data provide delineations of different types of surface sediments within the Project area.
- Guida et al. 2017: A collaborative effort among NEFSC, Woods Hole Oceanographic Institute, and University of Massachusetts-Dartmouth School for Marine Science conducted a multi-scale benthic assessment of wind energy leases in the Northwest Atlantic OCS. This study compiled data from numerous sources, including the NOAA National Centers for Environmental Information for bathymetric data, NEFSC for physical and biological oceanography, NOAA NEFSC fisheries independent trawl survey for demersal fish and shellfish, and the U.S. Geological Survey usSEABED website for surficial sediment data.
- NJDEP 2010: Ocean/Wind Power Ecological Baseline Studies. January 2008 to December 2009. Final Report.
- NEFSC conducted shelf-wide trawl surveys across the OCS and slope of the northeastern United States from the Mid-Atlantic to the Gulf of Maine. In 2021, seasonal surveys included spring bottom trawl survey (March to May), sea scallop/integrated benthic survey (May to June), Atlantic surf clam/ocean quahog survey (starting in August), and fall bottom trawl survey (September to November).
- NEFSC Ecosystem Monitoring (EcoMon) conducts program surveys concurrently with the spring and fall bottom trawl surveys since 1992. The OCS and slope of the northeastern United States is surveyed, i.e., the Mid-Atlantic Bight, Southern New England, Georges Bank, and the Gulf of Maine. In each survey plankton are sampled from approximately 30 randomly selected stations within each of the four regions.
- The NEAMAP Near Shore Trawl Survey was developed in 2006 to provide annual data to support fisheries management and stock assessment in the northeastern United States spring and fall surveys. Invertebrates surveyed include American lobster (*Homarus americanus*), horseshoe crab (*Limulus polyphemus*), longfin inshore squid (*Doryteuthis pealeii*), and shrimp species.
- The Barnegat Bay Research Program (2011 to 2015) was designed to evaluate environmental management issues, address water quality and ecosystem health concerns, address critical gaps, and characterize baseline conditions for future comparisons (Buchanan et al. 2017). Surveys included zooplankton, hard clams (northern quahog) (*Mercenaria mercenaria*), and blue crab (*Callinectes sapidus*).

The Ocean Wind 1 geographic analysis area exhibits substantial seasonal changes in water temperature due to the influence of the Gulf Stream and ocean circulation patterns, which strongly regulate the productivity, species composition, and spatial distribution of zooplankton (NJDEP 2010). The following zooplankton taxa were found to be abundant in the vicinity of the Project area by NJDEP (2010) citing Judkins et al. (1980), with copepods accounting for 62 percent of the zooplankton community.

- **Inner shelf** (less than 164-foot [50-meter] water depth) included C. *typicus*, *Penilia avirostris*, *T. longicornis*, *Evadne* spp., *Acartia tonsa*, and doliolids. Maximum abundance in July is dominated by *C. typicus* and *T. longicornis*.
- **Outer shelf** (more than 164-foot [50-meter] water depth) included *Calanus finmarchicus*, *Oithona similis*, *O. atlantica*, *M. lucens*, and *Clausocalanus pergens*. Maximum abundance during March is dominated by *L. retroversa*, *Pseudocalanus* sp., *O. similis*, *Paracalanus parvus*, and *M. lucens* and in May is dominated by *Pseudocalanus* sp., *Calanus finmarchicus*, and *O. similis*.

Major invertebrate species found in the geographic analysis area are listed in Table I-7. Some species are migratory (American lobster, Jonah crab, longfin inshore squid [*Doryteuthis pealeii*], and northern shortfin squid [*Illex illecebrosus*]), while others are sessile or have more limited mobility (e.g., large bivalve species, some crab species, ocean quahog). While most life stages for invertebrates (i.e., egg, larvae, juvenile, adult) within the geographic analysis area are benthic, larval lobster, horseshoe crab, and Jonah crab are pelagic, as are adult shortfin squid and juvenile and adult longfin squid.

Table I-7 Common and Federally Managed Major Invertebrate Species Known to Inhabit the Project Area

Common Name	Scientific Name	Benthic/ Demersal Life Stages	Pelagic Life Stages	Commercial/ Recreational Importance
American lobster	*Homarus americanus*	E, J, A	L	X
Atlantic sea scallop	*Placopecten magellanicus*	J, A	E, L	X
American horseshoe crab	*Limulus polyphemus*	E, J, A	L	--
Jonah crab	*Cancer borealis*	E, J, A	L	X
Lady crab	*Ovalipes ocellatus*	E, J, A	L	--
Spider crab	*Libinia emarginata*	E, J, A	L	--
Hermit crab	*Pagurus* spp.	E, J, A	L	--
Blue crab	*Callinectes sapidus*	E, J, A	L	X
Atlantic rock crab	*Cancer irroratus*	E, J, A	L	X
Longfin inshore squid	*Doryteuthis pealeii*	E	J A	X
Ocean quahog	*Arctica islandica*	J, A	E, L	X
Northern shortfin squid	*Illex illecebrosus*	--	J A	X
Atlantic Surfclam	*Spisula solidissima*	, J, A	E, L	X
Hard clam	*Mercenaria*	, J, A	E, L	X
Common octopus	*Octopus vulgaris*	E	L J A	--

A = adult; E = egg; L = larvae; J = juvenile; -- = not applicable

Invertebrate species with designated EFH that will be included in the EFH Assessment are described further below based on information provided in the Ocean Wind Offshore Wind Farm EFH Assessment Technical Report (COP Volume III, Appendix P; Ocean Wind 2023) and additional references as cited below. A description of the various life stages for these invertebrates will be provided in the forthcoming EFH Assessment to be completed by BOEM.

I.3.1 Atlantic Sea Scallop

The Atlantic sea scallop is a commercially important marine bivalve that is present from the Gulf of St. Lawrence to Cape Hatteras, North Carolina. In the Mid-Atlantic, these sea scallops typically inhabit waters less than 68°F (20°C) at depths of 66 to 262 feet (20 to 80 meters).

I.3.2 Longfin Inshore Squid

Longfin inshore squid inhabit pelagic waters from Newfoundland to the Gulf of Venezuela. This schooling species undertakes seasonal migrations, wherein they move offshore in a southerly direction in late fall and winter on the OCS edge. As water temperatures rise in spring, they move inshore again and head north. Longfin inshore squid is a commercially important species from Georges Bank to Cape Hatteras. Eggs for the longfin inshore squid occur in inshore and offshore bottom habitats from Georges Bank southward to Cape Hatteras, generally where bottom water temperatures are between 50°F and 73°F (10°C and 23°C), salinities are between 30 and 32 parts per thousand, and depth is less than 164 feet (50 meters). Like most loliginid squids, longfin inshore squid egg masses or "mops" are demersal and anchored to the substrates on which they are laid, which include a variety of hard-bottom types (e.g., shells, lobster pots, piers, fish traps, boulders, and rocks), SAV (e.g., *Fucus* sp.), sand, and mud.

I.3.3 Northern Shortfin Squid

Northern shortfin squid has a range extending from Newfoundland to Cape Hatteras, North Carolina. The Project area contains designated EFH for the juvenile (pre-recruit) life stage.

I.3.4 Ocean Quahog

The ocean quahog is a commercially important marine bivalve mollusk found along the OCS, with a range from Newfoundland to Cape Hatteras. Peak offshore densities of this species are found south of Nantucket to the Delmarva Peninsula.

I.3.5 Surfclam

The surfclam is a commercially important marine bivalve that inhabits sandy habitats along the OCS, with a range from the southern Gulf of St. Lawrence to Cape Hatteras, North Carolina. This clam species is found in concentrated numbers on Georges Bank, south of Cape Cod, off Long Island, southern New Jersey, and the Delmarva Peninsula.

I.4. Marine Mammals

There are 17 species (18 stocks) of marine mammals that are likely to have regular or common occurrences in the Project area (Table I-8). Species' federal protection status, occurrence in the geographic analysis area and Project area, critical habitat, population size trends, and mortality data must be considered to understand the potential impacts and their magnitude from the Proposed Action, action alternatives (B, C, D, and E), and the No Action Alternative (ongoing and planned activities and future offshore wind activities). Although beaked whales can occur in relatively high numbers in the geographic analysis area (see Figure F-10), their distribution is generally concentrated near the shelf edge (BOEM 2014) approximately 69 miles (110 kilometers) outside of the Project area. Therefore, beaked whales have not been included in the assessment of the Proposed Action. Rare observations of the West Indian manatee have occurred in the coastal areas and rivers of New Jersey. However, manatees cannot tolerate temperatures below 68°F for extended periods of time (USFWS 2014); therefore, their occurrence in the marine mammal geographic analysis area is considered extremely rare and is not considered further in the EIS. For an in-depth discussion of marine mammals in the vicinity of the Project area and the analysis of impacts, refer to Chapter 3, Section 3.15.

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Table I-8 Marine Mammal Species Documented, or Likely to Occur, in the Project Area and their Status, Population, Abundance, Seasonal Occurrence, Critical Habitat Near the Offshore Project Area, Stock, Best Population Estimate, Population Trend, Annual Caused Mortality, Effects of Human-caused Mortality, and Source of Population and Mortality Data

Common Name	Scientific Name	ESA/MMPA[1] Status	Occurrence in Northwest-Atlantic OCS[2]	Annual Peak Occurrence in the Northwest-Atlantic OCS[11]	Seasonal Occurrence in Marine Mammal Project Area[3]	Occurrence within Project Area[4]	Critical Habitat in Area of Direct Effects	Stock (NMFS)	Best Population Estimate from SAR[5]	Population Trend[6]	Annual Human-Caused Mortality[7]	Effects of Human-Caused Mortality[8]	Reference for Population & Mortality Data
Low-frequency Cetaceans													
Blue whale	*Balaenoptera musculus*	endangered/ strategic	rare	winter	spring, summer	rare	Not yet designated	Western North Atlantic	402[9]	unavailable	unknown	unknown	Hayes et al. (2020)
Fin whale	*Balaenoptera physalus*	endangered/ strategic	common	year-round	spring, summer, fall (possibly year-round)	regular	Not yet designated	Western North Atlantic	6,802	unavailable	2.35	significant	Hayes et al. (2021)
Humpback whale	*Megaptera novaeangilae*	delisted/none	common	year-round (winter–spring)	spring, summer, fall (possibly year-round)	regular	N/A	Gulf of Maine	1,396	+2.8%/year	15.25	significant	Hayes et al. (2021)
North Atlantic right whale	*Eubalaena glacialis*	endangered/ strategic	common	year-round (winter–spring)	year-round	regular	No[13]	Western North Atlantic	412	decreasing	8.15	significant	Hayes et al. (2021)
Sei whale	*Balaenoptera borealis*	endangered/ strategic	regular	year-round (spring)	spring, summer	rare	Not yet designated	Nova Scotia	6,292	unavailable	1.2	significant	Hayes et al. (2021)
Minke whale	*Balaenoptera acutorostrata*	none/none	common	year-round (summer–fall)	spring, summer, winter (possibly year-round)	regular	N/A	Canadian East Coast	21,968	unavailable	10.55	insignificant	Hayes et al. (2021)
Mid-frequency Cetaceans													
Sperm whale	*Physeter macrocephalus*	endangered/ strategic	common	year-round (summer–fall)	spring, summer, fall	uncommon	Not yet designated	North Atlantic	4,349[10]	unavailable	unknown	unknown	Hayes et al. (2020)
Short-finned pilot whale	*Globicephala macrorhynchus*	none/strategic	rare	year-round	year-round	uncommon	N/A	Western North Atlantic	28,924	unavailable	unknown	unknown	Hayes et al. (2020)
Long-finned pilot whale	*Globicephala melas*	none/strategic	common	year-round (spring–summer)	year-round	rare	N/A	Western North Atlantic	39,215	unavailable	21	insignificant	Hayes et al. (2020)
Risso's dolphin	*Grampus griseus*	none/none	Common	year-round (spring–fall)	year-round	uncommon	N/A	Western North Atlantic	35,493[10]	unavailable	53.9	significant	Hayes et al. (2020)
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	none/none	regular	year-round (spring–fall)	winter	regular	N/A	Western North Atlantic	93,233	unavailable	26	insignificant	Hayes et al. (2020)
Common bottlenose dolphin (coastal)[8]	*Tursiops truncatus*	none/strategic	common	year-round	year-round (most frequently in spring and summer)	regular	N/A	Western North Atlantic, Northern Migratory Coastal	3,751	decreasing	unknown	unknown	Hayes et al. (2021)
Common bottlenose dolphin (offshore)[8]	*Tursiops truncatus*	none/none	common	year-round	year-round (most frequently in spring and summer)	regular	N/A	Western North Atlantic, Offshore	62,851	unavailable	28	insignificant	Hayes et al. (2020)
High-frequency Cetaceans													
Harbor porpoise	*Phocoena phocoena*	none/none	common	year-round (fall–spring)	winter (possibly during spring and summer)	regular	N/A	Gulf of Maine-Bay of Fundy	95,543	unavailable	150	significant	Hayes et al. (2021)

Common Name	Scientific Name	ESA/MMPA[1] Status	Occurrence in Northwest-Atlantic OCS[2]	Annual Peak Occurrence in the Northwest-Atlantic OCS[11]	Seasonal Occurrence in Marine Mammal Project Area[3]	Occurrence within Project Area[4]	Critical Habitat in Area of Direct Effects	Stock (NMFS)	Best Population Estimate from SAR[5]	Population Trend[6]	Annual Human-Caused Mortality[7]	Effects of Human-Caused Mortality[8]	Reference for Population & Mortality Data
Phocid Pinnipeds													
Harbor seal[8]	*Phoca vitulina concolor*	none/none	common	year-round (fall–spring)	spring, fall, winter	regular	N/A	Western North Atlantic	75,834	unavailable	150	significant	Hayes et al. (2021)
Gray seal[8]	*Halichoerus grypus*	none/none	common	year-round	spring, fall	regular	N/A	Western North Atlantic	451,431	increasing	5,410	significant	Hayes et al. (2021)

Notes:
[1] The MMPA defines a “strategic” stock as a marine mammal stock (a) for which the level of direct human-caused mortality exceeds the potential biological removal level; (b) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; (c) which is listed as a threatened or endangered species under the ESA; or (d) is designated as depleted.
[2] Data from NEFSC and SEFSC (2018) and Davis et al. (2020).
[3] Seasonal abundance estimates for marine mammals, derived from density models in the New Jersey wind energy study area. From: Supplement to Final Report BOEM 2017-071, AMAPPS: 2010–2014 Appendix I (Kenney and Vigness-Raposa 2010; Ocean Wind 2023 citing Kraus et al. 2016; Ocean Wind 2023 citing Roberts et al. 2016; Ocean Wind 2023 citing Palka et al. 2017). Seasons are depicted as follows: spring (March–May); summer (June–August); fall (September–November); winter (December–February).
[4] Occurrence in the offshore survey corridor was derived from sightings and information in Ocean Wind 2023 citing NJDEP 2010; Ocean Wind 2023 citing NEFSC & SEFSC 2011, 2012, 2013, 2014, 2015a, 2015b, 2016, 2018, 2019, 2020; Ocean Wind 2023 citing Roberts et al. 2016; Ocean Wind 2023 citing Palka et al. 2017; and Hayes et al. 2020. The species known to occur in the Project area and vicinity, and expected to occur in the survey area, are addressed based on their reported occurrence of rare to regular (i.e., common).
[5] Best population estimates reported in the 2020 stock assessment report and most recently updated 2020 draft stock assessment report (Hayes et al. 2020, 2021; Ocean Wind 2023 citing NMFS 2020).
[6] Increasing = beneficial trend, not quantified; Decreasing = adverse trend, not quantified; Unavailable = population trend analysis not conducted on this species.
[7] Data based on Hayes et al. 2020, 2021; Waring et al. 2007; and Kenney and Vigness-Raposa 2010.
[8] Data based on Hayes et al. 2020, 2021; Waring et al. 2007; and Kenney and Vigness-Raposa 2010. Reflects human-caused mortality from all known sources, including fishing-related, vessel collisions, and other/unspecified. Per cited reference.
[9] The minimum population estimate is reported as the best population estimate in the most recently updated 2020 draft stock assessment report (Ocean Wind 2023 citing NMFS 2020).
[10] Density models (Palka et al. 2017) predicted that typically deep-water species such as Risso’s dolphins and sperm whales are present at very low densities in offshore edges of several wind energy study areas that are either close to the OCS break or extend into deeper waters.
[11] Kenney and Vigness-Raposa (2010): common = more than 100 observations; regular = 10–100 observations; rare = fewer than 10 observations.
[12] Kenney and Vigness-Raposa (2010) and NEFSC and SEFSC (2018) and Davis et al. (2020). common = more than 100 observations; regular = 10–100 observations; rare = fewer than 10 observations.
[13] Critical habitat areas approximately 260 miles north of the marine mammal geographic analysis area: Cape Cod Bay, Stellwagen Bank, and the Great South Channel and calving areas off Cape Canaveral, FL to Cape Fear, NC
FL = Florida; N/A = not applicable; NC = North Carolina; SAR = stock assessment report

I.5. Water Quality

Figure I-4 shows the 303(d) impaired waters in the water quality geographic analysis area. In New Jersey, impaired waters are mapped by an assessment unit similar to a watershed, while Virginia maps impaired waterbodies. South Carolina maps impaired waters by assessment points.

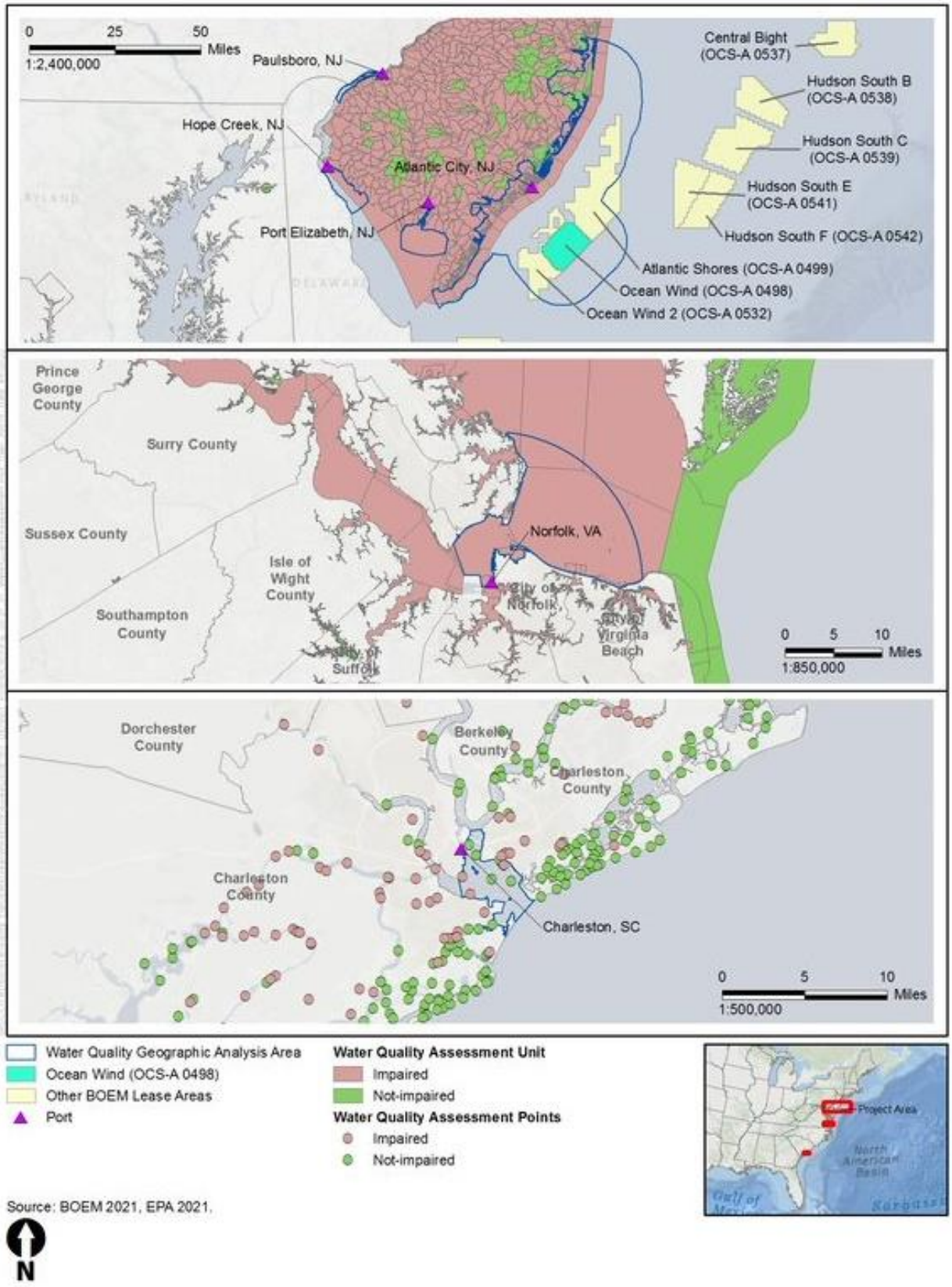


Figure I-4 Impaired Waters in the Geographic Analysis Area

I.6. Wetlands

Table I-9 and Table I-10 summarize NWI wetland communities in the geographic analysis area and NWI wetland impacts along the onshore export cable routes. These tables are equivalent to Tables 3.22-1 and 3.22-3 in Section 3.22, *Wetlands*, but show NWI data instead of NJDEP wetland data.

Figure I-5 shows NJDEP wetlands in the Oyster Creek Onshore Project area, and Figure I-6 shows NJDEP wetlands in the BL England Onshore Project area.

Table I-9 NWI Wetland Communities in the Geographic Analysis Area

Wetland Community	Acres	Percent of Total
Estuarine and Marine Deepwater	144,898	82
Estuarine and Marine Wetland	23,134	13
Freshwater Emergent Wetland	589	<1
Freshwater Forested/Shrub Wetland	8,291	5
Riverine	53	<1
Freshwater Pond	273	<1
Total	**177,238**	**100%**

Source: USFWS 2021

Table I-10 Summary of Wetland Impacts Along Onshore Export Cable Routes by NWI Wetland Community Type

Onshore Export Cable Route	NWI Wetland Community Type	Acres of Temporary Impact	% Relative to Wetlands in GAA	Duration of Impact
BL England	Estuarine and Marine Deepwater	0.72	< 0.01	Short term: 1–3 years
	Estuarine and Marine Wetland	0.49	< 0.01	Short term: 1–3 years
Oyster Creek	Estuarine and Marine Deepwater	0.29	< 0.01	Short term: 1–3 years
	Estuarine and Marine Wetland	8.23	0.03	Short term: 1–3 years
	Freshwater Forested/Shrub Wetland	4.81	0.06	Long Term: 3 to greater than 5 years
	Riverine	0.05	0.02	Short term: 1–3 years
	Freshwater Emergent Wetland	0.29	0.05	Short term: 1–3 years
	Freshwater Pond	0.14	0.05	Short term: 1–3 years

Source: Ocean Wind 2021
GAA = geographic analysis area

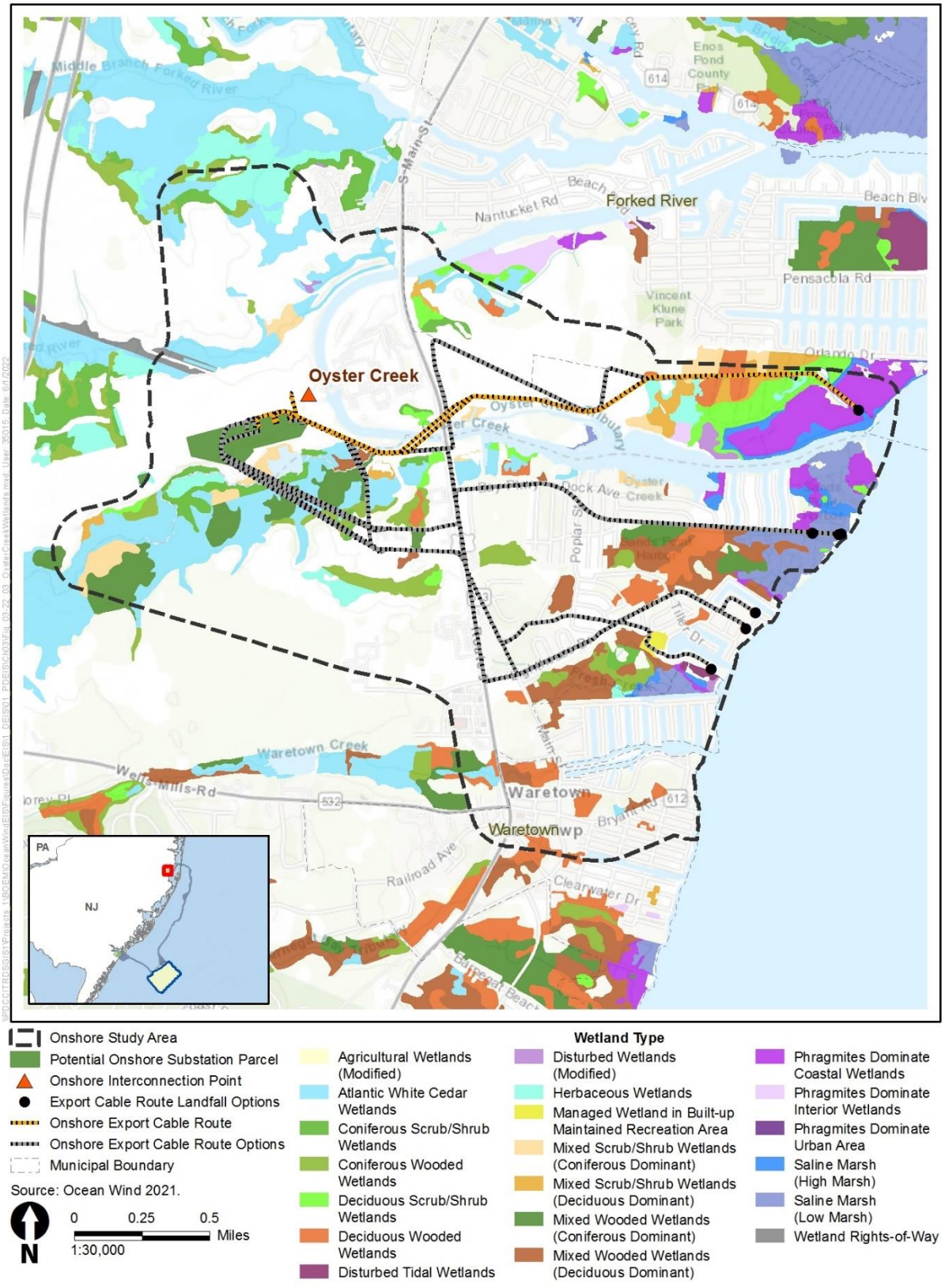


Figure I-5 Wetlands in the Oyster Creek Onshore Project Area

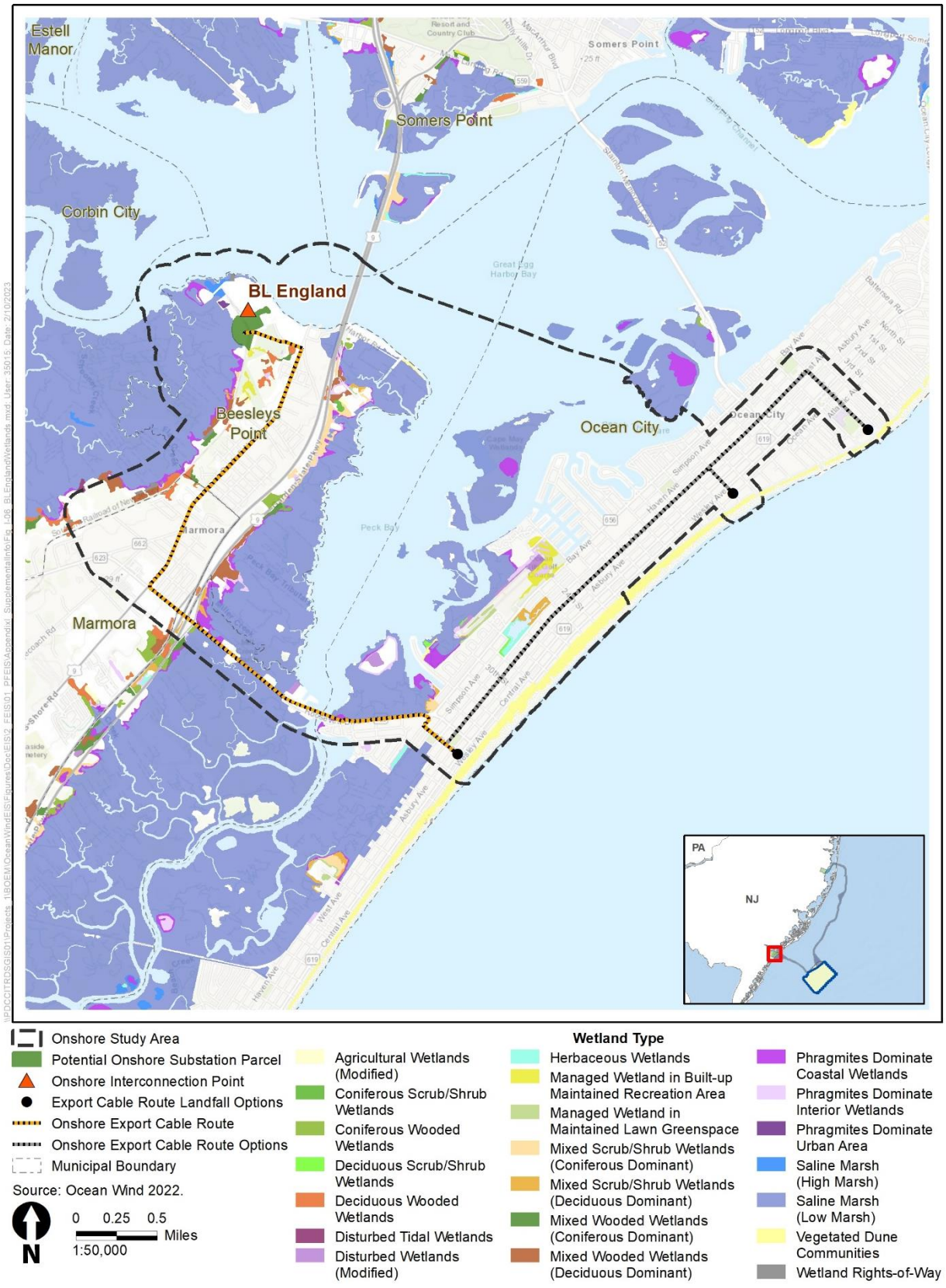


Figure I-6 Wetlands in the BL England Onshore Project Area

I.7. Benthic Habitat Delineation Maps

Figure I-7, Figure I-8, and Figure I-9 delineate benthic habitat conditions in the Wind Farm Area and along the export cable corridors that are classified as either anthropogenic, complex, heterogeneous complex, or soft-bottom habitats. Figure I-10 shows completed and planned SAV survey areas.

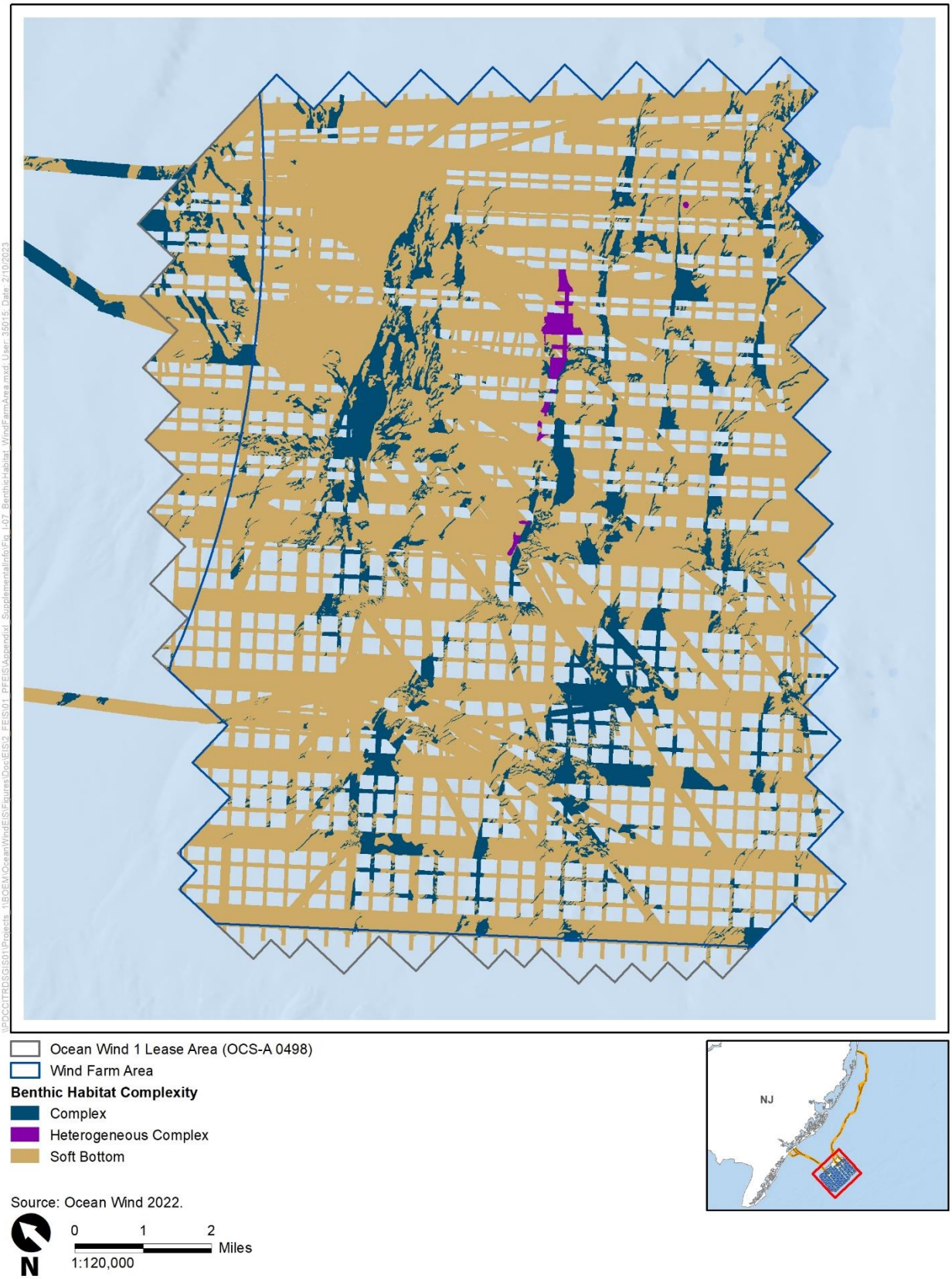


Figure I-7 Benthic Habitat in the Wind Farm Area

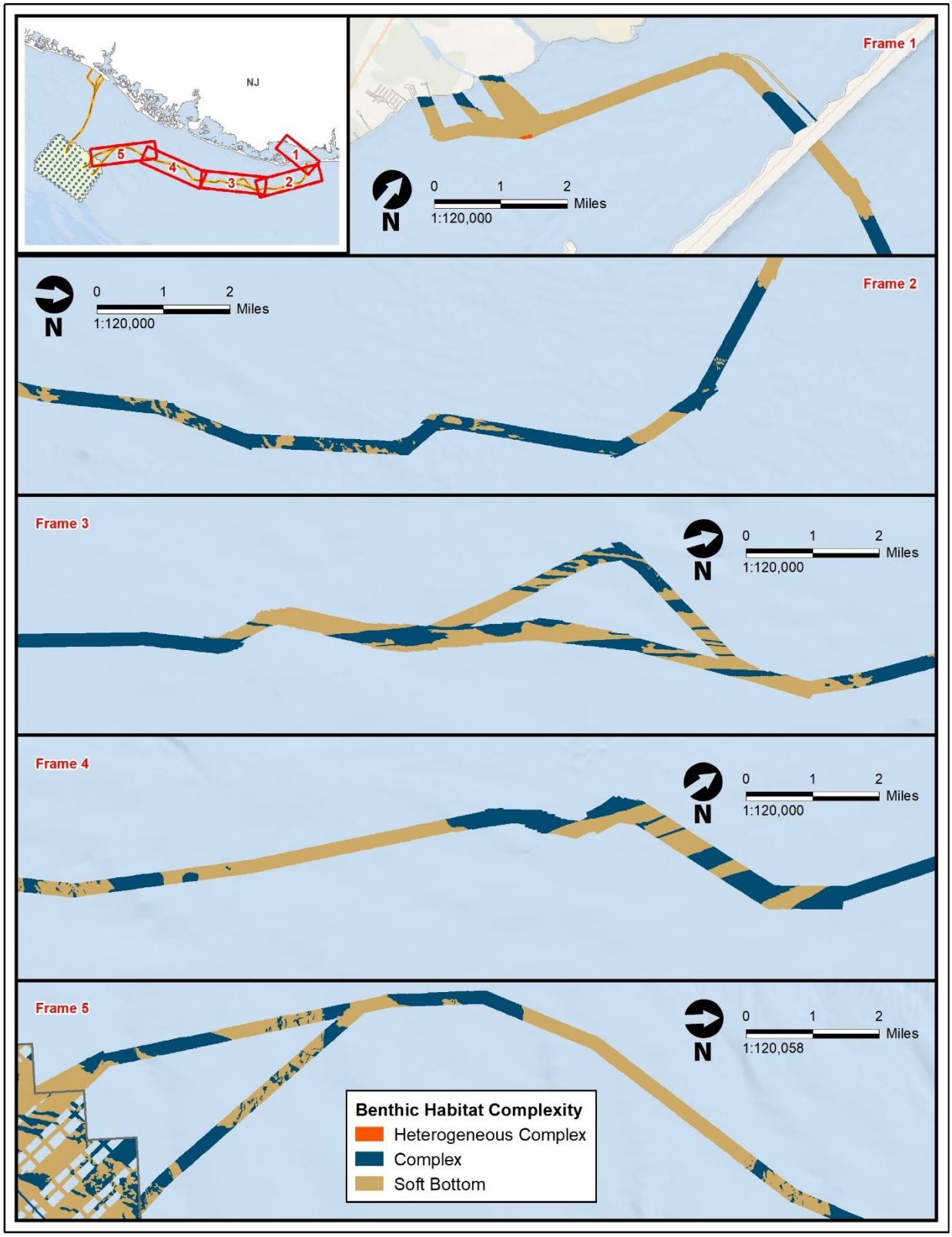


Figure I-8 Benthic Habitat in the Oyster Creek Export Cable Corridor

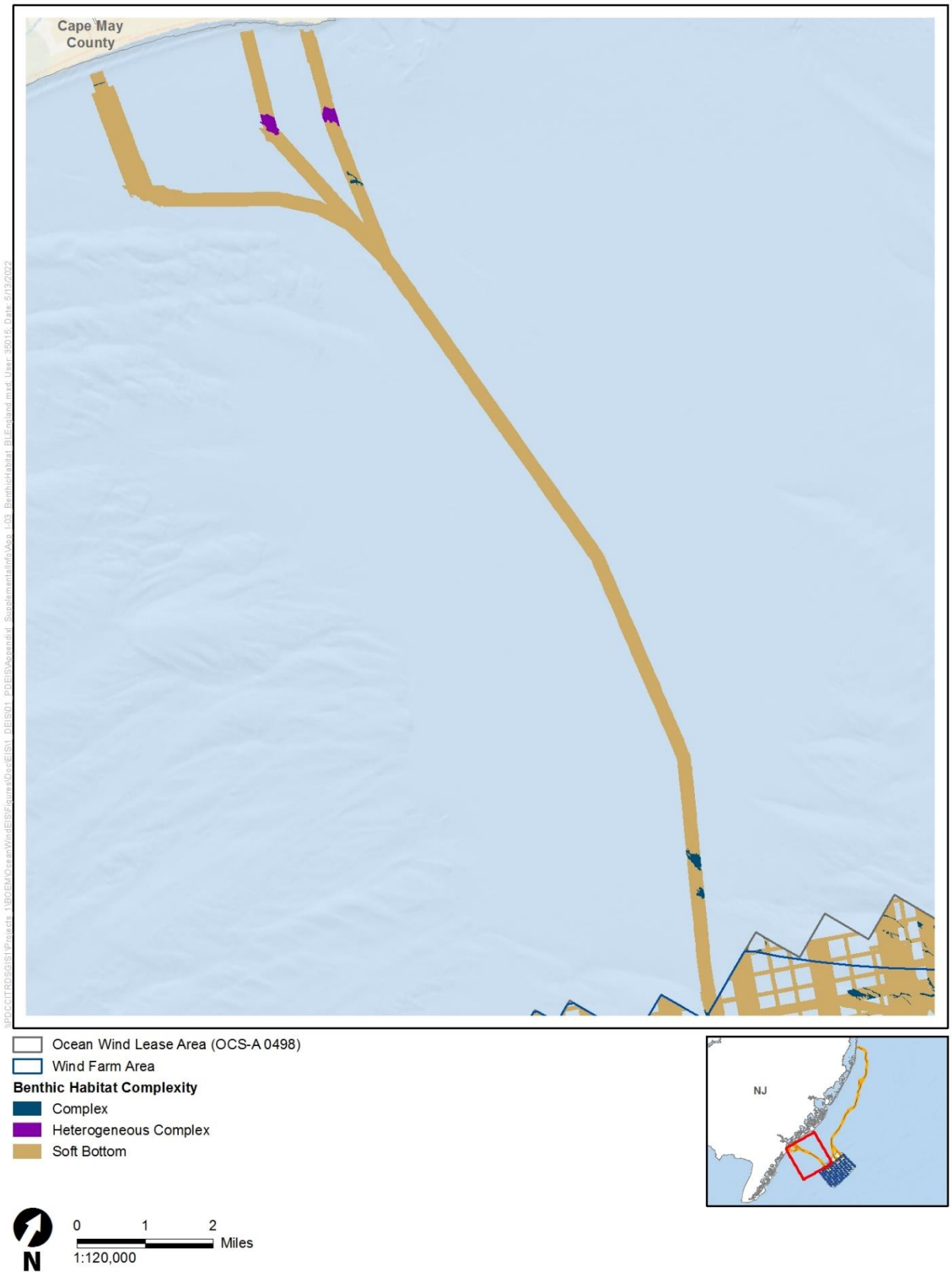


Figure I-9 Benthic Habitat in the BL England Export Cable Corridor

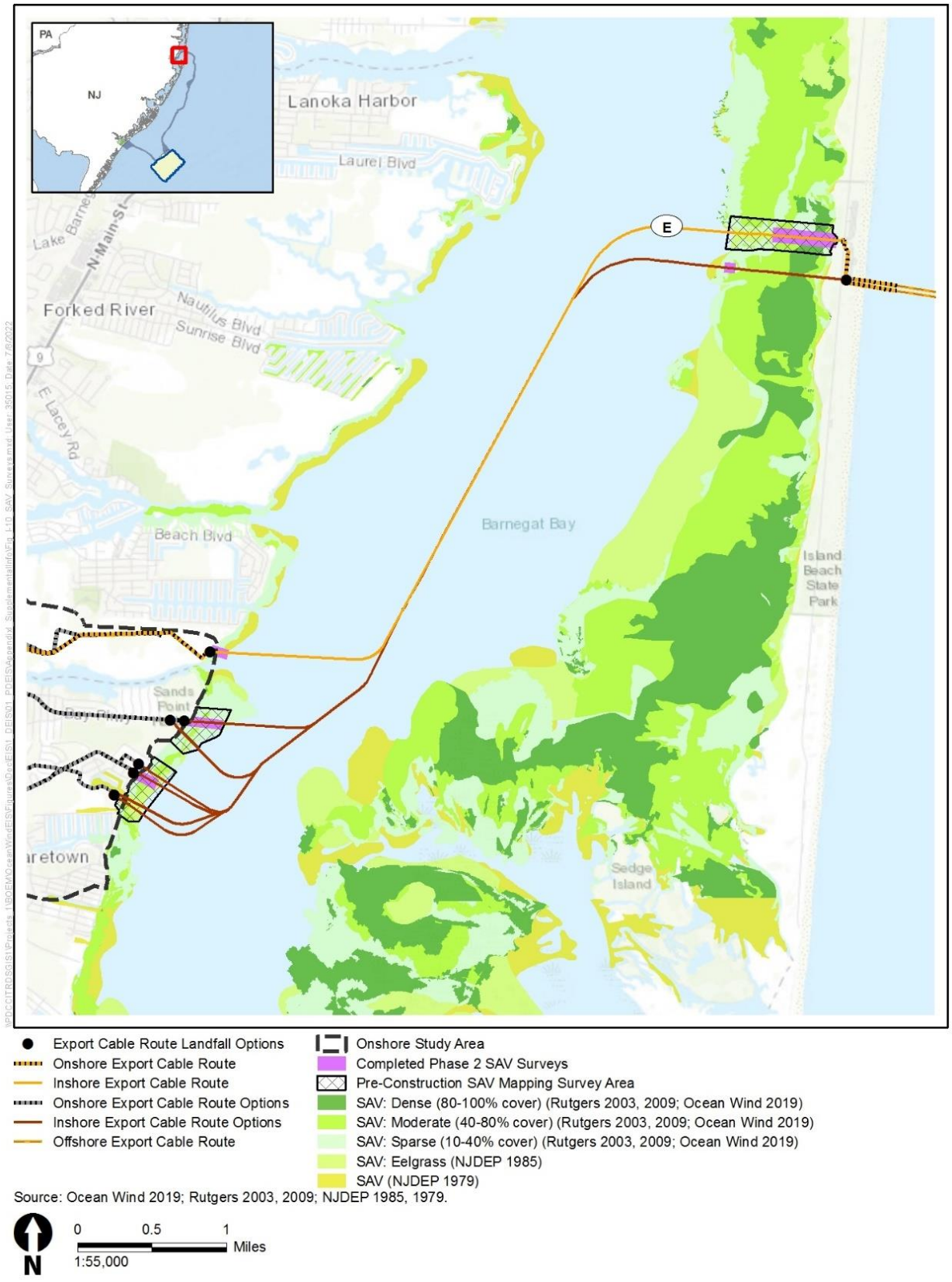


Figure I-10 SAV Survey Areas

I.8. Climate Resilience

Ocean Wind analyzed the resilience of proposed infrastructure that may be vulnerable to the impacts associated with climate change, such as sea level rise and more frequent storms. The TJBs have been identified as an asset potentially susceptible to impacts associated with climate change. The TJB is a large underground vault that serves as the location where the submarine and onshore cables are spliced together and anchored. An increased frequency of storm events could accelerate shoreline erosion. The TJBs potentially susceptible to shoreline erosion are those at the Oyster Creek landfalls. The BL England and Island State Park TJBs are within paved roadways, parking lots, or the gravel maintenance area, which are pre-developed areas and largely shielded from erosion. Factors for erosion were considered when developing the hardstand (i.e., stabilized area designed to support heavy vehicles or equipment) for the TJB compound for the Oyster Creek landfall, including locating the hardstand on existing features and building the hardstand to match nearby elevations rather than being built to withstand a certain flood elevation. Erosion prevention and protection measures were also considered, such as installation of sheet piles, gabion baskets, riprap, or a submerged or partially submerged barrier closer to the waterline. However, Ocean Wind anticipates that protection of the TJB from erosion by building up the area with imported fill and use of concrete mattress would provide the most accessibility, flexibility, and resilience.

Onshore substation location and design were analyzed to ensure that substation structures that could potentially be vulnerable to impacts associated with climate change met or exceeded Federal Emergency Management Agency recommendations. The BL England site is within a Coast A/AE Zone and is a Category IV Risk Structure, as it is a power-generating station. At the BL England site, the base flood elevation plus 3 feet is elevation 12 (100-year storm being elevation 9) and, based on the flood insurance study, the 500-year flood elevation is elevation 10.7. As such, the base flood elevation plus 3 feet is greater than the design flood elevation. The Project has chosen to elevate all substation equipment to elevation 12 (base flood elevation plus 3 feet) in accordance with the Federal Emergency Management Agency design guide document. In addition, these elevations will meet the newly proposed NJDEP Inland Flood Protection regulations flood elevations. Tidal flood elevations as a result of the effects of climate change at the Oyster Creek substation are not seen as a risk or concern. The lowest proposed elevation at the substation is elevation 21 (North American Vertical Datum of 1988), which is 14 feet above the flood hazard area design flood elevation based on Federal Emergency Management Agency flood insurance rate mapping. As such, the natural on-site topography would adequately protect the substation from increased flood depths due to sea level rise and more frequent high-intensity storm events resulting from climate change.

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Appendix J. Underwater Sound and Acoustic Modeling Results

J.1. Introduction

This appendix provides an overview of underwater sound sources, summarizes the regulation of underwater sound for marine mammals and fish/invertebrates, and identifies thresholds for explosives. In addition, this appendix summarizes the methods, assumptions, and results of the technical acoustic modeling report prepared for the Project.

J.2. Sources of Underwater Sound

Ocean sounds originate from a variety of sources. Some come from non-biological sources such as wind and waves, while others come from the movements or vocalizations of marine life (Hildebrand 2009). In addition, humans introduce sound into the marine environment through activities like oil and gas exploration, construction, military sonars, and vessel traffic (Hildebrand 2009). The acoustic environment or "soundscape" of a given ecosystem comprises all such sounds—biological, non-biological, and anthropogenic (Pijanowski et al. 2011). Soundscapes are highly variable across space, time, and water depth, among other factors, due to the properties of sound transmission and the types of sound sources present in each area. A soundscape is sometimes called the "acoustic habitat," as it is a vital attribute of a given area where an animal may live (i.e., habitat) (Hatch et al. 2016).

J.3. Physics of Underwater Sound

Sounds are created by the vibration of an object within its medium (Figure J-1). This movement generates kinetic energy, which travels as a propagating wave away from the sound source. As this wave moves through the medium, the particles undergo tiny back-and-forth movements ("particle motion") along the axis of propagation, but the particles themselves do not travel with the wave. Instead, they oscillate in roughly the same location, transferring their energy to surrounding particles. Instead, the vibration is transferred to adjacent particles, which are pushed into areas of high pressure (compression) and low pressure (rarefaction). Acoustic pressure is a non-directional (scalar) quantity, whereas particle motion is an inherently directional quantity (a vector) taking place in the axis of sound transmission. The total energy of the sound wave includes the potential energy associated with the sound pressure as well as the kinetic energy from particle motion.

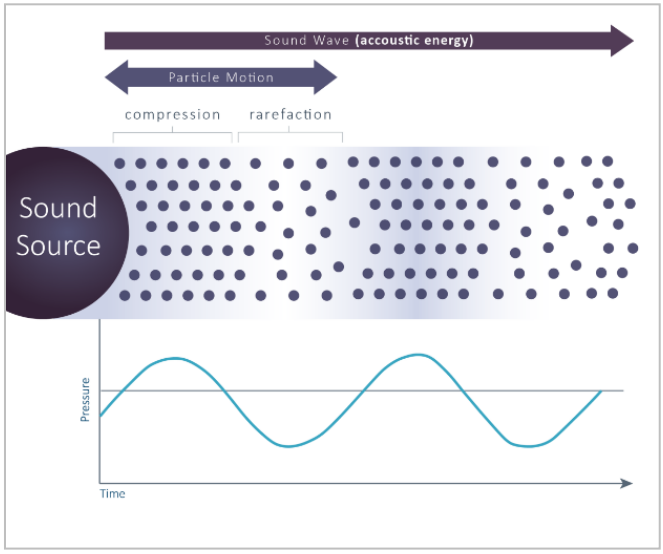
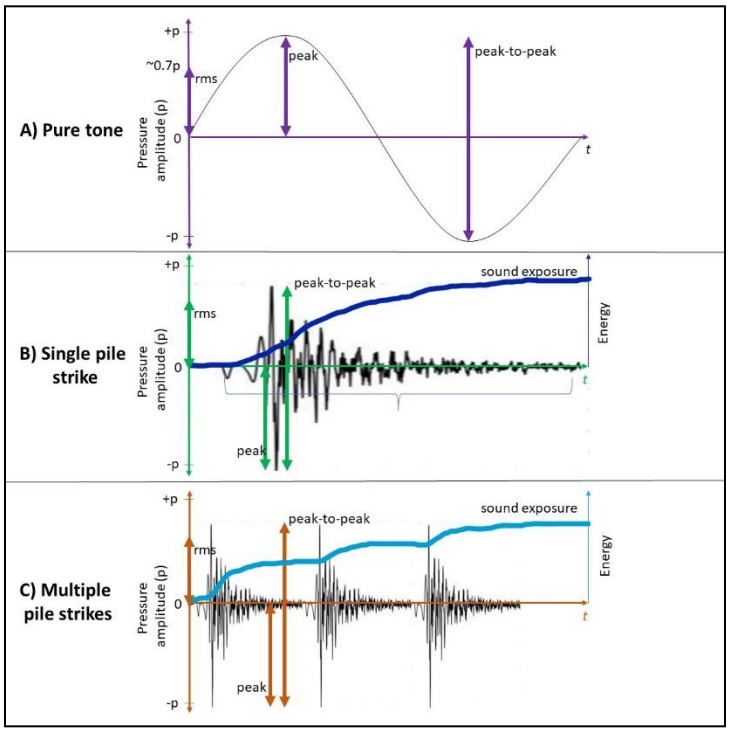


Figure J-1 Basic Mechanics of a Sound Wave

J.3.1 Units of Measurement

Sound can be quantified and characterized based on a number of physical parameters. A complete description of the units can be found in ISO 18405:2017. Some of the major parameters and their units (in parentheses) are:

Acoustic pressure (pascal): The values used to describe the acoustic (or sound) pressure are peak pressure (L_{pk}), peak-to-peak pressure (L_{pk-pk}), and RMS pressure (L_{RMS} or SPL) deviation. The peak sound pressure is defined as the maximum absolute sound pressure deviation within a defined time period and is considered an instantaneous value. The peak-to-peak pressure is the range of pressure change from the most negative to the most positive pressure amplitude of a signal (Figure J-2), whereas the RMS sound pressure represents a time-averaged pressure and is calculated as the square root of the mean (average) of the time-varying sound pressure over a given period (Figure J-2). The L_{pk}, L_{pk-pk}, and SPL are computed by multiplying the logarithm of the ratio of the peak or RMS pressures to a reference pressure (1 µPa in water) by a factor of 20 and are reported in dB; see sound levels described below.



A) A sine wave of a pure tonal signal with equal positive and negative peaks, so peak-to-peak is exactly twice the peak and RMS is approximately 0.7 x peak. B) A single pile-driving strike with one large positive pulse and a large negative pulse that is not necessarily the same magnitude. In this example, the negative pulse is more extreme so the reported peak value and peak-to-peak are less than double that. Sound exposure is shown as it accumulates across the time window. The final sound exposure would be considered the "single-shot" exposure and the RMS value is that divided by the duration of the pulse. C) Three consecutive pile-driving strikes with peak and peak-to-peak assessed the same way as in B). Sound exposure is shown accumulating across all three strikes and RMS is the total sound exposure divided by the entire time window shown. The cumulative sound exposure for this series of signals would be considered the total energy from all three pile-strikes.

Figure J-2 Sound Pressure Wave Representations of Four Metrics: Root-mean-square (L_{RMS}), Peak (L_{pk}), Peak-to-peak (L_{pk-pk}), and Sound Exposure (SEL)

Particle velocity (m/s): Particle velocity describes the change in position of the oscillating particles about its origin over a unit of time. Similar to sound pressure, particle velocity is dynamic and changes as the particles move back and forth. Therefore, peak particle velocity and RMS particle velocity can be used to describe this physical quantity. One major difference between sound pressure and particle velocity is that the former is a scalar (i.e., without the directional component) and the latter is a vector (i.e., includes both magnitude and direction). Particle acceleration can also be used to describe particle motion, and is defined as the rate of change of velocity of a particle with respect to time. It is measured in units of meters per second squared, or m/s^2.

Sound exposure (pascal-squared second): Sound exposure is proportional to the acoustic energy of a sound. It is the time-integrated squared sound pressure over a stated period or acoustic event (see Figure J-2). Unlike sound pressure, which provides an instantaneous or time-averaged value of acoustic pressure, sound exposure is cumulative over a period of time.

Acoustic intensity (watts per square meter): Acoustic or sound intensity is the amount of acoustic energy that passes through a unit area normal to the direction of propagation per second. It is the product of the sound pressure and the sound velocity. With an idealized constant source, the pressure and particle velocity will vary in proportion to each other at a given location, but the intensity will remain constant.

Sound levels: There is an extremely wide dynamic range of values when measuring acoustic pressure in pascals, so it is customary to use a logarithmic scale to compress the range of values. Aside from the ease it creates for comparing a wide range of values, animals (including humans) perceive sound on a logarithmic scale. These logarithmic acoustic quantities are known as *sound levels* and are expressed in dB, which is the logarithmic ratio of the measurement in question to a fixed reference value. Underwater acoustic SPLs are referenced to a pressure of 1 μPa (equal to 10^{-6} pascals or 10^{-11} bar). Note: airborne SPLs have a different reference pressure: 20 μPa.

The metrics previously described (sound pressure, sound exposure, and intensity) can also be expressed as levels, and are commonly used in this way:

- RMS sound pressure level (L_{RMS} or SPL, units of dB re 1 μPa)
- peak pressure level (L_{pk}, units of dB re 1 μPa)
- peak-to-peak pressure level ($L_{pk\text{-}pk}$, units of dB re 1 μPa)
- SEL (units of dB re 1 μPa^2s)

There are a few commonly used time periods used for SEL, including a 24 hour period (used in the U.S. for the regulation of noise impacts on marine mammals [SEL_{24}]), or the duration of a single event, such as a single pile-driving strike or an airgun pulse, called the single-strike SEL (SEL_{ss}). A sound exposure for some other period of time, such as the entire installation of a pile, may be written without a subscript (SEL) but, in order to be meaningful, should always denote the duration of the event.

Source Level: Another commonly discussed concept is source level. Source level is a representation of the amount of acoustic power radiated from the sound source being described. It describes how loud a particular source is in a way that can inform expected received levels at various ranges. It can be conceptualized as the product of the pressure at a particular location and the range from that location to a spherical (omnidirectional) source in an idealized infinite lossless medium. The source level is the sum of the received level and the propagation loss to that receiver. It is often discussed as what the received level would be 1 meter from the source, but this can lead to confusion as an actual measurement at 1 meter is likely to be impossible for large or non-spherical sources. The most common type is an SPL source level in units of dB re 1 μPa-m, although in some circumstances a SEL source level (in dB re 1 $\mu Pa^2s\text{-}m^2$) may be expressed; peak source level (in units of dB re 1 μPa-m) may also be appropriate for some sources.

J.3.2 Propagation of Sound in the Ocean

Underwater sound can be described through a source-path-receiver model. An acoustic source emits sound energy that radiates outward and travels through the water and the seafloor. The sound level decreases with increasing distance from the acoustic source as the sound travels through the environment. The amount by which the sound levels decrease between the theoretical source level and a receiver is called *propagation loss*. Among other things, the amount of propagation loss that occurs depends on the source-receiver separation, the geometry of the environment the sound is propagating through, the frequency of the sound, the properties of the water column, and the properties of the seafloor and sea surface.

When sound waves travel through the ocean, they may encounter areas with different physical properties that will likely alter the propagation pathway of the sound, compared to a homogenous and boundaryless environment. For example, near the ocean's surface, water temperature is usually higher, resulting in relatively fast sound speeds. As temperature decreases with increasing depth, the sound speed decreases. Sounds bend toward areas with lower speeds (Urick 1983). Ocean sound speeds are often slowest at mid-latitude depths of about 1,000 meters and, because of sound's preference for lower speeds, sound waves above and below this "deep sound channel" often bend toward it. Sounds originating in this layer can travel great distances. Sounds can also be trapped in the mixed layer near the ocean's surface (Urick

1983). Latitude, weather, and local circulation patterns influence the depth of the mixed layer, and the propagation of sounds near the surface is highly variable and difficult to predict.

At the boundaries near the sea surface and the sea floor, acoustic energy can be scattered, reflected, or attenuated depending on the properties at the surface (e.g., roughness, presence of wave activity, or bubbles) or seafloor (e.g., bathymetric features, substrate heterogeneity). For example, fine-grain sediments tend to absorb sounds well, while hard-bottom substrates reflect much of the acoustic energy back into the water column. The presence of ice on the ocean's surface can also affect sound propagation. For example, the presence of solid ice may dampen sound levels by blocking surface winds. The presence of ice can also increase sound levels when pieces of ice break or scrape together (Urick 1983). The effect will also depend on the thickness and roughness of the ice, among many other factors related to the ambient conditions. As a sound wave moves from a source to a receiver (i.e., an animal), it may travel on multiple pathways that may be direct, reflected, refracted, or a combination of these mechanisms, creating a complex pattern of transmission across range and depth. The patterns may become even more complicated in shallow waters due to repeated interactions with the surface and the bottom, frequency-specific propagation, and more heterogenous seafloor properties. All of these variables contribute to the difficulty in reliably predicting the sound field in a given marine environment at any particular time.

J.3.3 Sound Source Classification

In the current regulatory context, anthropogenic sound sources are divided into four types: impulsive, non-impulsive, continuous, and intermittent, based on their differing potential to affect marine species (NMFS 2018). Specifically, when it comes to potential damage to marine mammal hearing, sounds are classified as either impulsive or non-impulsive, and when considering the potential to affect behavior or acoustic masking, sounds are classified as either continuous or intermittent.

Impulsive noises are characterized as having (ANSI S1.13-2005 [Finneran 2016]):

- Broadband frequency content
- Fast rise times and rapid decay times
- Short durations (i.e., less than 1 second)
- High peak sound pressures

The characteristics of non-impulsive sound sources are less clear but may:

- Be variable in spectral composition, i.e., broadband, narrowband, or tonal
- Have longer rise time/decay times and total durations compared to an impulsive sound
- Be continuous (e.g., vessel engine radiated noise) or intermittent (e.g., echosounder pulses)

It is generally accepted that sources like explosions, airguns, sparkers, boomers, and impact pile driving are impulsive and have a greater likelihood of causing hearing damage than non-impulsive sources (explosions are further considered for non-auditory injury; see Section J.5.3, *Thresholds for Non-auditory Injury for Explosives*). At close distances to impulsive sounds, physiological effects on an animal are likely, including TTS and PTS. This binary, at-the-source classification of sound types, therefore, provides a conservative framework upon which to predict potential adverse hearing impacts on marine mammals.

For behavioral effects of anthropogenic sound on marine mammals, NMFS classifies sound sources as either intermittent or continuous (NMFS 2018). Continuous sounds, such as drilling or vibratory pile-driving, remain "on," i.e., above ambient noise, for a given period of time, although this is not well defined. An intermittent sound typically consists of bursts or pulses of sound on a regular on/off pattern, also called the duty-cycle. Examples of intermittent sounds are those from scientific echosounders, sub-

bottom profilers, and even pile driving. It is important to recognize that these delineations are not always practical in application, as a continuous yet moving sound source (such as a vessel passing over a fixed receiver) could be considered intermittent from the perspective of the receiver.

In reality, animals will encounter many signals in their environment that may contain many or all of these sound types, called complex sounds. Eeven for sounds that are impulsive at the source, as the signal propagates through the water, the degree of impulsiveness decreases (Martin et al. 2020). While there is evidence, at least in terrestrial mammals (Hamernik and Hsueh 1991), that complex sounds can be more damaging than continuous sounds, there is not currently a regulatory category for this type of sound. One current approach for assessing the impulsiveness of a sound that has gained attention is to compute the kurtosis of that signal. Kurtosis is a statistical measure that describes the prevalence of extreme values within a distribution of observations, in other words the "spikiness" of the data. Martin et al. (2020) showed that a sound with a kurtosis value of 3 or less has very few extreme values and is generally considered Gaussian (i.e., normally distributed) noise, whereas a kurtosis value greater than 40 represents a distribution of observations with many extreme values and is very spiky. This generally describes an impulsive noise. A distribution of sound level observations from a time series with a kurtosis value somewhere in between these two values would be considered a complex sound.

J.4. Sound Sources Related to Offshore Wind Development

J.4.1 Geophysical and Geotechnical Surveys

G&G surveys are conducted to characterize the bathymetry, sediment type, and benthic habitat characteristics of the marine environment. They may also be used to identify archaeological resources or obstacles on the seafloor. These types of surveys occur in the site assessment phase in order to inform the placement of offshore wind foundations but may also occur intermittently during and after turbine construction to identify, guide, and confirm the locations of turbine foundations. The suite of HRG sources that may be used in geophysical surveys includes side-scan sonars, multibeam echosounders, magnetometers and gradiometers, parametric sub-bottom profilers, compressed high-intensity radiated pulse sub-bottom profilers, boomers, or sparkers. Seismic airguns are not expected to be used for offshore wind applications. These HRG sources may be towed behind a ship, mounted on a ship's hull, or deployed from remotely operated vehicles or autonomous underwater vehicles.

All HRG sources are active acoustic sources, meaning they produce sound deliberately in order to obtain information about the environment. With the exception of some multibeam echosounder and side-scan sonar, they produce sounds below 180 kilohertz and therefore may be audible to marine species. Source levels vary widely depending on source type and operational power level used, from approximately 145 dB re 1 µPa-m for towed sub-bottom profilers up to 245 dB re 1 µPa-m for some multibeam echosounders (Crocker and Fratantonio 2016). Generally speaking, sources that emit sound in narrow beams directed at the seafloor are less likely to affect marine species because they ensonify a small portion of the water column, thereby reducing the likelihood that an animal encounters the sound. While sparkers are omnidirectional, most other HRG sources have narrow beamwidths (e.g., multibeam echosounders: up to 6 degrees, parametric sub-bottom profilers: 30 degrees, boomers: 30–90 degrees) (Crocker and Fratantonio 2016). Most HRG sources emit short pulses of sound, with periods of silence in between. This means that only several "pings" emitted from a vessel towing an active acoustic source would reach an animal below, even if the animal was stationary (Ruppel et al. 2022). HRG surveys may occur throughout the construction area with the potential for greater effort in some areas.

Geotechnical surveys may use vibracores, jet probes, bottom-grab samplers, deep borings, or other methods to obtain samples of sediments at each potential turbine location and along the cable route. For most of these methods, source levels have not been measured, but it is generally assumed that low-

frequency, low-level noise would be introduced as a byproduct of these actions. It is likely that the sound of the vessel would exceed that generated by the geotechnical method itself.

J.4.2 Unexploded Ordnance Detonations

UXO may be discovered on the seabed in offshore wind lease areas or along export cable routes. While non-explosive methods may be employed to lift and move these objects, some may need to be detonated. Underwater explosions of this type create a shock wave with a nearly instantaneous rise in pressure, followed by a series of symmetrical bubble pulses. Shock waves are supersonic, so they travel faster than the speed of sound. The explosive sound field extremely is complex, especially in shallow waters. In 2015, von Benda-Beckmann et al. measured received levels of explosions in shallow waters at distances ranging from 100–2,000 meters from the source in water depths ranging from 6–22 meters. The measured SEL from the explosive removal of a 263-kilogram charge was 216 dB re 1 μPa^2s at a distance of 100 meters and 196 dB re 1 μPa^2s at 2,000 meters. They found that SELs were lower near the surface than near the seafloor or in the middle of the water column, suggesting that if an animal is near the surface, the effects may be less damaging. Most of the acoustic energy for underwater explosions is below 1,000 Hz.

As an alternative to traditional detonation, a newer method called deflagration allows for the controlled burning of underwater ammunition. Typically, a remotely operated vehicle uses a small, targeted charge to initiate rapid burning of the ordnance; once this process is complete, the remaining debris can be cleared away. Recent work has demonstrated that both peak sound pressure (L_{pk}) and SEL measured from deflagration events may be as much as 20 dB lower than equivalently sized high-order detonations (Robinson et al. 2020).

J.4.3 Construction and Installation

J.4.3.1. Impact and Vibratory Pile Driving

At present, the installation of turbine foundations is largely done using pile driving. There are several techniques, including impact and vibratory driving, and many pile designs and sizes, including monopile and jacket foundations. Impact pile driving employs a hammer to strike the pile head and force the pile into the sediment with a typical hammer strike rate of approximately 30–50 strikes/minute. Typically, force is applied over a period of less than 20 milliseconds, but the pile can generate sound for upward of 0.5 second. Pile-driving noise is characterized as impulsive because of its high peak pressure, short duration, and rapid onset time. Underwater sound levels generated during pile driving depend on many factors including the pile material and size, characteristics of the substrate, penetration of the pile in the seabed, hammer energy and size, and water depth. Currently the design envelope for most offshore wind turbine installations anticipates hammer energy between 2,500 and 4,000 kilojoules (kJ) but, generally speaking, with increasing pile diameter, greater hammer energy is used. The propagation of pile-driving sounds depends on factors such as the sound speed in the water column (influenced by temperature, salinity, and depth), the bathymetry, and the composition of sediments in the seabed and will therefore vary among sites. Due to variation in these features, sounds may not radiate symmetrically outward from a pile.

Measurements of impact-pile driving are generally derived from measurements at facilities in Europe; see Bellman et al. (2020) for a complete report of expected sound levels and a discussion of noise abatement methods. In the U.S. OCS, BOEM has invested in the Realtime Opportunity for Development of Environmental Observations efforts to measure sound installation and operation of two wind farms: Block Island Wind Farm and Coastal Virginia Offshore Wind. At Block Island Wind Farm, 50-inch-diameter jacket foundations were installed in 30-meter water depth. Jacket foundations typically use using pin piles, which are generally substantially smaller than monopiles, but more pin piles are needed per

foundation. The sound levels generated will vary depending on the pile material, size, substrate, hammer energy, and water depth. At Block Island Wind Farm, Amaral et al. (2018) measured sound levels at various distances during pile driving and reported SPL received levels between 150–160 dB re 1 µPa at approximately 750 meters from the piles. It should be noted that the slant range of the jacket piles influenced the measurements, so caution is encouraged with interpretation. At Coastal Virginia Offshore Wind, two monopiles (7.8-meter diameter) were installed off in 27-meter water depth in 2020. Dominion Energy (2020) recorded sounds during this process; without noise mitigation, L_{pk} source levels were back-calculated to be 221 dB re 1 µPa-m, but with a double bubble curtain, L_{pk} source levels were around 212 dB re 1 µPa-m because a good portion of energy greater than 200 Hz was attenuated by the bubble curtain. The unmitigated SPL source level was 213 dB re 1 µPa-m; the mitigated SPL source level was 204 dB re 1 µPa-m.

Vibratory hammers may be used as an alternative to impact pile driving. The vibratory hammer continuously exerts vertical vibrations into the pile, which causes the sediment surrounding the pile to liquefy, allowing the pile to penetrate the substrate. The vibratory hammer typically oscillates at a frequency of 20–40 Hz (Matuschek and Betke 2009) and produces most of its acoustic energy below 2 kilohertz. While measurements of vibratory pile driving of large monopiles have not been reported, Buehler et al. (2015) measured sound levels at 10 meters distance from a 72-inch steel pile, and found them to be 185 dB re 1 µPa. Vibratory pile driving is a non-impulsive sound source but, because the hammer is on continuously, underwater sound introduced would be into the water column for a longer period of time than with impact pile driving.

A technique that is quickly gaining use for installation in hard rock substrates is down-the-hole pile driving, which uses a combination of percussive and drilling mechanisms, with a hammer acting directly on the rock to advance a hole into the rock and also advance the pile into that hole (Guan et al. 2022). Noise characteristics for down-the-hole pile driving include both impulsive and non-impulsive components. The impulsive component of the down-the-hole pile driving is the result of a percussive hammer striking the bedrock, while the non-impulsive component is from drilling and air lifting of cuttings and debris from the pile. While only limited studies have been conducted on down-the-hole pile-driving noise, its characteristics strongly resemble those of impact pile driving but with a higher hammer striking rate (approximately 10–15 Hz). The dominant frequencies from down-the-hole pile driving are below 2 kilohertz, similar to those of conventional impact pile driving. Due to the high rate of hammer striking along with the sounds of drilling and debris clearing out, sound levels in between the pulses are much higher than for conventional impact pile driving (Guan et al. 2022).

Various noise abatement technologies, such as bubble curtains, arrays of enclosed air resonators, or segmented nets of rubber or foam, may be employed to reduce noise from impact pile driving. Measurements from European wind farms have shown that a single noise abatement system can reduce broadband sound levels by 10–15 dB, while using two systems together can reduce sound levels as much as 20 dB (Bellmann et al. 2020). Based on Realtime Opportunity for Development of Environmental Observations measurements from Coastal Virginia Offshore Wind, double big bubble curtains are shown to be most effective for frequencies above 200 Hz, and greater noise reduction was seen in measurements taken in the middle of the water column compared to those near the seabed. Approximate sound level reduction is 3–5 dB below 200 Hz and 8–20 dB above 200 Hz, depending on the characteristics of the bubble curtain (Amaral et al. 2020).

J.4.3.2. Vessels

During construction, vessels and aircraft may be used to transport crew and equipment. See Section J.4.4, *Operations and Maintenance*, for further detail about sounds related to those activities. Large vessels would also be used during the construction phase to conduct pile driving and may use dynamic positioning systems. Dynamic positioning is the process by which a vessel holds station over a specific

seafloor location for some time period using input from gyrocompasses, motion sensors, global positioning systems, active acoustic positioning systems, and wind sensors to determine relative movement and environmental forces at work. Generally speaking, most acoustic energy is less than 1,000 Hz, often below 50 Hz, with tones related to engine and propeller size and type. The sound can also vary directionally, and this directionality is much more pronounced at higher frequencies. Because this is a dynamic operation, the sound levels produced will vary based on the specific operation, dynamic positioning system used (e.g., jet or propeller rotation versus a rudder or steering mechanism), and factors such as the blade rate and cavitation, in some cases. Representative sound field measurements from the use of dynamic positioning are difficult to obtain because the sound transmitted is often highly directional and context specific. The direction of sound propagation may change as different dynamic positioning needs requiring different configurations are applied.

Many studies have found that the measured sound levels of dynamic positioning alone are, counterintuitively, higher than those of dynamic positioning combined with the intended activities such as drilling (Jiménez-Arranz et al. 2020; Kyhn et al. 2011; Nedwell and Edwards 2004) and coring (Warner and McCrodan 2011). Nedwell and Edwards (2004) reported that dynamic positioning thrusters of the semi-submersible drill rig Jack Bates produced periodic noise (corresponding to the rate of the thruster blades) with most energy between 3–30 Hz. The received SPL measured at 100 meters from the vessel was 188 dB re 1 µPa. Warner and McCrodan (2011) found that most dynamic positioning related sounds from the self-propelled drill ship R/V Fugro Synergy were in the 110–140 Hz range, with an estimated source level of 169 dB re 1 µPa-m. Sounds in this frequency range varied by 12 dB during dynamic positioning, while the broadband levels, which also included diesel generators and other equipment sounds, varied by only 5 dB over the same time period. All of the above sources report high variability in levels with time. This is due in part to the intermittent usage and relatively slow rotation rates of thrusters used in dynamic positioning. It is also difficult to provide a realistic range of source levels from the data thus far because most reports do not identify the direction from which sound was measured relative to the vessel, and dynamic positioning thrusters are highly directional systems.

The active acoustic positioning systems used in dynamic positioning can be additional sources of high-frequency sound. These systems usually consist of a transducer mounted through the vessel's hull and one or more transponders affixed to the seabed. Kongsberg High-Precision Acoustic Positioning systems produce pings in the 10–32-kilohertz frequency range. The hull-mounted transducers have source levels of 188–206 dB re 1 µPa-m depending on adjustable power settings (Kongsberg Maritime AS 2013). The fixed transponders have maximum source levels of 186–206 dB re 1 µPa-m depending on model and beam width settings from 15 to 90 degrees (Jiminez-Arranz et al. 2020). These systems have high source levels, but beyond 2 kilometers they are generally quieter than other components of the sound from dynamic positioning vessels for various reasons, including that their pulses are produced in narrowly directed beams, each individual pulse is very short, and their high-frequency content leads to faster attenuation.

J.4.3.3. Dredging, Trenching, and Cable Laying

The installation of cables can be done by towing a tool behind the installation vessel to simultaneously open the seabed and lay the cable, or by laying the cable and following with a tool to embed the cable. Possible installation methods for these options include jetting, vertical injection, controlled-flow excavation, trenching, and plowing. Burial depth of the cables is typically 1–2 meters. Cable installation vessels may use utilize dynamic positioning to lay the cables (see Section J.4.3.2, *Vessels*).

Nedwell and Edwards (2004) measured sounds from a 130-meter-long trenching vessel and found that sound levels were similar to those produced during pipeline laying in the same area (see below), with the exception of a 20-kilohertz tonal sound, which they attributed to the vessel's dynamic positioning thrusters. Source levels for trenching were not reported. Nedwell et al. (2003) recorded underwater sound

160 meters from trenching activity with the hydrophone 2 meters below the surface (and water depth 7–11 meters) and back-calculated the SPL source level of trenching to be 178 dB re 1 µPa-m (assuming propagation loss of 22logR). They describe the sound as generally spanning a wide range of frequencies, variable over time, and accompanied by some tonal machinery noise and transients associated with rock breakage.

Mechanical dredges mechanically dig or gather sediment from the bottom using a bucket. They may also be called backhoe dredges, grab dredges, bucket dredges, bucket ladder dredges, or clamshells. These dredges are usually fixed via anchoring or dynamic positioning systems. Material is scraped off the bottom and lifted up to the ship using a winch. Mechanical dredging is widely used in the research community to sample hard materials from the seafloor for studies of volcanic areas (e.g., mid-ocean ridges) and deep-sea minerals. These dredges may be used in offshore wind projects to reach cable-burying depths in problematic areas where simple jetting cannot be used.

Dredging produces distinct sounds during each specific phase of operation: excavation, transport, and placement of dredged material (Central Dredging Association 2011; Jiménez-Arranz et al. 2020). Engines, pumps, and support vessels used throughout all phases may introduce low-level, continuous noise into the marine environment. The sounds produced during excavation vary depending on the sediment type—the denser and more consolidated the sediment is, the more force the dredger needs to impart, and the higher sound levels that are produced (Robinson et al. 2011). Hydraulic dredges (with cutterheads or drag arms in continuous contact with the seabed) produce nearly continuous sounds during the excavation process. On the other hand, sounds from mechanical dredges occur in intervals as the dredge lowers a bucket, digs, and raises the bucket with a winch. During the sediment transport phase, many factors—including the load capacity, draft, and speed of the vessel—influence the sound levels that are produced (Reine et al. 2014b). Sounds are also produced during pump-out operations when dredge plant pumps are operated (Central Dredging Association 2011). Dredging activities as a whole generally produce low-frequency sounds; most energy is below 1,000 Hz, with peaks typically occurring between 150–300 Hz (McQueen et al. 2018).

McQueen et al. (2018) summarized results from several studies that measured sounds during dredging operations. For cutterhead suction dredges, SPL source levels were 168–175 dB re 1 µPa-m (Greene 1987; Reine et al. 2012b, 2014a). Trailing suction hopper dredges were slightly louder, with SPL source levels ranging from 172–190 dB re 1 µPa-m (McQueen et al. 2018). Dickerson et al. (2001) recorded a maximum SPL of 124 dB re 1 µPa at 154 meters during the moment when the grab hit the seabed; during other phases of operation (e.g., raising and lowering of grab dredge, dumping sediment on barge), the received SPL was closer to approximately 110–115 dB re 1 µPa at 154 meters. Finally, SPL source levels during backhoe dredge operations ranged from 163–179 dB re 1 µPa-m (Nedwell et al. 2008; Reine et al. 2012a). Hydraulic dredges are generally louder than mechanical dredges, and dredging of coarser sediments usually produces more noise than softer sediments (Jiménez-Arranz et al. 2020). Additional detail and measurements of dredging sounds can be found in Jiménez-Arranz et al. (2020), McQueen et al. (2018), and Robinson et al. (2011).

J.4.4 Operations and Maintenance

J.4.4.1. Aircraft

Manned aircraft consist of propeller and jet engines, fixed-wing craft, and helicopters. Unmanned systems also exist. For jet engine aircraft, the engine is the primary source of sound. For propeller-driven aircraft and helicopters, the propellors and rotors also produce noise. Aircraft generally produce low-frequency sound below 500 Hz (Richardson et al. 1995). While aircraft noise can be substantial in air, penetration of aircraft noise into the water is limited because much of the noise is reflected off the water's surface (Richardson et al. 1995). The noise that does penetrate into the water column does this via a critical

incident angle or cone. With an idealized flat sea surface, the maximum critical incident angle is approximately 13 degrees (Urick 1983); beyond this, sound is reflected off the surface. When the sea surface is not flat, there may be some additional penetration into the water column in areas outside of this 13-degree cone. Nonetheless, the extent of noise from passing aircraft is more localized in water than it is in air.

Jiménez-Arranz et al. (2020) reviewed Richardson et al.'s (1995) sound measurements recorded below passing aircraft of various models. These SPL measurements included 124 dB re 1 µPa (dominant frequencies between 56–80 Hz) from a maritime patrol aircraft with an altitude of 76 meters, 109 dB re 1 µPa (dominant frequency content below 22 Hz) from a utility helicopter with an altitude of 152 meters, and 107 dB re 1 µPa (tonal, 82 Hz) from a turbo propeller with an altitude of 457 meters. Recent published levels associated with unmanned aircraft (Christiansen et al. 2016; Erbe et al. 2017) indicate source levels around or below 100 dB re 1 µPa-m.

J.4.4.2. Vessels in Transit

During operations, small vessels may be used to transport crew and supplies. Noise from vessel transit is considered to be continuous, with a combination of broadband and tonal sounds (Richardson et al. 1995; Ross 1976). Transiting vessels generate continuous sound from their engines, propeller cavitation, onboard machinery, and hydrodynamics of water flows (Ross 1976). The actual radiated sound depends on several factors, including the type of machinery on the ship, the material conditions of the hull, how recently the hull has been cleaned, interactions with the sea surface, and shielding from the hull, which reduces sound levels in front of the ship.

In general, vessel noise increases with ship size, power, speed, propeller blade size, number of blades, and rotations per minute. Source levels for large container ships can range from 177 to 188 dB re 1 µPa-m (McKenna et al. 2013) with most energy below 1 kilohertz. Smaller vessels typically produce higher-frequency sound concentrated in the 1–5 kilohertz range. Kipple and Gabriele (2003) measured underwater sound from vessels ranging from 14 to 65 feet long (25 to 420 horsepower) and back-calculated source levels to be 157–181 dB re 1 µPa-m. Similar levels are reported by Jiménez-Arranz et al. (2020), who provide a review of measurements for support and crew vessels, tugs, rigid-hull inflatable boats, icebreakers, cargo ships, oil tankers, and more.

During transit to and from shore bases, survey vessels typically travel at speeds that optimize efficiency, except in areas where transit speed is restricted. The vessel strike speed restrictions in place along the Atlantic OCS are expected to offer a secondary benefit of underwater noise reduction. For example, recordings from a speed reduction program in the Port of Vancouver (210–250-meter water depths) showed that reducing speeds to 11 knots reduced vessel source levels by 5.9–11.5 dB, depending on the vessel type (MacGillivray et al. 2019). Vessel noise is also expected to be lower during G&G surveys, as they typically travel around 5 knots when towing instruments.

J.4.4.3. Turbine Operations

Once wind farms are operational, low-level sounds are generated by each WTG, but sound levels are much lower than during construction. This type of sound is considered to be continuous, omnidirectional radially from the pile, and non-impulsive. Most of the energy associated with operations is below 120 Hz. Sound levels from WTG operations are likely to increase somewhat with increasing generator size and power ratings, as well as with wind speeds. Recordings from Block Island Wind Farm indicated that there was a correlation between underwater sound levels and increasing wind speed, but this was not clearly influenced by turbine machinery; rather it may have been explained by the natural effects that wind and sea state have on underwater sound levels (Elliott et al. 2019; Urick 1983).

A recent compilation (Tougaard et al. 2020) of operational noise from several wind farms, with turbines up to 6.15 MW in size, showed that operational noise generally attenuates rapidly with distance from the turbines (falling to near-ambient sound levels within approximately 1 kilometer from the source), and the combined noise levels from multiple turbines is lower or comparable to that generated by a small cargo ship. Tougaard et al. (2020) developed a formula predicting a 13.6-dB increase for every tenfold increase in WTG power rating. This means that operational noise could be expected to increase by 13.6 dB when increasing in size from a 0.5-MW turbine to a 5-MW one, or from 1 MW to 10 MW. The least squares fit of that dataset would predict that the SPL measured 100 meters from a hypothetical 15-MW turbine in operation in 10-m/s (19-knot or 22-mile-per-hour) wind would be 125 dB re 1 µPa. However, all of the 46 data points in that dataset—with the exception of the two from Block Island Wind Farm—were from WTGs operated with gear boxes of various designs rather than the newer use of direct-drive technology, which is expected to lower underwater noise levels substantially. Stöber and Thomsen (2021) make predictions for source levels of 10-MW turbines based on a linear extrapolation of maximum received levels from WTGs with ratings up to 6.15 MW. The linear fit is likely inappropriate, and the resulting predictions may be exaggerated. Tougaard et al. (2020) point out that received level differences among different pile types could be confounded by differences in water depth and turbine size. In any case, additional data are needed to fully understand the effects of size, foundation type properties (e.g., structural rigidity and strength), and drive type on the amount of sound produced during turbine operation.

J.4.5 Decommissioning

The methods that may be used for decommissioning are not well understood at this time. It is possible that explosives may be used (see Section J.4.2, *Unexploded Ordnance Detonations*). However, given the general trend of reducing the use of underwater explosives that has been observed in the oil and gas industry, it is likely that offshore wind structures will instead be removed by cutting. While it is difficult to extrapolate directly, we can glean some insights from a recent study that measured received sound levels during the mechanical cutting of well conductor casings on oil and gas platforms in California. The cutters operated at 60–72 revolutions per minute, and the cutting time varied widely between cuts (on the order of minutes to hours). At distances of 106–117 meters from the cutting, received SPLs were 120–130 dB re 1 µPa, with most acoustic energy falling between 20 and 2,000 Hz (Fowler et al. 2022). This type of sound is considered to be non-impulsive and intermittent (i.e., continuous while cuts are actually being made, with quieter periods between cuts). Additional noise from vessels (see Section J.4.3.2, *Vessels*) and other machinery may also be introduced throughout the decommissioning process.

J.5. Regulation of Underwater Sound for Marine Mammals

The MMPA prohibits the "take" of marine mammals, defined as the harassment, hunting, capturing, killing, or an attempt of any of those actions on a marine mammal. This act requires that an incidental take authorization be obtained for the incidental take of marine mammals as a result of anthropogenic activities. MMPA regulators divide the effects on marine mammals that could result in a take into Level A and Level B, defined as follows:

- Level A: Any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild
- Level B: Any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but that does not have the potential to injure a marine mammal or marine mammal stock in the wild (16 USC 1362)

With respect to anthropogenic sounds, Level A takes generally include injury impacts like PTS, whereas Level B takes include behavioral effects as well as TTS. The current regulatory framework used by

NMFS for evaluating an acoustic take of a marine mammal involves assessing whether the animal's received sound level exceeds a given threshold. For Level A, this threshold differs by functional hearing group, but for Level B, the same threshold is used across all marine mammals.

J.5.1 Thresholds for Injury

The current NMFS (2018) injury (Level A) thresholds consist of dual criteria of L_{pk} and 24-hour cumulative SEL thresholds (Figure J-1). These criteria are used to predict the potential range from the source within which injury may occur. The criterion that results in the larger physical impact range is generally used to be most conservative. The SEL thresholds are frequency weighted, which means that the sound is essentially filtered based on the animal's frequency-specific hearing sensitivity, de-emphasizing the frequencies at which the animal is less sensitive (see Section J.17 for the frequency range of hearing for each group). The frequency weighting functions are described in detail in Finneran (2016).

Table J-1 The Acoustic Thresholds for Onset of Permanent Threshold Shift and Temporary Threshold Shift for Marine Mammals for Both Impulsive and Non-impulsive Sound Sources

Marine Mammal Functional Hearing Group	Effect	Impulsive Source		Non-impulsive Source
		L_{pk} (dB re 1 µPa)	Weighted SEL_{24h} (dB re 1 µPa²s)	Weighted SEL_{24h} (dB re 1 µPa²s)
LFC	PTS	219	183	199
	TTS	213	168	179
MFC	PTS	230	185	198
	TTS	224	170	178
HFC	PTS	202	155	173
	TTS	196	140	153
Phocid pinnipeds underwater	PTS	218	185	201
	TTS	212	170	181
Otariid pinnipeds underwater	PTS	232	203	199
	TTS	226	188	199

Source: NMFS 2018
Note: L_{pk} values are unweighted within the generalized hearing range of marine mammals (i.e., 7 Hz to 160 kilohertz): Values presented for SEL use a 24-hour accumulation period unless stated otherwise, and are weighted based on the relevant marine mammal functional hearing group (Finneran 2016).
dB re 1 µPa = decibels relative to 1 µPa; dB re 1 μPa^2s = decibels relative to 1 μPa^2s.

J.5.2 Thresholds for Behavioral Disturbance

NMFS currently uses a threshold for behavioral disturbance (Level B) of 160 dB re 1 µPa SPL for non-explosive impulsive sounds (e.g., airguns, impact pile driving) and intermittent sound sources (e.g., scientific and non-tactical sonar), and 120 dB re 1 µPa SPL for continuous sounds (e.g., vibratory pile driving, drilling (NMFS 2022). This is an "unweighted" criterion that is applicable for all marine mammal species. In-air behavioral thresholds exist for harbor seals and non-harbor seal pinnipeds at 90 dB re 20 µPa SPL and 100 dB re 20 µPa SPL, respectively (NMFS 2022). Unlike with SEL-based thresholds, the accumulation of acoustic energy over time is not relevant for this criterion, meaning that a Level B take can occur even if an animal experiences a received SPL of 160 dB re 1 µPa very briefly just once.

While the Level B criterion is generally applied in a binary fashion, as alluded to previously, there are numerous factors that determine whether an individual will be affected by a sound, resulting in substantial variability even in similar exposure scenarios. In particular, it is recognized that the context in which a sound is received affects the nature and extent of responses to a stimulus (Ellison et al. 2012; Southall et

al. 2007). Therefore, a "step function" concept for Level B harassment was introduced by Wood et al. (2012) whereby proportions of exposed individuals experience behavioral disturbance at different received levels, centered at an SPL of 160 dB re 1 µPa. These probabilistic thresholds reflect the higher sensitivity that has been observed in beaked whales and migrating mysticete whales (Table J-2). At the moment, this step function provides additional insight to calculating Level B takes for certain species groups. The M-weighting functions, described by Southall et al. (2007) and used for the Wood et al. (2012) probabilistic disturbance step thresholds, are different from the weighting functions by Finneran (2016) previously mentioned. The M-weighting was specifically developed for interpreting the likelihood of audibility, whereas the Finneran weighting functions were developed to predict the likelihood of auditory injury.

Table J-2 Probabilistic disturbance SPL_{RMS} thresholds (M-weighted) used to predict a behavioral response. Probabilities are not additive and reflect single points on a theoretical response curve

Marine Mammal Group	Probabilistic Disturbance RMS Thresholds M-weighted dB re: 1 µPa RMS			
	120	140	160	180
Porpoises/beaked whales	50%	90%	--	--
Migrating mysticetes whales	10%	50%	90%	--
All other species/behaviors	--	10%	50%	90%

Source: Wood et al. 2012

J.5.3 Thresholds for Non-auditory Injury for Explosives

Shock waves associated with underwater detonations can induce non-auditory physiological effects, including mortality and direct tissue damage (i.e., severe lung injury, slight lung injury, and gastrointestinal tract injury). To predict non-auditory lung injury and mortality, the acoustic impulse, measured in pascal-seconds, is the integral of the pressure shock pulse over time and serves as the threshold. Because lung capacity or size is generally directly related to the size of an animal, body mass is one parameter used to predict the likelihood of lung injury. In addition, the depth of the animal is used, as this represents the ambient pressure conditions of the animal and its vulnerability to a rapid change in pressure. Gastrointestinal tract injury potential is identified using the peak SPL and is considered to occur beginning at levels of 237 dB re 1 µPa. The U.S. Navy established thresholds to identify to assess the potential for mortality and slight lung injury from explosive sources based on a modified Goertner equation; this assessment adopts and applies these thresholds (Navy 2017). Table J-3 provides an estimate of mass of the different marine mammal species covered in this assessment. Table J-4 lists the equations used to calculate thresholds based on effects observed in 1 percent of animals.

Table J-3 Representative Calf/Pup and Adult Mass Estimates Used for Assessing Impulse-based Onset of Lung Injury and Mortality Threshold Exceedance Distances

Impulse Animal Group	Representative Species	Calf/Pup Mass (kilograms)	Adult Mass (kilograms)
Baleen whales and sperm whale	Sei whale (*Balaenoptera borealis*), sperm whale (*Physeter macrocephalus*)	650	16,000
Pilot and minke whales	Minke whale (*Balaenoptera acutorostrata*)	200	4,000

Impulse Animal Group	Representative Species	Calf/Pup Mass (kilograms)	Adult Mass (kilograms)
Beaked whales	Gervais' beaked whale (*Mesoplodon europaeus*)	49	366
Dolphins, Kogia, pinnipeds, and sea turtles	Harbor seal (*Phoca vitulina*)	8	60
Porpoises	Harbor porpoise (*Phocoena phocoena*)	5	40

Table J-4 Marine Mammal Acoustic Thresholds used by NMFS for Non-auditory Injury and Mortality from Explosives

Mammals	Mortality (Severe Lung Injury) (Pa·s)	Slight Lung Injury (Pa·s)	G.I. Tract Injury (L_{pk}, dB re 1 µPa)
All marine mammals	$I=103M^{1/3}\left(1+\frac{D}{10.1}\right)^{1/6}$	$I=47.5M^{1/3}\left(1+\frac{D}{10.1}\right)^{1/6}$	237

Impulse thresholds for mortality and slight lung injury are calculated using the modified Goertner equation presented in Navy 2017, equations 11 (slight lung injury) and 12 (mortality), where *M* is the animal's mass in kilograms and *D* is the depth of the animal at exposure in meters.
Lung injury (severe and slight) thresholds are dependent on animal's mass, *M, in* kilograms (see Table C.9 in Navy 2017) and the animal's depth, *D,* in meters.
G.I. = gastrointestinal; Pa s = pascal-second

J.6. Thresholds for Auditory Injury for Explosives

The supersonic shock wave from an explosion transitions to normal pressure wave at a range determined by the weight and type of the explosive used. The range to the TTS and PTS threshold are outside of these radii, and the normal impulsive TTS and PTS thresholds (Table J-1) are applicable for determining auditory injury impacts (NMFS 2018).

J.7. Thresholds for Behavioral Disturbance for Explosives

Single blast events within a 24-hour period are not presently considered by NMFS to produce behavioral effects if they are below the onset of TTS thresholds for frequency-weighted SEL and peak pressure level. Only short-term startle responses are expected as far as behavioral responses. For multiple detonations, the threshold applied for behavioral effects is that same TTS threshold minus 5 dB.

J.7.1 Approach to Acoustic Exposure Modeling

In order to predict the number of individuals of a given species that may be exposed to harmful levels of sound from a specific activity, a series of modeling exercises are conducted. First, the sound field of a sound-generating activity is modeled based on characteristics of the source and the physical environment. From the sound field, the range to the U.S. regulatory acoustic threshold isopleths can be predicted. This approach is referred to as *acoustic modeling*. By overlaying the marine mammal density information for a certain species or population in the geographical area of the activity, the number of animals exposed within the acoustic threshold isopleths is then predicted. This is called *exposure modeling*. Some models further incorporate animal movement to make more realistic predictions of exposure numbers. Animal movement models may incorporate behavioral parameters including swim speeds, dive depths, course

changes, or reactions to certain sound types, among other factors. Exposure modeling may be conducted for a range of scenarios including different seasons, energy (e.g., pile-driving hammers), mitigation strategies (e.g., 6 dB versus 10 dB of attenuation), and levels of effort (e.g., number of piles per day).

J.8. Regulation of Underwater Sound for Fishes and Invertebrates

J.8.1 Thresholds for Injury

During construction of the Bay Bridge in California, researchers observed dead fish near pile-driving operations, suggesting that fish could be killed when in very close proximity (less than 10 meters) to the pile (Caltrans 2004). Further work around this construction project led to the formation of dual interim criteria by the Fisheries Hydroacoustic Working Group (2008), which were later adopted by NMFS. With these interim criteria, the maximum permitted peak SPL for a single pile-driving strike is 206 dB re 1 µPa, and the maximum accumulated SEL is 187 dB re 1 μPa^2s for fishes greater than 2 grams, and 183 dB re 1 μPa^2s for fishes below 2 grams (Table J-5). These criteria are still being used by NMFS but, given the new information obtained since 2008, the appropriateness of these thresholds is being reconsidered (Popper et al. 2019).

These early findings prompted a suite of laboratory experiments in which a special testing apparatus was used to simulate signals from pile driving that a fish would encounter around 10 meters from a pile (Casper et al. 2012, 2013a, 2013b; Halvorsen et al. 2011, 2012a, 2012b). An important component of this work was the ability to simulate both the pressure and particle motion components of the sound field, which is rarely done in laboratory experiments. These studies showed that effects are greater in fishes with swim bladders than those without, and that species with closed swim bladders experienced greater damage than those with open swim bladders. Evidence of barotrauma was observed starting at peak pressures of 207 dB re 1 µPa (Halvorsen et al. 2012a). Larger animals seem to have a higher susceptibility to injury than smaller animals (Casper et al. 2013a). The researchers found that most of the species tested showed recovery from injury within 10 days of exposure, but they note that injured animals may be more vulnerable to predation while they are recovering, and these secondary effects have not been studied. The authors also conclude that SEL alone is not enough to predict potential impacts on fishes; the energy in a given strike and the total number of strikes are also important factors. These studies formed the foundation of the *Guidelines for Fish and Sea Turtles* by Popper et al. (2014), which became ANSI standard (#ASA S3/SC1.4 TR-2014) and have become widely accepted hearing thresholds for fishes and turtles.

No studies have directly measured TTS in fishes as a result of exposure to pile-driving noise. Popper et al. (2005) exposed caged fish to sounds of seismic airguns (an impulsive signal that can serve as a proxy) and tested their hearing sensitivity afterward. Three species with differing hearing capabilities were exposed to five pulses at a mean received L_{pk} of 207 dB re 1 µPa (186 dB re 1 μPa^2s SEL). None of the fish showed evidence of barotrauma or tissue damage, and there was no damage to the hearing structures (Song et al. 2008). The species with the least-sensitive hearing—the broad whitefish—showed no evidence of TTS. The northern pike and lake chub, species with more sensitive hearing, did exhibit TTS after exposure to seismic pulses but showed recovery after 18 hours. The findings suggest that there is a relationship between hearing sensitivity and level of impact, and that species without a connection between the swim bladder and ear are unlikely to experience TTS. Nonetheless, Popper et al. (2014) propose 186 dB re 1 μPa^2s SEL as a conservative TTS threshold for all fishes exposed to either seismic airguns or pile driving, regardless of hearing anatomy. They acknowledge that research is needed on potential TTS due to exposure to pile-driving noise and that future work should measure particle motion as the relevant cue.

A handful of studies have directly investigated the effects of impulsive sounds on eggs and larvae of marine fishes and invertebrates, and most have taken place in the laboratory. Bolle et al. (2012) used a

device similar to that used by Halvorsen et al. (2012a) to simulate pile-driving sounds and found no damage to larvae of common sole (which has a swim bladder at certain larval stages) from an SEL of 206 dB re 1 uPa^2s, which the authors surmise is equivalent to the received level at approximately 100 meters from a 4-meter-diameter pile. Further work by Bolle et al. (2014) tested larvae of seabass and herring (both species have swim bladders). Several different life stages were tested, but none of the species showed a difference in mortality between control and exposed animals. The seabass were exposed to SELs up to 216 dB re 1 μPa^2s and maximum L_{pk} of 217 dB re 1 µPa, while herring were exposed to SELs up to 212 dB re 1 μPa^2s and maximum L_{pk} of 207 dB re 1 µPa. Together, the tested larvae represent the entire range of swim bladder shape types described by Popper et al. (2014). There was no difference in impacts experienced by species with and without a swim bladder or between those with open or closed swim bladders. Based on this work, Popper et al. (2014) use 210 dB re 1 uPa^2s SEL as a threshold for mortality after exposure to both pile driving and seismic airguns.

Popper et al. (2014) provide thresholds for non-recoverable injury, recoverable injury (i.e., mild forms of barotrauma), and TTS for the three hearing groups, plus an additional category for eggs and larvae (Table J-5). Unlike with marine mammals, Popper et al. (2014) do not distinguish between impulsive and non-impulsive sounds; instead they provide thresholds for each sound type (explosions, pile-driving, seismic airguns, sonars, and continuous sounds). That said, studies focused on pile-driving are sometimes used to draw conclusions about impacts from seismic airguns, and vice versa. This is simply due to a lack of comprehensive data for each source type. The thresholds are all given in terms sound pressure, not particle motion, though many have acknowledged that these would be more appropriate (Popper and Hawkins 2018). Currently, there are no underwater noise thresholds for invertebrates, but the effect ranges are expected to be similar to those predicted for fishes in Group 1.

Table J-5 Acoustic Thresholds for Exposure to Pile-driving Sound

Fish Hearing Group	Mortality and Non-Recoverable injury		Recoverable Injury		TTS
	L_{pk}	SEL	L_{pk}	SEL	SEL
Fish without swim bladder (Group 1)[1]	>213	>219	>213	>216	>>186
Fish with swim bladder not involved in hearing (Group 2)[1]	>207	210	>207	203	>186
Fish with swim bladder involved in hearing (Group 3)[1]	>207	207	>207	203	186
Eggs and Larvae[1]	>207	>210	--	--	--
Fish ≥ 2 grams[2]	--	--	206	187	--
Fish < 2 grams[2]	--	--	206	183	--

[1] Popper et al. (2014) Sound Exposure Guidelines. Note that Popper et al. (2014) use the notation "SEL_{cum}," but SEL without a subscript is the preferred nomenclature, used here to describe the energy that would be accumulated over an entire pile-driving event (i.e., installation of a pile).
[2] Fisheries Hydroacoustic Working Group (2008)

J.8.2 Thresholds for Behavioral Disturbance

NOAA Fisheries currently uses an SPL criterion of 150 dB re 1 µPa for the onset of behavioral effects in fishes (GARFO 2020). The scientific rationale for this criterion is not well supported by the data (Hastings 2008), and there has been criticism about its use (Popper et al. 2019). Most notably, the differences in hearing anatomy among fishes suggest the use of a single criterion may be too simplistic. Furthermore, a wide range of behavioral responses have been observed in the empirical studies thus far (ranging from startle responses to changes in schooling behavior), and it is difficult to ascertain which, if

any, of those responses may lead to significant biological consequences. Interestingly, several recent studies on free-ranging fishes (e.g., Hawkins et al. 2014; Roberts et al. 2016) have observed the onset of different behavioral responses at similar received levels (L_{pk-pk} of 152–167 dB re 1 µPa), and Popper et al. (2019) suggest that a received level of 163 dB re 1 µPa L_{pk-pk} might be more appropriate than the current criterion of 150 re 1 µPa L_{RMS}. Finally, given that most species are more sensitive to particle motion and not acoustic pressure, the criteria should, at least in part, be expressed in terms of particle motion. However, until there is further empirical evidence to support a different criterion, the 150 dB re 1 µPa L_{RMS} threshold remains in place as the interim metric that regulatory agencies have agreed upon.

J.8.3 Thresholds for Explosives

Popper et al. (2014) present criteria for mortality and non-recoverable injury as a result of exposure to detonations. They note that it is difficult to disentangle the effects of the compressive forces of the shock wave (very close to the explosion) versus the decompressive effect (area of negative pressure, farther from the explosion), but either can lead to barotrauma or mortality in fishes. Several studies (e.g., Goertner 1978; Yelverton 1975) have worked with different species, with different charge sizes and water depths, all of which are important factors in predicting the effects of explosives. Yet Popper et al. (2014) derive their thresholds using data from an older study that represent the lowest amplitude that caused consistent mortality across species (Hubbs and Rechnitzer 1952). Therefore, for all fishes, regardless of hearing anatomy, the threshold for mortality and non-recoverable injury is given as a range: 229–234 dB re 1 µPa L_{pk} by Popper et al. (2014), but in practice, 229 dB is likely used.

J.9. Short Project Description

This section is focused on providing an overview of the methods, assumptions, and results of the technical acoustic modeling report prepared for the Project (Ocean Wind 2022; Küsel et al. 2022; Hannay and Zykov 2022; JASCO 2021). Readers who may be less familiar with acoustic terminology are recommended to refer to the glossary (COP Volume III, Appendix R-2; Ocean Wind 2023).

The Project would consist of up to 98 WTGs, up to three OSS, and interconnection and export cables. The Project would be on the OCS offshore New Jersey in BOEM Lease Area OCS-A 0498. The major underwater noise-producing activities of this Project would include impact pile driving during construction. The piles to be driven would include large (11-meter-diameter at the mudline) monopiles and 2.44-meter-diameter pin piles. This appendix summary focuses on the quantitative modeling of the impact pile driving, vibratory pile driving, HRG surveys, and UXO detonations. Qualitative assessments of lower noise level activities (dredging, vessel movements etc.) were also provided in the technical acoustic modeling report (COP Volume III, Appendix R-2; Ocean Wind 2023).

For the quantitative modeling assessment of impact pile driving, predicted sound fields were generated for one representative deep-water location for the monopiles and for one shallow-water location for the jacket foundation with pin piles (Figure 2 and Table 3; Küsel et al. 2022). Sound field predictions were made for both summertime and wintertime conditions. To predict sound fields, the sound produced at the pile as the hammer strikes it must be characterized. The propagation of the hammer-strike sound through the water column and the sediment is then predicted. The result is a set of predicted broadband sound fields, which are used to predict the ranges to U.S. regulatory isopleths as well as the number of marine animals that could be exposed to sound levels that exceed regulatory thresholds. Finally, the effects of sound source mitigation (e.g., bubble curtains) on impact pile-driving effects were explored.

A practical spherical spreading model was used by JASCO (JASCO 2021) to estimate the extent of potential underwater noise effects as a result of vibratory driving of sheet piles. The sound level of the vibratory pile driver at 10 meters was assumed to be 165 dB re 1 μPa^2. The modeling assumed that the

installation and removal of cofferdams would require 18 hours over 2 days to complete, with vibratory pile driving taking place for no longer than 12 hours each 24-hour period over the installation period.

A total of 31,375 kilometers of HRG surveys are estimated to be required in the Offshore Project area and export cable route area, with a single vessel being able to cover 43.5 miles (70 kilometers) per day. For purposes of analysis, a single vessel survey day is assumed to cover the maximum 70 kilometers. In years 1, 4, and 5, 88 survey days per year are expected. It is estimated that a total of 6,110 linear kilometers would be needed within the Wind Farm Area and export cable route area during this time. Survey effort would be split between the Wind Farm Area and the export cable route area: 3,000 kilometers for the array cable, 2,300 kilometers for the Oyster Creek export cable, 510 kilometers for the BL England export cable, and 300 kilometers for the OSS interconnector cable. During years 2 and 3 (when construction would occur), 180 survey days per year would be required. HRG surveys during WTG and OSS construction and operation would include up to 11,000 kilometers of export cable surveys, 10,500 kilometers of array cable surveys, 1,065 kilometers of foundation surveys, 250 kilometers of WTG surveys, and up to 2,450 kilometers of monitoring and verification surveys. To cover the requirements of the Project, several HRG surveys were considered in the modeling:

- Shallow-penetration, non-impulsive, non-parametric sub-bottom profilers (compressed high-intensity radiated pulses), 2 to 20 kilohertz
- Medium-penetration, impulsive boomers, 3.5 Hz to 10 kilohertz
- Medium-penetration, impulsive sparkers, 50 Hz to 4 kilohertz

For HRG surveys, the NMFS User Spreadsheet Tool and transmission loss equations were used to estimate the distances to thresholds. Source levels relied upon measurements recorded from equipment, the best available manufacturer specifications (representing maximum output), or the closest proxy source (Ocean Wind 2022).

A separate report (Hannay and Zykov 2022) explored the predicted effects of UXO removal by detonation at several locations. In this report, the ranges were calculated to a variety of regulatory thresholds for peak pressure, impulse, and SEL metrics. The modeling of acoustic fields generated by UXO detonations was performed using a combination of semi-empirical and physics-based computational models.

J.10. Acoustic Models and Assumptions

The acoustic assessment of Project activities relies upon a variety of models to predict the potential effect on marine animals. The models used in the quantitative analysis include:

1. GRLWEAP Model: to model the force applied to the pile by the hammer
2. Finite Difference Model: to compute pile vibrations after the hammer strikes the pile
3. Full Waveform Range-dependent Acoustic Model (FWRAM): to calculate the time-dependent sound field and PK sound levels
4. Marine Operation Noise Model (MONM): a parabolic equation model to calculate SEL values for both impulse pile driving and UXO detonations
5. JASMINE Model: the JASCO Applied Sciences animat[1] movement and exposure model
6. UXO Semi-empirical Models: to predict the shock pulse source waveform, the impulse amplitude, and their attenuation with range

[1] Animat = simulated animal

7. NMFS User Spreadsheet Tool (NMFS 2020): this tool, supplied by NMFS, is used to calculate distances to regulatory thresholds when more sophisticated modeling is not available or is not warranted; this tool was used for HRG modeling and assumes spherical spreading.

Both FWRAM and MONM predict the propagation of the source signal through the physical environment. As such, these models require accurate descriptions of the ocean bathymetry, seafloor sediment properties, water column sound velocity profile, and ocean surface roughness. The assumptions of these models and their inputs are critical to the accuracy of the model output.

J.10.1 Physical Environment

The bathymetry information used in the modeling was extracted from the General Bathymetric Chart of the Oceans (GEBCO Bathymetric Compilation Group 2020). A simplified model of the sediment properties (i.e., the Geoacoustic Model) was developed based on measurements made within the Project area. The water column properties (i.e., sound velocity profile) were extracted from the U.S. Navy's Generalized Digital Environmental Model (Carnes 2009). The water column properties change seasonally, and an average of all the summer months was used to represent the Project area for the times in which pile driving was expected to occur. Additional analyses using winter conditions were prepared in the technical acoustic modeling report (COP Volume III, Appendix R-2; Ocean Wind 2023) but were not used for exposure analysis because the proposed activities are intended to take place outside of the NARW seasonal closures.

J.10.2 Impact Pile Sound Source Details

Required inputs for the modeling are the assumed size and properties of the piles, as well as the hammer energy used to drive them into the sediment (Table J-6).

Table J-6 Key Assumptions About the Piles Used in the Underwater Acoustic Modeling

Foundation type	Modeled maximum impact hammer energy (kJ)	Number of Strikes	Strike Rate (min-1)	Pile diameter (m)	Pile wall thickness (mm)	Seabed penetra-tion (m)	Piles per day
Monopile	4,000	10,846	50	8 to 11	80	50	2
Jacket	2,500	13,191	50	2.44	75	70	2–3

m = meter; mm = millimeter

To estimate the number of marine animals likely to be exposed above the regulatory thresholds, a conservative construction schedule that maximized activity during the highest-density months for each species was assumed. Sixty WTG monopiles (two per day for 30 days) were assumed to be installed in the highest-density month of each species and an additional 38 WTG monopiles (two per day for 19 days) were assumed to be installed during the month with the second highest animal density. Two options are being considered for OSS foundations: either three monopiles (two per day for 1 day and one on a third day) or 48 pin piles (three per day for 16 days) in the highest-density month. Both options were modeled and evaluated.

Monopile installation was expected to begin with 500-kJ hammer strikes that would be scaled up to 4,000 kJ at the end of the pile progression. A total of 10,846 strikes are expected per pile, and the strike rate was estimated at 50 strikes per minute. Pin piles are expected to scale from 500 kJ to 2,500 kJ hammer strike energies during the piling progression. A total of 13,191 strikes are predicted for each pin pile, with a strike rate of 50 strikes per minute. Details of the pile progression are presented in the technical acoustic modeling report (COP Volume III, Appendix R-2, Tables 1 and 2; Ocean Wind 2023). No simultaneous pile driving was included in the modeling assumptions.

J.10.3 Vibratory Driving Source Details

The sound level of the vibratory pile driver was assumed to be 165 dB re 1 μPa^2 at 10 meters range. The NMFS (2020) practical spherical spreading model was used to estimate the range to regulatory thresholds. This modeling assumed that the installation and removal of cofferdams would each require 18 hours to complete over 2 days, with vibratory driving taking place for no longer than 12 hours each day.

J.10.4 UXO Sound Source Details

Five different charge sizes (Table J-7) were modeled at the four modeling sites with depths ranging from 12 meters to 45 meters in depth. The net explosive weights listed in Table J-7 include both the donor charge and UXO weights. Predictions for the range to thresholds were made with and without 10 dB of bubble curtain mitigation. As Ocean Wind has committed to attaining a 10-dB attenuation for all UXO detonation events, mitigated values are presented herein.

Table J-7 UXO Charge Sizes Used for Underwater Acoustic Modeling

Navy Bin	Maximum net equivalent weight TNT	
	kilograms	pounds
E4	2.3	5
E6	9.1	20
E8	45.5	100
E10	227	500
E12	454	1,000

TNT = trinitrotoluene

J.10.5 HRG Sound Source Details

Both non-impulsive and impulsive HRG sources were considered (Table J-8).

Table J-8 HRG Equipment Used for Underwater Acoustic Assessment

Equipment	Operating frequency (kHz)	SL_{RMS} (dB re 1 µPa-m)	$SL_{0\text{-}pk}$ (dB re 1 µPa-m)	Pulse duration (width) (mse)	Repetition rate (Hz)	Beam-width (degrees)	CF (2016) or MAN
Non-parametric shallow penetration SBPs (non-impulsive)							
ET 216 (2000DS or 3200 top unit)	2–16	195	--	20	6	24	MAN
	2–8	--	--	--	--	--	--
ET 424	4–24	176	--	3.4	2	71	CF
ET 512	0.7–12	179	--	9	8	80	CF
GeoPulse 5430A	2–17	196	--	50	10	55	MAN
Teledyne Benthos Chirp III - TTV 170	2–7	197	--	60	15	100	MAN
Medium penetration SBPs (impulsive)							
AA, Dura-spark UHD (400 tips, 500 J)	0.3–1.2	203	211	1.1	4	Omni	CF

Equipment	Operating frequency (kHz)	SL_{RMS} (dB re 1 µPa-m)	$SL_{0\text{-}pk}$ (dB re 1 µPa-m)	Pulse duration (width) (mse)	Repetition rate (Hz)	Beam-width (degrees)	CF (2016) or MAN
AA, triple plate S-Boom (700–1,000 J)	0.1–5	205	211	0.6	4	80	CF

CF = Crocker and Fratantonio; dB re 1 µPa = decibel referenced to 1 micropascal; kHz = kilohertz; m = meter; MAN = manufacturer; $SL_{0\text{-}pk}$ = zero to peak source level; SL_{RMS} = root-mean-square source level; SBP = sub-bottom profilers

J.11. Details of Attenuation (Bubble Curtain) Method

As described in Ocean Wind's Application for MMPA Rulemaking and Letter of Authorization, Ocean Wind is proposing use of a dual noise mitigation system (e.g., bubble curtain system and an additional system) to achieve broadband noise attenuation during impact pile installation (Ocean Wind 2022). The same or a different noise mitigation system would be used during UXO detonations.

No specific sound source attenuation method was specified in the modeling report. However, the effect of sound source attenuation at 0, 6, 10, 15, and 20 dB for winter and summer conditions was presented in the report for the marine mammal regulatory SEL isopleths (COP Volume III, Appendix R-2, Tables H-45 and H-46; Ocean Wind 2023). These sound source attenuation effects are summarized for LFC (Figure J-3) to provide an illustration of the general effectiveness of different levels of sound source attenuation. An attenuation of 10 dB produces about a 50-percent reduction in the ranges to injury thresholds or isopleths. All the predicted exposures and ranges to thresholds were calculated using 10 dB of sound source attenuation.

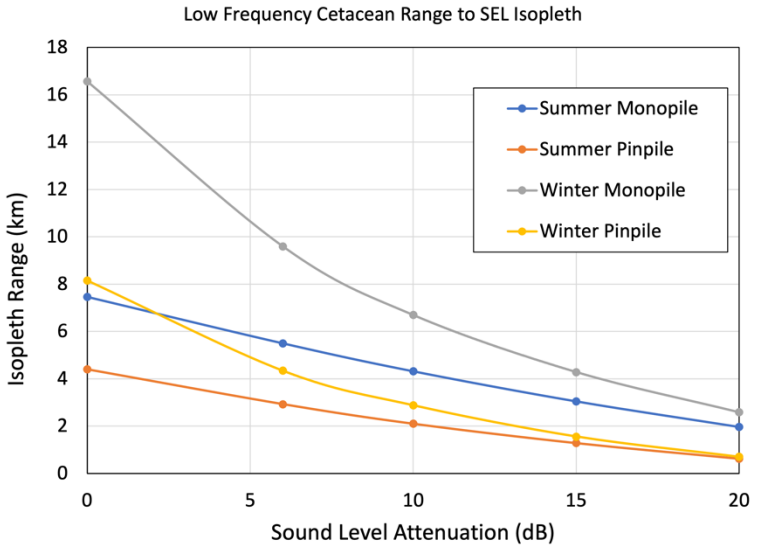


Figure J-3 Effect of Sound Source-Attenuation Levels on Ranges to SEL Isopleths for LFC in Summer and Winter Conditions

The effects of the five levels of sound attenuation on the distances to fish regulatory isopleths for the large monopoles were presented in the technical acoustic modeling report (COP Volume III, Appendix R-2; Ocean Wind 2023), Tables H-47 to H-54, with pin pile values presented in Tables H-55 to H-62.

J.12. Propagation Modeling Methods

To model the sound from the pile driving, the force of the pile-driving hammers was computed using the GRLWEAP 2010 wave equation model (Pile Dynamics 2010). The forcing functions from GRLWEAP were used as inputs to the Finite Difference model to compute the resulting pile vibrations. The sound radiating from the pile is simulated using a vertical array of discrete point sources. Their amplitudes were derived using an inverse technique, such that their collective particle velocity, calculated using a near-field wave-number integration model, matched the particle velocity in the water at the pile wall.

J.12.1 SEL Modeling

MONM was used to compute received SEL (L_E) for impact pile driving and UXO detonations. MONM uses a wide-angle parabolic equation solution to the acoustic wave equation (Collins 1993) based on a version of the U.S. Naval Research Laboratory's Range-dependent Acoustic Model that has been modified to account for a solid seabed (Zhang and Tindle 1995). Like all parabolic equation models, MONM requires environmental inputs such as bathymetry, the water sound speed profile, and seabed properties.

J.12.2 PK and SPL Modeling for Impact Pile Driving

Time-domain predictions of the pressure waves generated in the water are required for calculating SPL and PK pressure levels for impulsive sounds from impact pile driving. Furthermore, the pile must be represented as a distributed source to accurately characterize vertical directivity effects in the near-field zone. FWRAM computes synthetic pressure waveforms versus range and depth for range-varying marine acoustic environments (Figure J-4), and it requires the same environmental inputs as MONM. Synthetic pressure waveforms were modeled over the frequency range 10 to 2,048 Hz, inside a 0.5-second window. The synthetic pressure waveforms were post-processed, after applying a travel time correction, to calculate standard SPL and SEL metrics versus range and depth from the source.

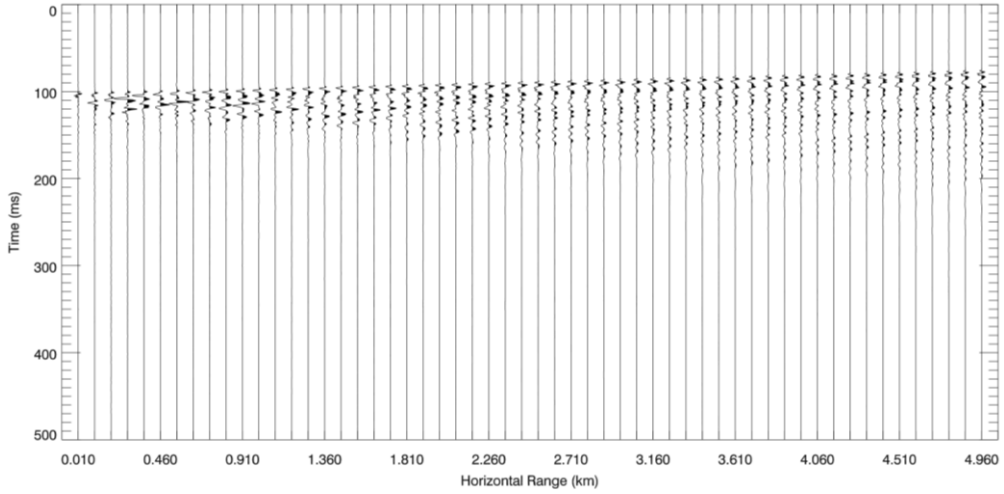


Figure J-4 Example of Synthetic Pressure Waveforms Computed by FWRAM at Multiple Range Offsets

J.12.3 Vibratory Pile-driving Modeling

Vibratory driving hammers are assumed to have a sound level of 165 dB re 1 μPa^2 at 10 meters range. Because the source level is so low, the simple NMFS (2020) practical spherical spreading model was used to predict the ranges to regulatory thresholds, which is a reasonable approach.

J.12.4 Peak Pressure and Impulse Modeling for UXO Detonations

The waveform of UXO detonations was predicted using the methodology of Arons and Yennie (1948, Küsel et. al. citing Arons and Yennie 1949). The shock wave peak pressure as a function of range was predicted using weak shock theory (Rogers 1977). These are both well-established prediction methods that have been validated.

J.12.5 HRG Acoustic Propagation Methods

Ranges to level A regulatory isopleths for the HRG sources were calculated using the NMFS (2020) User Spreadsheet Tool. This tool accounts for the source level, the speed of the vessel, the repetition rate of the source, the pulse duration, and frequency weighting for each source/animal hearing group combination. Ranges to behavioral thresholds were calculated using the NMFS (2020) practical spherical spreading model. Finally, isopleth distances for HRG sources with beamwidths less than 180° were calculated following NMFS Office of Protected Resources interim guidance (Guan 2020).

J.13. Animal Movement Model Methodology

The combination of the predicted sound fields and animal movements was used to derive the animal exposures. Movement predictions are typically created using an animat-based model (Dean 1998; Frankel et al. 2002). Such modeling is typically conducted for individual species, when sufficient data are available, or representative species groups. Animat models require the input of a variety of behavioral parameter values that reproduce the "behavioral envelope" of each species or group. Examples include the range of swimming speeds, dive depths, and course changes. The output can be thought of as a table of latitude, longitude, depth, and time values that represent the four-dimensional movements of the animat; the input values were not included in the report.

The JASMINE animat modeling program was used to simulate animal movement through the predicted sound fields. JASMINE simulates full four-dimensional movement (space and time). The direction of animats was predicted using either a random walk, correlated random walk, or correlated random walk with directional bias (used for migratory animals). The underwater acoustic and exposure modeling report (COP Volume III, Appendix R-2; Ocean Wind 2023) did not specify which directional model was used in the simulations they conducted.

Animat tracks begin with an initial position. The animal's direction is based on the input behavioral parameters, which, along with its speed and diving behavioral values, are used to create an individual movement leg (i.e., the course between two three-dimensional locations). The model then repeats the individual movement leg process to build a full track for the duration of the simulation.

Within each modeled species or species group, JASMINE can simulate different behavioral states (e.g., foraging, resting, or directed travel). A set of transition probabilities is used to control when or if an individual animat will switch behavioral states. However, the details of which behavioral states and the transition probabilities used in the animat modeling were not provided in the report.

JASMINE can include behavioral aversion to sound sources as a behavioral state. Aversion is used to explore how the predicted exposures of animals may differ between simulations where aversion to sound sources is included or not. The underwater acoustic and exposure modeling report (COP Volume III, Appendix R-2; Ocean Wind 2023) focused on exploring the differences caused by aversion in NARWs (a critically endangered species) and harbour porpoises (a common species in coastal waters known to have strong behavioral reactions to sound). Aversion for these two marine mammal species was implemented by allowing the animats to change course away from the sound source, with low levels of aversion at low sound received levels, moderate aversions at moderate sound levels, and strong aversion at higher sound

levels. The specific values are shown in the underwater acoustic and exposure modeling report (COP Volume III, Appendix R-2, Tables J-1 and J-2; Ocean Wind 2023).

J.14. Ranges to Regulatory Thresholds Methods

The standard approach of taking the maximum sound received level across all depths was used to reduce the three-dimensional sound field to a two-dimensional plan view. The physical environment often produces an oddly shaped sound field. The 95th percentile of all the maximum ranges (R_{max}) for each direction from the source that exceeded the isopleth ($R_{95\%}$) was used to represent the range to regulatory isopleths (Figure J-5).

Two approaches were used to determine the ranges to regulatory level isopleths. The first was simply the $R_{95\%}$ value for the sound field, which is applied for fish. The second approach was based on the results of the animat modeling for marine mammals and sea turtles. This approach is called the Exposure Range. For each animat, the range to the closest point of approach that exceeds an acoustic threshold was determined, producing a distribution of ranges. The 95th percentile of this distribution was taken as the $ER_{95\%}$ and used to estimate the range to regulatory thresholds for the species represented by that animat.

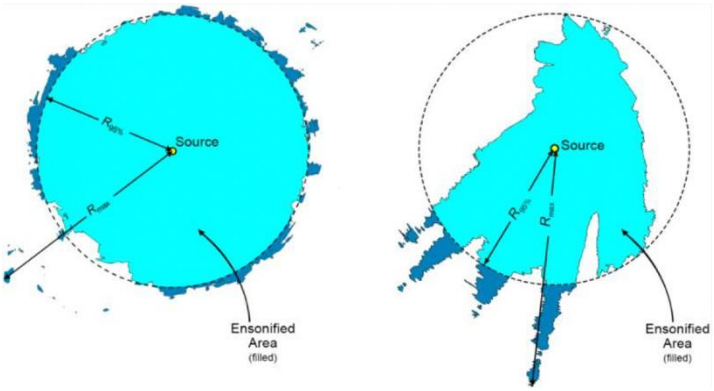


Figure J-5 Two Demonstrations of the Comparison Between the Maximum Range to the Regulatory Threshold (R_{max}) and the 95th percentile of All Maximum Threshold Ranges ($R_{95\%}$)

J.15. Marine Species Present in the Project Area

Thirty-nine marine mammal stocks (37 species) and four species of sea turtles potentially occur in the Offshore Project area (Table J-9). All the sea turtle species and six marine mammal species are listed under the ESA. Species with sufficient density to be potentially affected were modeled quantitatively. Rare species were not modeled because their low densities ensured that risks would approach zero.

Table J-9 Summarized List of Marine Mammal and Sea Turtle Species Present in the Project Area and their Abundance (rare species not modeled)

Species	Abundance	Modeled (Y/N)
Mysticetes		
Blue whale	402	Y
Fin whale	6,802	Y
Humpback whale	1,396	Y
Minke whale	21,968	Y
NARW	368	Y
Sei whale	6,292	Y

Species	Abundance	Modeled (Y/N)
Odontocetes		
Atlantic spotted dolphin	39,921	N
Atlantic white-sided dolphin	93,233	Y
Bottlenose dolphin (offshore)	62,851	Y
Bottlenose dolphin (coastal)	6,639	Y
Clymene dolphin	4,237	N
False killer whale	1,791	N
Fraser's dolphin	Unknown	N
Killer whale	Unknown	N
Melon-headed whale	Unknown	N
Pan tropical spotted dolphin	6,593	N
Pilot whale, long-finned	39,215	Y
Pilot whale, short-finned	28,924	Y
Pygmy killer whale	Unknown	N
Risso's dolphin	35,215	Y
Rough-toothed dolphin	136	N
Short-beaked common dolphin	172,974	Y
Sperm whale	4,349	Y
Spinner dolphin	4,102	N
Striped dolphin	67,036	N
Beaked Whales		
Cuvier's beaked whale	5,744	N
Blainville's beaked whale	10,107	N
Gervais' beaked whale		N
Sowerby's beaked whale		N
True's beaked whale		N
Northern bottlenose whale	Unknown	N
***Kogia* spp.**		
Dwarf sperm whale	7,750	N
Pygmy sperm whale	7,750	N
Porpoises		
Harbour porpoise	95,543	Y
Pinnipeds		
Gray seal	27,300	Y
Harbor seal	61,136	Y
Harp seal	Unknown	N
Hooded seal	Unknown	N
Sirenians		
Florida Manatee	4,834	N
Sea Turtles		
Leatherback sea turtle	--	Y
Loggerhead sea turtle	--	Y

Species	Abundance	Modeled (Y/N)
Kemp's ridley sea turtle	--	Y
Green sea turtle	--	N

Source: NMFS 2021.

J.15.1 Marine Mammal Seasonality and Densities for Project Duration

Mean monthly density estimates (animals per km^2) of all the marine mammal species in the Project area were derived using the Duke University Marine Geospatial Ecology Laboratory model results, which were updated on June 20, 2022 (Roberts and Halpin 2022). The new models resulted in updated density estimates for all taxa for which Ocean Wind is requesting take and serve as a complete replacement for the Roberts et al. (2016a) models and subsequent updates (Roberts et al. 2016b, 2017, 2018, 2021a, 2021b). Refer to Attachment J-1, *Updates to the Application for Marine Mammal Protection Act Rulemaking and Letter of Authorization*, for revised densities and take estimates.

J.15.2 Turtle Seasonality and Densities for Project Duration

At-sea density estimates for sea turtles are extremely limited, particularly in the Project area. For this reason, Küsel et al. (2022) used sea turtle densities estimated for a different geographic region as surrogates for the Project area. A multi-year series of seasonal aerial surveys was conducted in the New York Bight region by Normandeau Associates and APEM for the New York State Energy Research and Development Authority (Normandeau Associates and APEM 2018a, 2018b, 2019a, 2019b, 2020). Four sea turtle species were reported as being present in the area during these surveys: loggerhead, leatherback, Kemp's ridley, and green turtles. The Normandeau Associates and APEM density estimates were used in the Küsel et al. analysis of sea turtle impacts rather than the older Department of the Navy (2007) sea turtle density estimates.

To obtain the densities used in the current study, the maximum seasonal abundance for each species was extracted. The abundance was corrected to represent the abundance in the entire offshore planning area and then scaled by the full offshore planning area to obtain a density in units of animals per km^2. Two categories listed in the reports included more than one species: one combined loggerhead and Kemp's ridley turtles, and the other included turtles that were observed but not identified to the species level. The counts within the two categories that included more than one species were distributed amongst the relevant species with a weighting that reflected the recorded counts for each species. For example, loggerhead turtles were identified far more frequently than any other species; therefore, more of the unidentified counts were assigned to them. The underlying assumption is that a given sample of unidentified turtles would have a distribution of species that was similar to the observed distribution within a given season.

The New York State Energy Research and Development Authority study (Normandeau Associates and APEM 2018a, 2018b, 2019a, 2019b, 2020) reported that in the survey area, most of the sea turtles recorded were loggerhead sea turtles, by an order of magnitude. Seasonal sea turtle densities used in animal movement modeling are listed in Table J-10 for loggerhead, leatherback, Kemp's ridley, and green sea turtles.

Table J-10 Sea Turtle Density Estimates Derived from New York State Energy Research and Development Authority Annual Reports

Common name	Density (animals/100 km^2)			
	Spring	Summer	Fall	Winter
Kemp's ridley turtle	0.05	0.991	0.19	0

Common name	Density (animals/100 km^2)			
	Spring	Summer	Fall	Winter
Leatherback turtle	0	0.331	0.789	0
Loggerhead turtle	0.254	26.799	0.19	0.025
Green turtle	0	0.038	0	0

J.15.3 Seasonal Restrictions

There are two NARW seasonal management areas to the north and south of the Project area. Restrictions associated with these dynamic management areas are in effect between November 1 and April 30 annually. Vessels transiting these areas must comply with NMFS regulations and speed restrictions as applicable for NARWs.

J.16. Acoustic Impact Criteria

Marine mammal acoustic criteria used for the modeling effort were derived from the current U.S. regulatory acoustic criteria (Table J-11). PK pressure levels (L_{pk}) and frequency weighted accumulated SELs ($L_{E,24h}$) were taken from the NOAA Technical Guidance (2018) for marine mammal injury thresholds. SPL (L_p) for marine mammal behavioral thresholds were based on the unweighted NOAA (2005) and the frequency-weighted Wood et al. (2012) criteria.

Table J-11 NMFS Regulatory Levels for Marine Mammals in dB for MMPA Level A and Level B Acoustic Threshold-Level Exposure from Impulsive and Non-impulsive Sources

Functional Hearing Group	Sound Source Type				
	Impulsive			Non-Impulsive	
	Level A SEL_{cum}	Level A SEL_{peak}	Level B dB_{RMS}	Level A SEL_{cum}	Level B dB_{RMS}
Low-frequency cetaceans	183	219	160	199	120
Mid-frequency cetaceans	185	230		198	
High-frequency cetaceans	155	202		173	
Phocid pinnipeds underwater	185	218		201	

Sources: NOAA 2005; Wood et al. 2012; NMFS 2018
SEL_{cum} = cumulative sound exposure level

Fish injury thresholds (PK and SEL) were derived from the Fisheries Hydroacoustic Working Group (2008) and Stadler and Woodbury (2009) for fish that are equal to, greater than, or less than 2 grams. Injury thresholds (PK and SEL) were obtained from Popper et al. (2014) for fish without swim bladders, fish with swim bladders not involved in hearing, and fish with swim bladders involved in hearing.

Behavioral thresholds for fish were developed by the NMFS Greater Atlantic Regional Fisheries Office (Andersson et al. 2007; Wysocki et al. 2007; Mueller-Blenkle et al. 2010; Purser and Radford 2011) (Table J-12).

Table J-12 Acoustic Metrics and Thresholds for Fish or Sea Turtles Currently Used by NMFS Greater Atlantic Regional Fisheries Office and BOEM for Impulsive Pile Driving

Faunal Group	Injury		Impairment		Behavior
	PTS[1]		TTS		
	L_{pk}	$L_{E,\ 24hr}$	L_{pk}	$L_{E,\ 24hr}$	L_p
Fish equal to or greater than 2 grams	206	187	--	--	150
Fish less than 2 grams		183	--	--	
Fish without swim bladder	213	216	--	--	--
Fish with swim bladder not involved in hearing	207	203	--	--	--
Fish with swim bladder involved in hearing	207	203	--	--	--
Sea turtles	232	204	226	189	175

[1] PTS thresholds are applicable only to sea turtles; physical injury thresholds are provided for fish.
L_E = SEL (dB re 1 µPa^{2}s); L_p = RMS sound pressure (dB re 1 µPa); L_{pk} = peak sound pressure (dB re 1 µPa)

PK pressure levels (L_{pk}) and frequency-weighted accumulated SEL ($L_{E,24h}$) from Finneran et al. (2017) were used for the onset of PTS and TTS in sea turtles (Table J-12). Behavioral response thresholds for sea turtles were obtained from McCauley et al. (2000).

J.17. Marine Animal Exposure Estimates

J.17.1 Marine Mammals

The numbers of individual marine mammals predicted to receive sound levels above threshold criteria were determined using animal movement modeling. The modeled results assumed broadband attenuation of 10 dB and a summer sound speed profile. The modeling used to produce these results does not include aversion behavior in the animats. Refer to Attachment J-1 for marine mammal exposure estimates.

J.17.2 Sea Turtles

The same type of animat modeling was also conducted for the sea turtle species in the Project area to determine the numbers of individual sea turtles predicted to receive sound levels above threshold criteria (Table J-13 to Table J-16). These animat modeling results assumed broadband attenuation of 10 dB, calculated in the same way as the marine mammal exposures.

J.18. Acoustic Exposures and Ranges to Acoustic Regulatory Thresholds for Impact Pile-driving Scenarios

The results in the acoustic modeling report of the multiple combinations of the two modeled seasons, varying levels of sound source attenuation, Acoustic Range method, and Exposure Range method are too numerous to replicate here but several marine mammal exposure and harassment take estimates are presented in Attachment J-1 for various impact pile-driving scenarios while exposure estimates for sea turtles for various pile-driving scenarios are included herein (Table J-13 to Table J-16).

Table J-13 WTG Monopile Foundations: Number of Sea Turtles Predicted to Receive Sound Levels Above Exposure Criteria with 10 dB Attenuation for a Total of 98 Monopiles

Sea Turtle Species	Injury		Behavior
	$L_{E,\ 24h}$	L_{pk}	L_p
Kemp's ridley turtle	0.83	0	15.00
Leatherback turtle	0.25	0	6.61
Loggerhead turtle	7.50	0	168.84
Green turtle	0.06	0	0.47

Source: COP Volume III, Appendix R-2, Table 19; Ocean Wind 2023
L_E = SEL (dB re 1 µPa^{2}s); L_p = RMS sound pressure (dB re 1 µPa); L_{pk} = peak sound pressure (dB re 1 µPa)

Table J-14 OSS Monopile Foundations: Number of Sea Turtles Predicted to Receive Sound Levels Above Exposure Criteria with 10 dB Attenuation for a Total of Three Monopiles

Sea Turtle Species	Injury		Behavior
	$L_{E,\ 24h}$	L_{pk}	L_p
Kemp's ridley turtle	0.02	0	0.43
Leatherback turtle	<0.01	0	0.18
Loggerhead turtle	0.23	0	5.97
Green turtle	<0.01	0	0.01

Source: COP Volume III, Appendix R-2, Table 20; Ocean Wind 2023
L_E = SEL (dB re 1 µPa^{2}s); L_p = RMS sound pressure (dB re 1 µPa); L_{pk} = peak sound pressure (dB re 1 µPa)

Table J-15 Pin Piles Supporting OSS Jacket Foundation: Number of Sea Turtles Predicted to Receive Sound Levels Above Exposure Criteria with 10 dB Attenuation for a Total of 48 Pin Piles

Sea Turtle Species	Injury		Behavior
	$L_{E,\ 24h}$	L_{pk}	L_p
Kemp's ridley turtle	0	0	0.31
Leatherback turtle	0	0	0.44
Loggerhead turtle	0	0	14.70
Green turtle	0	0	0.02

Source: COP Volume III, Appendix R-2, Table 21; Ocean Wind 2023
L_E = SEL (dB re 1 µPa^{2}s); L_p = RMS sound pressure (dB re 1 µPa); L_{pk} = peak sound pressure (dB re 1 µPa)

Table J-16 Exposure Ranges ($ER_{95\%}$) in Meters to Marine Mammal Threshold Criteria with 10-dB Sound Attenuation: Monopile Foundation (tapered 8- to 11-meter-diameter monopiles, two piles per day)

Species	$ER_{95\%}$ Injury (PTS) Threshold $L_{E\ 24h}$/ $SEL_{cum,\ 24h}$ (meters)		$ER_{95\%}$ Behavioral Threshold L_p/SPL_{RMS} (meters)	
	Summer (May through November)	Winter (December only)	Summer (May through November)	Winter (December only)
LFC	1,650	2,490	3,130	3,450
MFC	0	0	3,090	3,410
HFC	880	1,430	3,070	3,370
Pinnipeds in water	80	240	3,090	3,420
Sea turtles	300	440	1,060	1,260

J.19. Ranges to Acoustic Regulatory Thresholds for Vibratory Pile-driving Installation and Cofferdams Removal

Küsel et al. (2022) presented distance ranges to regulatory isopleths by marine mammal hearing groups for the vibratory installation and removal of cofferdams (Table J-17). The maximum distances to the Level A thresholds ranged from 7.7 meters for MFC to 128.2 meters for HFC. The maximum ranges to the Level B thresholds were 10,000 meters for all marine mammal hearing groups.

Table J-17 Distances to Weighted MMPA Level A Cumulative Sound Exposure Level Acoustic Thresholds (NMFS 2018) and Unweighted Level B root-mean-square Sound Pressure Level Acoustic Thresholds (NMFS 2012) for Marine Mammals Associated with Vibratory Pile Installation and Removal of Cofferdams

Marine Mammal Hearing Group	Level A Threshold SEL_{cum} (dB re 1 μPa^2s)	Maximum Distance (m) to Level A Threshold	Level B Threshold SPL_{RMS} (dB re 1 μPa^2)	Maximum Distance (m) to Unweighted Level B Threshold
Low-frequency cetaceans	199	86.7	120	10,000
Mid-frequency cetaceans	198	7.7	120	10,000
High-frequency cetaceans	173	128.2	120	10,000
Phocid pinnipeds in water	201	52.7	120	10,000

Source (thresholds): NMFS 2012, 2018; source (distances): Küsel et al. 2022.
dB re 1 μPa^2 = decibel referenced to 1 micropascal squared; m = meter; SEL_{cum} = cumulative sound exposure level; SPL_{RMS} = root-mean-square sound pressure level

J.20. Ranges to Acoustic Regulatory Thresholds for UXO Detonations

Hannay and Zykov (2022; Tables 9 to 36) present ranges to regulatory isopleths for the various sites, explosive weights, body sizes, and species groups of marine mammals, sea turtles, and marine fishes. Information on the total number of marine mammal takes for UXO surveys, maximum ranges to the regulatory thresholds for any site, and body size of marine mammals and sea turtles is summarized herein (Table J-18 and Table J-19) for mitigated (10-dB reduction) scenarios. The ranges for fish injury peak pressure were 290 meters with 10 dB of mitigation.

Determining the maximum UXO ranges to regulatory thresholds for impulse signals required assessing body size. A set of representative animal masses for smaller and larger animals in several species categories of marine mammals and sea turtles was selected (Hannay and Zykoy 2022, Section 7.1). Five body mass categories of marine mammals and sea turtles were developed, with high and low body mass ranges (Hannay and Zykoy 2022, Table 7), with turtles included in the group with HFC, with the body size masses ranging from 5 kilograms (harbour porpoise calf) to 16,000 kilograms (adult sperm whale).

Table J-18 Summary of Maximum UXO Ranges (meters) to Regulatory Thresholds for Auditory Injury in Marine Mammals and Sea Turtles for Peak Pressure and SEL Metrics ($R_{95\%}$) for Mitigated Scenario

Functional Hearing Group	Injury Type	Metric	
		Peak Pressure	SEL
LFC	Level A (PTS)	846	3,780
	Level B (TTS)	1,618	11,900
MFC	Level A (PTS)	258	4,61

Functional Hearing Group	Injury Type	Metric	
		Peak Pressure	SEL
	Level B (TTS)	4,94	2,550
HFC	Level A (PTS)	5,369	62,00
	Level B (TTS)	10,367	14,100
PW	Level A (PTS)	942	1,600
	Level B (TTS)	1,802	7,020
Turtle	Level A (PTS)	210	472
	Level B (TTS)	398	2,250

Note: Maximum ranges are based on worst-case scenario modeling results for charge size E12 (454 kilograms) and site (S1, S2, S3, S4) (Hannay and Zykov 2022).
PW = phocid pinnipeds in water

Table J-19 Summary of Maximum UXO Ranges (meters) to Regulatory Thresholds for Non-Auditory Injury and Mortality in Marine Mammals and Sea Turtles for Peak Pressure for Mitigated Scenario

Injury Type	Marine Mammal Species	Adult	Pup/Calf
Mortality	Baleen whale/sperm whale	34	109
	Minke whale	58	162
	Beaked whale	135	234
	Dolphins, kogia, pinnipeds, turtles	224	332
	Porpoise	243	353
Lung Injury	Baleen whale/sperm whale	237	81
	Minke whale	132	330
	Beaked whale	282	448
	Dolphins, kogia, pinnipeds, turtles	429	606
	Porpoise	465	648
Onset Gastrointestinal Injury		125	125

Note: Maximum ranges are based on worst-case scenario modeling results for charge size E12 (454 kilograms) and deepest water depth (45 meters) based on 1% of animals exposed (mortality/lung injury) (Hannay and Zykov 2022).

J.21. Ranges to Acoustic Regulatory Thresholds for HRG Survey Sources

Summarized here are the distances to the regulatory thresholds for marine mammal hearing groups associated with use of nine types of shallow and medium sound sources or comparable sound source categories during HRG surveys (Table J-20), which were presented in the MMPA Letter of Authorization application for the Project (Ocean Wind 2022).

Table J-20 Distance to Weighted MMPA Level A and Unweighted MMPA Level B Marine Mammal Hearing Group Thresholds Associated with Use of Each Type of HRG Sound Source or Comparable Sound Source Category

HRG Sound Source	Distance to MMPA Level A Threshold (meters)					Distance to MMPA Level B (meters)
	LFC (SEL_{cum} threshold)	MFC (SEL_{cum} threshold)	HFC (SEL_{cum} threshold)	HFC ($SPL_{0\text{-}pk}$ threshold)	PW (SEL_{cum} threshold)	All (SPL_{RMS} threshold)
Shallow Sub-Bottom Profilers						
ET 216 CHIRP	<1	<1	2.9	NA	0	9
ET 424 CHIRP	0	0	0	NA	0	4
ET 512i CHIRP	0	0	<1	NA	0	6
GeoPulse 5430	<1	<1	36.5	NA	<1	21
TB CHIRP III	1.5	<1	16.9	NA	<1	48
Medium Sub-Bottom Profilers						
AA Triple plate S-Boom (700/1,000J)	<1	0	0	4.7	<1	34
AA Dura-spark UHD (500J/400 tip)	<1	0	0	2.8	<1	141
AA Dura-spark UHD 400+400	<1	0	0	2.8	<1	141
GeoMarine Geo-Source Dual 400 Tip Sparker	<1	0	0	2.8	<1	141

Source: Application for MMPA Letter of Authorization, Ocean Wind 2022: Table 1-30
AA = Applied Acoustics; CHIRP = Compressed High-Intensity Radiated Pulse; ET = EdgeTech; NA=not applicable; PW = phocid pinnipeds in water; SEL_{cum} = cumulative sound exposure level; $SPL_{0\text{-}pk}$ = zero to peak source level; TB = Teledyne Benthos; UHD = Ultra-high Definition

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ATTACHMENT J-1
UPDATES TO THE APPLICATION FOR MARINE MAMMAL PROTECTION ACT RULEMAKING AND LETTER OF AUTHORIZATION

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Ocean Wind 1
An Ørsted & PSEG project

Ocean Wind 1 Offshore Wind Farm

Updates to the Application for Marine Mammal Protection Act (MMPA) Rulemaking and Letter of Authorization

Submitted to:
National Marine Fisheries Service
Office of Protected Resources

Prepared for:
Ocean Wind LLC

Prepared by:
HDR, Inc.

August 2022

Purpose and Need

Ocean Wind LLC (Ocean Wind), a subsidiary of Orsted Wind Power North America LLC (Orsted) (Applicant), and joint venture partner Public Service Enterprise Group Renewable Generation LLC (PSEG), is proposing to install up to 98 wind turbine generators (WTGs) and three associated offshore substations (OSSs), each supported by a steel pipe monopile (OSSs may have jacket pile (pin pile) foundations); install and remove cofferdams at landfall sites; detonate unexploded ordnances (UXO); and conduct high-resolution site characterization surveys during construction and operation, all to support the construction of an offshore wind farm. The Ocean Wind Offshore Wind Farm Project (OCW01, Offshore Wind Farm, or Project) is being developed pursuant to the Bureau of Ocean Energy Management (BOEM) requirements for the Ocean Wind BOEM Lease Area Outer Continental Shelf (OCS)-A-0498 Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf.

Ocean Wind submitted a request for a rulemaking and Letter of Authorization (LOA) pursuant to Section 101(a)(5) of the Marine Mammal Protection Act (MMPA) and 50 Code of Federal Regulations (CFR) § 216 Subpart I to allow for the incidental harassment of small numbers of marine mammals resulting from the installation of WTGs and OSSs; installation and removal of cofferdams at locations of export cable route (ECR) to landfall transitions; potential detonations of UXO; and performance of high-resolution geophysical (HRG) site characterization surveys operating at less than 180 kHz which was deemed complete on February 11, 2022. A Notice of Receipt of the LOA application was published in the Federal Register on March 7, 2022 (87 FR 12666).

The take requests included in Section 6 of the OCW01 LOA application, submitted to NMFS in February 2022, were based primarily on a collection of Roberts et al. (2016a, 2016b, 2017, 2018, 2020, 2021a, 2021b) density estimates. On June 20, 2022, the Duke Marine Geospatial Ecology Lab released a comprehensive new set of marine mammal density models for the U.S. east coast, available at https://seamap.env.duke.edu/models/-Duke/EC/. **The new models result in updated density estimates for all taxa for which OCW01 is requesting take** and serve as a complete replacement for the Roberts et al. (2016) models and subsequent updates. Although our LOA application was deemed complete in February 2022, OCW01 voluntarily agreed to provide NMFS and the Public with updated take estimates resulting from this update in the density models.

Additionally, OCW01 has committed to mitigating all potential unexploded ordnance (pUXO) detonations since the submittal of the LOA application. Therefore, we are presenting an updated take request for that activity based on a mitigated scenario of up to 10 pUXO detonations assuming 10 dB of mitigation.

The tables presented in this document have been updated and are intended to replace the corresponding tables contained within the LOA application. Only tables that have been updated due to the new Roberts et al. (2022) models or the mitigated pUXO detonation scenarios are included herein, otherwise tables within the LOA application remain valid.

Updates to Methodology

- Each proposed activity resulting in potential marine mammal take (WTG/OSS installation, cofferdam installation, HRG surveys, and UXO detonation) is associated with unique animal density estimates defined by the anticipated extent of that activity's "footprint", which includes the activity location plus a perimeter that corresponds to maximum extent of the Level B isopleth, rounded up to the nearest 5-km increment (Figure 1 through Figure 4).
- All density grid cells which overlapped with the activity footprint were included in the analysis (Figure 1).

- For all activities, coastal migratory and offshore stocks of bottlenose dolphins were delineated using the 20-m isobath. For WTG/OSS installation (i.e., impact piling), coastal and offshore bottlenose dolphins were rerun using animal movement modeling in order to have coastal bottlenose dolphins seeded only in less than 20 m water depth and offshore bottlenose dolphins seeded only in greater than 20 m water depth.
- Harbor seal, gray seal, short-finned pilot whale, and long-finned pilot whale densities have now been scaled based on relative abundance in the project area, vs. in the LOA application where densities were applied equally to both species present and not adjusted by abundance.
- The 2022 updates to the North Atlantic right whale (NARW) and humpback whale density models resulted in datasets with three different time spans for each species. We have selected the most recent of these for this analysis: 2009-2019 for humpbacks, and 2010-2019 for NARW.
- As stated above, OCW01 has committed to mitigating every potential unexploded ordnance (pUXO) detonation with a minimum 10 dB noise reduction. We have therefore revised all take estimates to reflect the 10 dB-mitigated scenario. Potential exposures for all marine mammal taxa were modeled using frequency-weighted sound exposure level (SEL) values. In the LOA application, SPL_{pk} values were used to model exposures for high-frequency cetaceans because these distances were larger than SEL distances for the unmitigated scenario.
- Because cofferdam installation may take place at any time between October and May (no cofferdams will be installed from June through September), requested take is based on the average density for the months October through May (vs. using the maximum monthly density to estimate take)[1]. This averaging approach avoids potential overestimation of take and aligns with the take estimation approach for HRG surveys, which assumes density averaged across all months in which activities may take place.
- Estimated takes resulting from HRG surveys have been better aligned with the proposed schedule as outlined in the COP; namely, an annual total of 88 survey days for years 1, 4, and 5 with approximately 47.5 survey days in the wind farm area (WFA) and 40.5 survey days in the export cable route (ECR) area, and 180 survey days for years 2 and 3 with approximately 101.5 survey days in the WFA and 78.5 survey days in the ECR. Likewise the activity footprint and associated animal densities have been parsed to separate the ECR cable route from the WFA in order to more accurately represent the spatial resolution of proposed survey effort (Fig. 3; Tables 6-3 and 6-X).

All other methods outlined within the LOA application remain unchanged.

[1] Note that the mean density values were selected during the density extraction process, consistent with what was done in the LOA application.

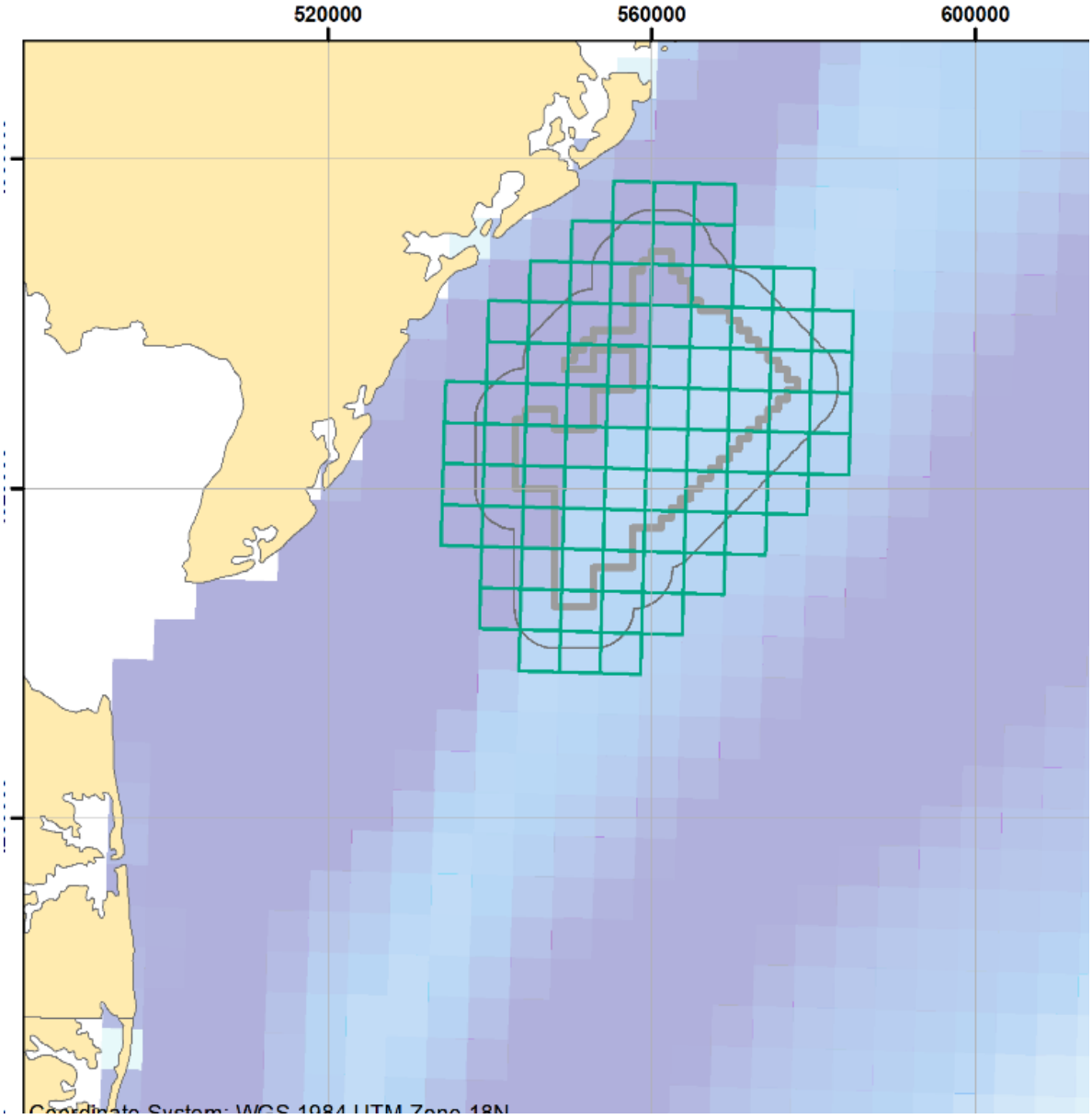


Figure 1. Marine mammal (e.g., NARW) density map showing highlighted grid cells used to calculate mean monthly species exposure estimates for WTG and OSS installation within a 5 km perimeter around the full OCS-A 0498 lease area (Roberts et al. 2016, 2022)

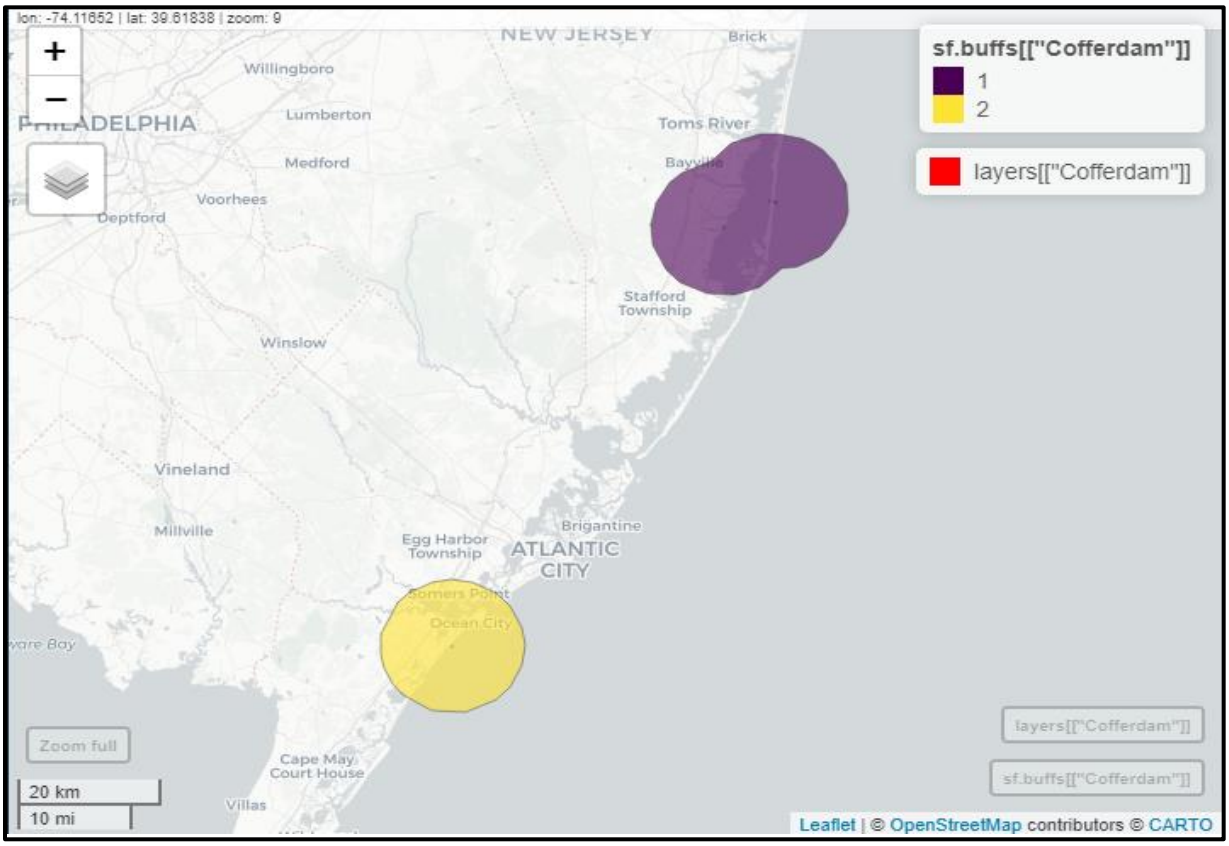


Figure 2. Activity footprint associated with cofferdam Installation (10 km perimeter)

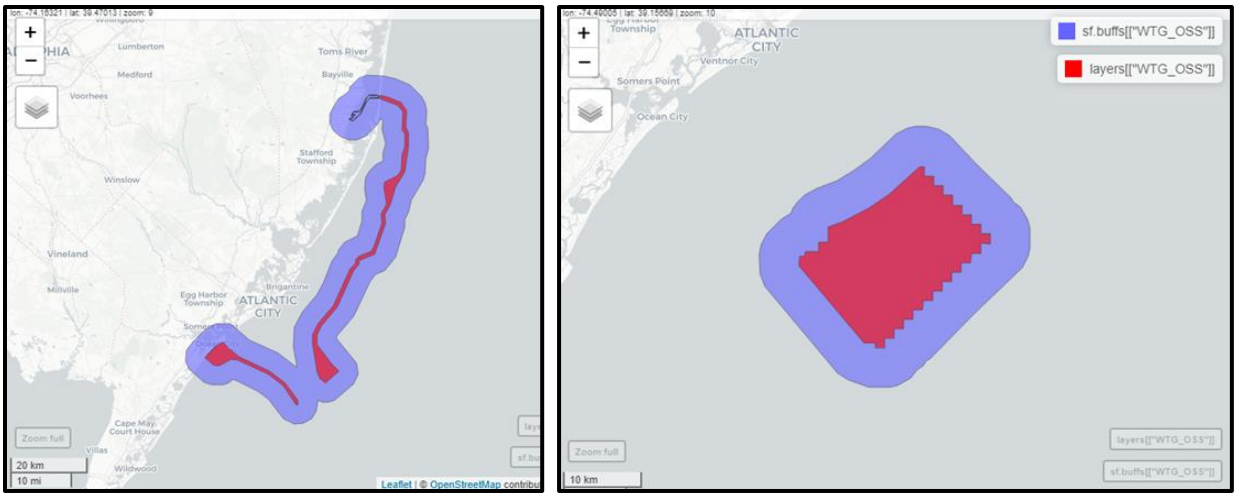


Figure 3. Activity footprint associated with HRG Surveys (5 km perimeter; ECR survey area shown in L panel; WFA surveys shown in R panel)

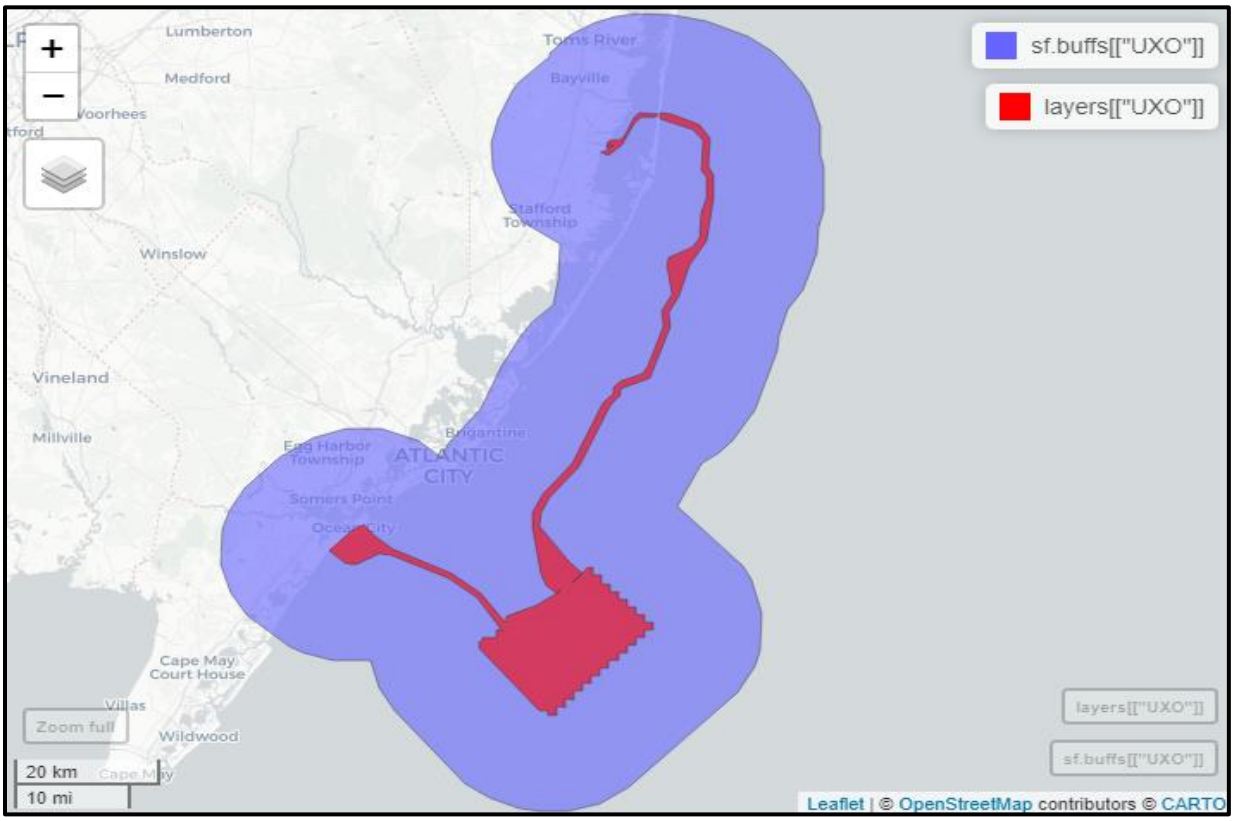


Figure 4. Activity footprint associated with pUXO Detonations (15 km perimeter)

Updated Tables

Table 6-1. Estimated Densities (Animals/km^2) Used for Modeling Marine Mammal Exposures to WTG and OSS Installation Within a 5 km Buffer Around Ocean Wind Farm OCS-A 0498 Lease Area for All Months within the Planned Construction Schedule.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Density
North Atlantic right whale [a]					0.00010	0.00003	0.00001	0.00001	0.00002	0.00004	0.00012	**0.00045**	
Fin whale [a]			--	--	0.00080	0.00067	0.00041	0.00023	0.00027	0.00030	0.00038	**0.00141**	--
Sei whale [a]		--	--	--	0.00021	0.00005	0.00001	0.00001	0.00002	0.00007	0.00021	**0.00042**	--
Minke whale		--	--	--	**0.00674**	0.00154	0.00044	0.00020	0.00012	0.00061	0.00014	0.00041	--
Humpback whale	--	--	--	--	0.00085	0.00051	0.00010	0.00005	0.00018	0.00062	0.00081	**0.00126**	--
Sperm whale [a]	--	--	--	--	**0.00008**	0.00003	0.00001	0.00000	0.00000	0.00000	0.00003	0.00004	--
Atlantic white-sided dolphin	--	--	--	--	**0.00643**	0.00475	0.00018	0.00003	0.00043	0.00474	0.00539	0.00488	--
Bottlenose dolphin, offshore [b]	--	--	--	--	0.07555	0.09293	0.11089	**0.11352**	0.10079	0.09563	0.11146	0.06987	--
Bottlenose dolphin, coastal [b]	--	--	--	--	0.33333	0.39124	0.42611	0.47620	**0.51100**	0.45149	0.44875	0.23091	--
Short-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00011**
Long-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00015**
Risso's dolphin	--	--	--	--	0.00024	0.00006	0.00006	0.00007	0.00006	0.00012	0.00063	**0.00096**	--
Common dolphin	--	--	--	--	0.02902	0.01382	0.00831	0.00355	0.00059	0.00862	0.04682	**0.05157**	--
Harbor porpoise	--	--	--	--	0.00801	0.00010	0.00006	0.00005	0.00001	0.00003	0.00010	**0.02456**	--
Harbor seal	--	--	--	--	0.08433	0.01299	0.00319	0.00194	0.00391	0.01947	0.05067	**0.09830**	--
Gray seal	--	--	--	--	0.03017	0.00465	0.00114	0.00069	0.00140	0.00697	0.01813	**0.03517**	--

[a] Listed as Endangered under the ESA.

[b] Density adjusted by their relative abundance (see Section 3.1 of Appendix A for more information).

Note: Exposure modeling for the Atlantic spotted dolphin and the blue whale was not conducted because impacts on these species approach zero due to their low predicted densities in the Project; therefore, these species were excluded from all quantitative analyses and tables based on modeling results.

Note: Gray cells with **Bold** values indicate highest monthly density May – December. Gray cells with Underlined values represent the second highest monthly density May – December. No pile installation is planned for January – April. Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) (Roberts *et al.* 2022).

Table 6-2. Estimated Densities (Animals/km^2) of Marine Mammals Within a 10 km Buffer of the Affected Area of the Cofferdam Installation for All Months within the Planned Construction Schedule.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Density	Oct – May Average
North Atlantic right whale [a]	0.00066	0.00054	0.00030	0.00017	0.00004	--	--	--	--	0.00003	0.00013	0.00038	--	**0.00028**
Blue whale [a]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00075**	--
Fin whale [a]	0.00070	0.00021	0.00041	0.00052	0.00018	--	--	--	--	0.00017	0.00017	0.00081	--	**0.00039**
Sei whale [a]	0.00013	0.00008	0.00015	0.00019	0.00009	--	--	--	--	0.00003	0.00014	0.00029	--	**0.00014**
Minke whale	0.00013	0.00015	0.00021	0.00296	0.00234		--	--	--	0.00030	0.00004	0.00009	--	**0.00078**
Humpback whale	0.00071	0.00048	0.00072	0.00049	0.00026	--	--	--	--	0.00028	0.00067	0.00134	--	**0.00062**
Sperm whale [a]	0.00001	0.00001	0.00001	0.00002	0.00002	--	--	--	--	0.00000	0.00005	0.00003	--	**0.00002**
Atlantic white-sided dolphin	0.00047	0.00030	0.00046	0.00121	0.00067	--	--	--	--	0.00060	0.00128	0.00118	--	**0.00077**
Common bottlenose dolphin - Offshore [b]	0.03783	0.01201	0.01922	0.08214	0.20581	--	--	--	--	0.32131	0.29980	0.21115	--	**0.14866**
Common bottlenose dolphin - Coastal [b]	0.05088	0.01936	0.04322	0.21940	0.54984	--	--	--	--	0.74941	0.62651	0.33903	--	**0.32471**
Short-finned pilot whale [b]	--	--	--	--	--	--	-	--	--	--	--	--	**0.00001**	--
Long-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00001**	--
Risso's dolphin	0.00000	0.00000	0.00000	0.00001	0.00001	--	--	--	--	0.00001	0.00004	0.00007	--	**0.00002**
Common dolphin	0.00222	0.00096	0.00171	0.00411	0.00281	--	--	--	--	0.00197	0.01140	0.00757	--	**0.00409**
Harbor porpoise	0.01230	0.01081	0.01234	0.01637	0.00324	--	--	--	--	0.00006	0.00022	0.01297	--	**0.00854**
Harbor seal	0.09066	0.06456	0.07150	0.11609	0.07464	--	--	--	--	0.11182	0.16049	0.11575	--	**0.10069**
Gray seal	0.03244	0.02310	0.02558	0.04153	0.02670	--	--	--	--	0.04001	0.05742	0.04141	--	**0.03602**

[a] Listed as Endangered under the ESA.

[b] Density adjusted by their relative abundance (short-finned pilot whale = 0.00000133395 animals/km^2; long-finned pilot whale = 0.00000181 animals/km^2) (see Section 3.1 of **Appendix A** for more information).

Note: Grey cells with **Bold** values indicate density used in Cofferdam exposure estimates.

Table 6-3. Estimated Densities (Animals/km^2) of Marine Mammals Within a 5 km Buffer Around the Affected Area of the High-Resolution Geophysical Surveys (Export Cable Route) for All Months.

Species	January	February	March	April	May	June	July	August	September	October	November	December	Annual Density	Annual Average
North Atlantic right whale [a]	0.00088	0.00076	0.00047	0.00029	0.00007	0.00002	0.00001	0.00001	0.00001	0.00004	0.00014	0.00047	--	**0.00026**
Blue whale [a]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00001**	--
Fin whale [a]	0.00134	0.00053	0.00069	0.00082	0.00040	0.00042	0.00019	0.00011	0.00014	0.00027	0.00032	0.00122	--	**0.00054**
Sei whale [a]	0.00022	0.00013	0.00026	0.00038	0.00014	0.00005	0.00001	0.00001	0.00001	0.00004	0.00020	0.00043	--	**0.00016**
Minke whale	0.00027	0.00029	0.00036	0.00495	0.00432	0.00070	0.00013	0.00005	0.00007	0.00047	0.00008	0.00021	--	**0.00099**
Humpback whale	0.00084	0.00057	0.00080	0.00081	0.00045	0.00031	0.00009	0.00006	0.00014	0.00046	0.00091	0.00145	--	**0.00057**
Sperm whale [a]	0.00002	0.00002	0.00001	0.00004	0.00007	0.00000	0.00000	0.00000	0.00000	0.00000	0.00006	0.00004	--	**0.00002**
Atlantic white-sided dolphin	0.00111	0.00069	0.00087	0.00266	0.00184	0.00124	0.00006	0.00001	0.00013	0.00164	0.00286	0.00247	--	**0.00130**
Common bottlenose dolphin – Offshore [b]	0.02538	0.00856	0.01571	0.06199	0.15746	0.21175	0.21513	0.22393	0.23224	0.22416	0.22789	0.13564	--	**0.14499**
Common bottlenose dolphin - Coastal [b]	0.04469	0.01658	0.03581	0.16624	0.41650	0.54059	0.53568	0.57866	0.65609	0.59458	0.53167	0.28456	--	**0.36680**
Short-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00001**	--
Long-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00002**	--
Risso's dolphin	0.00001	0.00000	0.00000	0.00005	0.00004	0.00001	0.00001	0.00001	0.00001	0.00003	0.00018	0.00023	--	**0.00005**
Common dolphin	0.00628	0.00277	0.00453	0.01061	0.00995	0.00203	0.00053	0.00014	0.00004	0.00409	0.02396	0.01937	--	**0.00702**
Harbor porpoise	0.02199	0.01958	0.01839	0.02454	0.00526	0.00014	0.00007	0.00002	0.00001	0.00005	0.00022	0.02073	--	**0.00925**
Harbor seal	0.09088	0.06190	0.05808	0.09051	0.08105	0.05305	0.00872	0.00522	0.01027	0.05957	0.10025	0.10656	--	**0.06051**
Gray seal	0.03252	0.02215	0.02078	0.03238	0.02900	0.01898	0.00312	0.00187	0.00367	0.02131	0.03587	0.03812	--	**0.02165**

[a] Listed as Endangered under the ESA.

[b] Density adjusted by their relative abundance (see Section 3.1 of Appendix A for more information).

Note: **Bold** values indicate densities used in HRG ECR exposure estimates.

Table 6-X NEW. Estimated Densities (Animals/km^2) of Marine Mammals Within a 5 km Buffer Around the Affected Area of the High-Resolution Geophysical Surveys (Wind Farm Area) for All Months.

Species	January	February	March	April	May	June	July	August	September	October	November	December	Annual Density	Annual Average
North Atlantic right whale [a]	0.00066	0.00073	0.00061	0.00049	0.00011	0.00003	0.00001	0.00001	0.00002	0.00004	0.00009	0.00037	--	**0.00026**
Blue whale [a]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00001**	--
Fin whale [a]	0.00187	0.00142	0.00106	0.00102	0.00093	0.00076	0.00051	0.00029	0.00031	0.00031	0.00038	0.00144	--	**0.00086**
Sei whale [a]	0.00026	0.00016	0.00034	0.00075	0.00025	0.00006	0.00001	0.00001	0.00002	0.00008	0.00025	0.00042	--	**0.00022**
Minke whale	0.00058	0.00059	0.00061	0.00673	0.00788	0.00187	0.00054	0.00025	0.00014	0.00066	0.00017	0.00050	--	**0.00171**
Humpback whale	0.00095	0.00066	0.00084	0.00103	0.00102	0.00061	0.00012	0.00006	0.00021	0.00071	0.00088	0.00113	--	**0.00069**
Sperm whale [a]	0.00004	0.00002	0.00001	0.00007	0.00010	0.00003	0.00001	0.00000	0.00000	0.00000	0.00003	0.00003	--	**0.00003**
Atlantic white-sided dolphin	0.00360	0.00231	0.00210	0.00674	0.00806	0.00607	0.00022	0.00004	0.00058	0.00585	0.00642	0.00589	--	**0.00399**
Common bottlenose dolphin – Offshore [b]	0.01615	0.00555	0.00786	0.02497	0.06586	0.08314	0.09932	0.09994	0.08669	0.08358	0.09841	0.06283	--	**0.06119**
Common bottlenose dolphin - Coastal [b]	0.03145	0.01108	0.02114	0.07735	0.20004	0.23634	0.27770	0.29394	0.29119	0.27197	0.29371	0.16292	--	**0.18073**
Short-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00014**	--
Long-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00018**	--
Risso's dolphin	0.00019	0.00003	0.00003	0.00032	0.00030	0.00008	0.00007	0.00008	0.00007	0.00015	0.00083	0.00127	--	**0.00029**
Common dolphin	0.02980	0.01260	0.01481	0.03048	0.03751	0.01786	0.01024	0.00416	0.00066	0.01046	0.05685	0.06472	--	**0.02418**
Harbor porpoise	0.03940	0.03782	0.02871	0.03842	0.00970	0.00015	0.00009	0.00007	0.00001	0.00003	0.00014	0.02757	--	**0.01518**
Harbor seal	0.11132	0.08232	0.05158	0.05694	0.09691	0.00776	0.00170	0.00107	0.00224	0.01127	0.03705	0.10569	--	**0.04715**
Gray seal	0.03983	0.02945	0.01846	0.02037	0.03467	0.00278	0.00061	0.00038	0.00080	0.00403	0.01325	0.03781	--	**0.01687**

[a] Listed as Endangered under the ESA.

[b] Density adjusted by their relative abundance (see Section 3.1 of Appendix A for more information).

Note: **Bold** values indicate densities used in HRG WFA exposure estimates

Table 6-Y (NEW). Estimated Densities (Animals/km^2) of Marine Mammals Within a 15 km Buffer Around the Affected Area of pUXO Detonations for All Months in which Detonations are Allowed (May through October).

Species	January	February	March	April	May	June	July	August	September	October	November	December	Annual Density
North Atlantic right whale [a]	--	--	--	--	**0.00008**	0.00002	0.00001	0.00001	0.00002	0.00004	--	--	--
Blue whale [a]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00001**
Fin whale [a]	--	--	--	--	**0.00068**	0.00061	0.00034	0.00019	0.00023	0.00029	--	--	--
Sei whale [a]	--	--	--	--	**0.00021**	0.00006	0.00001	0.00001	0.00002	0.00006	--	--	--
Minke whale	--	--	--	--	**0.00627**	0.00146	0.00037	0.00019	0.00012	0.00056	--	--	--
Humpback whale	--	--	--	--	**0.00081**	0.00056	0.00011	0.00007	0.00019	0.00063	--	--	--
Sperm whale [a]	--	--	--	--	**0.00008**	0.00003	0.00003	0.00001	0.00000	0.00000	--	--	--
Atlantic white-sided dolphin	--	--	--	--	**0.00545**	0.00415	0.00013	0.00003	0.00041	0.00392	--	--	--
Common bottlenose dolphin – Offshore [b]	--	--	--	--	0.09128	0.12148	0.12465	**0.12615**	0.12612	0.12511	--	--	--
Common bottlenose dolphin - Coastal [b]	--	--	--	--	0.45605	0.58021	0.56497	0.61742	**0.71100**	0.64462	--	--	--
Short-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00010**
Long-finned pilot whale [b]	--	--	--	--	--	--	--	--	--	--	--	--	**0.00013**
Risso's dolphin	--	--	--	--	**0.00021**	0.00007	0.00006	0.00006	0.00005	0.00009	--	--	--
Common dolphin	--	--	--	--	**0.02407**	0.01261	0.00759	0.00417	0.00095	0.00754	--	--	--
Harbor porpoise	--	--	--	--	**0.00789**	0.00024	0.00016	0.00008	0.00002	0.00007	--	--	--
Harbor seal	--	--	--	--	**0.09467**	0.04068	0.00659	0.00392	0.00774	0.04540	--	--	--
Gray seal	--	--	--	--	**0.03387**	0.01456	0.00236	0.00140	0.00277	0.01624	--	--	--

[a] Listed as Endangered under the ESA.

[b] Density adjusted by their relative abundance (see Section 3.1 of Appendix A for more information).
Note: **Bold** values indicate densities used in pUXO exposure estimates.

Table 6-7. Estimated Maximum Level A Exposures of Marine Mammals Resulting from WTG Foundation Monopile Impact Installation. Results indicate total potential exposures per stock modeled over the effective period of the LOA assuming 2 piles are installed per day.

Species	Estimated Level A Exposures (SEL_{cum})
North Atlantic right whale [a]	0.9 [b]
Fin whale [a]	3.69
Sei whale [a]	0.89
Minke whale	18.42
Humpback whale	4.24
Sperm whale [a]	0
Atlantic white-sided dolphin	0
Common bottlenose dolphins:	
Offshore	0
Coastal	0
Pilot whales:	
Short-finned pilot whale	0
Long-finned pilot whale	0
Risso's dolphin	0
Common dolphin	0
Harbor porpoise	51.31 [C]
Seals:	
Gray seal	3.04
Harbor seal	12.16

Note: Values taken from JASCO's density and exposure modeling update memo (August 2022). Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts on the species approach zero due to their low predicted densities in the Project area. These species are therefore excluded from quantitative analyses and tables.

[a] Listed as Endangered under the ESA.

[b] Level A exposures were estimated for this species, but due to mitigation measures in **Section 11**, no Level A takes are expected or requested. Level A exposure estimates are added to Level B take requests in **Section 6.2.3**.

[C] The calculated Level A exposures are likely an overestimate; the modeled 10 dB reduction due to NMS is assumed across all frequencies and does not take into account that the reduction is greater at higher frequencies, which are those heard best by harbor porpoise.

Table 6-8. Estimated Maximum Level A Exposures of Marine Mammals Resulting from OSS Foundation Monopile or Pin Pile Impact Pile Driving. Results indicate total potential exposures per stock modeled over the effective period of the LOA assuming 2 monopiles or 3 pin piles are installed per day.

Species	Estimated Level A Exposures (SEL_{cum}) 11-m Monopiles (3)	Estimated Level A Exposures (SEL_{cum}) 2.44-m Pin Piles (48)
North Atlantic right whale [a]	0.04 [b]	0.10 [b]
Fin whale [a]	0.15	0.48
Sei whale [a]	0.04	0.14
Minke whale	0.76	2.29
Humpback whale	0.18	0.54
Sperm whale [a]	0	0
Atlantic white-sided dolphin	0	0
Common bottlenose dolphins:		
Offshore	0	0
Coastal	0	0
Pilot whales:		
Short-finned pilot whale	0	0
Long-finned pilot whale	0	0
Risso's dolphin	0	0
Common dolphin	0	0
Harbor porpoise [c]	2.38	16.60
Seals:		
Gray seal	0.08	0.32
Harbor seal	0.37	0.43

Note: Values taken from JASCO's density and exposure modeling update memo (August 2022). Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts on the species approach zero due to their low predicted densities in the Project area. These species are therefore excluded from quantitative analyses and tables.

[a] Listed as Endangered under the ESA.

[b] Level A exposures were estimated for this species, but due to mitigation measures outlined in **Section 11**, no Level A takes are expected or requested. See **Section 6.2.3** for more information.

[C] The calculated Level A exposures are likely an overestimate; the modeled 10 dB reduction due to NMS is assumed across all frequencies and does not take into account that the reduction is greater at higher frequencies, which are those heard best by harbor porpoise.

Table 6-9. Estimated Level A Exposures by Month to Marine Mammal Species Resulting from Vibratory Pile Installation and Removal of Cofferdams.

Species	Jan	Feb	Mar	Apr	May	Oct	Nov	Dec	Average Exposures [a]
North Atlantic right whale [b]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Blue whale [b]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Fin whale [b]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Sei whale [b]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Minke whale	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Humpback whale	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Sperm whale [b]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Atlantic white-sided dolphin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Common bottlenose dolphins:									
Offshore	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Coastal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Pilot whales:									
Short-finned pilot whale	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Long-finned pilot whale	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Risso's dolphin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Common dolphin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**<0.01**
Harbor porpoise	0.02	0.02	0.02	0.02	<0.01	<0.01	<0.01	0.02	**0.01**
Seals:									
Gray seal	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	0.01	**0.01**
Harbor seal	0.02	0.02	0.02	0.03	0.02	0.03	0.04	0.03	**0.02**

Note: **Bolded** values indicate estimates used in final take request.

[a] Average Exposure values were calculated using the October – May average density column from Table 6-2; all other monthly exposure methods remained the same.

[b] Listed as Endangered under the ESA.

Table 6-10. Estimated Potential Maximum Level A Exposures of Marine Mammals Resulting from the Possible Detonations of up to 10 UXOs assuming both 10 dB of Attenuation

Species	Estimated Level A Exposures (PTS SEL)
	10 dB Attenuation
North Atlantic right whale [a,b]	0.03
Blue whale [a]	<0.01
Fin whale [a]	0.28
Sei whale [a]	0.08
Minke whale	2.53
Humpback whale	0.33
Sperm whale [a]	<0.01
Atlantic white-sided dolphin	0.03
Common bottlenose dolphins:	
Offshore	0.68
Coastal	3.84
Pilot whales:	
Short-finned pilot whale	<0.01
Long-finned pilot whale	<0.01
Risso's dolphin	<0.01
Common dolphin	0.13
Harbor porpoise	9.49
Seals:	
Gray seal	2.28
Harbor seal	6.39

[a] Listed as Endangered under the ESA.

[b] Level A exposures were estimated for this species, but due to mitigation measures outlined in **Section 11**, no Level A takes are expected or requested. See **Section 6.2.3** for more information.

Table 6-11. Estimated Annual Level A Exposures of Marine Mammals Resulting from HRG Surveys.

Species	Estimated Level A Exposures [b]	
	Years 1, 4, and 5 (88 days each of HRG surveys)	Years 2 and 3 (180 days each of HRG surveys)
North Atlantic right whale [a]	<0.01	0.01
Blue whale [a]	<0.01	<0.01
Fin whale [a]	0.01	0.02
Sei whale [a]	<0.01	<0.01
Minke whale	0.02	0.04
Humpback whale	0.01	0.02
Sperm whale [a]	<0.01	<0.01
Atlantic white-sided dolphin	0.03	0.05
Common bottlenose dolphins:		
Offshore	1.23	2.46
Coastal	3.28	6.60
Pilot whales:		
Short-finned pilot whale	<0.01	<0.01
Long-finned pilot whale	<0.01	<0.01
Risso's dolphin	<0.01	<0.01
Common dolphin	0.20	0.42
Harbor porpoise	5.60	11.59
Seals:		
Gray seal	0.23	0.48
Harbor seal	0.66	1.34

[a] Listed as Endangered under the ESA.

[b] Although Level A exposures were estimated for HRG surveys, due to mitigation measures outlined in **Section 11**, no Level A takes are expected or requested. See **Section 6.2** for more information.

Table 6-12. Estimated Level B Maximum Exposures of Marine Mammals Resulting from WTG Monopile Impact Installation based on the 160 dB rms Threshold.

Species	Estimated Level B Exposures
North Atlantic right whale [a]	3.11
Fin whale [a]	7.05
Sei whale [a]	2.00
Minke whale	52.25
Humpback whale	13.82
Sperm whale [a]	0
Atlantic white-sided dolphin	71.5
Common bottlenose dolphins:	
Offshore	935.91
Coastal	0
Pilot whales:	
Short-finned pilot whale	0.04
Long-finned pilot whale	0
Risso's dolphin	7.06
Common dolphin	1,229.37
Harbor porpoise	233.89
Seals:	
Gray seal	197.56
Harbor seal	554.22

Notes: Values taken from JASCO's density and exposure modeling update memo (August 2022). Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts on the species approach zero due to their low predicted densities in the Project area. These species are therefore excluded from quantitative analyses and tables.

[a] Listed as Endangered under the ESA.

Table 6-13. Estimated Maximum Level B Exposures of Marine Mammals Resulting from OSS Foundation Monopile or Pin Pile Impact Pile Driving.

Species	Estimated Level B Exposures 8/11-m Monopiles (3)	Estimated Level B Exposures 2.44-m Pin Piles (48)
North Atlantic right whale [a]	0.14	0.75
Fin whale [a]	0.27	1.20
Sei whale [a]	0.08	0.45
Minke whale	2.32	15.81
Humpback whale	0.51	3.63
Sperm whale [a]	0	0
Atlantic white-sided dolphin	2.37	16.20
Common bottlenose dolphins:		
Offshore	30.44	168.23
Coastal	0	0
Pilot whales:		
Short-finned pilot whale	<0.01	0
Long-finned pilot whale	0	0
Risso's dolphin	0.26	1.79
Common dolphin	40.51	293.89
Harbor porpoise	10.004	70.97
Seals:		
Gray seal	6.98	38.59
Harbor seal	19.76	99.14

Notes: Values taken from JASCO's density and exposure modeling update memo (August 2022). Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts on the species approach zero due to their low predicted densities in the Project area. These species are therefore excluded from quantitative analyses and tables.

[a] Listed as Endangered under the ESA.

Table 6-14. Estimated Level B Exposures by Month to Marine Mammal Species Resulting from Vibratory Pile Installation and Removal of Cofferdams.

Species	Jan	Feb	Mar	Apr	May	Oct	Nov	Dec	Average Exposures
North Atlantic right whale [a]	2.08	1.71	0.97	0.55	0.13	0.09	0.41	1.20	**0.89**
Blue whale [a]	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	**0.02**
Fin whale [a]	2.21	0.65	1.30	1.64	0.57	0.54	0.55	2.56	**1.25**
Sei whale [a]	0.40	0.26	0.48	0.61	0.29	0.09	0.44	0.91	**0.44**
Minke whale	0.42	0.48	0.68	9.40	7.42	0.94	0.12	0.28	**2.47**
Humpback whale	2.25	1.51	2.28	1.56	0.83	0.90	2.13	4.26	**1.96**
Sperm whale [a]	0.03	0.04	0.02	0.06	0.08	0.00	0.15	0.09	**0.06**
Atlantic white-sided dolphin	1.49	0.96	1.47	3.84	2.11	1.91	4.06	3.76	**2.45**
Common bottlenose dolphins:									
Offshore	120.06	38.12	60.99	260.70	653.27	1019.85	951.596	670.22	**471.85**
Coastal	161.51	61.44	137.20	696.39	1745.23	2378.69	1988.58	1076.10	**1030.64**
Pilot whales:									
Short-finned pilot whale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Long-finned pilot whale	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.01**
Risso's dolphin	0.01	0.00	0.00	0.03	0.02	0.02	0.11	0.21	**0.05**
Common dolphin	7.05	3.05	5.43	13.05	8.91	6.24	36.20	24.03	**12.99**
Harbor porpoise	39.03	34.32	39.17	51.95	10.28	0.18	0.69	41.18	**27.10**
Seals:									
Gray seal	102.96	73.31	81.20	131.83	84.76	126.98	182.25	131.44	**114.34**
Harbor seal	287.77	204.92	226.96	368.48	236.92	354.92	509.40	367.39	**319.59**

Note: **Bolded** values indicate estimates used in final take request.

[a] Average Exposure values were calculated using the October – May average density column from Table 6-2; all other monthly exposure methods remained the same.

[b] Listed as Endangered under the ESA.

Table 6-15. Estimated Maximum Level B Exposures of Marine Mammals Resulting from the Possible Detonations of up to 10 UXOs assuming both 10 dB of Attenuation

Species	Estimated Level B Exposures (TTS SEL)
	10 dB Attenuation
North Atlantic right whale [a]	0.35
Blue whale [a]	0.04
Fin whale [a]	2.87
Sei whale [a]	0.87
Minke whale	26.42
Humpback whale	3.41
Sperm whale [a]	0.01
Atlantic white-sided dolphin	1.05
Common bottlenose dolphins:	
Offshore	24.36
Coastal	137.31
Pilot whales:	
Short-finned pilot whale	0.02
Long-finned pilot whale	0.02
Risso's dolphin	0.04
Common dolphin	4.65
Harbor porpoise	46.50
Seals:	
Gray seal	50.98
Harbor seal	142.49

[a] Listed as Endangered under the ESA.

Table 6-16. Estimated Annual Maximum Level B Exposures of Marine Mammals Resulting from HRG Surveys.

Species	Estimated Annual Level B Exposures Per Year	
	Years 1, 4 and 5 (88 days each of HRG surveys)	Years 2 and 3 (180 days each of HRG surveys)
North Atlantic right whale [a]	0.46	0.94
Blue whale [a]	0.02	0.03
Fin whale [a]	1.24	2.56
Sei whale [a]	0.33	0.68
Minke whale	2.40	4.98
Humpback whale	1.10	2.27
Sperm whale [a]	0.04	0.09
Atlantic white-sided dolphin	4.79	10.04
Common bottlenose dolphins:		
Offshore	173.84	348.37
Coastal	464.18	933.46
Pilot whales:		
Short-finned pilot whale	0.14	0.29
Long-finned pilot whale	0.19	0.40
Risso's dolphin	0.31	0.65
Common dolphin	28.38	59.52
Harbor porpoise	21.69	44.88
Seals:		
Gray seal	33.23	67.56
Harbor seal	92.88	188.83

[a] Listed as Endangered under the ESA.

Table 6-17. Requested Level A and Level B Takes for Marine Mammals During Impact Pile Driving of WTG 8/11-m Monopiles for the Effective Period of the LOA (5-year total).

Species	Population Size	Level A Harassment Takes	Level B Harassment Takes	Max Percent Population
North Atlantic right whale [a]	368	0 [b]	4	1.09
Blue whale [a]	unknown	0	4 [c]	unknown
Fin whale [a]	6,802	4	8	0.18
Sei whale [a]	6,292	1	2 [d]	0.05
Minke whale	21,968	19	53	0.33
Humpback whale	1,396	5	14	1.36
Sperm whale [a]	4,349	0	3 [d]	0.07
Atlantic white-sided dolphin	93,233	0	72	0.08
Atlantic spotted dolphin	39,921	0	45 [d]	0.11
Common bottlenose dolphins:				
Offshore	62,851	0	936	1.49
Coastal	6,639	0	0	0.00
Pilot whales:				
Short-finned pilot whale	28,924	0	10 [d]	0.03
Long-finned pilot whale	39,215	0	10 [d]	0.03
Risso's dolphin	35,215	0	30 [d]	0.09
Common dolphin	172,974	0	1,230	0.71
Harbor porpoise	95,543	52	234	0.30
Seals:				
Gray seal	27,300	4	198	0.74
Harbor seal	61,336	13	555	0.93

Note: Values ≥0.5 from **Table 6-7** and **Table 6-12** have been rounded up to the nearest integer, values <0.5 rounded down to 0.

[a] Listed as Endangered under the ESA.

[b] 0.90 Level A exposures were estimated for North Atlantic right whale, but due to mitigation measures outlined in **Section** Error! Reference source not found., no Level A takes are expected or requested.

[c] No Level B exposures were estimated for blue whale, but up to 4 Level B takes not calculated through density estimates are requested in the unlikely event that 4 individuals, or two cow and calf pairs, approach monopile installation.

[d] The requested take for these species was adjusted based on mean group size:

- Sei whale: Kenney and Vigness-Raposa, 2010.
- Sperm whale: Barkaszi and Kelly, 2019.
- Atlantic spotted dolphin: Kenney and Vigness-Raposa, 2010.
- Pilot whales: Kenney and Vigness-Raposa, 2010.
- Risso's dolphin: Barkaszi and Kelly, 2019.

Table 6-18. Requested Level A and Level B Takes for Marine Mammals During Impact Pile Driving for Either OSS Scenario: 3 8/11-m Monopiles or 3 Jacket Foundations Composed of 16 2.44-m Pin Piles Each.

Species	Population Size	3 8/11-m Monopile Scenario			48 2.44-m Pin Pile Scenario		
		Level A Harassment Takes	Level B Harassment Takes	Max Percent Population	Level A Harassment Takes	Level B Harassment Takes	Max Percent Population
North Atlantic right whale [a]	368	0	0	0.00	0	1	0.27
Blue whale [a]	unknown	0	0	0.00	0	0	0.00
Fin whale [a]	6,802	0	0	0.00	0	2	0.03
Sei whale [a]	6,292	0	0	0.00	0	0	0.01
Minke whale	21,968	1	3	0.02	3	16	0.09
Humpback whale	1,396	0	1	0.07	1	4	0.36
Sperm whale [a]	4,349	0	0	0.00	0	3 [b]	0.07
Atlantic white-sided dolphin	93,233	0	3	0.01	0	17	0.02
Atlantic spotted dolphin	39,921	0	0	0.00	0	45 [b]	0.11
Common bottlenose dolphins:							
Offshore	62,851	0	31	0.05	0	169	0.27
Coastal	6,639	0	0	0.06	0	0	0.00
Pilot whales:							
Short-finned pilot whale	28,924	0	0	0.00	0	10 [b]	0.03
Long-finned pilot whale	39,215	0	0	0.00	0	10 [b]	0.03
Risso's dolphin	35,215	0	0	0.00	0	30 [b]	0.09
Common dolphin	172,974	0	41	0.02	0	294	0.17
Harbor porpoise	95,543	3	11	0.01	17	71	0.09
Seals:							
Gray seal	27,300	0	7	0.03	0	39	0.14
Harbor seal	61,336	0	20	0.03	0	100	0.16

Note: Values ≥0.5 from **Table 6-8** and **Table 6-13** have been rounded up to the nearest integer, values <0.5 rounded down to 0.

[a] Listed as Endangered under the ESA.

[b] The requested take for these species was adjusted based on mean group size:

- Sei whale: Kenney and Vigness-Raposa, 2010.
- Sperm whale: Barkaszi and Kelly, 2019.
- Atlantic spotted dolphin: Kenney and Vigness-Raposa, 2010.
- Pilot whales: Kenney and Vigness-Raposa, 2010.
- Risso's dolphin: Barkaszi and Kelly, 2019.

Table 6-19. Requested Level A and Level B Takes Resulting from Vibratory Installation and Removal of Cofferdams and the Percentage of Each Population or Stock Taken for the Effective Period of the LOA (5-year total).

Species	Population Size	Level A Harassment Takes	Level B Harassment Takes	Max Percent Population
North Atlantic right whale [a]	368	0	1	0.27
Blue whale [a]	unknown	0	0	0.00
Fin whale [a]	6,802	0	2	0.03
Sei whale [a]	6,292	0	1	0.02
Minke whale	21,968	0	3	0.01
Humpback whale	1,396	0	3	0.21
Sperm whale [a]	4,349	0	0	0.00
Atlantic white-sided dolphin	93,233	0	5	0.01
Atlantic spotted dolphin	39,921	0	45 [b]	0.11
Common bottlenose dolphins:				
Offshore	62,851	0	472	0.75
Coastal [f]	6,639	11 [c]	1,031	15.70
Pilot whales:				
Short-finned pilot whale	28,924	0	10 [d]	0.03
Long-finned pilot whale	39,215	0	10 [d]	0.03
Risso's dolphin	35,215	0	30 [d]	0.09
Common dolphin	172,974	0	13	0.01
Harbor porpoise	95,543	0	28	0.03
Seals:				
Gray seal	27,300	28 [e]	115	0.52
Harbor seal	61,336	28 [e]	320	0.57

[a] Listed as Endangered under the ESA.

[b] No Level B exposures were estimated for Atlantic spotted dolphin, but up to 45 Level B takes are requested in the unlikely event a pod of up to 45 individuals approaches cofferdam installation or removal (based on Kenney and Vigness-Raposa, 2010).

[c] No Level A exposures were estimated for coastal bottlenose dolphin, but up to 11 Level A takes are requested in the unlikely event a pod of dolphins approaches cofferdam installation or removal (based on Toth *et al.* 2011).

[d] Level B take of these species were adjusted to account for mean group size:

- Pilot whales: Kenney and Vigness-Raposa, 2010.
- Risso's dolphins: Barkaszi and Kelly, 2019.

[e] No Level B exposures were estimated for gray and harbor seals, but up to 28 Level A takes are requested in the event that up to 2 animals per day approach cofferdam installation or removal.

[f] Coastal bottlenose dolphin take for bayside (vs. Atlantic-facing) cofferdams is likely overestimated, as this stock has been shown to prefer coastal to estuarine environments (Toth et al. 2011).

Table 6-20. Requested Level A and Level B Takes Resulting from the Detonation of up to 10 UXOs and the Percentage of Each Population or Stock Taken for the Effective Period of the LOA (5-year total).

Species	Population Size	10 dB of Attenuation		
		Level A Harassment Takes	Level B Harassment Takes	Max Percent Population
North Atlantic right whale [a]	368	0	1	0.00
Blue whale [a]	unknown	0	0	0.00
Fin whale [a]	6,802	0	3	0.04
Sei whale [a]	6,292	0	1	0.02
Minke whale	21,968	0 [b]	27	0.12
Humpback whale	1,396	0	4	0.29
Sperm whale [a]	4,349	0	3 [c]	0.07
Atlantic white-sided dolphin	93,233	0	2	0.01
Atlantic spotted dolphin	39,921	0	45 [c]	0.11
Common bottlenose dolphins:				
Offshore	62,851	0 [b]	25	0.04
Coastal	6,639	0 [b]	138	2.08
Pilot whales:				
Short-finned pilot whale	28,924	0	10 [c]	0.03
Long-finned pilot whale	39,215	0	10 [c]	0.03
Risso's dolphin	35,215	0	30 [c]	0.09
Common dolphin	172,974	0	5	<0.01
Harbor porpoise	95,543	10	47	0.06
Seals:				
Gray seal	27,300	3	51	0.20
Harbor seal	61,336	7	143	0.24

Note: Calculated exposures that were ≥0.5 were rounded up to the nearest whole number.

[a] Listed as Endangered under the ESA.

[b] A small number of Level A exposures were estimated based on density calculations; however, no Level A take in these instances is requested due to mitigation measures outlined in **Section 11**.

[c] The requested take for these species was adjusted based on mean group size:

- Sperm whale: Barkaszi and Kelly, 2019.
- Atlantic spotted dolphin: Kenney and Vigness-Raposa, 2010.
- Pilot whales: Kenney and Vigness-Raposa, 2010.
- Risso's dolphin: Barkaszi and Kelly, 2019.

Table 6-21. Requested Level A and Level B Takes Per Year for High-resolution Geophysical Surveys Conducted during Ocean Wind Construction.

Species	Population Size	Years 1, 4, and 5 (88 days of HRG surveys per year)			Years 2 and 3 (180 days of HRG surveys per year)		
		Annual Level A Harassment Takes	Annual Level B Harassment Takes	Annual Max Percent Population	Annual Level A Harassment Takes	Annual Level B Harassment Takes	Annual Max Percent Population
North Atlantic right whale [a]	368	0	1 [d]	0.27	0	2 [d]	0.54
Blue whale [a]	unknown	0	0	0.00	0	0	0.00
Fin whale [a]	6,802	0	2	0.03	0	3	0.04
Sei whale [a]	6,292	0	0	0.00	0	1 [b]	0.02
Minke whale	21,968	0	3	<0.01	0	5 [b]	0.02
Humpback whale	1,396	0	2	0.14	0	3 [b]	0.21
Sperm whale [a]	4,349	0	3 [b]	0.07	0	3 [b]	0.07
Atlantic white-sided dolphin	93,233	0	5	<0.01	0	11	0.01
Atlantic spotted dolphin	39,921	0	45 [b]	0.11	0	45 [b]	0.11
Common bottlenose dolphins:							
Offshore	62,851	0 [c]	174	0.28	0 [c]	349	0.62
Coastal	6,639	0 [c]	465	7.00	0 [c]	934	19.70
Pilot whales:							
Short-finned pilot whale	28,924	0	10 [b]	0.03	0	10 [b]	0.03
Long-finned pilot whale	39,215	0	10 [b]	0.03	0	10 [b]	0.03
Risso's dolphin	35,215	0	30 [b]	0.09	0	30 [b]	0.09
Common dolphin	172,974	0	29	0.01	0	60	0.03
Harbor porpoise	95,543	0 [c]	22	0.02	0 [c]	45	0.05
Seals:							
Gray seal	27,300	0	34	0.12	0 [c]	68	0.25
Harbor seal	61,336	0 [c]	93	0.15	0 [c]	189	0.31

[a] Listed as Endangered under the ESA.

[b] The requested take for these species was adjusted based on mean group size:

- Sei whale: Kenney and Vigness-Raposa, 2010.
- Minke whale: Kenney and Vigness-Raposa, 2010.
- Humpback whale: CeTAP, 1982.
- Sperm whale: Barkaszi and Kelly, 2019
- Atlantic spotted dolphin: Kenney and Vigness-Raposa, 2010.
- Pilot whales: Kenney and Vigness-Raposa, 2010.
- Risso's dolphin: Barkaszi and Kelly, 2019.

[c] A small number of Level A exposures were estimated based on density calculations; however, no Level A take is requested due to mitigation measures outlined in **Section 11**.

[d] For all species other than NARW, estimated take values greater than 0.5 were rounded up to 1. Take values for NARW were set manually for conservatism: 0.45 was rounded to 1, and .93 was rounded to 2.

Table 6-22. Requested Level A and Level B Takes for All Activities Conducted During Ocean Wind Construction.

Species	Population Size	Year 1			Year 2			Year 3			Year 4			Year 5		
		Level A	Level B	Max %	Level A	Level B	Max %	Level A	Level B	Max %	Level A	Level B	Max %	Level A	Level B	Max %
North Atlantic right whale [a]	368	0	3	0.82	0	7	1.90	0	2	0.54	0	1	0.27	0	1	0.27
Blue whale [a]	unknown	0	0	N/A	0	4	N/A	0	0	N/A	0	0	N/A	0	0	N/A
Fin whale [a]	6,802	0	7	0.10	4	13	0.25	0	3	0.04	0	2	0.03	0	2	0.03
Sei whale [a]	6,292	0	2	0.03	1	3	0.06	0	1	0.02	0	0	0.00	0	0	0.00
Minke whale	21,968	0	33	0.15	22	74	0.44	0	5	0.02	0	3	0.01	0	3	0.01
Humpback whale	1,396	0	9	0.64	6	21	1.93	0	3	0.21	0	2	0.14	0	2	0.14
Sperm whale [a]	4,349	0	6	0.14	0	6	0.14	0	3	0.07	0	3	0.07	0	3	0.07
Atlantic white-sided dolphin	93,233	0	12	0.01	0	100	0.11	0	11	0.01	0	5	0.01	0	5	0.01
Atlantic spotted dolphin	39,921	0	135	0.34	0	135	0.34	0	45	0.11	0	45	0.11	0	45	0.11
Common bottlenose dolphins:																
Offshore	62,851	0	671	1.07	0	1,454	2.31	0	349	0.56	0	174	0.28	0	174	0.28
Coastal [b]	6,639	11	1,634	24.78	0	934	14.07	0	934	14.07	0	465	7.00	0	465	7.00
Pilot Whales:																
Short-finned pilot whale	28,924	0	30	0.10	0	30	0.10	0	10	0.03	0	10	0.03	0	10	0.03
Long-finned pilot whale	39,215	0	30	0.08	0	30	0.08	0	10	0.03	0	10	0.03	0	10	0.03
Risso's dolphin	35,215	0	90	0.26	0	90	0.26	0	30	0.09	0	30	0.09	0	30	0.09
Common dolphin	172,974	0	47	0.03	0	1,584	0.92	0	60	0.03	0	29	0.02	0	29	0.02
Harbor porpoise	95,543	10	97	0.11	69	350	0.44	0	45	0.56	0	22	0.02	0	22	0.02
Seals:																
Gray seal	27,300	31	200	0.85	4	305	1.13	0	68	0.25	0	34	0.12	0	34	0.12
Harbor seal	61,336	35	556	0.96	13	844	1.40	0	189	0.31	0	93	0.15	0	93	0.15

[a] Listed as Endangered under the ESA.

[b] Coastal bottlenose dolphin take for bayside (vs. Atlantic-facing) cofferdams is likely overestimated, as this stock has been shown to prefer coastal to estuarine environments (Toth et al. 2011).

Table 6-23. Summary of Level A and Level B Takes for All Activities Conducted During Ocean Wind Construction.

Species	Population Size	5 Year Total		
		Level A	Level B	Max Percent
North Atlantic right whale [a]	368	0	14	3.80
Blue whale [a]	unknown	0	4	N/A
Fin whale [a]	6,802	4	27	0.46
Sei whale [a]	6,292	1	6	0.11
Minke whale	21,968	22	118	0.64
Humpback whale	1,396	6	37	3.08
Sperm whale [a]	4,349	0	24	0.55
Atlantic white-sided dolphin	93,233	0	133	0.14
Atlantic spotted dolphin	39,921	0	405	1.01
Common bottlenose dolphins:				
Offshore	62,851	0	2,822	4.49
Coastal [b]	6,639	11	4,432	66.92
Pilot Whales:				
Short-finned pilot whale	28,924	0	90	0.31
Long-finned pilot whale	39,215	0	90	0.23
Risso's dolphin	35,215	0	270	0.77
Common dolphin	172,974	0	1,749	1.01
Harbor porpoise	95,543	79	536	0.64
Seals:				
Gray seal	27,300	35	641	2.48
Harbor seal	61,336	48	1,775	2.97

[a] Listed as Endangered under the ESA.

[b] Coastal bottlenose dolphin take for bayside (vs. Atlantic-facing) cofferdams is likely overestimated, as this stock has been shown to prefer coastal to estuarine environments (Toth et al. 2011).

References

Toth, J.L., Hohn, A.A., Able, K.W. and Gorgone, A.M., 2011. Patterns of seasonal occurrence, distribution, and site fidelity of coastal bottlenose dolphins (*Tursiops truncatus*) in southern New Jersey, USA. Marine Mammal Science, 27(1), pp.94-110.

Appendix K. List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

This EIS is available in electronic form for public viewing at https://www.boem.gov/renewable-energy/state-activities/ocean-wind-1. Hard copies and digital versatile disks (DVDs) of the EIS can be requested by contacting the Program Manager, Office of Renewable Energy in Sterling, Virginia. Publication of the Draft EIS initiated a 45-day comment period where government agencies, members of the public, and interested stakeholders could provide comments and input. BOEM accepted comments received or postmarked no later than August 8, 2022, in any of the following ways:

- In hard copy form, delivered by hand or by mail, enclosed in an envelope labeled "Ocean Wind 1 COP EIS" and addressed to Program Manager, Office of Renewable Energy, Bureau of Ocean Energy Management, 45600 Woodland Road, Sterling, Virginia 20166.
- Through the regulations.gov web portal by navigating to http://www.regulations.gov and searching for docket number "BOEM-2022-0021."
- By attending one of the EIS public meetings at the locations and dates listed in the notice of availability and providing written or verbal comments. BOEM used comments received during the public comment period to inform its preparation of the final EIS, as appropriate. EIS notification lists for the Project are provided in Table K-1 through Table K-4.

K.1. Notification List

Table K-1 Federal Agencies

Agency	Contact
Cooperating Federal Agencies	
USEPA	Mark Austin, NEPA Lead, USEPA Region 2
NOAA, NMFS	Sue Tuxbury, Fishery Biologist/Wind Coordinator, Greater Atlantic Regional Fisheries Office, Habitat and Ecosystems Services Division
USCG	Matt Creelman, District 5
U.S. Department of the Interior, BSEE	Juliette Giordano, Lead Environmental Protection Specialist
USACE	Naomi Handell, Regulatory Program Manager, USACE North Atlantic Division Brian Anthony, Biologist, USACE Philadelphia District, Regulatory Branch
USFWS	Eric Schrading, Field Supervisor, New Jersey Field Office
National Park Service	Mary Krueger, Energy Specialist, Project Lead
DOD	Steven Sample, Executive Director, DoD Siting Clearinghouse

Table K-2 State and Local Agencies or Other Interested Parties

Agency	Contact
Cooperating State Agencies	
NJDEP	Megan Brunatti, Director, Office of Permitting & Project Navigation
New York State Department of State	Laura McLean, Coastal Energy Review Specialist
New Jersey Board of Public Utilities	Jim Ferris, P.E., CEM, Deputy Director, Division of Clean Energy
Libraries (Draft EIS only)	
Ocean County Library, Waretown	112 Main Street, Waretown, New Jersey, 08758
Atlantic City Free Public Library (Main)	1 North Tennessee Avenue, Atlantic City, New Jersey, 08401
Ocean City Free Public Library	1735 Simpson Avenue, Ocean City, New Jersey, 08226
Cape May County Library, Wildwood	6300 Atlantic Avenue, Wildwood Crest, New Jersey, 08260

Table K-3 Tribes and Native Organizations

Agency	Contact
Stockbridge-Munsee Community, Band of Mohican Indians	Jeff Bendremer, Tribal Historic Preservation Officer
Delaware Nation	Carissa Speck, Historic Preservation Director
Delaware Tribe of Indians	Susan Bachor, Archaeologist, Delaware Tribe Historic Preservation Office Representative
The Shinnecock Indian Nation	Jeremy Dennis, Junior Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)	Cheryl Andrews-Maltais, Chairwoman Bettina Washington, Tribal Historic Preservation Officer Lael Echo-Hawk, General Counsel

Table K-4 Section 106 Consulting Parties

Government or Organization	Participating Consulting Parties	Contact
SHPOs and State Agencies	NJDEP, Historic Preservation Office	Katherine Marcopul, Administrator and Deputy Historic Preservation Officer
	NJDEP, Office of Historic Sites & Parks	Mark Texel, Administrator
	New Jersey Historic Trust	Dorothy Guzzo, Executive Director
Federal Agencies	ACHP	Christopher Daniel, Federal Property Management Section, Program Analyst Chris Koeppel, Federal Property Management Section, Assistant Director

Government or Organization	Participating Consulting Parties	Contact
	USACE	Naomi Handell, Regulatory Program Manager, USACE North Atlantic Division Brian Anthony, Biologist, Regulatory Branch, USACE Philadelphia District Ann Marie Dilorenzo, Division Section 408 Coordinator, USACE North Atlantic Division Juan Carlos Corona, Philadelphia District Section 408 Coordinator
	USCG	Matt Creelman, District 5 Agency Point of Contact Robb Webb, District 5 George Detweiler, Headquarters Jodi Min, Sector Delaware Bay Elizabeth Marshall, Sector Delaware Bay
	USEPA	Abbey States, Human Health Risk Assessor Mark Austin, Team Leader, Environmental Reviews
	National Park Service	Mary Krueger, Energy Specialist for the Northeast Region Kathy Schlegel, Historical Landscape Architect
	U.S. Naval History and Heritage Command	Dr. Alexis Catsambis, Underwater Archaeology Branch
Federally Recognized Tribes	Delaware Nation	Carissa Speck, Historic Preservation Director
	Delaware Tribe of Indians	Susan Bachor, Archaeologist, Delaware Tribe Historic Preservation Office Representative
	Stockbridge-Munsee Community Band of Mohican Indians	Jeff Bendremer, Tribal Historic Preservation Officer
	The Shinnecock Indian Nation	Jeremy Dennis, Junior Tribal Historic Preservation Officer
	Wampanoag Tribe of Gay Head (Aquinnah)	Cheryl Andrews-Maltais, Chairwoman Bettina Washington, Tribal Historic Preservation Officer Lael Echo-Hawk, General Counsel
Local Government	Atlantic County	Gerald DelRosso, County Administrator Frances Brown, Senior Planner
	Cape May City	Warren Coupland, Historic Preservation Commission Chairperson
	Cape May County	William Cook, Special Council, Cultural Heritage Partners
	City of North Wildwood	Michael J. Donohue, Blaney Donohue & Weinberg, P.C. Nicholas Long, City Administrator
	Harvey Cedars Borough	Daina Dale, Municipal Clerk Jonathan Oldham, Mayor Paul Rice, Commissioner

Government or Organization	Participating Consulting Parties	Contact
	Linwood City	Mary Cole, Deputy Municipal Clerk Leigh Ann, Napoli Municipal Clerk, Registrar of Vital Statistics
	Margate City	Roger McLarnon, Planner, Zoning Officer
	Ocean City	George Savastano, Business Administrator Doug Bergen, Public Information Officer Dottie McCrosson, City Solicitor
	Sea Isle City	George Savastano, Business Administrator Shannon Romano, Municipal Clerk
	Somers Point City	Jason Frost, City Administrator
	Stafford Township	Mathew von der Hayden, Township Administrator Justin Riggs, Assistant to the Administrator
Nongovernmental Organizations or Groups	Absecon Lighthouse	Jean Muchanic, Executive Director
	Flanders Condominium Association	Peter Voudouris, President
	Garden State Seafood Association	Scot Mackey, Trenton Representative
	House at 114 South Harvard Avenue	Donald Feith, Property Owner
	Long Beach Island Historical Association	Ronald Marr, President
	The Noyes Museum of Art	Michael Cagno, Executive Director
	Ritz Condominium Association	Gordon Pherribo, President Board of Trustees
	Rutgers University, Department of Marine and Coastal Sciences	Oscar Schofield, Distinguished Professor and Department Chair
	Save Lucy Committee, Inc.	James M. Rutala, Rutala Associates, LLC
	Vassar Square Condominiums	Paul Snyderman, President, Board of Trustees

Appendix L. Other Impacts

L.1. Unavoidable Adverse Impacts of the Proposed Action

CEQ's NEPA-implementing regulations (40 CFR 1502.16(a)(2)) require that an EIS evaluate the potential unavoidable adverse impacts associated with a Proposed Action. Adverse impacts that can be reduced by mitigation measures but not eliminated are considered unavoidable. Table L-1 provides a listing of such impacts. Most potential unavoidable adverse impacts associated with the Proposed Action would occur during the construction phase and would be temporary. Chapter 3 provides additional information on the potential impacts listed below.

All impacts from planned activities are still expected to occur as described in the No Action Alternative analysis in this EIS, regardless of whether the Proposed Action is approved.

Table L-1 Potential Unavoidable Adverse Impacts of the Proposed Action

Resource Area	Potential Unavoidable Adverse Impact of the Proposed Action
Air Quality	• Air quality impacts from emissions from engines associated with vessel traffic, construction activities, and equipment operation
Bats	• Displacement and avoidance behavior due to habitat loss/alteration, equipment noise, and vessel traffic
Benthic Resources	• Suspension and re-settling of sediments due to seafloor disturbance • Conversion of soft-bottom habitat to new hard-bottom habitat • Habitat quality impacts, including reduction in certain habitat types as a result of seafloor alterations • Disturbance, displacement, and avoidance behavior due to habitat loss/ alteration, equipment activity and noise, and vessel traffic • Individual mortality due to construction activities • Temporary loss of SAV within Barnegat Bay due to cable emplacement
Birds	• Displacement and avoidance behavior due to habitat loss/alteration, equipment noise, and vessel traffic
Coastal Habitat and Fauna	• Habitat alteration and removal of vegetation, including trees • Temporary avoidance behavior by fauna during construction activity and noise-producing activities • Individual fauna mortality due to collision with vehicles or equipment during clearing and grading activities, particularly species with limited mobility
Commercial Fisheries and For-Hire Recreational Fishing	• Disruption of access or temporary restriction in harvesting activities due to construction of offshore Project elements • Disruption of harvesting activities during operations of offshore wind facility • Changes in vessel transit and fishing operation patterns • Changes in risk of gear entanglement or availability of target species
Cultural Resources	• Impacts on viewsheds of historic properties

Resource Area	Potential Unavoidable Adverse Impact of the Proposed Action
Demographics, Employment, and Economics	• Disruption of commercial fishing, for-hire recreational fishing, and marine recreational businesses during offshore construction and cable installation • Hindrances to ocean economy sectors due to the presence of the offshore wind facility, including commercial fishing, recreational fishing, sailing, sightseeing, and supporting businesses
Environmental Justice	• Compounded health issues of local environmental justice communities near ports as a result of air quality impacts from emissions from engines associated with vessel traffic, construction activities, and equipment operation • Loss of employment or income due to disruption to commercial fishing, for-hire recreational fishing, or marine recreation businesses • Hindrances to subsistence fishing due to offshore construction and operation of the offshore wind facility
Finfish, Invertebrates, and Essential Fish Habitat	• Temporary loss of SAV within Barnegat Bay due to cable emplacement • Suspension and re-settling of sediments due to seafloor disturbance • Displacement, disturbance, and avoidance behavior due to construction-related impacts, including noise, vessel traffic, increased turbidity, sediment deposition, and EMF • Individual mortality due to construction activities • Habitat quality impacts, including reduction in certain habitat types as a result of seafloor surface alterations • Conversion of soft-bottom habitat to new hard-bottom habitat
Land Use and Coastal Infrastructure	• Conversion of undeveloped areas to utility right-of-way or easement or cable maintenance or replacement • Land use disturbance due to construction as well as effects due to noise, vibration, and travel delays • Potential for accidental releases during construction
Marine Mammals	• Increased risk of injury (TTS or PTS) to individuals due to underwater noise from pile-driving activities during construction • Disturbance (behavioral effects) and acoustic masking due to underwater noise from pile driving, shipping and other vessel traffic, aircraft, geophysical surveys (HRG surveys and geotechnical drilling surveys), WTG operation, and dredging during construction and operations • Increased risk of individual injury and mortality due to vessel strikes • Increased risk of individual injury and mortality associated with fisheries gear
Navigation and Vessel Traffic	• Congestion in port channels • Increased navigational complexity, vessel congestion, and allision risk within the offshore Wind Farm Area • Potential for disruption to marine radar on smaller vessels operating within or in the vicinity of the Project, increasing navigational complexity • Hindrances to SAR missions within the offshore Wind Farm Area
Other Uses	• Disruption to offshore scientific research and surveys and species monitoring and assessment • Increased navigational complexity for military or national security vessels operating within the Wind Farm Area • Changes to aviation and air traffic navigational patterns

Resource Area	Potential Unavoidable Adverse Impact of the Proposed Action
Recreation and Tourism	• Disruption of coastal recreation activities during onshore construction, such as beach access • Viewshed effects from the WTGs altering enjoyment of marine and coastal recreation and tourism activities • Disruption to access or temporary restriction of in-water recreational activities from construction of offshore Project elements • Temporary disruption to the marine environment and marine species important to fishing and sightseeing due to turbidity and noise • Hindrances to some types of recreational fishing, sailing, and boating within the area occupied by WTGs during operation
Sea Turtles	• Increased risk of for individual injury and mortality due to vessel strikes during construction, O&M, and decommissioning • Disturbance, displacement, and avoidance behavior due to habitat disturbance and underwater noise during construction
Scenic and Visual Resources	• Alterations to the ocean, seascape, landscape character units' character, and effects on viewer experience, by the wind farm, vessel traffic, onshore landing sites, onshore export cable routes, onshore substations, and electrical connections with the power grid
Water Quality	• Increase in suspended sediments due to seafloor disturbance during construction, O&M, and decommissioning
Wetlands and Waters of the US	• Wetland and surface water alterations, including increased sedimentation deposition and removal of vegetation

L.2. Irreversible and Irretrievable Commitment of Resources

CEQ's NEPA-implementing regulations (40 CFR 1502.16(a)(4)) require that an EIS review the potential impacts on irreversible or irretrievable commitments of resources resulting from implementation of a Proposed Action. CEQ considers a commitment of a resource irreversible when the primary or secondary impacts from its use limit the future options for its use. Irreversible commitment of resources typically applies to impacts on nonrenewable resources such as marine minerals or cultural resources. The irreversible commitment of resources occurs due to the use or destruction of a specific resource. An irretrievable commitment refers to the use, loss, or consumption of a resource, particularly a renewable resource, for a period of time.

Table L-2 provides a listing of potential irreversible and irretrievable impacts by resource area. EIS Chapter 3 provides additional information on the impacts summarized below.

Table L-2 Irreversible and Irretrievable Commitment of Resources by Resource Area for the Proposed Action

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Air Quality	No	No	BOEM expects air pollutant emissions to comply with permits regulating compliance with air quality standards. Emissions would be temporary during construction activities. To the extent that the Proposed Action displaces fossil-fuel energy generation, overall improvement of air quality would be expected.

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Bats	Yes	No	Irreversible impacts on bats could occur if one or more individuals were injured or killed; however, implementation of mitigation measures developed in consultation with USFWS would reduce or eliminate the potential for such impacts. Decommissioning of the Project would reverse the impacts of bat displacement from foraging habitat.
Benthic Resources	No	No	Although local mortality of benthic fauna, habitat alteration, and SAV losses is likely to occur, BOEM does not anticipate population-level impacts on benthic organisms; habitat could recover after decommissioning activities.
Birds	Yes	No	Irreversible impacts on birds could occur if one or more individuals were injured or killed; however, implementation of mitigation measures developed in consultation with USFWS would reduce or eliminate the potential for such impacts. Decommissioning of the Project would reverse the impacts of bird displacement from foraging habitat.
Coastal Habitat and Fauna	No	No	Although limited removal of habitat associated with clearing and grading for construction of the onshore export cable and substation are likely to occur, BOEM does not anticipate population-level impacts on flora or fauna; coastal habitat could recover after construction in some areas, and after decommissioning activities in other areas.
Commercial Fisheries and For-Hire Recreational Fishing	No	Yes	Based on the anticipated duration of construction and O&M activities, BOEM does not anticipate irreversible impacts on commercial fisheries. The Project could alter habitat during construction and operations, limit access to fishing areas during construction, or reduce vessel maneuverability during operations. However, the conceptual decommissioning of the Project would reverse those impacts. Irretrievable impacts (lost revenue) could occur due to the loss of use of fishing areas at an individual level.
Cultural Resources	Yes	Yes	Although unlikely, unanticipated removal or disturbance of previously unidentified cultural resources onshore and offshore could result in irreversible and irretrievable impacts.
Demographics, Employment, and Economics	No	Yes	Construction activities could temporarily increase contractor needs, housing needs, supply requirements, and demand for local businesses, leading to an irretrievable loss of workers for other projects. These factors could lead to increased housing and supply costs.

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Environmental Justice	No	Yes	Impacts on environmental justice communities could occur due to loss of income or employment for low-income workers in marine industries; this could be reversed by Project decommissioning or by other employment, but income lost during Project operations would be irretrievable.
Finfish, Invertebrates, and Essential Fish Habitat	No	No	Although local mortality of finfish and invertebrates and habitat alteration and loss of SAV habitat could occur, BOEM does not anticipate population-level impacts on finfish, invertebrates, and essential fish habitat. It is expected that the aquatic habitat for finfish and invertebrates would recover following decommissioning activities.
Land Use and Coastal Infrastructure	Yes	Yes	Land use required for construction and operational activities could result in a minor irreversible impact. Construction activities could result in a minor irretrievable impact due to the temporary loss of use of the land for otherwise typical activities. Onshore facilities may or may not be decommissioned.
Marine Mammals	No	Yes	Irreversible impacts on marine mammal populations could occur if one or more individuals of an ESA-listed species were injured or killed or if those populations experienced behavioral effects of high severity. With implementation of mitigation measures, developed in consultation with NMFS (e.g., timing windows, vessel speed restrictions, safety zones), the potential for an ESA-listed species to experience high-severity behavioral effects or be injured or killed would be reduced or eliminated. No irreversible high-severity behavioral effects from Project activities are anticipated, as described in Section 3.15; however, due to the uncertainties from lack of information that are outlined in Appendix D, these effects are still possible. Irretrievable impacts could occur if individuals or populations grow more slowly as a result of displacement from the Project area.
Navigation and Vessel Traffic	No	Yes	Based on the anticipated duration of construction and operations, BOEM does not anticipate impacts on vessel traffic to result in irreversible impacts. Irretrievable impacts could occur due to changes in transit routes, which could be less efficient during the life of the Project.
Other Uses	No	Yes	Disruption of offshore scientific research and surveys would occur during proposed Project construction, operations, and decommissioning activities.
Recreation and Tourism	No	No	Construction activities near the shore could result in a minor, temporary loss of use of the land for recreation and tourism purposes.

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Sea Turtles	No	Yes	Irreversible impacts on sea turtles could occur if one or more individuals of species listed under the ESA were injured or killed; however, the implementation of mitigation measures, developed in consultation with NMFS, would reduce or eliminate the potential for impacts on listed species. Irreversible impacts could occur if individuals or populations grow more slowly as a result of injury or mortality due to vessel strikes or entanglement with fisheries gear caught on the structures, or due to displacement from the Project area.
Scenic and Visual Resources	No	No	Long-term (until post-decommissioning) seascape unit, open ocean unit, and landscape units' character alterations, and effects on viewer experience, by the wind farm, vessel traffic, onshore landing sites, onshore export cable routes, onshore substations, and electrical connections with the power grid would occur.
Water Quality	No	No	BOEM does not expect activities to cause loss of, or major impacts on, existing inland waterbodies or wetlands. Turbidity impacts in marine and coastal environments would be short term.
Wetlands	No	No	BOEM does not expect activities to cause loss of, or major impacts on, existing inland waterbodies or wetlands.

L.3. Relationship Between the Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

CEQ's NEPA-implementing regulations (40 CFR 502.16(a)(3)) require that an EIS address the relationship between short-term use of the environment and the potential impacts of such use on the maintenance and enhancement of long-term productivity. Such impacts could occur as a result of a reduction in the flexibility to pursue other options in the future, or assignment of a specific area (land or marine) or resource to a certain use that would not allow other uses, particularly beneficial uses, to occur at a later date. An important consideration when analyzing such effects is whether the short-term environmental effects of the action will result in detrimental effects on long-term productivity of the affected areas or resources.

As assessed in EIS Chapter 3, BOEM anticipates that the majority of the potential adverse effects associated with the Proposed Action would occur during construction activities and would be short term in nature and minor to moderate in severity/intensity. These effects would cease after decommissioning activities. In assessing the relationships between short-term use of the environment and the maintenance and enhancement of long-term productivity, it is important to consider the long-term benefits of the Proposed Action, which include:

- Promotion of clean and safe development of domestic energy sources and clean energy job creation;
- Promotion of renewable energy to help ensure geopolitical security, combat climate change, and provide electricity that is affordable, reliable, safe, secure, and clean;

- Delivery of power to the New Jersey energy grid to contribute to the state's renewable energy requirements; and
- Increased habitat for certain fish species.

Based on the anticipated potential impacts evaluated in this document and the Final EIS that could occur during Proposed Action construction, O&M, and decommissioning, and with the exception of some potential impacts associated with onshore components, BOEM anticipates that the Proposed Action would not result in impacts that would significantly narrow the range of future uses of the environment. Removal or disturbance of habitat associated with onshore activities could create long-term irreversible impacts. For purposes of this analysis, BOEM assumes that the irreversible impacts presented in Table L-2 would be long term. After completion of the Proposed Action's operations and decommissioning phases, however, BOEM expects the majority of marine and onshore environments to return to normal long-term productivity levels.

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Appendix M. Seascape, Landscape, and Visual Impact Assessment

M.1. Introduction

This appendix describes the SLVIA methodology and key findings that BOEM used to identify the potential impacts of offshore wind structures (WTGs and OSS) on scenic and visual resources within the geographic analysis area. This SLVIA methodology applies to any offshore wind energy development proposed for the OCS and incorporates by reference the detailed description of the methodology described in the *Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States* (BOEM 2021). Section M.2, *Method of Analysis*, describes the specific methodology used to apply the SLVIA methodology to the Ocean Wind 1 COP and Section M.3, *Results*, summarizes the wind farm distances, FOVs, noticeable elements, visual contrasts, scale of change, and prominence that contributed to the determination of impact levels for each KOP under the Proposed Action and each of the action alternatives that include modifications to WTG array layouts (Alternatives B-1, B-2, C-1, C-2, and D). The Project's incremental contribution to cumulative impacts of the action alternatives in combination with other planned offshore wind projects is also assessed. An overview map of scenic resources present in the geographic analysis area is included as Attachment M-1, *Scenic Resources Overview Map*. Visual simulations of the Proposed Action alone, other planned offshore wind projects without the Proposed Action, and other offshore wind projects in combination with the Proposed Action are included in Attachment M-2, *Cumulative Visual Simulations*. Visual simulations of Alternatives B-1, B-2, and C-1 are included in Attachment M-3, *Visual Simulations of Action Alternatives*. Nighttime visual simulations are included as Attachment M-4, *Nighttime Visual Simulations*.

M.2. Method of Analysis

The SLVIA has two separate but linked parts: seascape, open ocean, and landscape impact assessment (SLIA) and VIA. SLIA analyzes and evaluates impacts on both the physical elements and features that make up a landscape, seascape, or open ocean; and the aesthetic, perceptual, and experiential aspects of the landscape, seascape, or open ocean that make it distinctive. These impacts affect the "feel," "character," or "sense of place" of an area of landscape, seascape, or open ocean, rather than the composition of a view from a particular place. In SLIA, the impact receptors (the entities that are potentially affected by the proposed Project) are the seascape/open ocean/landscape itself and its components, both its physical features and its distinctive character.

VIA analyzes and evaluates the impacts on people of adding the proposed development to views from selected viewpoints. VIA evaluates the change to the composition of the view itself and assesses how the people who are likely to be at that viewpoint may be affected by the change to the view. Enjoyment of a particular view is dependent on the viewer and, in VIA, the impact receptors are people. The inclusion of both SLIA and VIA in the BOEM SLVIA methodology is consistent with NEPA's objective of providing Americans with aesthetically and culturally pleasing surroundings and its requirement to consider all potentially significant impacts of development.

The magnitude of effect in a seascape, open ocean, landscape, or view depends on the nature, scale, prominence, and visual contrast of the change and its experiential duration. The SLVIA offshore geographic analysis area consists of the extent of the zone of theoretical visibility and zones of visual influence (COP Volume III, Appendix L; Ocean Wind 2023), as follows:

- Offshore turbine array area where the WTGs and OSS would be located plus a 40-mile (64.4-kilometer) radius area. This distance is the maximum extent within which a seascape, landscape, or visual effect could occur, given visibility of the maximum height of the WTG rotor (906 feet [276.1 meters]).

The OSS (maximum height of 296 feet [90.2 meters]) would potentially be visible to a distance of 23.8 miles (38.3 kilometers).

WTG visibility would be variable through the day depending on many factors. View angle, sun angle, and atmospheric conditions would affect the WTG visibility. Visual contrast of WTGs would vary throughout the day depending on the visual character of the horizon's backdrop and whether the WTGs are backlit, side-lit, or front-lit. If less visual contrast is apparent in the morning hours, then it is likely that the visual contrast may be more pronounced in the afternoon. The inverse is possible, as well. These effects are also influenced by varying atmospheric conditions, direction of view, distance between the viewer and the WTGs, and elevation of the viewer.

At closer distances, approximately 12 miles or closer, the form of the WTG may be the dominant visual element creating the visual contrast regardless of color. At greater distances, color may become the dominant visual element creating visual contrast under certain visual conditions that gives visual definition to the WTG's form and line.

As the elevation of the viewer increases, the lesser the effect EC has on the visible height of individual WTGs.

While the East Coast shoreline has a prevailing eastward viewing direction, localized views may vary from southwest to north-northeast. All cardinal directions are conceivable when viewing from a water vessel while at sea. When viewing from onshore toward a northerly direction and scanning to the south, the color of the horizon backdrop will often vary. Variation will continue as the sun arcs across the sky from sunrise to sunset. Depending on sun angle, the backdrop sky color may have various intensities of white to gray and sky blue to pale blue to dark blue-gray. Partly cloudy to overcast conditions will also influence the color make-up of the horizon's backdrop. The sunrise and sunset have varying degrees of light blue to dark blue, light and dark purples intermixed with oranges, yellows, and reds. Partly cloudy skies may increase the remarkable color effects during the sunset and sunrise periods of the day.

When placing WTGs offshore, the visual interplay and contrasting elements in form, line, color, and texture may vary with the ever-changing character of the backdrop. Front-lit WTGs may have strong color contrast against a darker gray sky, giving definition to the WTG vertical form and line contrast to the ocean's horizontal character and the line where the sea meets sky, or visually dissipate against a whiter backdrop created by high levels of evaporative atmospheric moisture during clear sunny days. Partly cloudy skies may create varying degrees of sunlight reflecting off the white color wind turbines, placing some WTGs in the shadow and making them appear darker gray and less conspicuous while highlighting others with a bright white color contrast. The level of noticeability would be directly proportional to the degree of visual contrast and scale of change between the WTGs and the corresponding backdrop.

These variations through the course of the day may result in periods of moderate to major visual effect while at other times of day would have minor or negligible effect.

The onshore geographic analysis area includes landfalls, buried onshore export cables, onshore substations, and transmission connections to the electric grid. The visual impacts of onshore components are assessed in Section 3.20, *Scenic and Visual Resources*.

The SLVIA methodology and parameters assessed consider local stakeholders' identity, culture, values, and issues and the understanding of baseline maritime conditions. Project activities for all stages of the Project life cycle (construction and installation, O&M, and decommissioning) are assessed against the environmental baseline to identify the potential interactions between the Project and the seascape, landscape, and viewers. Potential impacts are assessed to determine an impact level consistent with the definitions in Table M-1.

Table M-1 Definitions of Potential Adverse Impact Levels

Impact Level	Historic Properties under Section 106 of the NHPA	Visual Resources
Negligible	No historic properties affected, as defined at 36 CFR 800.4(d)(1).	SLIA: Very little or no effect on seascape/landscape unit character, features, elements, or key qualities either because unit lacks distinctive character, features, elements, or key qualities; values for these are low; or Project visibility would be minimal. VIA: Very little or no effect on viewer experiences because Project visibility/contrast/magnitude of change are minimal, or view receptor sensitivity/susceptibility/value is minimal.
Minor	No adverse effects on historic properties could occur, as defined at 36 CFR 800.5(b).	SLIA: The Project would introduce features that may have low to medium levels of visual prominence within the geographic area of an ocean/seascape/landscape character unit. The Project features may introduce a visual character that is somewhat inconsistent with the character of the unit, which may have minor to medium negative effects on the unit's features, elements, or key qualities, but the unit's features, elements, or key qualities have low susceptibility or value. SLIA: The Project would introduce features that may have low to medium levels of visual prominence within the geographic area of an ocean/seascape/landscape character unit. The Project features may introduce a visual character that is somewhat inconsistent with the character of the unit, which may have minor to medium negative effects on the unit's features, elements, or key qualities, but the unit's features, elements, or key qualities have low susceptibility or value. VIA: The visibility of the Project would introduce a small but noticeable to medium level of change to the view's character, have a low to medium level of visual prominence that attracts but may or may not hold the viewer's attention, and have a small to medium effect on the viewer's experience. The viewer receptor sensitivity/susceptibility/value is low. If the value, susceptibility, and viewer concern for change are medium or high, the nature of the sensitivity is evaluated to determine if elevating the impact to the next level is justified. For instance, a KOP with a low magnitude of change but a high level of viewer concern (combination of susceptibility/value) may justify adjusting to a moderate level of impact.

Impact Level	Historic Properties under Section 106 of the NHPA	Visual Resources
Moderate	Adverse effects on historic properties as defined at 36 CFR 800.5(a)(1) could occur but would be avoided or minimized using a less-impactful scenario contemplated under the PDE.	SLIA: The Project would introduce features that would have medium to large levels of visual prominence within the geographic area of an ocean/seascape/landscape character unit. The Project would introduce a visual character that is inconsistent with the character of the unit, which may have a moderate negative effect on the unit's features, elements, or the key qualities. In areas affected by large magnitudes of change, the unit's features, elements, or key qualities have low susceptibility or value. VIA: The visibility of the Project would introduce a moderate to large level of change to the view's character, may have a moderate to large levels of visual prominence that attracts and holds but may or may not dominate the viewer's attention, and has a moderate effect on the viewer's visual experience. The viewer receptor sensitivity/susceptibility/value is medium to low. Moderate impacts are typically associated with medium viewer receptor sensitivity (combination of susceptibility/value) in areas where the view's character has medium levels of change, or low viewer receptor sensitivity (combination of susceptibility/value) in areas where the view's character has large changes. If the value, susceptibility, and viewer concern for change is high, the nature of the sensitivity is evaluated to determine if elevating the impact to the next level is justified.
Major	Adverse effects on historic properties as defined at 36 CFR 800.5(a)(1) could occur; at least some would require mitigation to resolve.	SLIA: The Project would introduce features that would have dominant levels of visual prominence within the geographic area of an ocean/seascape/landscape character unit. The Project would introduce a visual character that is inconsistent with the character of the unit, which may have a major negative effect on the unit's features, elements, or key qualities. The concern for change (combination of susceptibility/value) to the character unit is high. VIA: The visibility of the Project would introduce a major level of character change to the view; attract, hold, and dominate the viewer's attention; and have a moderate to major effect on the viewer's visual experience. The viewer receptor sensitivity/susceptibility/value is medium to high. If the magnitude of change to the view's character is medium but the susceptibility or value at the KOP is high, the nature of the sensitivity is evaluated to determine if elevating the impact to major is justified. If the sensitivity (combination of susceptibility/value) at the KOP is low in an area where the magnitude of change is large, the nature of the sensitivity is evaluated to determine if lowering the impact to moderate is justified.

M.3. Results

M.3.1 Proposed Action

Atmospheric conditions offshore and near the shoreline limit views more than the typically drier-air conditions in inland areas. Visual simulations from representative viewpoints included as Appendix D to the *Ocean Wind Visual Impact Assessment Report* (COP Volume III, Appendix L; Ocean Wind 2023) indicate that daytime and nighttime visibility of WTGs and OSS would be noticeable to the casual observer from beach viewpoints. Distances to the Proposed Action WTG and OSS array would range from:

- 28.1 miles (45.2 kilometers) from KOP-3 (Bay View Park) on the northern extent of the geographic analysis area;
- 15.3 miles (24.6 kilometers) from KOP-12 and KOP-13 (Atlantic City Beachfront), which is the closest KOP to the front edge of the WTG array; and
- 25.9 miles (41.7 kilometers) from KOP-26 (Wildwood Crest Fishing Pier) on the southern extent of the geographic analysis area.

The noticeable daytime and nighttime elements of the Project's WTGs and substations and their viewshed distances are listed in Table M-2. Each WTG would have two L-864 flashing red obstruction lights on the top of the nacelle, one of which is required to be lit (BOEM 2021). WTGs would have additional intermediate lighting on the tower utilizing low-intensity red flashing (L-810) obstruction lighting (see Section 2.1.1.2, *Offshore Activities and Facilities*). Line-of-sight calculations for onshore viewers (5-foot [1.5-meter] eye level) are based on intervening EC screening (7.98 inches [20.3 centimeters] height per mile). Heights of WTG and substation components are stated relative to MLLW and highest astronomical tide.

Table M-3 and Table M-4 indicate the Proposed Action's effects based on horizontal FOV and vertical FOV, respectively, defined as the extent of the observable landscape seen at any given moment, usually measured in degrees (BOEM 2021). The horizontal FOV for each KOP is listed in Appendix D to COP Volume III, Appendix L (Ocean Wind 2023). FOVs are valid and reliable indicators of the magnitude of view occupation by Proposed Action facilities. Typical human perception extends to 124° in the horizontal axis and 55° in the vertical axis. The nearest shoreline viewers would be 15.3 miles (25.9 kilometers) from the Wind Farm Area. EC, at this distance, reduces the observable height above the horizon of the nearest WTG from 906 feet (276.1 meters) MLLW to 801 feet (244 meters), resulting in occupation of 0.6° and 1 percent of the vertical view. WTGs would further diminish in perceived size with distance and EC.

Table M-2 Heights of Noticeable[1] 12-MW WTG Elements and Substations and Visible Distances[2]

Noticeable Element	Height in Feet (meters)	Visible Distance[2] in Miles (kilometers)
Rotor Blade Tip	906 (276) MLLW	0–39.6 (63.7)
Navigation Light	531 (162) MLLW	0–31.0 (49.9)
Nacelle	521 (159) MLLW	0–30.7 (49.4)
Hub	512 (156) MLLW	0–30.5 (49.1)
OSS	296 (90) MLLW	0–23.8 (38.3)
Mid-tower Light	256 (78) MLLW	0–22.4 (36.0)
Yellow Tower Base Color	50 (15) HAT	0–11.4 (18.3)

[1] Perception of Project elements, from 5.5 feet (1.7 meters) human eye level while standing at mean sea level, involves static distance-related sizes, forms, lines, colors, and textures; variable daytime lighting conditions; variable nighttime light conditions; and variable meteorological conditions.
[2] Based on intervening EC and clear-day conditions.
HAT = highest astronomical tide

Table M-3 Horizontal FOV Occupied by the Proposed Action

Noticeable Element	Width miles (kilometers)	Distance miles (kilometers)	Horizontal FOV	Human FOV	Percent of FOV
Wind Farm	11.8 (19.0)	15.3 (25.9)	37.6°	124°	30%

Table M-4 Vertical FOV Occupied by the Proposed Action

Noticeable Element	Height feet (meters)	Distance miles (kilometers)	Height Above Horizon[1] feet (meters)	Vertical FOV	Human FOV	Percent of FOV
Rotor Blade Tip	906 feet (276.1) MLLW	15.3 (25.9)	801 (244)	0.6°	55°	1%

[1] Based on intervening EC and clear-day conditions.

Table M-5 lists the wind farm's distances, horizontal FOVs, noticeable features based on their heights and EC, and visual contrasts. The analysis considers the introduction of WTGs and OSS to an open ocean baseline. The scale, size, contrast, and prominence of change focuses on the:

- Arrangement of WTGs and OSS in the view;
- Horizontal FOV and vertical FOV scale of the wind farm array, based on WTG and OSS size and number;
- Position of the array in the open ocean;
- Position of the array in the view; and
- Turbine array's distance from the viewer.

Visibility, character-changing effects, and visual contrasts reduce steadily with distance from the observation point. Visibility, character-changing effects, scale, prominence, and visual contrasts increase with elevated observer position in comparison with the wind farm. Distance and observer elevation considerations are informed by the VIA simulations (Appendix D to COP Volume III, Appendix L; Ocean Wind 2023), EC calculations, horizontal FOV, and vertical FOV in undeveloped open ocean. The wind farm and nearest WTGs would be:

- Unavoidably dominant features in the view between 0 and 5 miles (0–8 kilometers) distance;
- Strongly pervasive features between 5 and 12 miles (8–19.3 kilometers) distance;
- Clearly visible features between 12 and 28 miles (19.3–45.1 kilometers) distance;
- Low on the horizon, but persistent features in the view between 28 and 31 miles (45.1–49.9 kilometers) distance;
- Intermittently noticed features between 31 and 39.6 miles (49.9–63.7 kilometers) distance; and
- Below the horizon beyond 39.6 miles (63.7 kilometers) distance.

Visual contrast determinations involve comparisons of characteristics of the seascape, open ocean, and landscape before and after Project implementation. The range of potential contrasts includes strong, moderate, weak, and none (BOEM 2021). The strongest daytime contrasts would result from tranquil and flat seas combined with sunlit WTG towers, nacelles, flickering rotors, and a yellow tower base color against a dark background sky and an undifferentiated foreground. There would be daily variation in WTG color contrast as sun angles change from backlit to front-lit (sunrise to sunset) and the backdrop would vary under different lighting and atmospheric conditions. The weakest daytime contrasts would result from turbulent seas combined with overcast daylight conditions on WTG towers, nacelles, and rotors against an overcast background sky and a foreground modulated by varied landscape elements. The strongest nighttime contrasts would result from dark skies (absent moonlight) combined with navigation lights, activated lighting on the OSS, mid-tower lights, and Project lighting reflections on low clouds and active (non-reflective) surf, and the dark-sky light dome. The weakest nighttime contrasts would result from moonlit, cloudless skies; tranquil (reflective) seas; ADLS activation; and only mid-tower lights.

The seascape character units, landscape character units, and viewer experiences would be affected by the Proposed Action's noticeable features, applicable distances and FOV extents, open views versus view framing and intervening foregrounds, and form, line, color, and texture contrasts, scale of change, and prominence in the characteristic seascape and landscape. Higher impact levels would stem from unique, extensive, and long-term appearance of strongly contrasting, large, and prominent vertical structures in the otherwise horizontal seascape environment; where structures are an unexpected element and viewer experience is of formerly open views of high-sensitivity seascape and landscape; and from high sensitivity view receptors.

Construction involving moving and stationary visual feature contrasts to forms, lines, colors, and textures, scale, and prominence in formerly open seascape may have more effect on viewers than operational and decommissioning impacts, where the viewing context is existing WTGs and substations. Construction impacts would be temporary and include:

- Daytime and nighttime movement of installation vessels, cranes, and other equipment visible in the seascape in and around the Lease Area;
- Dawn, dusk, and nighttime construction lighting on WTGs and OSS;
- Beach, other sensitive land-based, and boat and cruise ship views of WTGs and OSS under construction;
- Laying of the offshore and onshore buried export cables and the connections between offshore and onshore export cables at high-sensitivity Island Beach State Park and Ocean City beach landing sites; and
- Activities along the onshore landfalls, export cable routes, and BL England and Oyster Creek onshore substations.

Operational effects would be similar to those of end-stage construction and would be long term and fully reversible.

Proposed Action impacts on high-sensitivity seascape character would be **major**. The daytime and nighttime (lighting) presence of the WTGs, OSS, and construction and O&M vessel traffic would change perception of this area from natural, undeveloped seascape to a developed wind energy environment characterized by visually dominant WTGs and OSS.

Maintenance activities would cause **minor** effects on seascape character by increased O&M vessel traffic to and from the Wind Farm Area. Increases in these vessel movements would be noticeable to offshore viewers but are unlikely to have a significant effect.

Decommissioning would involve the removal of all offshore structures and is expected to follow the reverse of the construction activity. Decommissioning activities would cause effects similar to those of construction activities.

Viewshed analyses (Appendix A to COP Volume III, Appendix L; Ocean Wind 2023) determined that clear-weather visibility of the WTGs and OSS would occur from 12.5 percent of the land area within the Proposed Action's zone of visual influence. The Proposed Action would be visible along the barrier islands' eastern beaches. The majority of landward visibility (155 square miles) would occur within 15–20 miles of the Proposed Action over inland bays. Visibility would diminish significantly between 30 and 40 miles, contributing 44 square miles to the zone of visual influence. Due to coastal meteorological conditions, Proposed Action visibility in these areas would be noticeably reduced on approximately 3 days out of 4 to 5 days.

Daytime lighting of WTGs is not required. ADLS would reduce nighttime impact levels from **major** to **moderate** or **moderate** to **minor**, due to substantially limited hours of lighting. Residual impacts would result from the presence of continuously flashing lights, sky light dome, and reflections on clouds during those limited hours. Lights of the three OSS, when lit for maintenance, potentially would be visible from beaches and adjoining land and built environment during hours of darkness. The nighttime sky light dome and cloud lighting caused by reflections from the water surface may be seen from distances beyond the 40-mile (64.4-kilometer) geographic analysis area, depending on variable ocean surface and meteorological reflectivity. Onshore substations' nighttime lighting would be visible in their immediate neighborhoods during hours of darkness and similar in magnitude and extent to existing conditions.

Table M-5 Wind Farm Distances, FOVs, Noticeable Elements, Visual Contrasts, Scale of Change, and Prominence

KOP[1]	Distance in miles (kilometers)						Proposed Action FOV Degrees (% of 124°)	Noticeable Elements[2] & Impact Level	Contrast, Scale of Change, and Prominence							
	Proposed Action	Alternative B-1	Alternative B-2	Alternative C-1	Alternative C-2	Alternative D			Proposed Action Form	Proposed Action Line	Proposed Action Color	Proposed Action Texture	Proposed Action Scale	Proposed Action Prominence[3]	Alternatives B-1, B-2	Alternatives C-1, C-2, D
KOP-1	38.6 (62.1)	38.7 (62.3)	39.9 (64.2)	38.4 (61.8)	39.6 (63.7)	38.6 (62.1)	17° (14%)	R **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-2	33.4 (53.7)	33.4 (53.7)	34.7 (55.8)	33 (53.1)	34.3 (55.2)	34.3 (55.2)	20° (16%)	R **Negligible**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-3	28.1 (45.2)	28.1 (45.2)	29.5 (47.5)	27.6 (44.4)	28.9 (46.5)	28.9 (46.5)	23° (18%)	R, NL, N, and H **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-4	28.0 (45.1)	28 (45.1)	29.8 (47.9)	26.5 (42.6)	28.3 (45.5)	28.3 (45.5)	19° (15%)	R, NL, N, and H **Minor**	Weak	Weak	Weak	Weak	Small	1	Same as Proposed Action	Same as Proposed Action
KOP-5	22.6 (36.4)	22.6 (36.4)	24.2 (38.9)	21.7 (34.9)	23.2 (37.3)	23.2 (37.3)	28° (22%)	R, NL, N, H, and O[1] **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-6	21.8 (35.1)	21.9 (35.2)	23.2 (37.3)	20.7 (33.3)	22.4 (36)	22.4 (36)	30° (24%)	R, NL, N, H, O, and M[1] **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-7	20.4 (32.8)	20.1 (32.3)	21.2 (34.1)	18.4 (29.6)	20.1 (32.3)	20.2 (32.5)	33° (27%)	R, NL, N, H, O, and M[1] **Minor**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-8	21.0 (33.8)	21.1 (33.9)	22.7 (36.5)	19.8 (31.9)	21 (33.8)	21 (33.8)	31° (25%)	R, NL, N, H, O, and M[1] **Minor**	Weak	Weak	Weak	Weak	Small	1	Same as Proposed Action	Same as Proposed Action
KOP-9	16.8 (27.0)	16.8 (27.0)	17.9 (28.8)	15.3 (24.6)	17.5 (28.2)	17 (27.4)	37° (30%)	R, NL, N, H, O, and M[1] **Moderate**	Weak	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-10	16.2 (26.1)	16.3 (26.2)	17.3 (27.8)	14.6 (23.5)	16.5 (26.5)	16.3 (26.2)	39° (31%)	R, NL, N, H, O, and M[1] **Moderate**	Weak	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-11	19.7 (31.7)	19.8 (31.9)	21.6 (34.8)	18.9 (30.4)	19.8 (31.9)	19.8 (31.9)	23° (18%)	R, NL, N, H, O, and M[1] **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-12	16.0 (25.7)	16 (25.7)	16.8 (27)	14 (22.5)	15.1 (24.3)	15.1 (24.3)	41° (33%)	R, NL, N, H, O, and M[1] **Moderate**	Weak	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-13	16.0 (25.7)	16 (25.7)	16.8 (27)	14 (22.5)	15.1 (24.3)	15.1 (24.3)	41° (33%)	R, NL, N, H, O, and M[1] **Minor**	Weak	Weak	Weak	Weak	Medium	6	Same as Proposed Action	Same as Proposed Action
KOP-14	15.3 (25.6)	16 (25.7)	16.9 (27.2)	14.1 (22.7)	15.2 (24.5)	15.2 (24.5)	41° (33%)	R, NL, N, H, O, and M[1] **Moderate**	Moderate	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-15	15.8 (25.4)	16.7 (26.9)	17.7 (28.5)	14.9 (24.0)	15.8 (25.4)	15.8 (25.4)	1° (.8%)	Unseen **Negligible**	None	None	None	None	None	0	Same as Proposed Action	Same as Proposed Action
KOP-16	16.0 (25.7)	17 (27.4)	17.9 (28.8)	15.3 (24.6)	16 (25.7)	16 (25.7)	39° (31%)	R, NL, N, H, O, and M[1] **Moderate**	Moderate	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-17	18.3 (29.4)	19.3 (31.1)	20.2 (32.5)	18.4 (29.6)	18.3 (29.4)	18.4 (29.6)	31° (25%)	R, NL, N, H, O, and M[1] **Minor**	Weak	Weak	Weak	Weak	Medium	3	Same as Proposed Action	Same as Proposed Action
KOP-18	15.4 (24.8)	16.5 (26.5)	17.4 (28.0)	15.4 (24.8)	15.4 (24.8)	15.6 (25.1)	36° (29%)	R, NL, N, H, O, and M[1] **Moderate**	Moderate	Weak	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-19	16.2 (26.1)	17.1 (27.5)	18 (29.0)	16.2 (26.1)	16.2 (26.1)	16.3 (26.2)	34° (27%)	R, NL, N, H, O, and M[1] **Moderate**	Moderate	Moderate	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-20	17.4 (28.0)	18.1 (29.1)	18.9 (30.4)	17.4 (28.0)	17.4 (28.0)	17.4 (28.0)	19° (15%)	R, NL, N, H, O, and M[1] **Negligible**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-21	17.8 (28.6)	18.5 (29.8)	19.1 (30.7)	17.8 (28.6)	17.8 (28.6)	17.9 (28.8)	29° (23%)	R, NL, N, H, O, and M[1] **Moderate**	Moderate	Weak	Moderate	Weak	Medium	4	Same as Proposed Action	Same as Proposed Action
KOP-22	20.9 (33.6)	21.5 (34.6)	22 (35.4)	20.9 (33.6)	20.9 (33.6)	21 (33.8)	25° (20%)	R, NL, N, H, O, and M[1] **Minor**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action

KOP[1]	Distance in miles (kilometers)						Proposed Action FOV Degrees (% of 124°)	Noticeable Elements[2] & Impact Level	Contrast, Scale of Change, and Prominence							
	Proposed Action	Alternative B-1	Alternative B-2	Alternative C-1	Alternative C-2	Alternative D			Proposed Action Form	Proposed Action Line	Proposed Action Color	Proposed Action Texture	Proposed Action Scale	Proposed Action Prominence[3]	Alternatives B-1, B-2	Alternatives C-1, C-2, D
KOP-23	20.9 (33.6)	21.5 (34.6)	22 (35.4)	20.9 (33.6)	20.9 (33.6)	21 (33.8)	25° (20%)	R, NL, N, H, O, and M[1] **Minor**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-24	24.3 (39.1)	24.8 (39.9)	25.2 (40.5)	24.3 (39.1)	24.3 (39.1)	24.4 (39.3)	22° (18%)	R, NL, N, H, and O[1] **Minor**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-25	23.6 (38.0)	24.1 (38.8)	24.5 (39.4)	23.6 (38.0)	23.6 (38.0)	23.7 (38.1)	9° (7%)	R, NL, N, H, and O[1] **Minor**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-26	25.9 (41.7)	26.4 (42.5)	26.7 (43.0)	25.9 (41.7)	25.9 (41.7)	26 (41.8)	20° (16%)	R, NL, N, and H **Minor**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-27	28.4 (45.7)	28.8 (46.3)	29.1 (46.8)	28.4 (45.7)	28.4 (45.7)	28.5 (45.8)	18° (14%)	R, NL, N, and H **Minor**	Weak	Weak	Weak	Weak	Small	2	Same as Proposed Action	Same as Proposed Action
KOP-28	33.9 (54.5)	34.3 (55.2)	34.6 (55.7)	33.9 (54.5)	33.9 (54.5)	34 (54.7)	23° (18%)	R **Minor**	Weak	Weak	Weak	Weak	Small	1	Same as Proposed Action	Same as Proposed Action
KOP-29	Sub-station	NA	NA	NA	NA	NA	NA	**Minor**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-30	Sub-station	NA	NA	NA	NA	NA	NA	**Minor**	Weak	Weak	Weak	Weak	Small	3	Same as Proposed Action	Same as Proposed Action
KOP-31	0–40 (0–64)	0–40 (0–64)	0–40 (0–64)	0–40 (0–64)	0–40 (0–64)	0–40 (0–64)	124° (100%)	R, NL, N, H, O, M, and Y **Major**	Strong	Strong	Strong	Strong	Large	6	Same as Proposed Action	Same as Proposed Action
KOP-32	0–40 (0–64)	0–40 (0–64)	0–40 (0–64)	0–40 (0–64)	0–40 (0–64)	0–40 (0–64)	124° (100%)	R, NL, N, H, O, M, and Y **Major**	Strong	Strong	Strong	Strong	Large	6	Same as Proposed Action	Same as Proposed Action

[1] KOP-1 Barnegat Lighthouse; KOP-2 Harvey Cedars Beach Access; KOP-3 Bayview Park; KOP-4 Garden State Parkway; KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit; KOP-6 Great Bay Boulevard Wildlife Management Area; KOP-7 Edwin B. Forsythe National Wildlife Refuge; KOP-8 Absecon Creek Boat Ramp; KOP-9 North Brigantine Natural Area Wildlife Observation Deck; KOP-10 16th Street Park Beachfront; KOP-11 Atlantic City Country Club; KOP-12 Atlantic City Beachfront; KOP-13 Atlantic City Beachfront (Nighttime); KOP-14 Atlantic City Playground Pier; KOP-15 Ventor City, City Hall; KOP-16 Lucy the Elephant National Historic Landmark; KOP-17 Bay Front Historic District, Municipal Beach Park; KOP-18 Ocean City Boardwalk; KOP-19 Corson's Inlet State Park; KOP-20 Sea Isle City Promenade; KOP-21 Avalon Beach Jetty; KOP-22 Stone Harbor Beach; KOP-23 Stone Harbor Beach (nighttime); KOP-24 North Wildwood Boulevard Bridge; KOP-25 Hereford Inlet Lighthouse; KOP-26 Wildwood Crest Fishing Pier; KOP-27 Cape May National Wildlife Refuge; KOP-28 Cape May Lighthouse; KOP-29 BL England Substation Area; KOP-30 Oyster Creek Substation Area; KOP-31 Commercial and Recreational Fishing and Tour Boat Area; KOP-32 Commercial and Cruise Ship Shipping Lanes
[2] Noticeable elements: R = rotor, NL = navigation light, N = nacelle, H = hub, O = OSS, M = mid-tower light, Y = yellow tower base color
[3] WTGs and OSS (onshore) visibility: 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).

Table M-6 lists the Proposed Action's noticeable features based on their heights, distances, and EC.

Table M-6 Noticeable Elements and Impacts by Seascape Character Unit, Open Ocean Character Unit, Landscape Character Unit, and KOP for the Proposed Action

Noticeable Elements[1] Impacts	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
R, NL, N, H, O, M, and Y **Major**	Open Ocean Character Unit KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area KOP-32 Cruise Ship Shipping Lanes
R, NL, N, H, O, and M **Moderate**	Seascape and Landscape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-16 Lucy the Elephant National Historic Landmark KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-20 Sea Isle City Promenade KOP-21 Avalon Beach Jetty
R, NL, N, H, O, and M **Minor**	KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-11 Atlantic City Country Club KOP-13 Atlantic City Beachfront—Nighttime KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime
R, NL, N, H, and O **Minor**	Landscape Character Units: Marshland, and Bay/Shoreline KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-17 Bay Front Historic District, Municipal Beach Park KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse
R, NL, N, and H **Minor**	KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-26 Wildwood Crest Fishing Pier KOP-28 Cape May Lighthouse
R, NL, and N **Minor**	Landscape Character Units: Mainland and Ridges
R **Minor**	KOP-1 Barnegat Lighthouse
R **Negligible**	KOP-2 Harvey Cedars Beach Access KOP-15 Ventor City, City Hall (obscured, not distant) KOP-20 Sea Isle City Promenade KOP-27 Cape May National Wildlife Refuge

[1] R = rotor, NL = navigation light, N = nacelle, H = hub, O = OSS, M = mid-tower light, Y = yellow tower base color
WMA = Wildlife Management Area

Table M-7 summarizes the Proposed Action's wind farm distance, percent of FOV occupied by the wind farm, and effects on the seascape units, open ocean unit, landscape units, and KOPs.

Table M-7 Wind Farm Distance Effects by Seascape Character Unit, Open Ocean Character Unit, Landscape Character Unit, and KOP for the Proposed Action

Distance miles (kilometers) Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
0–40.0 (0–64.4) Dominant/Major to Minor Noticeability	Open Ocean Character Unit KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area
5.0–40.0 (8.0–64.4) Dominant/Major to Minor Noticeability	Open Ocean Character Unit KOP-32 Cruise Ship Shipping Lanes
15.3–18.0 (24.6–29.0) Moderate Noticeability	Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-13 Atlantic City Beachfront—Nighttime KOP-14 Atlantic City Playground Pier KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-21 Avalon Beach Jetty
18.0–31.0 (29.0–49.9) Minor Noticeability	Landscape Character Units: Marshland, and Bay/Shoreline KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-11 Atlantic City Country Club KOP-16 Lucy the Elephant National Historic Landmark KOP-17 Bay Front Historic District, Municipal Beach Park KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-26 Wildwood Crest Fishing Pier KOP-27 Cape May National Wildlife Refuge
31.1–40.0 (50.1–64.4) Minor Noticeability	KOP-1 Barnegat Lighthouse (elevated viewpoint) KOP-28 Cape May Lighthouse (elevated viewpoint)

Distance miles (kilometers) Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
31.1–40.0 (50.1–64.4) Minor to Negligible Noticeability	Landscape Character Units: Mainland and Ridges KOP-2 Harvey Cedars Beach Access KOP-15 Ventor City, City Hall (obscured, not distant) KOP-20 Sea Isle City Promenade (obscured, not distant)

WMA = Wildlife Management Area

Table M-8 summarizes the Proposed Action's wind farm distance, percent of FOV occupied by the wind farm, and effects on the seascape units, landscape units, and KOPs.

Table M-8 Wind Farm Percent of FOV and Effects by Seascape Character Unit, Open Ocean Character Unit, Landscape Character Unit, and KOP for the Proposed Action

Percent (°) of 124° FOV POV[1] Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
100% (124°) to 16% (20°) Dominant/Major to Minor	Open Ocean Character Unit KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area
41% (51°) to 16% (20°) Dominant/Major to Minor	Open Ocean Character Unit KOP-32 Cruise Ship Shipping Lanes
33% (37.6°) to 29% (36°) Moderate	Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-11 Atlantic City Country Club KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-15 Ventor City, City Hall KOP-16 Lucy the Elephant National Historic Landmark KOP-17 Bay Front Historic District, Municipal Beach Park KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-20 Sea Isle City Promenade KOP-21 Avalon Beach Jetty
20% (25°) Minor to Moderate	KOP-13 Atlantic City Beachfront—Nighttime KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime
28% (35°) to 20% (25°) Minor	Landscape Character Units: Marshland, and Bay/Shoreline KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp

Percent (°) of 124° FOV POV[1] Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
	KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-26 Wildwood Crest Fishing Pier KOP-27 Cape May National Wildlife Refuge
20% (25°) to 16% (20°) Minor to Negligible	Landscape Character Units: Mainland and Ridges KOP-1 Barnegat Lighthouse KOP-2 Harvey Cedars Beach Access KOP-28 Cape May Lighthouse KOP-29 BL England Substation Area KOP-30 Oyster Creek Substation Area

[1] Percent of view
WMA = Wildlife Management Area

Foreground influence assessments, involving the presence of intervening or framing elements and their influence on effects of Project characteristics, are based on each KOP's locale photography and visual simulations (Appendix D to COP Volume III, Appendix L; Ocean Wind 2023) and summarized in Table M-9.

Table M-9 Foreground View Framing and Intervening Elements for the Proposed Action

Foreground Element(s) Influence	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
Open Ocean Negligible Influence	Open Ocean Character Unit KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area KOP-32 Cruise Ship Shipping Lanes
Beach, Dunes, and Ocean Minor Influence	Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, and Coastal Dune KOP-2 Harvey Cedars Beach Access KOP-3 Bayview Park KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-13 Atlantic City Beachfront—Nighttime KOP-14 Atlantic City Playground Pier KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-21 Avalon Beach Jetty KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime KOP-26 Wildwood Crest Fishing Pier

Foreground Element(s) Influence	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
Buildings, Vegetation, and Topography Moderate to Dominant Influence	Landscape Character Units: Island Community, Marshland, Bay/Shoreline, Mainland, and Ridges KOP-1 Barnegat Lighthouse KOP-2 Harvey Cedars Beach Access KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-11 Atlantic City Country Club KOP-15 Ventor City, City Hall KOP-16 Lucy the Elephant National Historic Landmark KOP-17 Bay Front Historic District, Municipal Beach Park KOP-20 Sea Isle City Promenade KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-27 Cape May National Wildlife Refuge KOP-28 Cape May Lighthouse

WMA = Wildlife Management Area

Proposed Action contrasts in the characteristic seascape and landscape, as perceived in views from each KOP, are based on visual simulations (Appendix D to COP Volume III, Appendix L; Ocean Wind 2023). Seascape unit view contrasts are estimated based on similar open view conditions in ocean environments. Landscape and seascape compatibility and photography conditions for each viewpoint are presented in COP Volume III, Appendix L, Table 9.1 (Ocean Wind 2023). The COP landscape and seascape evaluation scale ranges from faint, apparent, conspicuous, and prominent to dominant. No onshore viewpoints would result in either prominent or dominant conditions. Offshore potential viewpoints' evaluations range from faint to dominant. Visual contrast determinations involve comparisons of characteristics of the seascape and landscape before and after Proposed Action implementation. The range of potential contrasts includes strong, moderate, weak, and none. The strongest daytime contrasts would result from tranquil and flat seas combined with sunlit WTG towers, nacelles, flickering rotors, and the yellow tower 50-foot (15.2-meter) base color against a dark background sky and an undifferentiated foreground. The weakest daytime contrasts would result from turbulent seas combined with overcast daylight conditions on WTG towers, nacelles, and rotors again an overcast background sky and a foreground modulated by varied landscape elements. The strongest nighttime contrasts would result from dark skies (absent moonlight) combined with navigation lights, activated lighting on the OSS, mid-tower lights, and Project lighting reflections on low clouds and active (non-reflective) surf, and the dark-sky light dome. The weakest nighttime contrasts would result from moonlit, cloudless skies, tranquil (reflective) seas, ADLS activation, and only mid-tower lights.

Photographic comparisons of characteristics of the seascape's and landscape's existing conditions and Proposed Action implementation are included in Appendix D to COP Volume III, Appendix L (Ocean

Wind 2023) for each of the KOPs in the following summary tables. Visual contrast determinations are listed in Table M-10.

Table M-10 Visual Contrasts to Seascape, Open Ocean, Landscape, and KOPs for the Proposed Action

Contrast Rating Effects	Seascape, Open Ocean, Landscape, and Offshore and Onshore Key Observation Points
Strong Contrasts **Major**	Open Ocean: KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area KOP-32 Cruise Ship Shipping Lanes
Moderate Contrasts **Moderate**	Seascape KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-21 Avalon Beach Jetty KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime KOP-16 Lucy the Elephant National Historic Landmark
Weak Contrasts **Minor**	KOP-1 Barnegat Lighthouse KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-11 Atlantic City Country Club KOP-13 Atlantic City Beachfront—Nighttime KOP-17 Bay Front Historic District, Municipal Beach Park KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-26 Wildwood Crest Fishing Pier KOP-28 Cape May Lighthouse KOP-29 BL England Substation Area KOP-30 Oyster Creek Substation Area
None to very weak **Negligible**	KOP-2 Harvey Cedars Beach Access KOP-15 Ventor City, City Hall KOP-20 Sea Isle City Promenade KOP-27 Cape May National Wildlife Refuge

WMA = Wildlife Management Area

Table M-11 summarizes Proposed Action impacts on the seascape character units, open ocean character unit, and landscape character units throughout the geographic analysis area. The seascape, open ocean, and landscape criteria listed in Table M-1 and consideration of the preceding assessments would result in impact levels for character units as shown in Table M-11.

Table M-11 Proposed Action Impact on Seascape Character, Open Ocean Character, and Landscape Character

Level of Impact	Seascape Character Units, Open Ocean Character Unit, and Landscape Character Units
Major	SLIA: Open Ocean Character Unit
Moderate	SLIA: Seascape Character Units and Landscape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community
Minor	SLIA: Landscape Character Units: Bay/Shoreline, Island, Mainland, Marshland, and Ridges
Negligible	SLIA: Landscape Character Units: Island, Mainland, and Ridges

Table M-12 summarizes Proposed Action impacts on viewer experience (KOP locations) throughout the geographic analysis area. The viewer experience criteria listed in Table M-1 and consideration of the preceding assessments would result in impact levels for KOPs as shown in Table M-12.

Table M-12 Impact Levels on Viewer Experience for the Proposed Action

Impact Level	Offshore and Onshore Key Observation Points
Major	VIA: KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area KOP-32 Cruise Ship Shipping Lanes
Moderate	VIA: KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-16 Lucy the Elephant National Historic Landmark KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-21 Avalon Beach Jetty KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime

Impact Level	Offshore and Onshore Key Observation Points
Minor	VIA: KOP-1 Barnegat Lighthouse KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-6 Great Bay Boulevard WMA KOP-8 Absecon Creek Boat Ramp KOP-11 Atlantic City Country Club KOP-13 Atlantic City Beachfront—Nighttime KOP-17 Bay Front Historic District, Municipal Beach Park KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-26 Wildwood Crest Fishing Pier KOP-28 Cape May Lighthouse KOP-29 BL England Substation Area KOP-30 Oyster Creek Substation Area
Negligible	VIA: KOP-2 Harvey Cedars Beach Access KOP-15 Ventor City, City Hall KOP-20 Sea Isle City Promenade KOP-27 Cape May National Wildlife Refuge

WMA = Wildlife Management Area

NEPA requires consideration of other reasonably foreseeable activities in the Project's viewshed and the Project's incremental effects on seascape character, open ocean character, landscape character, and viewer experience. These effects include direct physical effects on the seascape, open ocean, and landscape or changes to the distinct character of the seascape, open ocean, and landscape.

Effects on seascape character, open ocean character, and landscape character can occur in the following conditions (BOEM 2021, Chapter 8):

- Multi-project WTGs and OSS visible within or from the open ocean character unit as overlapping or adjacent features and elements
- Multi-project WTGs and OSS visible from seascape character units as overlapping or adjacent features and elements
- Multi-project WTGs and OSS visible from landscape character units as overlapping or adjacent features and elements

Effects on viewer experience can occur in the following conditions (BOEM 2021 Chapter 8):

- Multi-project WTGs and OSS visible as overlapping features and elements
- Multi-project WTGs and OSS visible as adjacent features and elements
- Multi-project WTGs and OSS visible as viewers move through the seascape, open ocean, and landscape

Attachment M-2 presents simulations of the incremental effects of the Project in the context of other planned wind farms.

Consideration of effects of other planned wind farms on seascape character, open ocean character, and landscape character is listed in Table M-13.

Consideration of effects on viewer experience of other planned wind farms is listed in Table M-14.

Consideration of effects on seascape character, open ocean character, and landscape character of other planned wind farms in combination with the Proposed Action is listed in Table M-15.

Consideration of effects on viewer experience of other planned wind farms in combination with the Proposed Action is listed in Table M-16.

Table M-13 Other Planned Wind Farms' Seascape, Open Ocean, and Landscape Units Cumulative Wind Farm Distances, FOVs, Noticeable Elements, Visual Contrasts, Scale of Change, and Prominence

	Character Unit		
	Seascape (Beaches)[1]	**Open Ocean**	**Landscape[4]**
Distance in miles (kilometers)			
Atlantic Shores South	8.8 (14.2)	0 to 42.5 (0 to 68.4)	Variable to 42.5 (68.4)
Atlantic Shores North	9.1 (14.6)	0 to 42.5 (0 to 68.4)	Variable to 42.5 (68.4)
Bight Wind Holdings	26.5 (42.6)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
Atlantic Shores Offshores Wind Bight	34.4 (55.4)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
Invenergy Wind Offshore	37.5 (60.3)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
Ocean Wind 2	8.9 (14.3)	0 to 40 (64.4)	Variable to 40 (64.4)
Garden State	12.8 (20.6)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
Skipjack	15.5 (24.9)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
FOV Degrees (1% of 124°)	158° (127%)	82° to 360° (66 to 290%)	155° (125%)
Noticeable Elements[2] & Impact Level	R, NL, N, H, O, and M **Major**	R, NL, N, H, O, M, and Y **Major**	R, NL, N, H, O, and M **Major**
Contrast, scale of change, and prominence			
Form	Strong to Weak	Strong	Strong to Weak
Line	Moderate to Weak	Strong	Moderate to Weak
Color	Strong to Weak	Strong	Strong to Weak
Texture	Moderate to Weak	Strong	Moderate to Weak
Scale	Large	Large	Large
Prominence[3]	6	6	6

[1] The most conservative onshore case involves the seaward edge of the beach nearest the projects. The seascape unit edge is 3.45 miles (5.6 kilometers) offshore (New Jersey jurisdictional boundary).
[2] Noticeable elements: R = rotor, NL = navigation light, N = nacelle, H = hub, O = OSS, M = mid-tower light, Y = yellow tower base color
[3] WTGs and OSS Prominence (visibility): 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).
[4] The seaward edge between landscape and seascape varies. The most conservative case is a 1.0-mile (1.6-kilometer) distance from the seaward beach edge.

Table M-14 Other Planned Wind Farms' Cumulative Viewer Experience Wind Farm Distances, FOVs, Noticeable Elements, Visual Contrasts, Scale of Change, and Prominence

	KOP[1]			
	KOP-6	**KOP-14**	**KOP-19**	**KOP-22**
Distance in miles (kilometers)				
Atlantic Shores South	12.1 (19.5)	11.1 (17.7)	21.6 (34.8)	31.4 (50.5)
Atlantic Shores North	11.5 (18.5)	18.2 (29.3)	31.5 (50.7)	42.2 (67.9)
Bight Wind Holdings	37.8 (60.8)	46.4 (74.7)	38.6 (62.1)	68.9 (55.2)
Atlantic Shores Offshores Wind Bight	36.7 (59)	42.2 (67.9)	54.2 (87.2)	61.5 (111)
Invenergy Wind Offshore	44.5 (71.6)	43.8 (70.5)	53.3 (85.8)	60.2 (96.9)
Ocean Wind 2	28.6 (46)	9.2 (14.8)	11.6 (18.7)	13.7 (22)
Garden State	55.7 (89.6)	42.3 (68.1)	32.9 (52.9)	22.1 (35.6)
Skipjack	62.2 (100)	50.4 (81.1)	39.8 (64.1)	28.8 (46.3)
Cumulative FOV Degrees (1% of 124°)	142° (114%)	136° (110%)	136° (110%)	144° (116%)
Noticeable Elements[2] & Impact Level	R, NL, N, H, O, and M to R **Major**	R, NL, N, H, O, and M to R **Major**	R, NL, N, H, O, and M to R **Major**	R, NL, N, H, O, and M to R **Major**
Contrast, scale of change, and prominence				
Form	Strong	Strong	Strong	Strong
Line	Moderate	Moderate	Moderate	Moderate
Color	Strong	Strong	Strong	Strong
Texture	Moderate	Moderate	Moderate	Moderate
Scale	Large	Large	Large	Large
Prominence[3]	6	6	6	6

[1] KOP-6 Great Bay Boulevard Wildlife Management Area, KOP-14 Atlantic City Playground Pier; KOP-19 Corson's Inlet State Park, KOP-22 Stone Harbor Beach
[2] Noticeable elements: R = rotor, NL = navigation light, N = nacelle, H = hub, O = OSS, M = mid-tower light, Y = yellow tower base color
[3] WTGs and OSS (onshore) visibility: 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).

Table M-15 Ocean Wind 1 and Other Planned Wind Farms' Seascape, Open Ocean, and Landscape Units Cumulative Wind Farm Distances, FOVs, Noticeable Elements, Visual Contrasts, Scale of Change, and Prominence

	Character Unit		
	Seascape (Beaches)[1]	**Open Ocean**	**Landscape[4]**
Distance in miles (kilometers)			
Proposed Action	15.3 (24.6)	0 to 40 (0 to 64.4)	Variable to 40 (64.4)
Alternatives B-1 & B-2	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Alternatives C-1, C-2, & D	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Atlantic Shores South	8.8 (14.2)	0 to 42.5 (0 to 68.4)	Variable to 42.5 (68.4)
Atlantic Shores North	9.1 (14.6)	0 to 42.5 (0 to 68.4)	Variable to 42.5 (68.4)
Bight Wind Holdings	26.5 (42.6)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
Atlantic Shores Offshores Wind Bight	34.4 (55.4)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
Invenergy Wind Offshore	37.5 (60.3)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
Ocean Wind 2	8.9 (14.3)	0 to 40 (0 to 64.4)	Variable to 40 (64.4)
Garden State	12.8 (20.6)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
Skipjack	15.5 (24.9)	0 to 38.6 (0 to 62.1)	Variable to 38.6 (62.1)
FOV Degrees (1% of 124°)	158° (127%)	82° to 360° (66 to 290%)	155° (125%)
Noticeable Elements[2] & Impact Level	R, NL, N, H, O, and M to R **Major**	R, NL, N, H, O, M, and Y to R **Major**	R, NL, N, H, O, and M to R **Major**
Contrast, Scale of Change, and Prominence			
Form	Strong to Weak	Strong	Strong to Weak
Line	Moderate to Weak	Strong	Moderate to Weak
Color	Strong to Weak	Strong	Strong to Weak
Texture	Moderate to Weak	Strong	Moderate to Weak
Scale	Large	Large	Large
Prominence[3]	6	6	6

[1] The most conservative onshore case involves the seaward edge of the beach nearest the projects. The seascape unit edge is 3.45 miles (5.6 kilometers) offshore (New Jersey jurisdictional boundary).
[2] Noticeable elements: R = rotor, NL = navigation light, N = nacelle, H = hub, O = OSS, M = mid-tower light, Y = yellow tower base color
[3] WTGs and OSS (onshore) visibility: 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers'

attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).
[4] The seaward edge between landscape and seascape varies.

Table M-16 Ocean Wind 1 and Other Planned Wind Farms' Cumulative Viewer Experience Wind Farm Distances, FOVs, Noticeable Elements, Visual Contrasts, Scale of Change, and Prominence

	KOP			
	KOP-6	**KOP-14**	**KOP-19**	**KOP-22**
Distance in miles (kilometers)				
Proposed Action	21.8 (35.1)	15.3 (25.6)	16.2 (26.1)	20.9 (33.6)
Alternatives B-1 & B-2	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Alternatives C-1, C-2, & D	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Atlantic Shores South	12.1 (19.5)	11.1 (17.7)	21.6 (34.8)	31.4 (50.5)
Atlantic Shores North	11.5 (18.5)	18.2 (29.3)	31.5 (50.7)	42.2 (67.9)
Bight Wind Holdings	37.8 (60.8)	46.4 (74.7)	38.6 (62.1)	68.9 (55.2)
Atlantic Shores Offshores Wind Bight	36.7 (59)	42.2 (67.9)	54.2 (87.2)	61.5 (111)
Invenergy Wind Offshore	44.5 (71.6)	43.8 (70.5)	53.3 (85.8)	60.2 (96.9)
Ocean Wind 2	28.6 (46)	9.2 (14.8)	11.6 (18.7)	13.7 (22)
Garden State	55.7 (89.6)	42.3 (68.1)	32.9 (52.9)	22.1 (35.6)
Skipjack	62.2 (100)	50.4 (81.1)	39.8 (64.1)	28.8 (46.3)
Cumulative FOV Degrees (1% of 124°)	142° (114%)	136° (110%)	136° (110%)	144° (116%)
Noticeable Elements[2] & Impact Level	R, NL, N, H, O, and M to R **Major**	R, NL, N, H, O, and M to R **Major**	R, NL, N, H, O, and M to R **Major**	R, NL, N, H, O, and M to R **Major**
Contrast, Scale of Change, and Prominence				
Form	Strong	Strong	Strong	Strong
Line	Moderate	Moderate	Moderate	Moderate
Color	Strong	Strong	Strong	Strong
Texture	Moderate	Moderate	Moderate	Moderate
Scale	Large	Large	Large	Large

	KOP			
	KOP-6	**KOP-14**	**KOP-19**	**KOP-22**
Prominence[3]	6	6	6	6

[1] KOP-6 Great Bay Boulevard Wildlife Management Area, KOP-14 Atlantic City Playground Pier; KOP-19 Corson's Inlet State Park, KOP-22 Stone Harbor Beach
[2] Noticeable elements: R = rotor, NL = navigation light, N = nacelle, H = hub, O = OSS, M = mid-tower light, Y = yellow tower base color
[3] WTGs and OSS (onshore) visibility: 0 = Not visible. 1 = Visible only after extended study; otherwise not visible. 2 = Visible when viewing in general direction of the wind farm; otherwise likely to be missed by casual observer. 3 = Visible after brief glance in general direction of the wind farm; unlikely to be missed by casual observer. 4 = Plainly visible; could not be missed by casual observer, but does not strongly attract visual attention or dominate view. 5 = Strongly attracts viewers' attention to the wind farm; moderate to strong contrasts in form, line, color, or texture, luminance, or motion. 6 = Dominates view; strong contrasts in form, line, color, texture, luminance, or motion fill most of the horizontal FOV or vertical FOV (NAEP 2012).

M.3.2 Alternative B

Table M-17 and Table M-18 compare Alternative B-1 wind farm width-, height-, and distance-related occupation of views from the nearest shoreline area with that of Alternative B-2. Distances vary by 0.8 mile and the horizontal FOVs vary by 1° or less. The vertical FOVs vary by less than 1° of the viewer FOV. These results indicate slight changes to the FOV results compared to the Proposed Action (Table M-3 and Table M-4).

Table M-17 Horizontal FOV Occupied by Alternatives B-1 and B-2

Noticeable Element	Width[1] miles (km)	Distance miles (km)	Horizontal FOV	Human FOV	Percent of FOV
B-1 Wind Farm	11.8 (19.0)	16.1 (25.9)	36.2°	124°	29%
B-2 Wind Farm	12.0 (19.0)	16.9 (27.2)	35.4°	124°	28%

[1] The wind farm width increases from west to east.
km = kilometers

Table M-18 Vertical FOV Occupied by Alternatives B-1 and B-2

Noticeable Element	Height feet (m) MLLW	Distance miles (km)	Height Above Horizon[1] feet (m)	Vertical FOV	Human FOV	Percent of FOV
B-1 Rotor Blade Tip	906 (276.1)	16.1 (25.9)	787 (239.9)	0.5°	55°	0.9%
B-2 Rotor Blade Tip	906 (276.1)	16.9 (27.2)	772 (239.9)	0.5°	55°	0.9%

[1] Based on intervening EC and clear-day conditions.
km = kilometers; m = meters

Table M-19 summarizes the wind farm's noticeable elements and effects on the seascape character unit, landscape character units, and viewer experience under Alternatives B-1 and B-2. Results for Alternatives B-1 and B-2 are similar, and similar to those of the Proposed Action, with slight changes in the visibility of lower portions of towers due to EC and slight changes in the overall horizontal and vertical FOVs.

Table M-19 Wind Farm Noticeable Elements and Effects by Seascape Character Unit, Open Ocean Character Unit, Landscape Character Unit, and KOP for Alternatives B-1 and B-2

Noticeable Elements[1] Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
R, NL, N, H, O, M, and Y **Major**	Open Ocean Character Unit KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area KOP-32 Cruise Ship Shipping Lanes

Noticeable Elements[1] Effects	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
R, NL, N, H, O, and M **Moderate**	Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-16 Lucy the Elephant National Historic Landmark KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-20 Sea Isle City Promenade KOP-21 Avalon Beach Jetty
R, NL, N, H, O, and M **Minor**	KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-11 Atlantic City Country Club KOP-13 Atlantic City Beachfront—Nighttime KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime
R, NL, N, H, and O **Minor**	Landscape Character Units: Marshland, and Bay/Shoreline KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-17 Bay Front Historic District, Municipal Beach Park KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse
R, NL, N, and H **Minor**	Landscape Character Units: KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-26 Wildwood Crest Fishing Pier KOP-27 Cape May National Wildlife Refuge
R, NL, and N **Minor**	Landscape Character Units: Mainland and Ridges
R **Minor**	KOP-1 Barnegat Lighthouse
Unseen **Negligible**	KOP-2 Harvey Cedars Beach Access KOP-15 Ventor City, City Hall (obscured, not distant) KOP-28 Cape May Lighthouse

[1] R = rotor, NL = navigation light, N = nacelle, H = hub, O = OSS, M = mid-tower light, Y = yellow tower base color
WMA = Wildlife Management Area

Table M-20 summarizes the wind farm's distance effects on the seascape unit, landscape units, and KOPs under Alternatives B-1 and B-2.

Table M-20 Wind Farm Distance Effects by Seascape Unit, Open Ocean Unit, Landscape Unit, and KOP for Alternatives B-1 and B-2

Distance miles (kilometers) Effect	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
0–40.0 (0–64.4) Dominant/Major to Minor Noticeability	Open Ocean Character Unit KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area
5.8–40.0 (9.3–64.4) Dominant/Major to Minor Noticeability	Open Ocean Character Unit KOP-32 Cruise Ship Shipping Lanes
B-1: 16.1–18.0 (25.9–29.0) B-2: 16.9–18.0 (27.2–29.0) Moderate Noticeability	Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-21 Avalon Beach Jetty
18.0–31.0 (29.0–49.9) Minor Noticeability	Landscape Character Units: Marshland, and Bay/Shoreline KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-11 Atlantic City Country Club KOP-13 Atlantic City Beachfront—Nighttime KOP-16 Lucy the Elephant National Historic Landmark KOP-17 Bay Front Historic District, Municipal Beach Park KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-26 Wildwood Crest Fishing Pier KOP-27 Cape May National Wildlife Refuge
31.1–40.0 (50.1–64.4) Minor Noticeability	KOP-1 Barnegat Lighthouse (elevated viewpoint) KOP-28 Cape May Lighthouse (elevated viewpoint)
31.1–40.0 (50.1–64.4) Minor to Negligible Noticeable	Landscape Character Units: Mainland and Ridges KOP-2 Harvey Cedars Beach Access KOP-15 Ventor City, City Hall (obscured, not distant) KOP-20 Sea Isle City Promenade (obscured, not distant)

WMA = Wildlife Management Area

Table M-21 summarizes the percent and degrees of FOV occupied by the wind farm and effects on the seascape unit, landscape units, and KOPs under Alternatives B-1 and B-2. There are slight differences in results for Alternatives B-1 and B-2, and slight differences from the FOVs of the Proposed Action.

Table M-21 Wind Farm Percent of FOV and Effects by Seascape Unit, Open Ocean Unit, Landscape Unit, and KOP for Alternatives B-1 and B-2

Percent of 124° FOV Effect	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
100% (124°) to 16% (20°) Dominant/Major to Minor Noticeability	Open Ocean Character Unit KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area
Dominant/Major to Minor Noticeability	Open Ocean Character Unit KOP-32 Cruise Ship Shipping Lanes
B-1: 29% (36.2°) to 29% (36°) B-2: 28% (35.4°) to 29% (36°) Moderate Noticeability	Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-11 Atlantic City Country Club KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-15 Ventor City, City Hall KOP-16 Lucy the Elephant National Historic Landmark KOP-17 Bay Front Historic District, Municipal Beach Park KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-20 Sea Isle City Promenade KOP-21 Avalon Beach Jetty
20% (25°) Minor to Moderate	KOP-13 Atlantic City Beachfront—Nighttime KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime
28% (35°) to 20% (25°) Minor Noticeability	Landscape Character Units: Marshland, and Bay/Shoreline KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-26 Wildwood Crest Fishing Pier KOP-27 Cape May National Wildlife Refuge

Percent of 124° FOV Effect	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
28% (25°) to 16% (20°) Minor to Negligible Noticeable	Landscape Character Units: Mainland and Ridges KOP-1 Barnegat Lighthouse KOP-2 Harvey Cedars Beach Access KOP-28 Cape May Lighthouse KOP-29 BL England Substation Area KOP-30 Oyster Creek Substation Area

WMA = Wildlife Management Area

Foreground influence assessments, involving the presence of intervening or framing elements and their influence on effects of Project characteristics, are based on the Alternatives B-1 and B-2 visual simulations (Attachment M-3) and locale photography (Appendix D to COP Volume III, Appendix L; Ocean Wind 2023). KOP foreground influences would be similar for Alternatives B-1 and B-2, as summarized in Table M-22.

Table M-22 Foreground View Framing or Intervening Elements for Alternatives B-1 and B-2

Foreground Element(s) Influence	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
Open Ocean Negligible Influence	Open Ocean Character Unit KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area KOP-32 Cruise Ship Shipping Lanes
Beach, Dunes, and Ocean Minor Influence	Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, and Coastal Dune KOP-2 Harvey Cedars Beach Access KOP-3 Bayview Park KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-13 Atlantic City Beachfront—Nighttime KOP-14 Atlantic City Playground Pier KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-21 Avalon Beach Jetty KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime KOP-26 Wildwood Crest Fishing Pier

Foreground Element(s) Influence	Seascape Units, Open Ocean Unit, Landscape Units, and Offshore and Onshore Key Observation Points
Buildings, Vegetation, and Topography Moderate to Dominant Influence	Landscape Character Units: Island Community, Marshland, Bay/Shoreline, Mainland, and Ridges KOP-1 Barnegat Lighthouse KOP-2 Harvey Cedars Beach Access KOP-4 Garden State Parkway KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-11 Atlantic City Country Club KOP-15 Ventor City, City Hall KOP-16 Lucy the Elephant National Historic Landmark KOP-17 Bay Front Historic District, Municipal Beach Park KOP-20 Sea Isle City Promenade KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-27 Cape May National Wildlife Refuge KOP-28 Cape May Lighthouse

WMA = Wildlife Management Area

Visual contrast assessments, form, line, color, and texture comparisons of characteristics of the seascape and landscape before and after implementation of Alternative B-1 or B-2 are indicated in Table M-23. There would be a slight difference in contrasts between Alternatives B-1 and B-2, and a slight difference from the Proposed Action. Project contrasts to the characteristic seascape and landscape, as perceived in views from each KOP locale, are based on Alternatives B-1 and B-2 visual simulations (Attachment M-3).

Table M-23 Visual Contrasts to Seascape, Open Ocean, Landscape, and KOPs for Alternatives B-1 and B-2

Contrast Rating Effects	Seascape Units, Open Ocean Unit, and Offshore and Onshore Key Observation Points
Strong Contrasts **Major**	Open Ocean KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area KOP-32 Cruise Ship Shipping Lanes

Contrast Rating Effects	Seascape Units, Open Ocean Unit, and Offshore and Onshore Key Observation Points
Moderate Contrasts **Moderate**	Seascape KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-21 Avalon Beach Jetty KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime KOP-16 Lucy the Elephant National Historic Landmark
Weak Contrasts **Minor**	Landscape KOP-1 Barnegat Lighthouse KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-6 Great Bay Boulevard WMA KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-8 Absecon Creek Boat Ramp KOP-11 Atlantic City Country Club KOP-13 Atlantic City Beachfront—Nighttime KOP-17 Bay Front Historic District, Municipal Beach Park KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-26 Wildwood Crest Fishing Pier KOP-28 Cape May Lighthouse KOP-29 BL England Substation Area KOP-30 Oyster Creek Substation Area
None to very weak **Negligible**	KOP-2 Harvey Cedars Beach Access KOP-15 Ventor City, City Hall KOP-20 Sea Isle City Promenade KOP-27 Cape May National Wildlife Refuge

WMA = Wildlife Management Area

The seascape, open ocean, and landscape criteria listed in Table M-1, and related consideration of the preceding assessments, would result in impact levels. Table M-24 summarizes the impacts of Alternatives B-1 and B-2 on the seascape character units, open ocean character unit, and landscape character units throughout the geographic analysis area. While there would be slight differences in the extents of visible elements, FOVs, and contrasts, overall impact levels would be similar for Alternative B-1, Alternative B-2, and the Proposed Action.

Table M-24 Alternatives B-1 and B-2 Impact on Seascape Character, Open Ocean Character, and Landscape Character

Level of Impact	Seascape Character Units, Open Ocean Character Unit, and Landscape Character Units
Major	SLIA: Open Ocean Character Unit
Moderate	SLIA: Seascape Character Units and Landscape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community
Minor	SLIA: Landscape Character Units: Bay/Shoreline, Island, Mainland, Marshland, and Ridges
Negligible	SLIA: Landscape Character Units: Island, Mainland, and Ridges

The viewer experience criteria listed in Table M-1, and related consideration of the preceding assessments, would result in impact levels. Table M-25 summarizes the impacts of Alternatives B-1 and B-2 on the viewer experience (KOP locations) throughout the geographic analysis area. While there would be slight differences in the extents of visible elements, FOVs, and contrasts, overall impact levels would be similar for Alternative B-1, Alternative B-2, and the Proposed Action.

Table M-25 Impact of Alternatives B-1 and B-2 on Viewer Experience

Impact Level	Offshore and Onshore Key Observation Points
Major	VIA: KOP-31 Recreational Fishing, Pleasure, and Tour Boat Area KOP-32 Cruise Ship Shipping Lanes SLIA: Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community
Moderate	SLIA: Seascape Character Units: Beachfront and Jetty/Seawall, Boardwalk, Coastal Dune, and Island Community VIA: KOP-7 Edwin B. Forsythe National Wildlife Refuge KOP-9 North Brigantine Natural Area Wildlife Observation Deck KOP-10 16th Street Park Beachfront KOP-12 Atlantic City Beachfront—Daytime KOP-14 Atlantic City Playground Pier KOP-16 Lucy the Elephant National Historic Landmark KOP-18 Ocean City Boardwalk KOP-19 Corson's Inlet State Park KOP-21 Avalon Beach Jetty KOP-22 Stone Harbor Beach—Daytime KOP-23 Stone Harbor Beach—Nighttime

Impact Level	Offshore and Onshore Key Observation Points
Minor	SLIA: Landscape Character Units: Marshland, and Bay/Shoreline VIA: KOP-1 Barnegat Lighthouse KOP-3 Bayview Park KOP-4 Garden State Parkway KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit KOP-6 Great Bay Boulevard WMA KOP-8 Absecon Creek Boat Ramp KOP-11 Atlantic City Country Club KOP-13 Atlantic City Beachfront—Nighttime KOP-17 Bay Front Historic District, Municipal Beach Park KOP-24 North Wildwood Boulevard Bridge KOP-25 Hereford Inlet Lighthouse KOP-26 Wildwood Crest Fishing Pier KOP-28 Cape May Lighthouse KOP-29 BL England Substation Area KOP-30 Oyster Creek Substation Area
Negligible	SLIA: Landscape Character Units: Mainland and Ridges VIA: KOP-2 Harvey Cedars Beach Access KOP-15 Ventor City, City Hall KOP-20 Sea Isle City Promenade KOP-27 Cape May National Wildlife Refuge

WMA = Wildlife Management Area

M.3.3 Alternatives C-1, C-2, and D

Table M-26 and Table M-27 compare Alternatives C-1, C-2, and D wind farm width-, height-, and distance-related occupation of views from the nearest shoreline area. Distances vary by 1.2 mile and the horizontal FOVs vary by 2.3 degree. The vertical FOV is less than 1°. These results indicate slight changes to the FOV results compared to the Proposed Action (Table M-3 and Table M-4).

Table M-26 Horizontal FOV Occupied by Alternatives C-1, C-2, and D

Noticeable Element	Width miles (km)	Distance miles (km)	Horizontal FOV	Human FOV	Percent of FOV
C-1 Wind Farm	10.6 (17.1)	14.1 (22.7)	36.9°	124°	30%
C-2 Wind Farm	10.7 (17.2)	15.1 (24.3)	35.3°	124°	30%
D Wind Farm	11.8 (19.0)	15.3 (25.9)	37.6°	124°	30%

km = kilometers

Table M-27 Vertical FOV Occupied by Alternatives C-1, C-2, and D

Noticeable Element	Height feet (m) MLLW	Distance miles (km)	Visible Height[1] feet (m)	Vertical FOV	Human FOV	Percent of FOV
C-1 Rotor Blade Tip	906 feet (276.1)	14.1 (22.7)	820 (244)	0.6°	55°	1%
C-2 Rotor Blade Tip	906 feet (276.1)	15.1 (24.3)	804 (244)	0.6°	55°	1%
D Rotor Blade Tip	906 feet (276.1)	15.3 (25.9)	801 (244)	0.6°	55°	1%

[1] Based on intervening EC and clear-day conditions.
km = kilometers; m = meters

M.4. SLIA Summary

SLIA considers the impacts on the physical elements and features that make up a seascape, open ocean, or landscape and the aesthetic, perceptual, and experiential aspects of the seascape, open ocean, or landscape that contribute to its distinctive character. These impacts affect the "feel," "character," or "sense of place" of an area of seascape, open ocean, or landscape. Table M-28 summarizes the effects of the character of the offshore and onshore components of the Project with the aspects that contribute to the distinctive character of the seascape, open ocean, and landscape areas from which the Project would be visible (BOEM 2021).

M.5. VIA Summary

The VIA considers the characteristics of the view receptor, characteristics of the view toward the Project facilities, and experiential impacts of the Project. Table M-29 summarizes the viewer sensitivity, view receptor susceptibility, view value, and summary of the measures of effects from the visible character and magnitude of the offshore and onshore components of the Project (BOEM 2021).

Table M-28 Seascape Character, Open Ocean Character, Landscape Character and Impact Levels

	Affected Environment						Proposed Action															Impact Levels				
	Unit Susceptibility			Unit Value			Project Visibility				Character Key Feature Change			Character Key Element Change			Character Key Quality Change			Proposed Action				Alternatives B-1, B-2, C-1, C-2, and D
Character Unit	High	Medium	Low	High	Medium	Low	Dominant	Substantial	Low	Unseen	High	Medium	Low	High	Medium	Low	High	Medium	Low	Major	Moderate	Minor	Negligible	Impact Level
Open Ocean	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Ocean	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Beachfront	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Boardwalks/Jetties/ Seawalls	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Dunes	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Commerce	X				X		X				X			X			X			X				Same as Proposed Action
Seascape Institutional	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Municipal	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Parks	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Preserves	X			X			X				X			X			X			X				Same as Proposed Action
Seascape Residential	X			X			X				X			X			X			X				Same as Proposed Action
Landscape Bay/ Estuary/Marsh	X			X				X				X			X			X			X				Same as Proposed Action

Character Unit	Affected Environment						Proposed Action															Impact Levels				
	Unit Susceptibility			Unit Value			Project Visibility				Character Key Feature Change			Character Key Element Change			Character Key Quality Change			Proposed Action				Alternatives B-1, B-2, C-1, C-2, and D
	High	Medium	Low	High	Medium	Low	Dominant	Substantial	Low	Unseen	High	Medium	Low	High	Medium	Low	High	Medium	Low	Major	Moderate	Minor	Negligible	Impact Level
Landscape River	X			X				X				X			X			X			X			Same as Proposed Action
Landscape Agriculture			X			X		X				X			X			X			X			Same as Proposed Action
Landscape Commerce			X			X		X				X			X			X			X			Same as Proposed Action
Landscape Forest		X		X					X				X			X			X						Same as Proposed Action
Landscape Institutional	X			X				X				X			X			X			X			Same as Proposed Action
Landscape Park	X			X				X				X			X			X			X			Same as Proposed Action
Landscape Preserve	X			X				X				X			X			X			X			Same as Proposed Action
Landscape Recreation		X			X			X				X			X			X			X			Same as Proposed Action
Landscape Residential	X			X				X				X			X			X			X			Same as Proposed Action

Table M-29 Viewer Sensitivity, Receptor Susceptibility, View Value, Viewer Experience, and Impact Levels

KOP[1]	Affected Environment									Viewer Experience				Impact Levels				
	Viewer Sensitivity			Receptor Susceptibility			View Value			Distance-Noticeable Elements-HFOV-VFOV-Contrast-Scale-Prominence Effects				Proposed Action				Alternatives B-1, B-2, C-1, C-2, and D
	High	Medium	Low	High	Medium	Low	High	Medium	Low	Dominant	Substantial	Low	Unseen	Major	Moderate	Minor	Negligible	Impact Levels
KOP-1[2]	X			X			X					X				X		Same as Proposed Action
KOP-2	X				X		X					X					X	Same as Proposed Action
KOP-3[2]	X			X			X					X				X		Same as Proposed Action
KOP-4	X					X	X						X			X		Same as Proposed Action
KOP-5	X				X		X					X				X		Same as Proposed Action
KOP-6	X				X		X					X				X		Same as Proposed Action
KOP-7	X			X			X					X				X		Same as Proposed Action
KOP-8	X			X			X					X				X		Same as Proposed Action
KOP-9	X					X	X				X				X			Same as Proposed Action
KOP-10	X				X		X				X				X			Same as Proposed Action
KOP-11	X				X		X					X				X		Same as Proposed Action
KOP-12	X				X		X				X				X			Same as Proposed Action
KOP-13	X				X		X					X				X		Same as Proposed Action
KOP-14	X				X		X				X				X			Same as Proposed Action
KOP-15[2]	X			X			X						X				X	Same as Proposed Action
KOP-16	X			X			X				X				X			Same as Proposed Action
KOP-17	X			X			X					X				X		Same as Proposed Action
KOP-18	X				X		X				X				X			Same as Proposed Action
KOP-19	X				X		X				X				X			Same as Proposed Action
KOP-20	X				X		X						X				X	Same as Proposed Action
KOP-21	X				X		X					X			X			Same as Proposed Action
KOP-22	X				X		X					X				X		Same as Proposed Action
KOP-23	X				X		X					X				X		Same as Proposed Action

KOP[1]	Affected Environment									Viewer Experience				Impact Levels				
	Viewer Sensitivity			Receptor Susceptibility			View Value			Distance-Noticeable Elements-HFOV-VFOV-Contrast-Scale-Prominence Effects				Proposed Action				Alternatives B-1, B-2, C-1, C-2, and D
	High	Medium	Low	High	Medium	Low	High	Medium	Low	Dominant	Substantial	Low	Unseen	Major	Moderate	Minor	Negligible	Impact Levels
KOP-24	X				X		X					X				X		Same as Proposed Action
KOP-25	X				X		X					X				X		Same as Proposed Action
KOP-26	X				X		X					X				X		Same as Proposed Action
KOP-27	X				X		X						X				X	Same as Proposed Action
KOP-28	X				X		X					X				X		Same as Proposed Action
KOP-29		X		X				X				X				X		Same as Proposed Action
KOP-30		X		X				X				X				X		Same as Proposed Action
KOP-31	X			X			X			X				X				Same as Proposed Action
KOP-32	X			X			X			X				X				NA

[1] KOP-1 Barnegat Lighthouse; KOP-2 Harvey Cedars Beach Access; KOP-3 Bayview Park; KOP-4 Garden State Parkway; KOP-5 Edwin B. Forsythe National Wildlife Refuge - Holgate Unit; KOP-6 Great Bay Boulevard Wildlife Management Area; KOP-7 Edwin B. Forsythe National Wildlife Refuge; KOP-8 Absecon Creek Boat Ramp; KOP-9 North Brigantine Natural Area Wildlife Observation Deck; KOP-10 16th Street Park Beachfront; KOP-11 Atlantic City Country Club; KOP-12 Atlantic City Beachfront; KOP-13 Atlantic City Beachfront (Nighttime); KOP-14 Atlantic City Playground Pier; KOP-15 Ventor City, City Hall; KOP-16 Lucy the Elephant National Historic Landmark; KOP-17 Bay Front Historic District, Municipal Beach Park; KOP-18 Ocean City Boardwalk; KOP-19 Corson's Inlet State Park; KOP-20 Sea Isle City Promenade; KOP-21 Avalon Beach Jetty; KOP-22 Stone Harbor Beach; KOP-23 Stone Harbor Beach (nighttime); KOP-24 North Wildwood Boulevard Bridge; KOP-25 Hereford Inlet Lighthouse; KOP-26 Wildwood Crest Fishing Pier; KOP-27 Cape May National Wildlife Refuge; KOP-28 Cape May Lighthouse; KOP-29 BL England Substation Area; KOP-30 Oyster Creek Substation Area; KOP-31 Commercial and Recreational Fishing and Tour Boat Area; KOP-32 Commercial and Cruise Ship Shipping Lanes
[2] Elevated observation deck or lighthouse.
HFOV = horizontal field of view; NA = not applicable; VFOV = vertical field of view

M.6. References

Bureau of Ocean Energy Management (BOEM). 2021. *Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States*. OCS Study BOEM 2021-032. April.

National Association of Environmental Professionals. (NAEP). 2012. *Offshore Wind Turbine Visibility and Visual Impact Thresholds*.

Ocean Wind LLC (Ocean Wind). 2023. *Construction and Operations Plan, Ocean Wind Offshore Wind Farm*. Volumes I–III. May. Available: https://www.boem.gov/ocean-wind-construction-and-operations-plan/.

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ATTACHMENT M-1
SCENIC RESOURCES OVERVIEW MAP

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SCENIC RESOURCE MAPPING

RESOURCES MAP 1

OVERVIEW MAP

MAP 02

MAP 03

MAP 04

MAP 05

MAP 06

MAP 07

MAP 08

40-Mile Study Area Boundary

OCEAN WIND
OFFSHORE
PROJECT AREA

ATLANTIC OCEAN

0 5 10
MILES

NORTH

LEGEND

- 40-Mile Study Area Boundary
- C527 Resource Code (see Scenic Resource Table)

Conservation Areas

- National Natural Landmark (NNL)
- National Wildlife Refuge
- State Park/State Forest
- State Wildlife Management Area (WMA)
- State Recreation Area
- Local Park/Conservation/Recreation Area
- Historic or Cultural Conservation Area
- Private Conservation Land

Historic Resources

- National Historic Landmark (NHL)
- NHL District
- Listed NRHP Historic Property
- Listed NRHP Historic District
- Eligible NRHP Historic Property
- Eligible NRHP Historic District
- Local Historic Landmark
- Local NRHP Historic District

Other Resources

- State Scenic Byway
- National Wild & Scenic Rivers
- Waterbodies
- Cemetery

OCEAN WIND

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ATTACHMENT M-2
CUMULATIVE VISUAL SIMULATIONS

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

VISUALIZATIONS

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

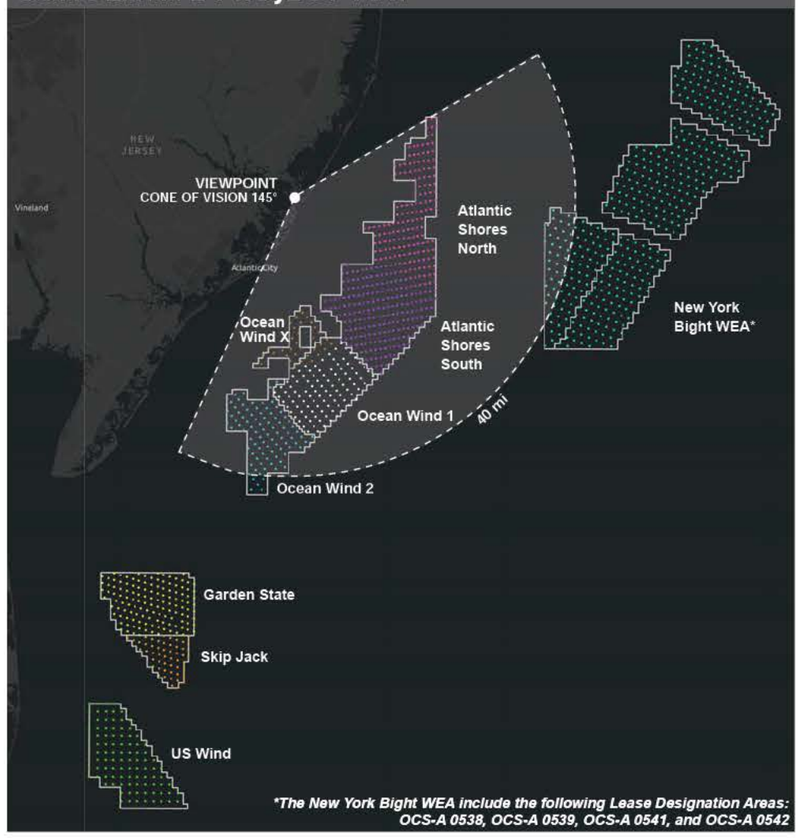
**** New York Bight WEA is not visible from this viewpoint due to the land mass in the foreground.**

CUMULATIVE PROJECT INFORMATION

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

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

CUMULATIVE PROJECT MAP



WIND DIRECTION

NORTHWEST

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

VIEWPOINT INFORMATION

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

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

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

COMPLETE PANORAMIC VIEW



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

1A: Northeast view showing only Ocean Wind 1

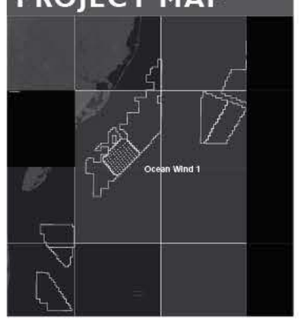
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township



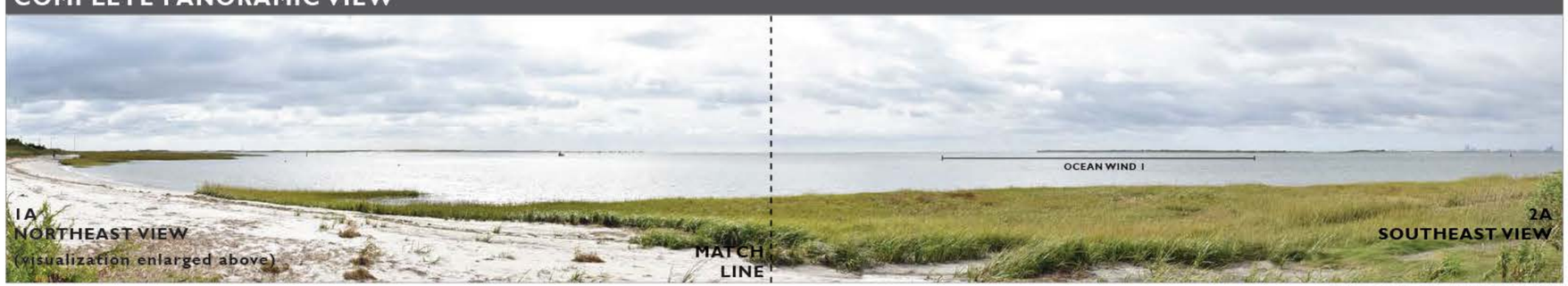
Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

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

Ocean Wind
An Ørsted Initiative

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1B: Northeast view showing all visible projects

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township



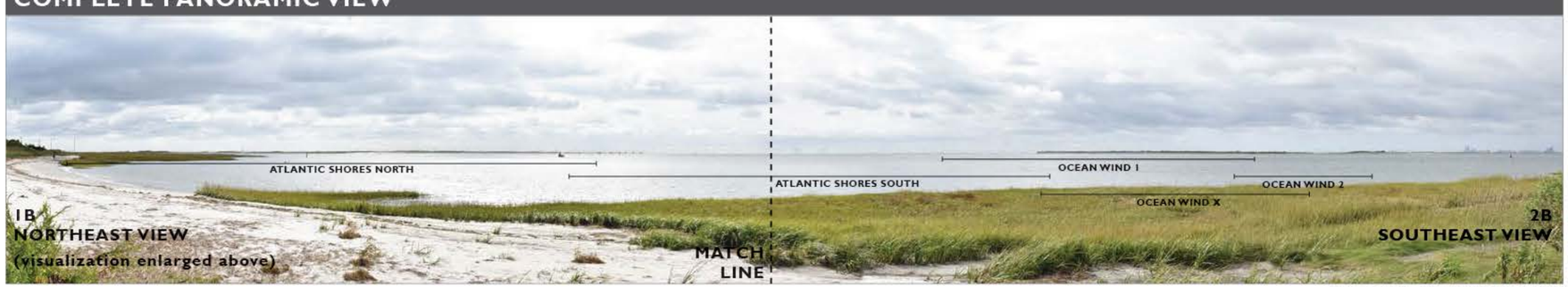
Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

NORTHWEST

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

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

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township



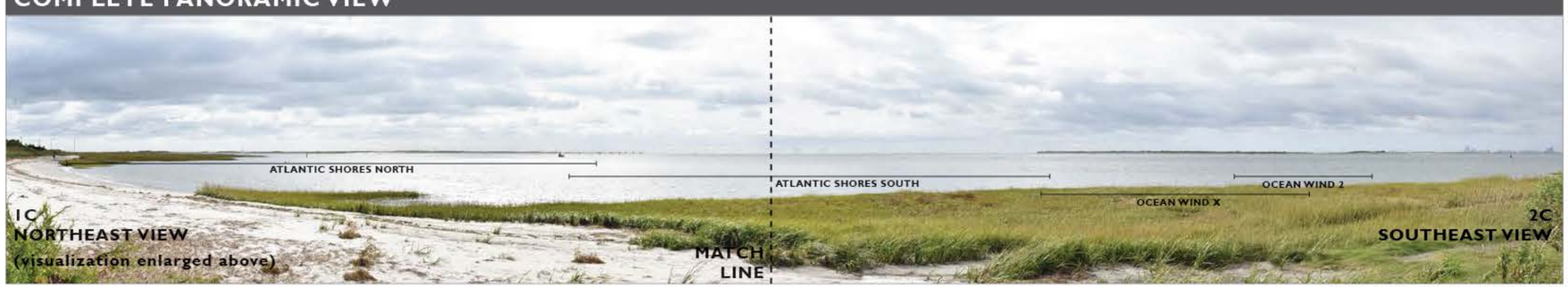
Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

NORTHWEST

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

Ocean Wind
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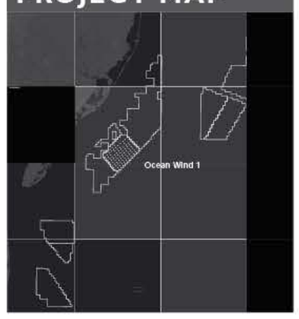
2A: Southeast view showing only Ocean Wind 1

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

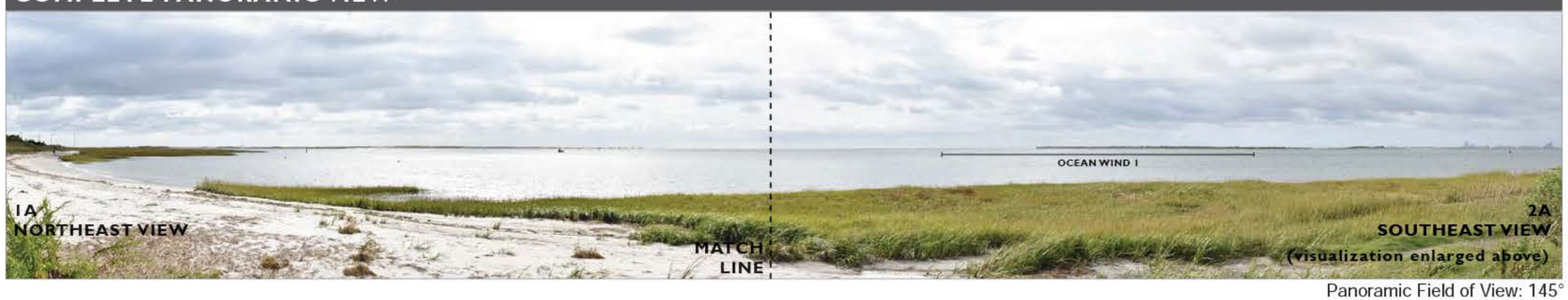


Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

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

Ocean Wind
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2B: Southeast view showing all visible projects

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

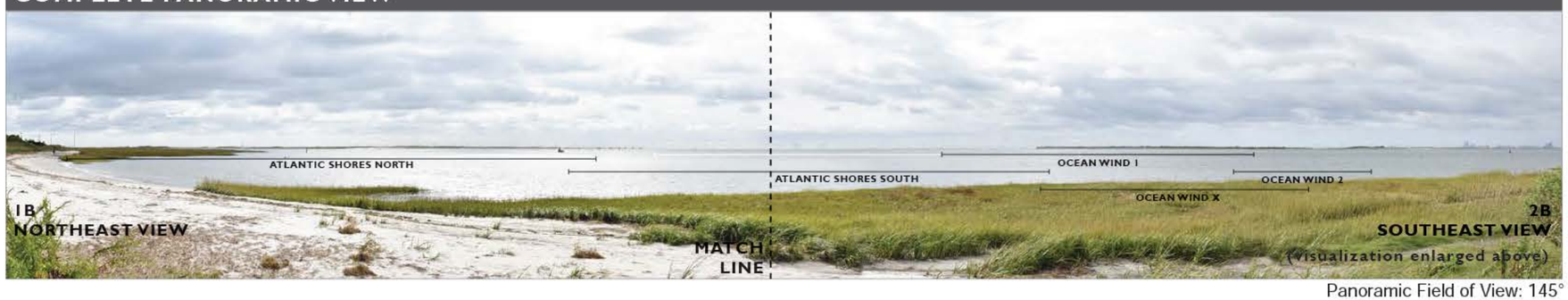


Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

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

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

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

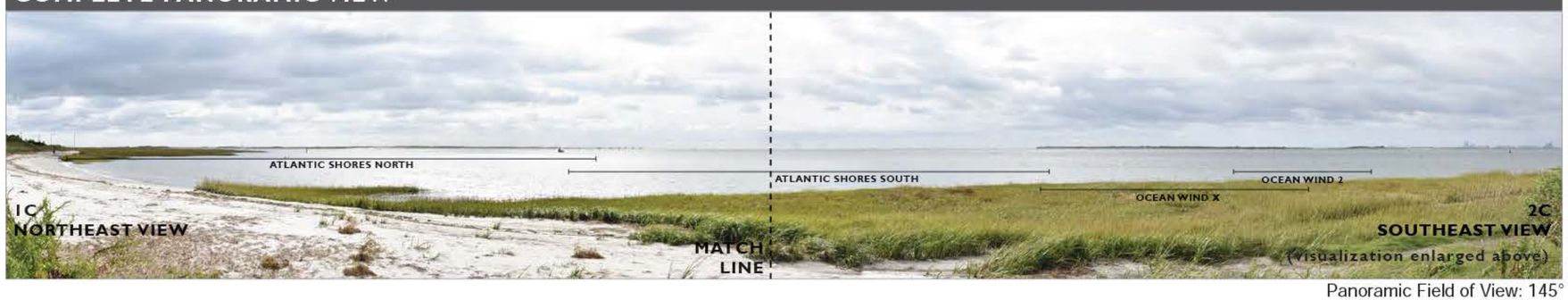


Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

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

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VIEWPOINT

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

VISUALIZATIONS

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

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

WIND DIRECTION

SOUTHWEST

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

CUMULATIVE PROJECT INFORMATION

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

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

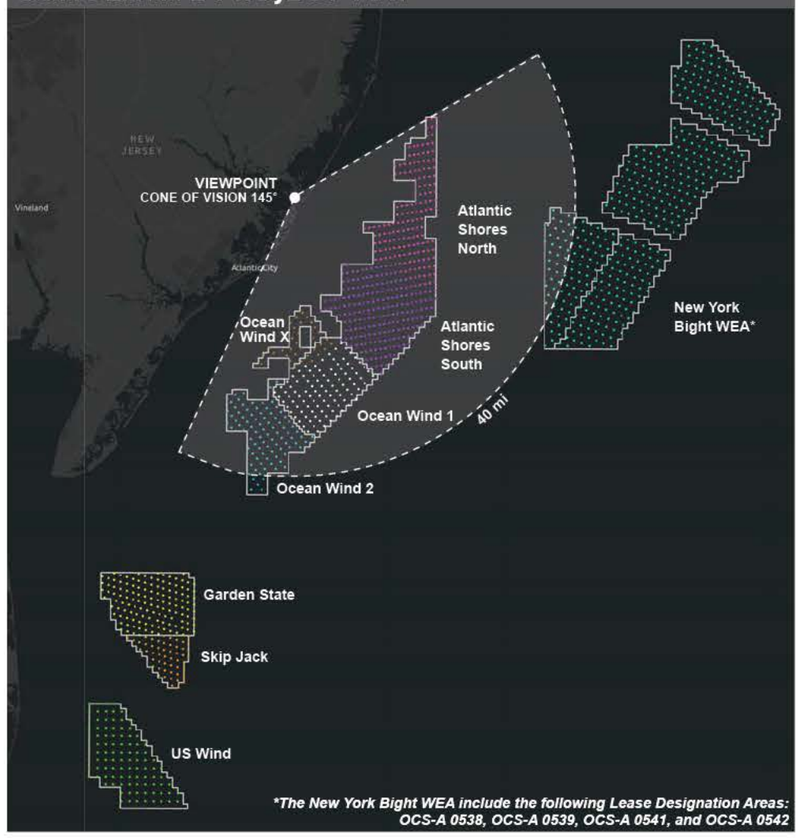
VIEWPOINT INFORMATION

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

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

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

CUMULATIVE PROJECT MAP



COMPLETE PANORAMIC VIEW



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

1A: Northeast view showing only Ocean Wind 1

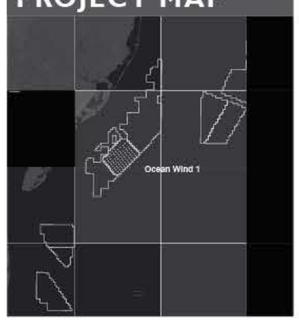
Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township



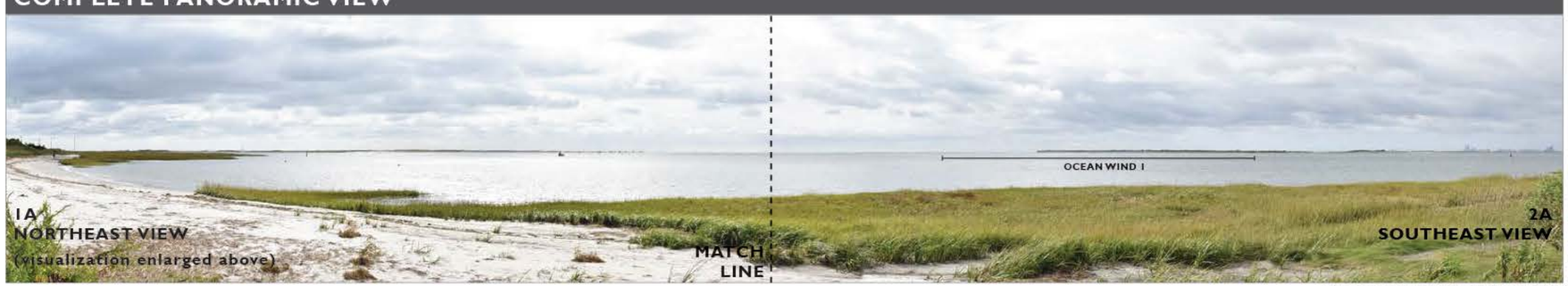
Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
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1B: Northeast view showing all visible projects

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township



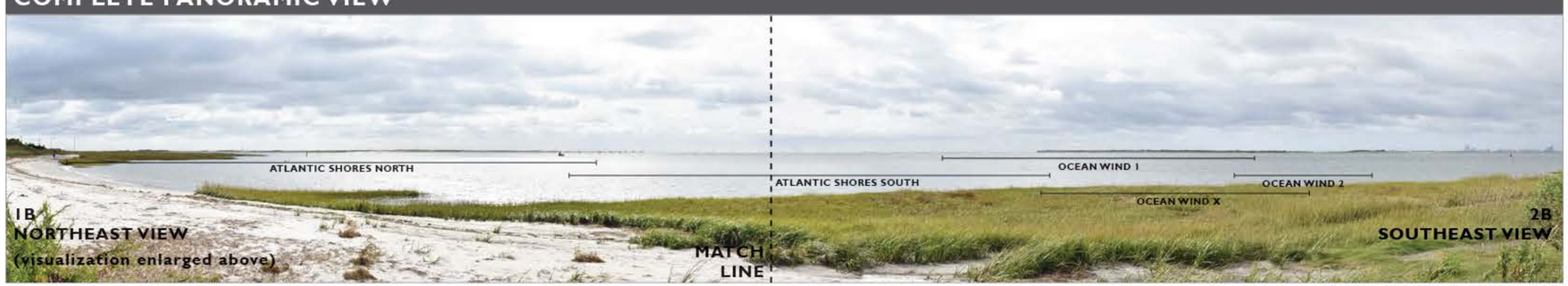
Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

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

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

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township



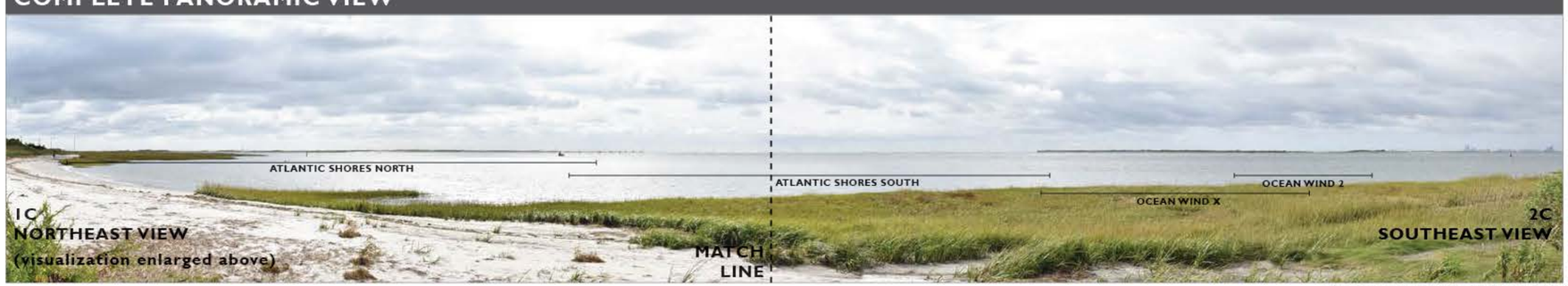
Ocean Wind 1 not in view

Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
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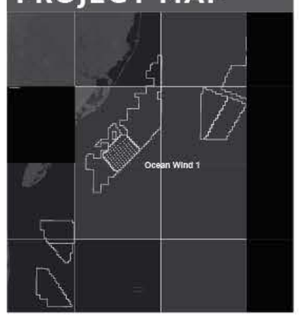
2A: Southeast view showing only Ocean Wind 1

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

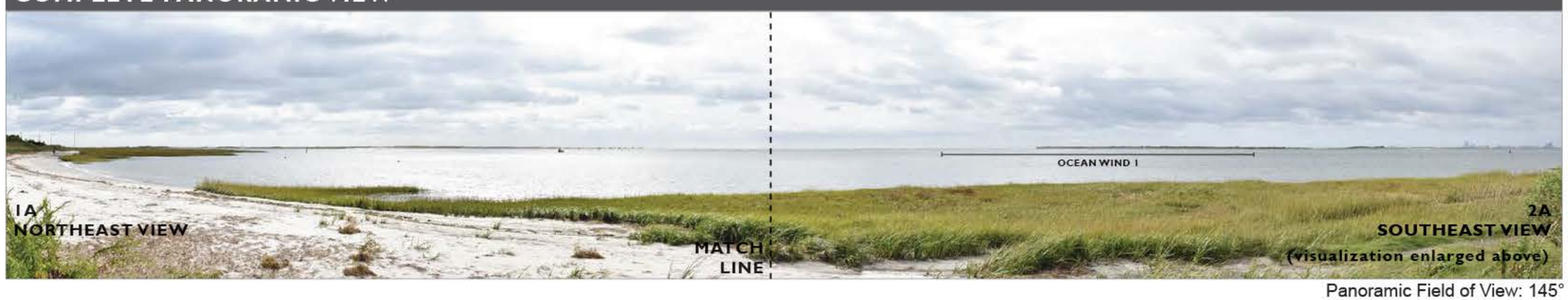


Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

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2B: Southeast view showing all visible projects

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

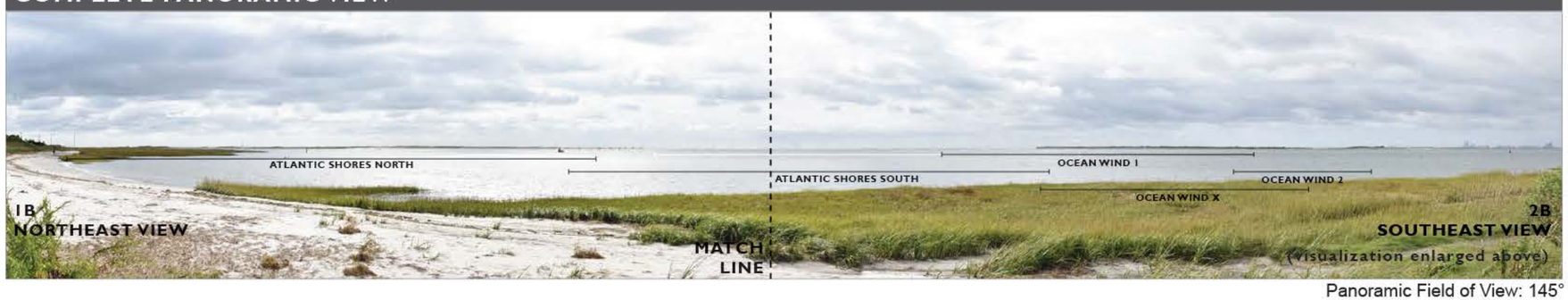


Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

tjd&a

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

Great Bay Boulevard Wildlife Management Area, Little Egg Harbor Township

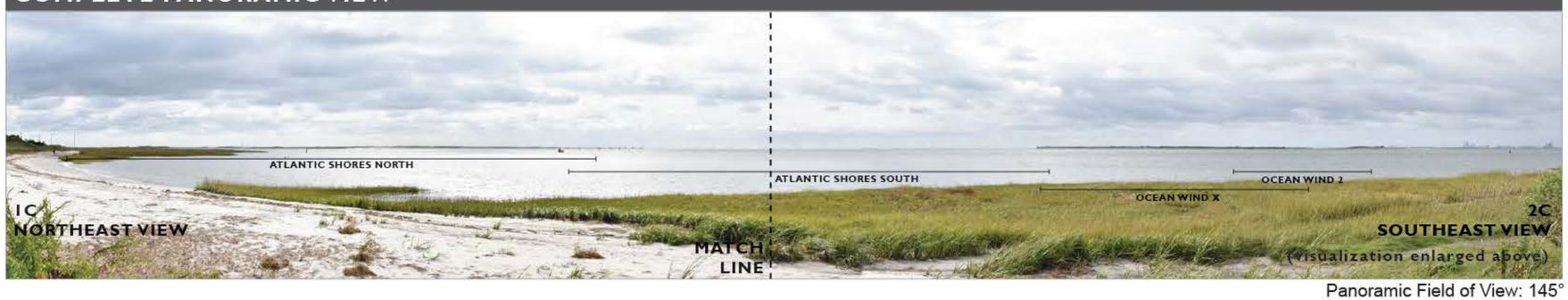


Panoramic Field of View: 69°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 145°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
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VIEWPOINT
Playground Pier, Atlantic City

VISUALIZATIONS

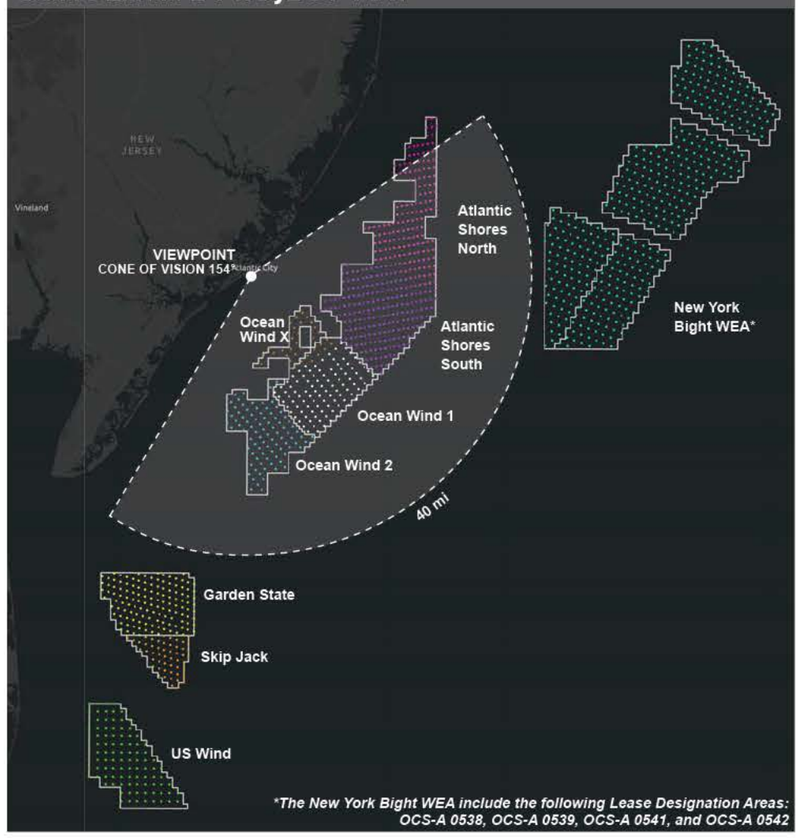
VISUALIZATIONS INCLUDED	
3A	Northeast view: only Ocean Wind 1
3B	Northeast view: all visible projects
3C	Northeast view: all visible projects except Ocean Wind 1
4A	Southeast view: only Ocean Wind 1
4B	Southeast view: all visible projects
4C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

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

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

CUMULATIVE PROJECT MAP



WIND DIRECTION

NORTHWEST

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

VIEWPOINT INFORMATION

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

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

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

COMPLETE PANORAMIC VIEW



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

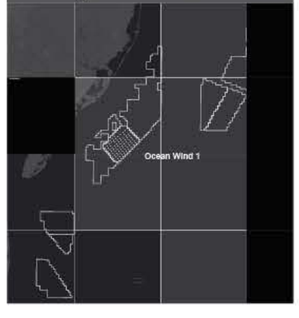
3A: Northeast view showing only Ocean Wind 1

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

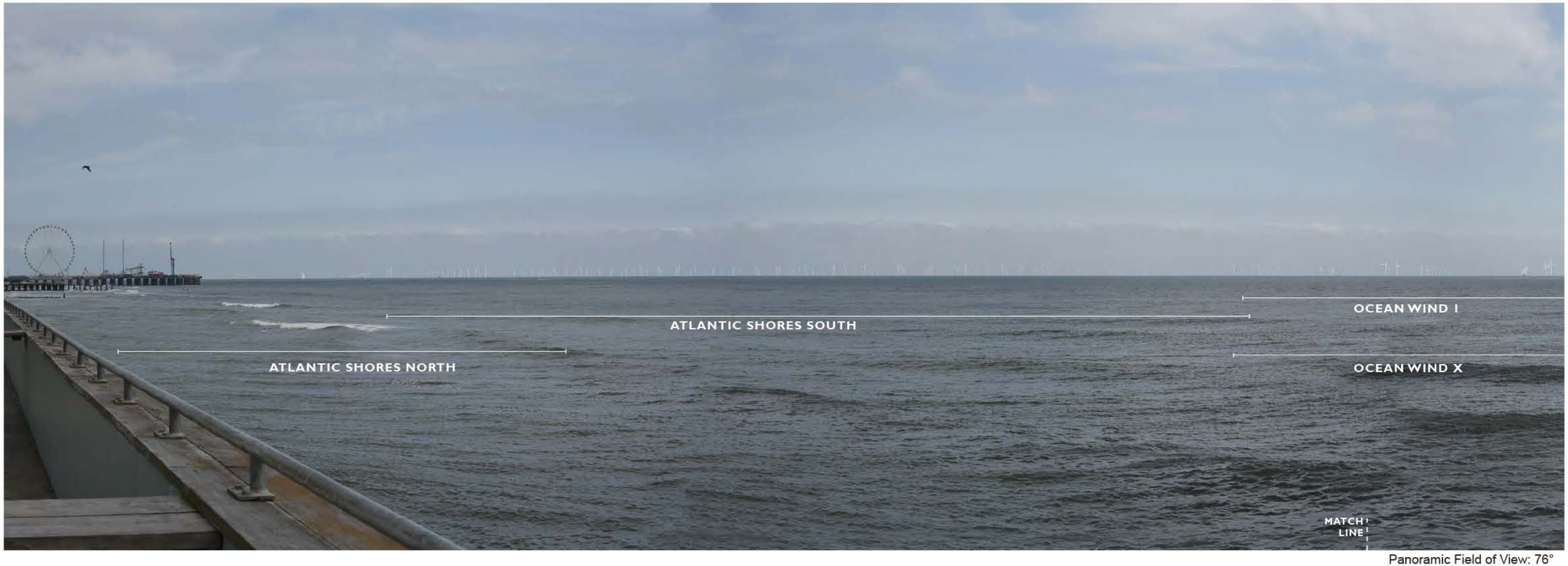
NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

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3B: Northeast view showing all visible projects

Playground Pier, Atlantic City

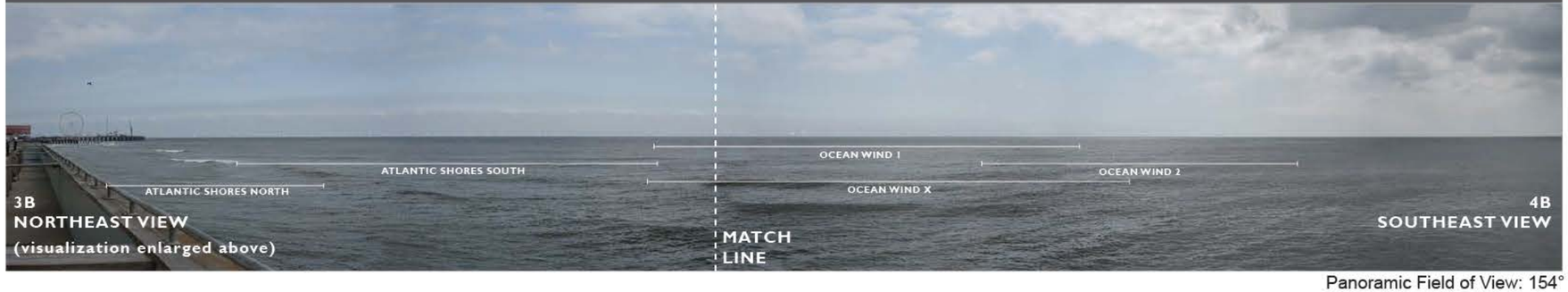


Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

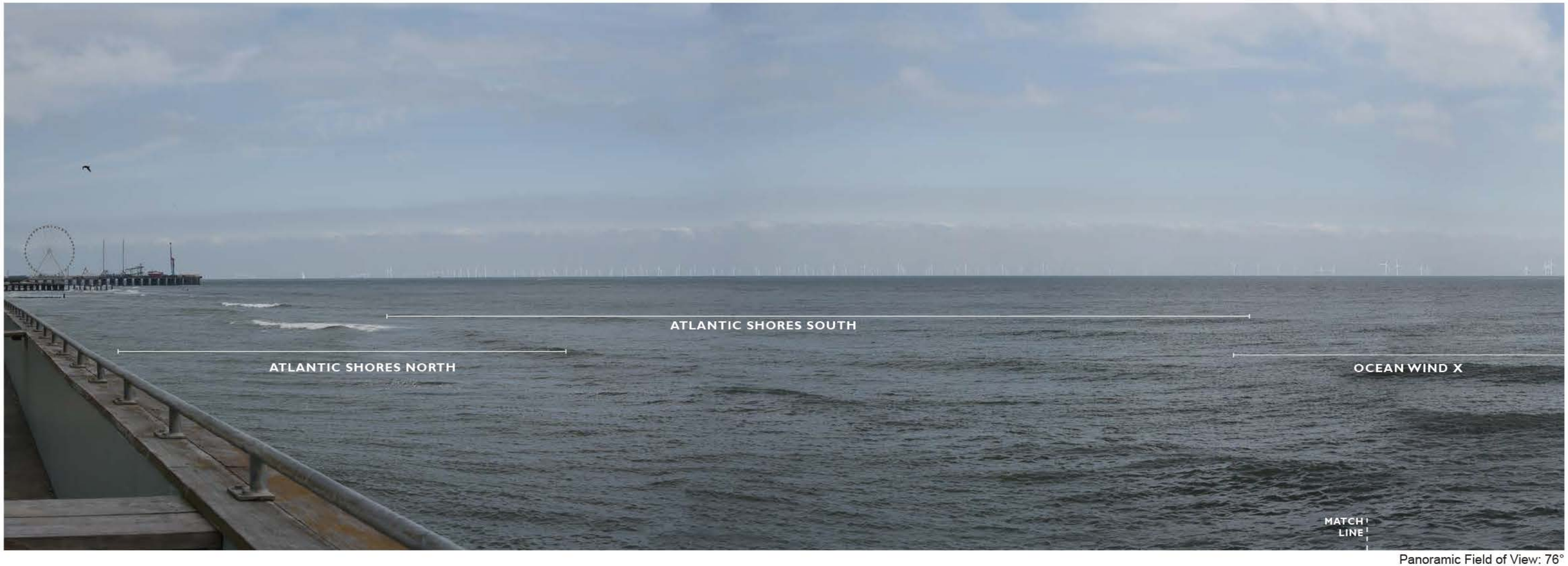
NORTHWEST
Turbine rotors and blades are modeled in all projects to face northwest to approximate the most visually impacting scenario.

Ocean Wind
An Ørsted Initiative

tjd&a

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

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
An Ørsted Initiative

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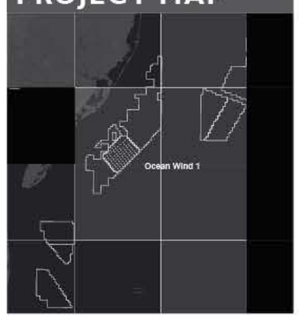
4A: Southeast view showing only Ocean Wind 1

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
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4B: Southeast view showing all visible projects

Playground Pier, Atlantic City

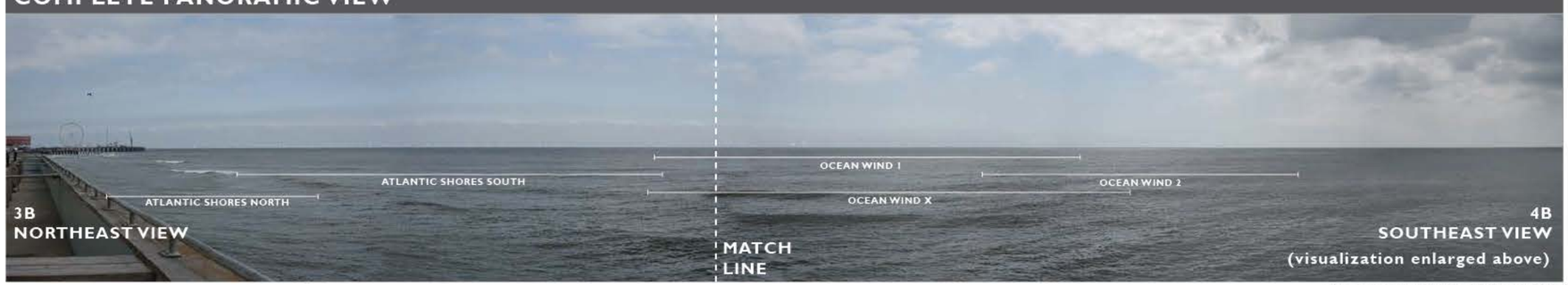


Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

NORTHWEST

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

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

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
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VIEWPOINT
Playground Pier, Atlantic City

VISUALIZATIONS

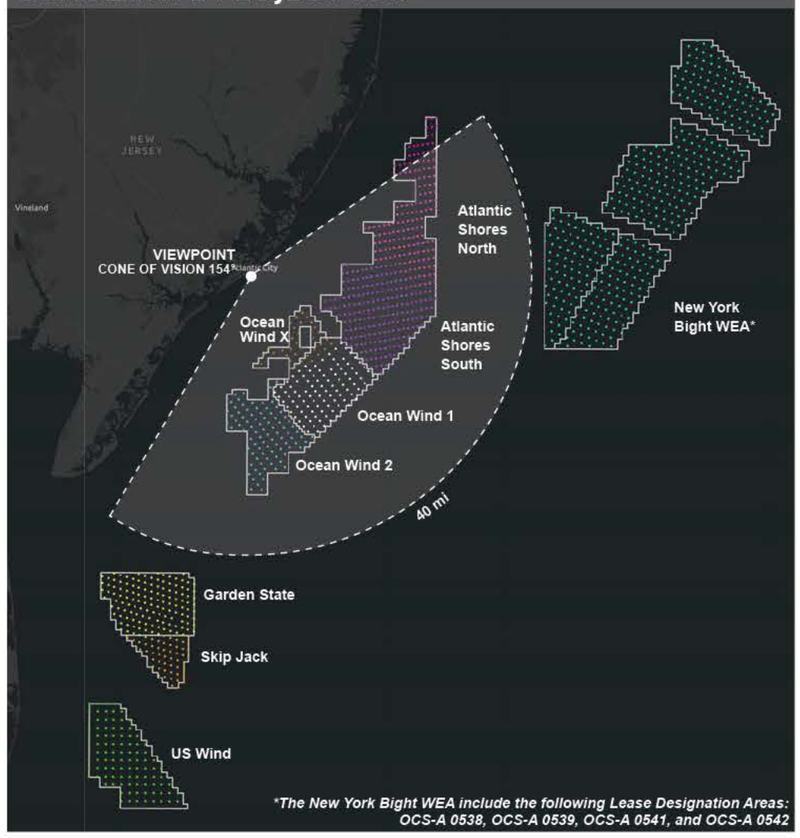
VISUALIZATIONS INCLUDED	
3A	Northeast view: only Ocean Wind 1
3B	Northeast view: all visible projects
3C	Northeast view: all visible projects except Ocean Wind 1
4A	Southeast view: only Ocean Wind 1
4B	Southeast view: all visible projects
4C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

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

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

CUMULATIVE PROJECT MAP



WIND DIRECTION

SOUTHWEST

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

VIEWPOINT INFORMATION

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

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

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

COMPLETE PANORAMIC VIEW



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

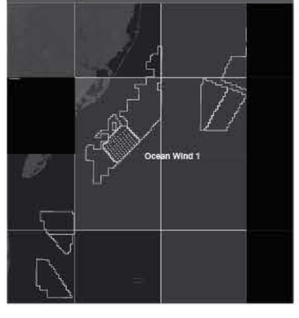
3A: Northeast view showing only Ocean Wind 1

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

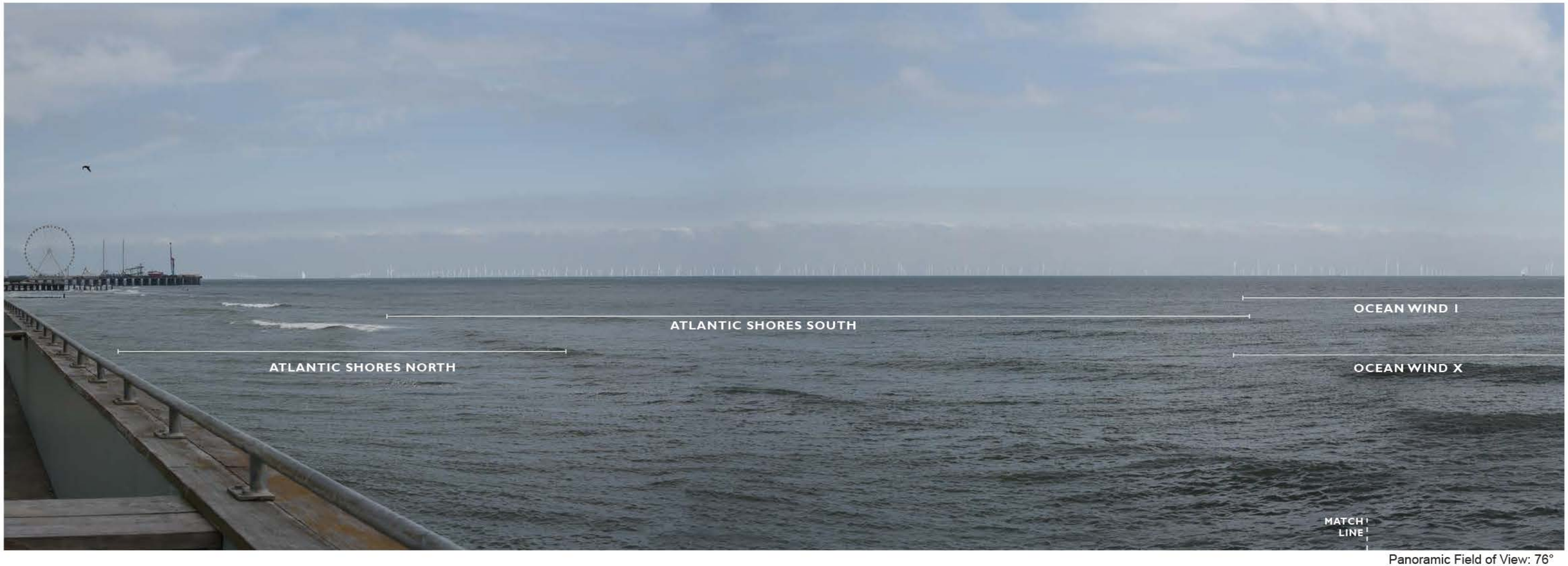
Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

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3B: Northeast view showing all visible projects

Playground Pier, Atlantic City

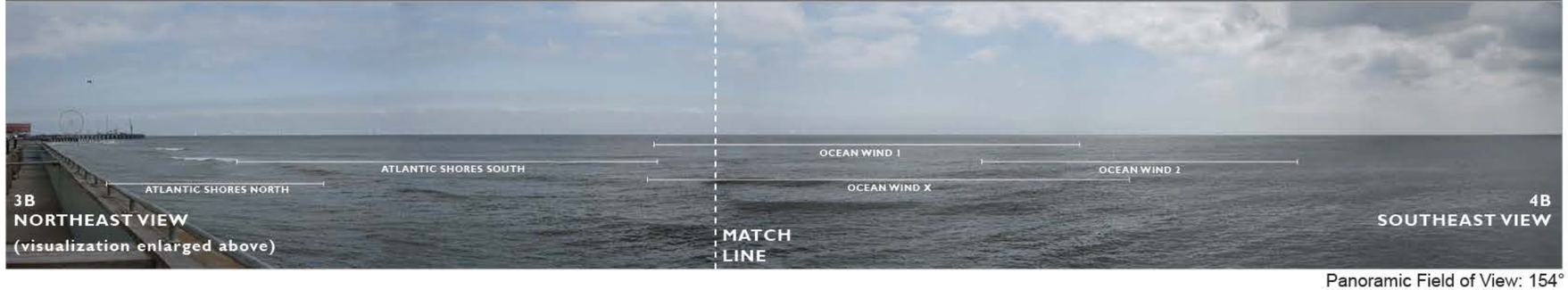


Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

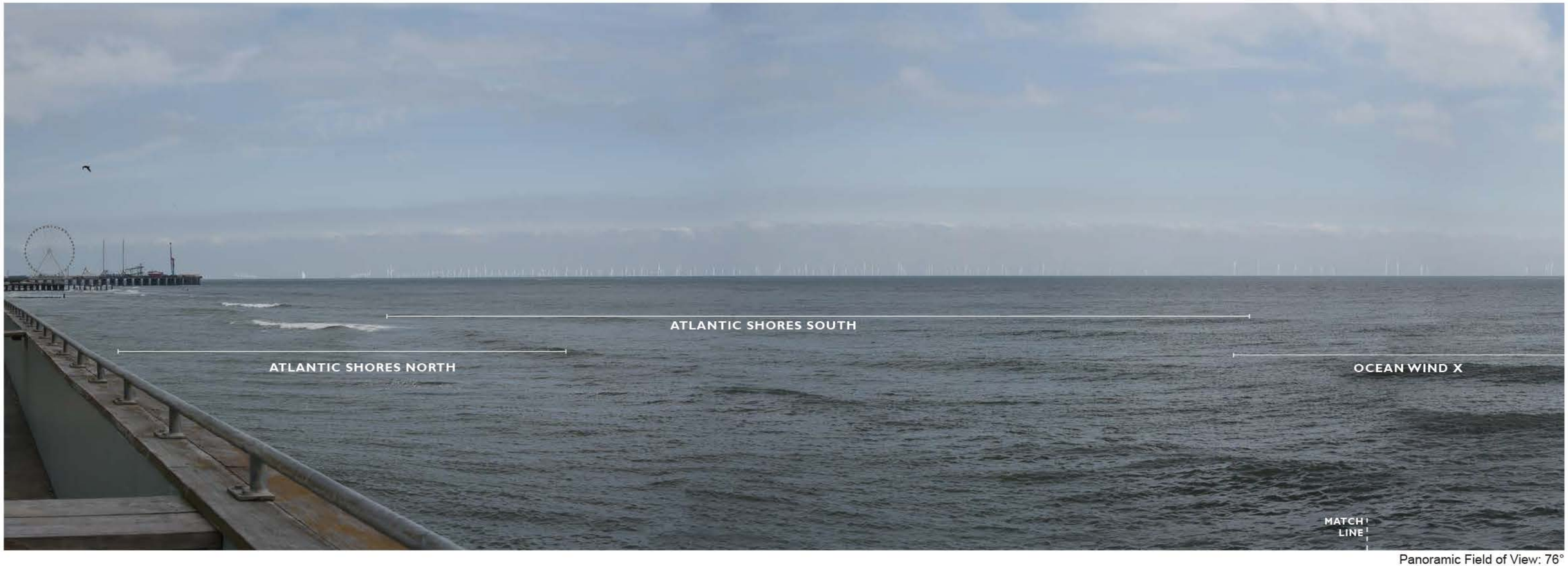
Turbine rotors and blades are modeled in all projects to face southwest in accordance with prevailing winds.

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

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
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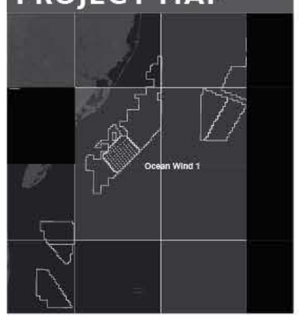
4A: Southeast view showing only Ocean Wind 1

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

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4B: Southeast view showing all visible projects

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

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

Playground Pier, Atlantic City



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

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

VISUALIZATIONS

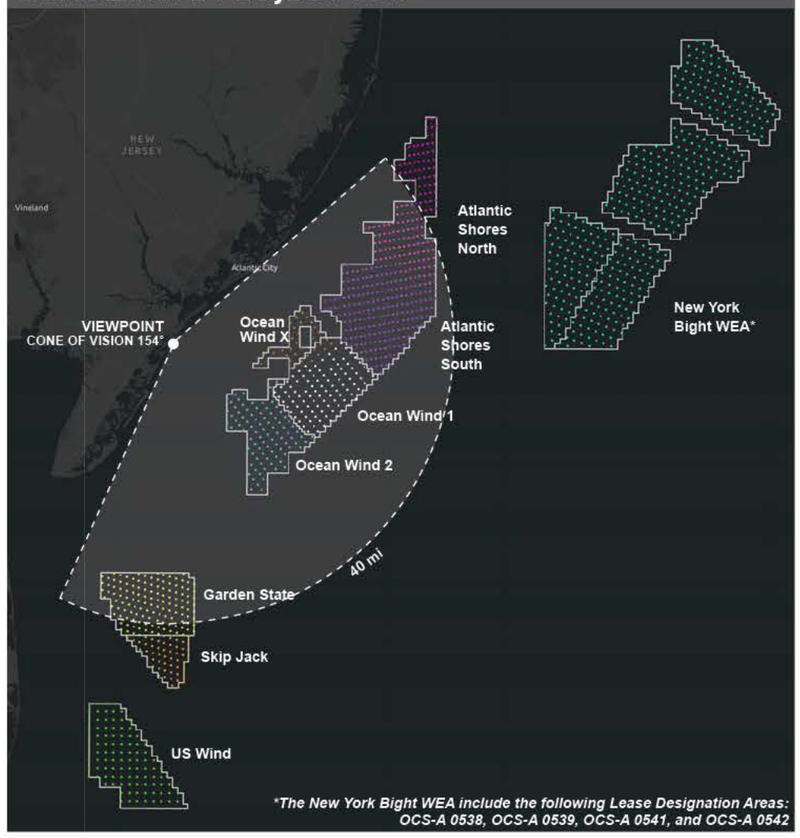
VISUALIZATIONS INCLUDED	
5A	Northeast view: only Ocean Wind 1
5B	Northeast view: all visible projects
5C	Northeast view: all visible projects except Ocean Wind 1
6A	Southeast view: only Ocean Wind 1
6B	Southeast view: all visible projects
6C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

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

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

CUMULATIVE PROJECT MAP



WIND DIRECTION

NORTHWEST

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

VIEWPOINT INFORMATION

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

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

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

COMPLETE PANORAMIC VIEW



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

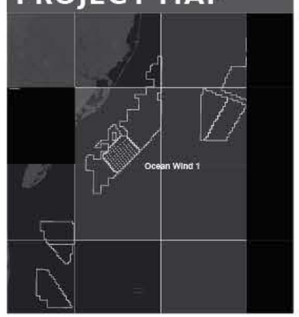
5A: Northeast view showing only Ocean Wind 1

Corson's Inlet State Park, Ocean City



Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

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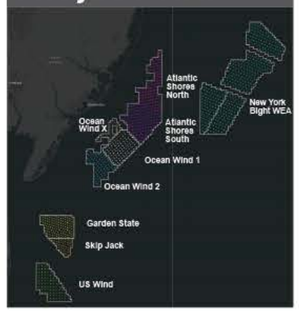
5B: Northeast view showing all visible projects

Corson's Inlet State Park, Ocean City



Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

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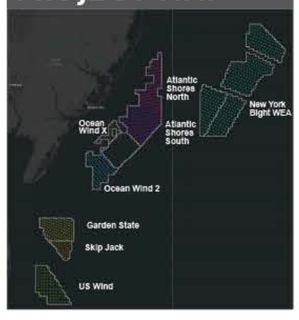
5C: Northeast view showing all projects except Ocean Wind 1

Corson's Inlet State Park, Ocean City



Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
An Ørsted Initiative

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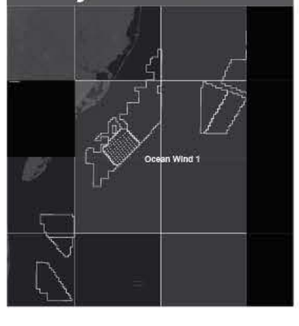
6A: Southeast view showing only Ocean Wind 1

Corson's Inlet State Park, Ocean City



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
An Ørsted Initiative

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6B: Southeast view showing all visible projects

Corson's Inlet State Park



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

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

Corson's Inlet State Park



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

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

VISUALIZATIONS

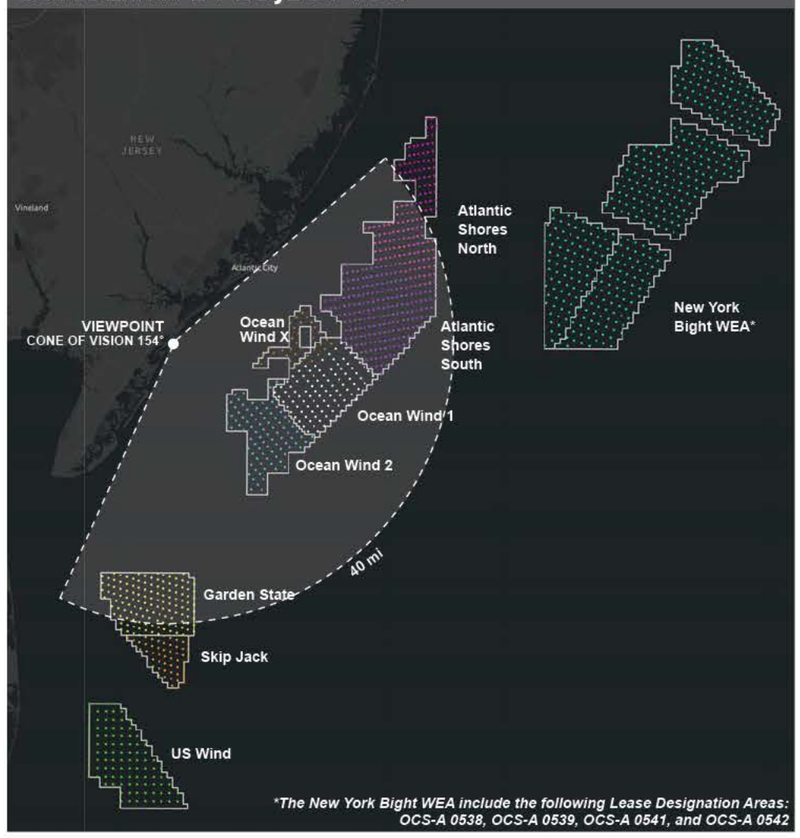
VISUALIZATIONS INCLUDED	
5A	Northeast view: only Ocean Wind 1
5B	Northeast view: all visible projects
5C	Northeast view: all visible projects except Ocean Wind 1
6A	Southeast view: only Ocean Wind 1
6B	Southeast view: all visible projects
6C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

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

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

CUMULATIVE PROJECT MAP



WIND DIRECTION

SOUTHWEST

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

VIEWPOINT INFORMATION

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

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

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

COMPLETE PANORAMIC VIEW



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

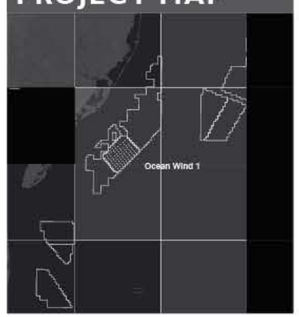
5A: Northeast view showing only Ocean Wind 1

Corson's Inlet State Park, Ocean City



Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
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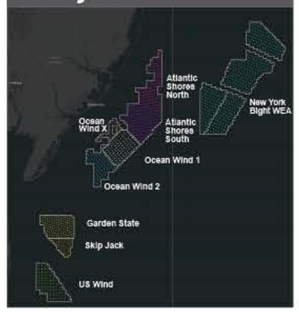
5B: Northeast view showing all visible projects

Corson's Inlet State Park, Ocean City



Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

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

Corson's Inlet State Park, Ocean City



Panoramic Field of View: 80°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

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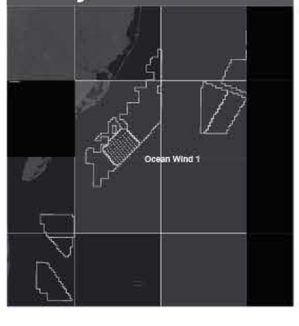
6A: Southeast view showing only Ocean Wind 1

Corson's Inlet State Park, Ocean City



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
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6B: Southeast view showing all visible projects

Corson's Inlet State Park



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

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

Corson's Inlet State Park



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
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VIEWPOINT
Stone Harbor Beach Access, Stone Harbor

VISUALIZATIONS

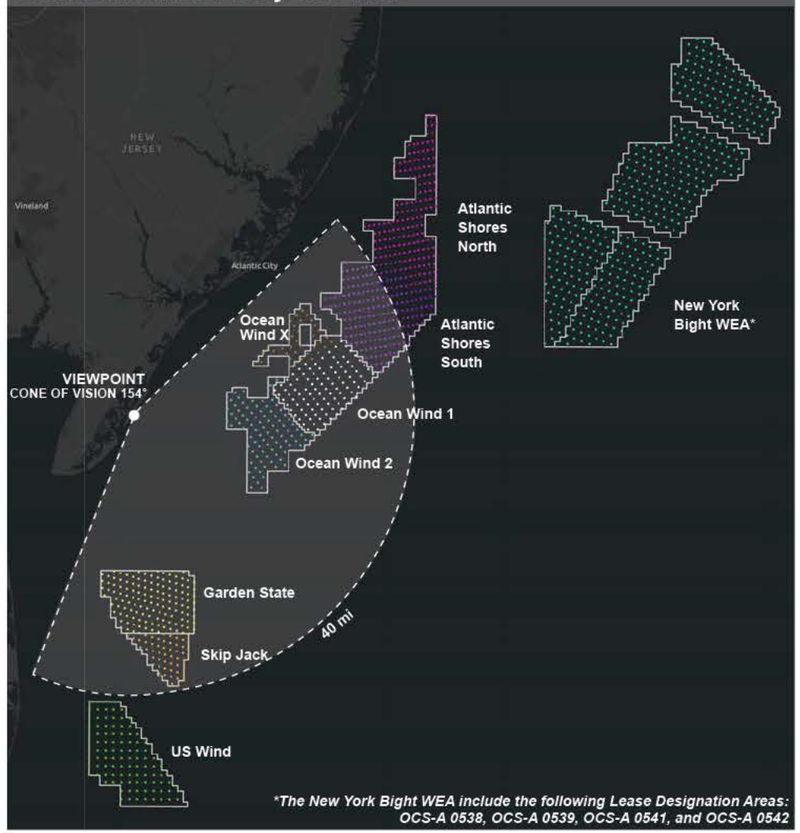
VISUALIZATIONS INCLUDED	
7A	Northeast view: only Ocean Wind 1
7B	Northeast view: all visible projects
7C	Northeast view: all visible projects except Ocean Wind 1
8A	Southeast view: only Ocean Wind 1
8B	Southeast view: all visible projects
8C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

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

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

CUMULATIVE PROJECT MAP



WIND DIRECTION

NORTHWEST

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

VIEWPOINT INFORMATION

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

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

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

COMPLETE PANORAMIC VIEW



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

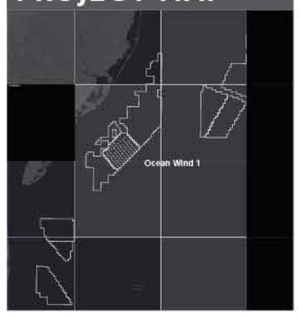
7A: Northeast view showing only Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
An Ørsted Initiative

tjd&a

7B: Northeast view showing all visible projects

Stone Harbor Beach Access, Stone Harbor



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
An Ørsted Initiative

tjd&a

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

Stone Harbor Beach Access, Stone Harbor



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
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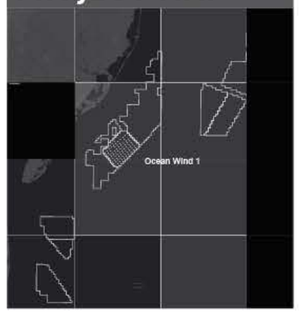
8A: Southeast view showing only Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
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8B: Southeast view showing all visible projects

Stone Harbor Beach Access, Stone Harbor



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

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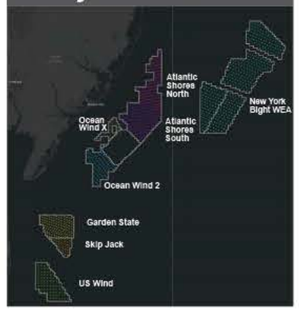
8C: Southeast view showing all projects except Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

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

Ocean Wind
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VIEWPOINT
Stone Harbor Beach Access, Stone Harbor

VISUALIZATIONS

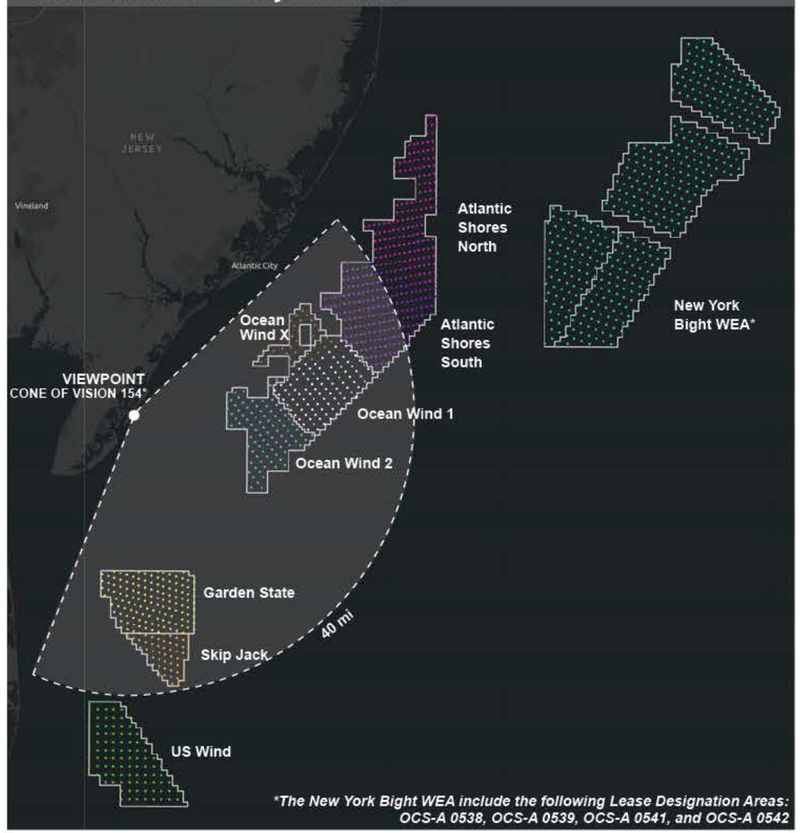
VISUALIZATIONS INCLUDED	
7A	Northeast view: only Ocean Wind 1
7B	Northeast view: all visible projects
7C	Northeast view: all visible projects except Ocean Wind 1
8A	Southeast view: only Ocean Wind 1
8B	Southeast view: all visible projects
8C	Southeast view: all visible projects except Ocean Wind 1

CUMULATIVE PROJECT INFORMATION

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

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

CUMULATIVE PROJECT MAP



WIND DIRECTION

SOUTHWEST

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

VIEWPOINT INFORMATION

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

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

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

COMPLETE PANORAMIC VIEW



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

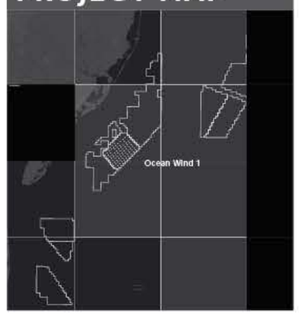
7A: Northeast view showing only Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

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7B: Northeast view showing all visible projects

Stone Harbor Beach Access, Stone Harbor



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

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

Stone Harbor Beach Access, Stone Harbor



Panoramic Field of View: 76°

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

tjd&a

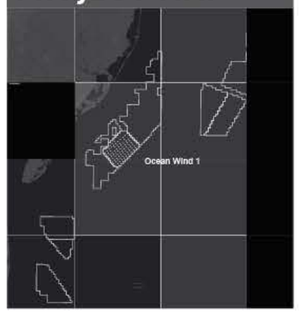
8A: Southeast view showing only Ocean Wind 1

Stone Harbor Beach Access, Stone Harbor



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

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8B: Southeast view showing all visible projects

Stone Harbor Beach Access, Stone Harbor



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

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

Stone Harbor Beach Access, Stone Harbor



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

PROJECT MAP



COMPLETE PANORAMIC VIEW



Panoramic Field of View: 154°

WIND DIRECTION

SOUTHWEST

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

Ocean Wind
An Ørsted Initiative

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ATTACHMENT M-3
VISUAL SIMULATIONS OF ACTION ALTERNATIVES

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V06. Great Bay Boulevard Wildlife Management Area

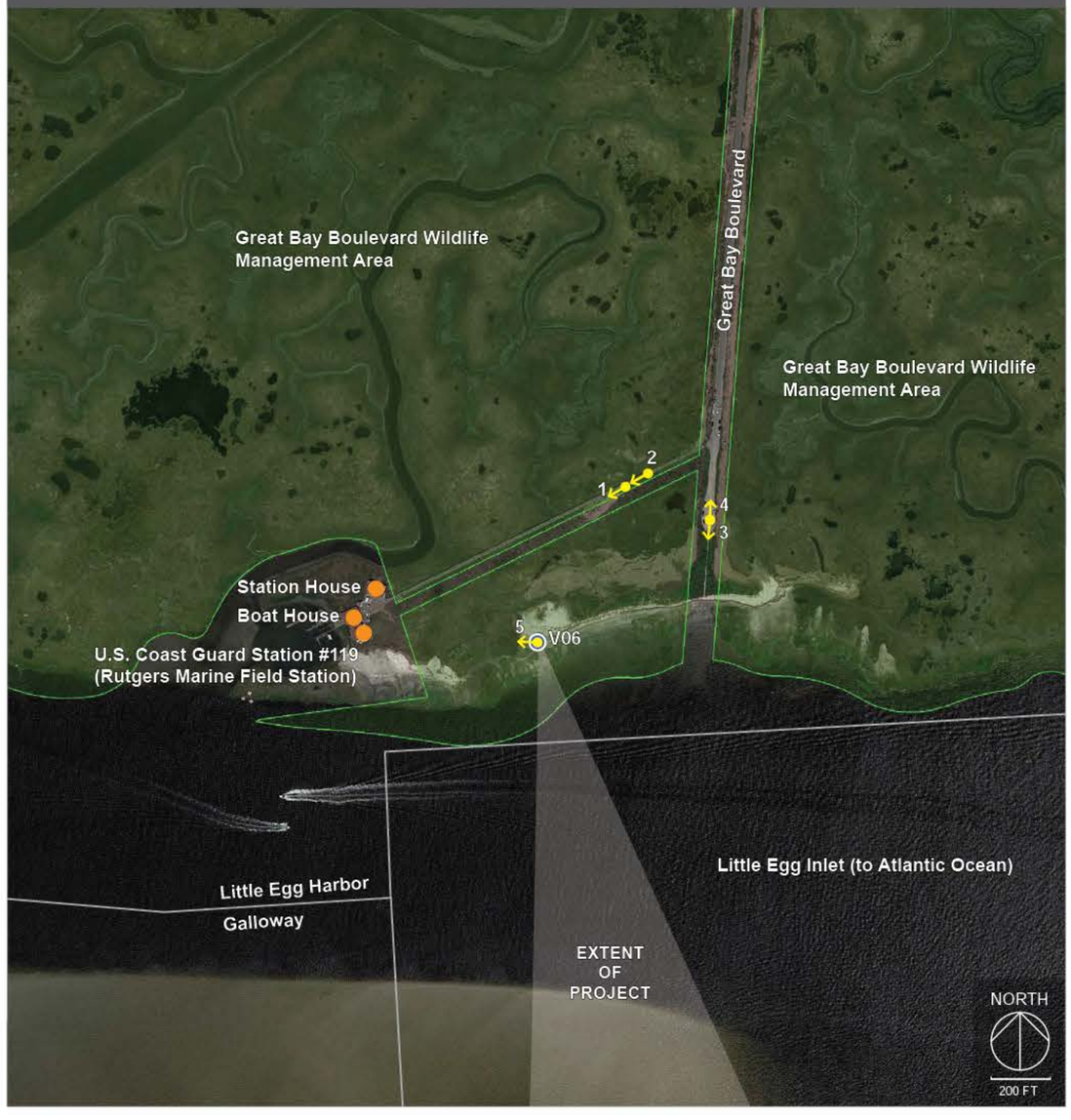
Little Egg Harbor Township, Ocean County

LANDSCAPE INFORMATION

Field Identification Number. 274
Context Image Dates. 20 September 2018
Site Map Aerial Date. 24 May 2018
Physiographic Area. Marsh + Bay
Landscape Similarity Zone (LSZ). Marshland

Scenic Resources. Viewpoint from Great Bay Boulevard Wildlife Management Area. Viewpoint near three structures eligible for the NRHP: U.S. Coast Guard Station #119 (Rutgers Marine Field Station); Station House; and Boat House.

SITE MAP



CONTEXT IMAGES



1. View looking southwest from access gate on boardwalk toward U.S. Coast Guard Station #119 (Rutgers Marine Field Station). Atlantic City skyline is visible on left side of image.



2. View looking southwest from boardwalk toward U.S. Coast Guard Station #119 (Rutgers Marine Field Station) access gate.



3. View looking south from end of Great Bay Boulevard toward beach access.



4. View looking north from the end of Great Bay Boulevard.



5. View looking west from visualization location on beach toward U.S. Coast Guard Station #119 (Rutgers Marine Field Station).

V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

ORIGINAL LAYOUT VISUALIZATION

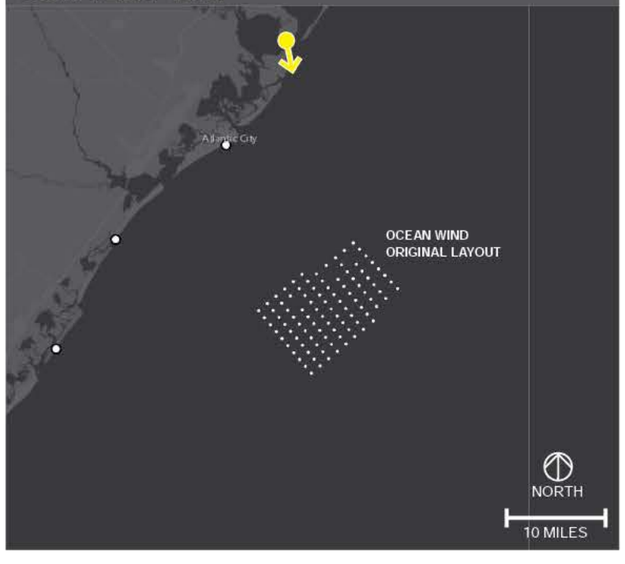
Ocean Wind
An Ørsted Initiative

PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP

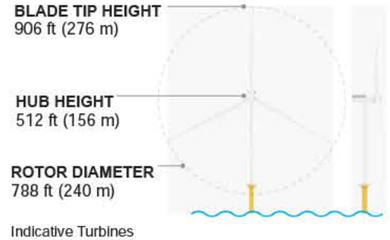


ALTERNATIVES ANALYSIS

Original Layout: Turbine layout submitted in COP.

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	20 September 2018
Time	9:40 AM
Latitude	39.508809°
Longitude	-74.322008°
Direction of View	South
LSZ	Marshland

PHOTO

Field ID	274
Camera	NIKON D5500
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	7′

PROJECT INFRASTRUCTURE

Number of Turbines	99
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	72°
Humidity	73%
Visibility	10 mi
Wind Direction	E
Wind Speed	7 mph
Weather Conditions	Overcast

PROJECT VIEW

Distance to Project	21.85 miles
Project Horizontal Field of View (HFOV)	30°

V06

Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

OCEAN WIND

tjd&a Landscape Architects & Planners

V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

ALTERNATIVE B-1 VISUALIZATION

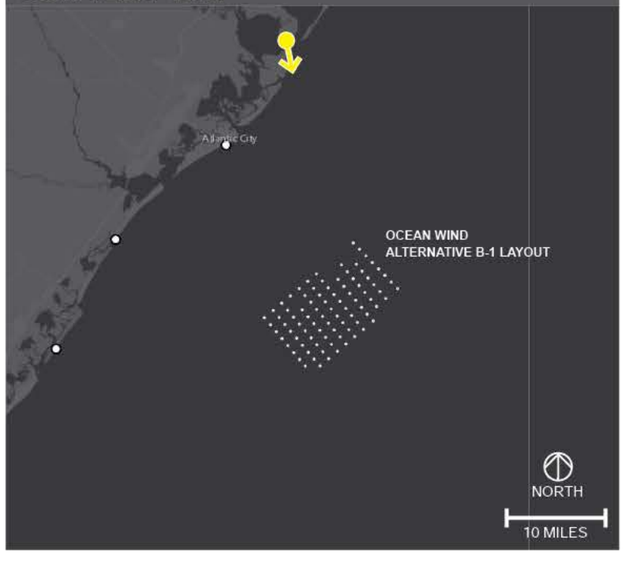
Ocean Wind
An Ørsted Initiative

PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP

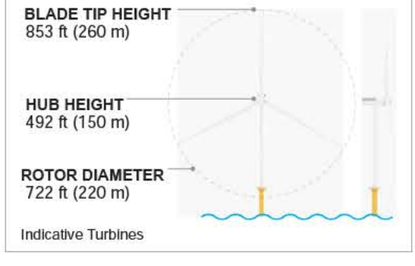


ALTERNATIVES ANALYSIS

Alternative B-1: Exclusion of up to nine turbine positions in the first two shoreward strings of turbines that includes F01 to K01 and B02 to D02.

Turbine dimensions: 853 ft blade tip height, 492 ft hub height, 722 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	20 September 2018
Time	9:40 AM
Latitude	39.508809°
Longitude	-74.322008°
Direction of View	South
LSZ	Marshland

PHOTO

Field ID	274
Camera	NIKON D5500
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	7′

PROJECT INFRASTRUCTURE

Number of Turbines	89
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	72°
Humidity	73%
Visibility	10 mi
Wind Direction	E
Wind Speed	7 mph
Weather Conditions	Overcast

PROJECT VIEW

Distance to Project	21.85 miles
Project Horizontal Field of View (HFOV)	28°

V06

Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

OCEAN WIND

tjd&a Landscape Architects & Planners

V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

ALTERNATIVE B-2 VISUALIZATION

Ocean Wind
An Ørsted Initiative

PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP

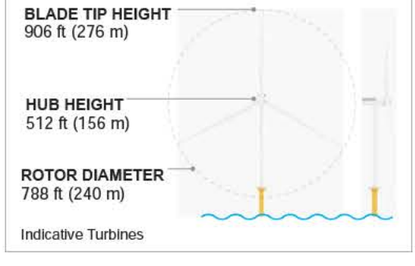


ALTERNATIVES ANALYSIS

Alternative B-2: Exclusion of up to 19 turbine positions in the first three shoreward strings of turbines that includes F01 to K01, A02 to K02, A03 and C03.

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	20 September 2018
Time	9:40 AM
Latitude	39.508809°
Longitude	-74.322008°
Direction of View	South
LSZ	Marshland

PHOTO

Field ID	274
Camera	NIKON D5500
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	7′

PROJECT INFRASTRUCTURE

Number of Turbines	79
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	72°
Humidity	73%
Visibility	10 mi
Wind Direction	E
Wind Speed	7 mph
Weather Conditions	Overcast

PROJECT VIEW

Distance to Project	23.53 miles
Project Horizontal Field of View (HFOV)	27°

V06

Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

OCEAN WIND

tjd&a Landscape Architects & Planners

V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

ALTERNATIVE C-1 VISUALIZATION

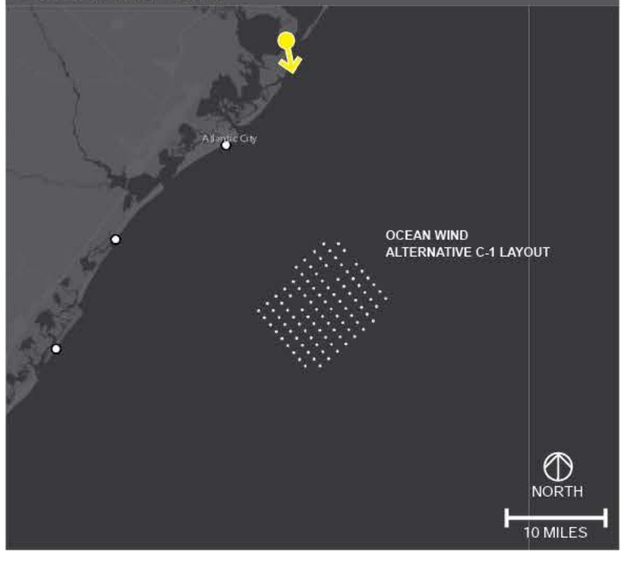
Ocean Wind
An Ørsted Initiative

PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP

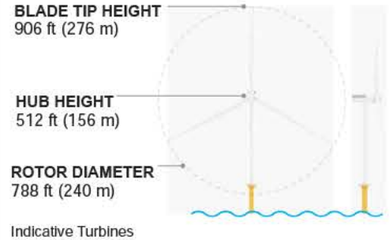


ALTERNATIVES ANALYSIS

Alternative C-1: Exclusion of eight turbine positions (A02 to A09), relocation of eight turbine positions to the northern portion of the Ocean Wind Lease Area (C00 to F00 and B01 to E01).

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	20 September 2018
Time	9:40 AM
Latitude	39.508809°
Longitude	-74.322008°
Direction of View	South
LSZ	Marshland

PHOTO

Field ID	274
Camera	NIKON D5500
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	7′

PROJECT INFRASTRUCTURE

Number of Turbines	98
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	72°
Humidity	73%
Visibility	10 mi
Wind Direction	E
Wind Speed	7 mph
Weather Conditions	Overcast

PROJECT VIEW

Distance to Project	21.19 miles
Project Horizontal Field of View (HFOV)	27°

V06

Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

OCEAN WIND

tjd&a Landscape Architects & Planners

V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

EXISTING CONDITIONS

Ocean Wind
An Ørsted Initiative



NORMAL VIEW EXISTING IMAGE

V06

Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

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V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

ORIGINAL LAYOUT VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW VISUALIZATION

V06

Great Bay Boulevard Wildlife Management Area

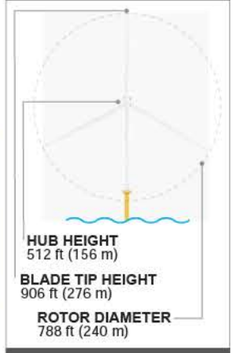
Little Egg Harbor Township, Ocean County

ORIGINAL VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

ALTERNATIVE B-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW VISUALIZATION

V06

Great Bay Boulevard Wildlife Management Area

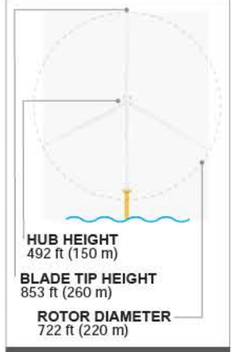
Little Egg Harbor Township, Ocean County

ALTERNATIVE B-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

ALTERNATIVE B-2 VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW VISUALIZATION

V06

Great Bay Boulevard Wildlife Management Area

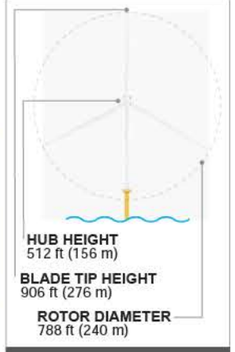
Little Egg Harbor Township, Ocean County

ALTERNATIVE B-2 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

tjd&a

1 December 2021

V06. Great Bay Boulevard Wildlife Management Area

Little Egg Harbor Township, Ocean County

ALTERNATIVE C-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW VISUALIZATION

V06

Great Bay Boulevard Wildlife Management Area

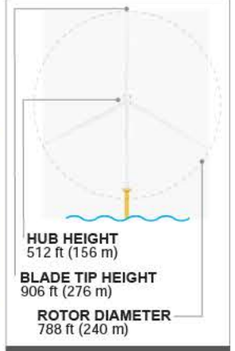
Little Egg Harbor Township, Ocean County

ALTERNATIVE C-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

tjd&a

1 December 2021

V14. Playground Pier

Atlantic City, Atlantic County

LANDSCAPE INFORMATION

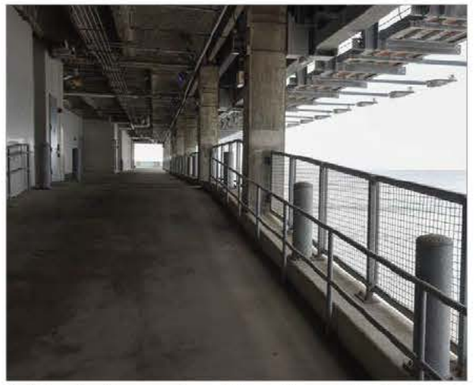
Field Identification Number. 200
Context Image Dates. 19 September 2018
Site Map Aerial Date. 26 August 2016
Physiographic Area. Shoreline
Landscape Similarity Zone (LSZ). Boardwalk

Scenic Resources. Visualization near Atlantic City Convention Hall (NHL); Shelburne Hotel (listed on NRHP); Atlantic City Boardwalk Historic District (identified historic property - no official NRHP eligibility determination).

SITE MAP



CONTEXT IMAGES



1. View looking southeast from the west side of Playground Pier toward the end of the pier.



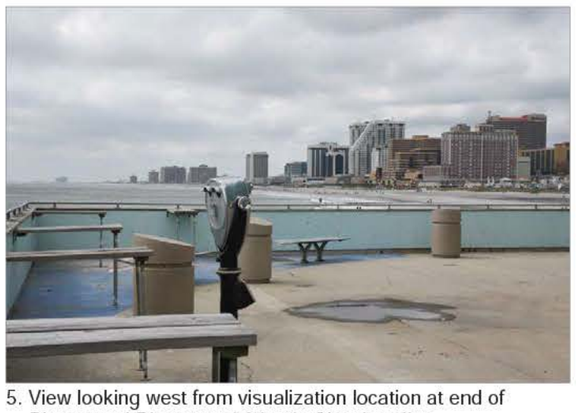
2. View looking northeast from visualization location at end of Playground Pier toward Central Pier and Steel Pier.



3. View looking west from end of Playground Pier toward Atlantic City. The Atlantic City Convention Hall (NHL) is visible on the right side of the image.



4. View looking northeast from end of playground pier toward Central Pier and Steel Pier.



5. View looking west from visualization location at end of Playground Pier toward Atlantic City shoreline.

V14. Playground Pier

Atlantic City, Atlantic County

ORIGINAL LAYOUT VISUALIZATION

Ocean Wind
An Ørsted Initiative

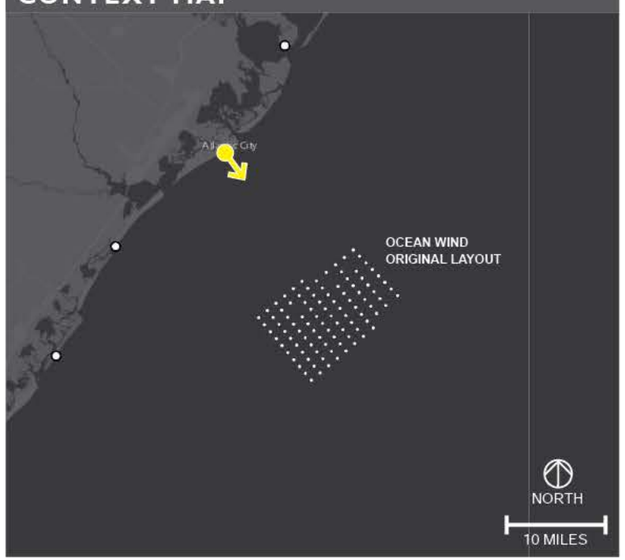
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

CONTEXT MAP

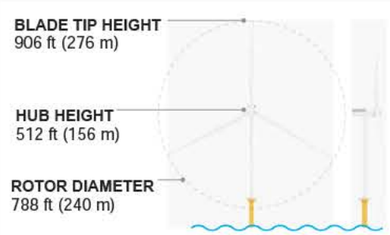


ALTERNATIVES ANALYSIS

Original Layout: Turbine layout submitted in COP.

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	19 September 2018
Time	12:28 PM
Latitude	39.352591°
Longitude	-74.433571°
Direction of View	Southeast
LSZ	Boardwalk

PHOTO

Field ID	200
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	24'

PROJECT INFRASTRUCTURE

Number of Turbines	99
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	79°
Humidity	77%
Visibility	10 mi
Wind Direction	N
Wind Speed	7 mph
Weather Conditions	Broken clouds

PROJECT VIEW

Distance to Project	15.21 miles
Project Horizontal Field of View (HFOV)	41°

V14

Playground Pier

Atlantic City, Atlantic County

OCEAN WIND

tjd&a Landscape Architects & Planners

V14. Playground Pier

Atlantic City, Atlantic County

ALTERNATIVE B-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative

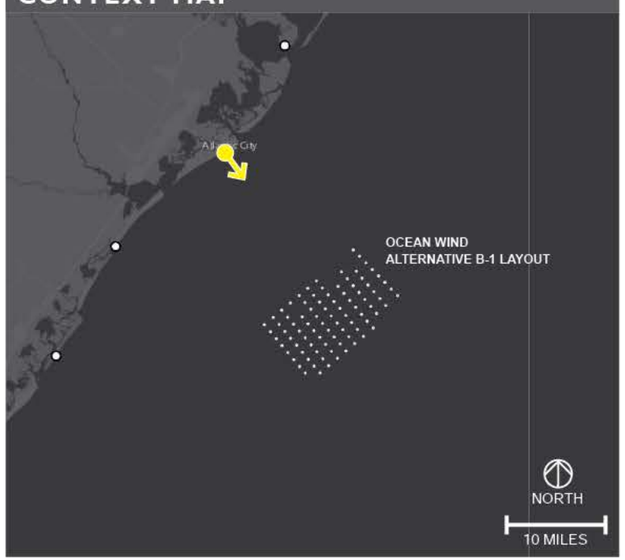
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

CONTEXT MAP

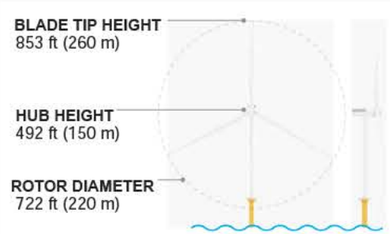


ALTERNATIVES ANALYSIS

Alternative B-1: Exclusion of up to nine turbine positions in the first two shoreward strings of turbines that includes F01 to K01 and B02 to D02.

Turbine dimensions: 853 ft blade tip height, 492 ft hub height, 722 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	19 September 2018
Time	12:28 PM
Latitude	39.352591°
Longitude	-74.433571°
Direction of View	Southeast
LSZ	Boardwalk

PHOTO

Field ID	200
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	24'

PROJECT INFRASTRUCTURE

Number of Turbines	89
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	79°
Humidity	77%
Visibility	10 mi
Wind Direction	N
Wind Speed	7 mph
Weather Conditions	Broken clouds

PROJECT VIEW

Distance to Project	15.97 miles
Project Horizontal Field of View (HFOV)	40°

V14

Playground Pier

Atlantic City, Atlantic County

OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

ALTERNATIVE B-2 VISUALIZATION

Ocean Wind
An Ørsted Initiative

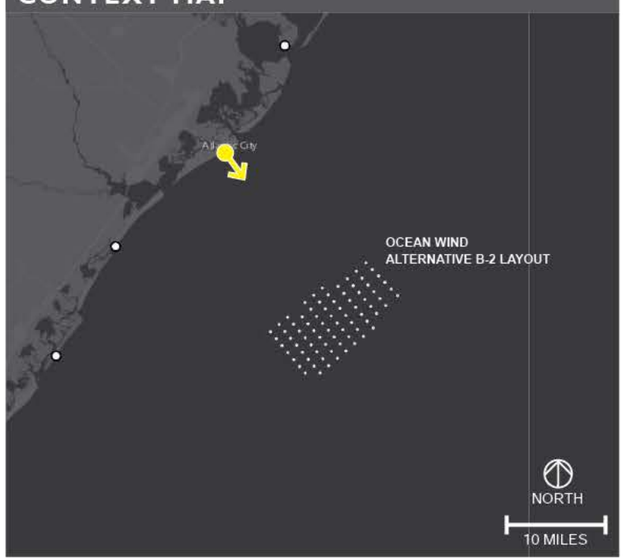
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

CONTEXT MAP

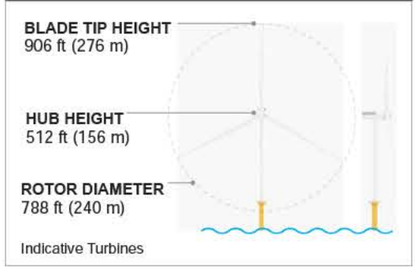


ALTERNATIVES ANALYSIS

Alternative B-2: Exclusion of up to 19 turbine positions in the first three shoreward strings of turbines that includes F01 to K01, A02 to K02, A03 and C03.

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	19 September 2018
Time	12:28 PM
Latitude	39.352591°
Longitude	-74.433571°
Direction of View	Southeast
LSZ	Boardwalk

PHOTO

Field ID	200
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	24'

PROJECT INFRASTRUCTURE

Number of Turbines	79
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	79°
Humidity	77%
Visibility	10 mi
Wind Direction	N
Wind Speed	7 mph
Weather Conditions	Broken clouds

PROJECT VIEW

Distance to Project	18.11 miles
Project Horizontal Field of View (HFOV)	38°

V14

Playground Pier

Atlantic City, Atlantic County

OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

ALTERNATIVE C-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative

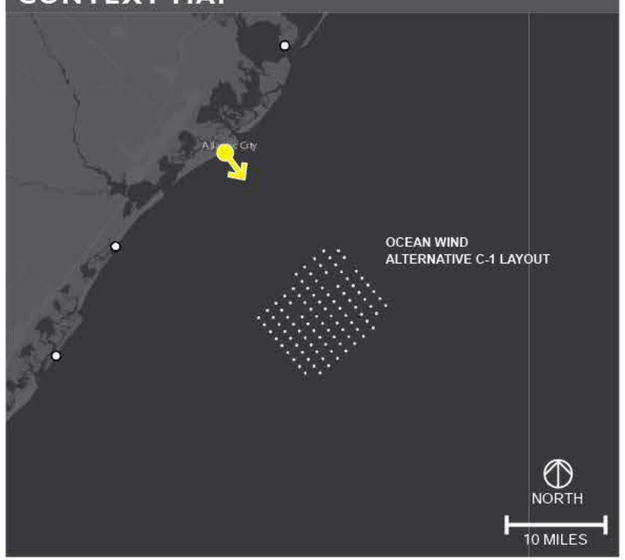
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

CONTEXT MAP

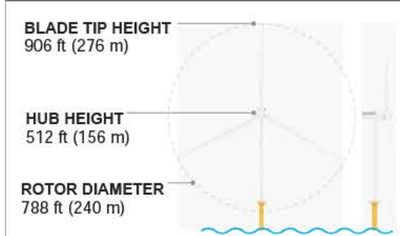


ALTERNATIVES ANALYSIS

Alternative C-1: Exclusion of eight turbine positions (A02 to A09), relocation of eight turbine positions to the northern portion of the Ocean Wind Lease Area (C00 to F00 and B01 to E01).

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	19 September 2018
Time	12:28 PM
Latitude	39.352591°
Longitude	-74.433571°
Direction of View	Southeast
LSZ	Boardwalk

PHOTO

Field ID	200
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	24'

PROJECT INFRASTRUCTURE

Number of Turbines	98
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	79°
Humidity	77%
Visibility	10 mi
Wind Direction	N
Wind Speed	7 mph
Weather Conditions	Broken clouds

PROJECT VIEW

Distance to Project	14.07 miles
Project Horizontal Field of View (HFOV)	35°

V14

Playground Pier

Atlantic City, Atlantic County

OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

EXISTING CONDITIONS



NORMAL VIEW I EXISTING IMAGE

V14

Playground Pier

Atlantic City, Atlantic County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

ORIGINAL LAYOUT VISUALIZATION

Ocean Wind
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NORMAL VIEW I VISUALIZATION

V14

Playground Pier

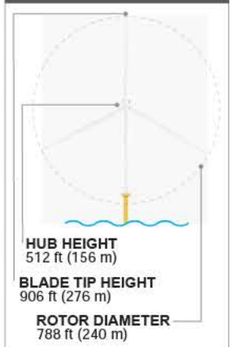
Atlantic City, Atlantic County

ORIGINAL VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

ALTERNATIVE B-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW I VISUALIZATION

V14

Playground Pier

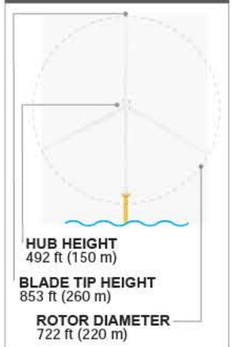
Atlantic City, Atlantic County

ALTERNATIVE B-1 VISUALIZATION

VIEW NOTE

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TURBINE DIMENSIONS



OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

Ocean Wind
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NORMAL VIEW I VISUALIZATION

V14

Playground Pier

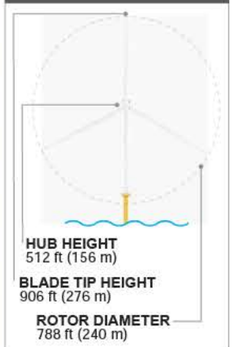
Atlantic City, Atlantic County

ALTERNATIVE B-2 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



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V14. Playground Pier

Atlantic City, Atlantic County

Ocean Wind
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NORMAL VIEW I VISUALIZATION

V14

Playground Pier

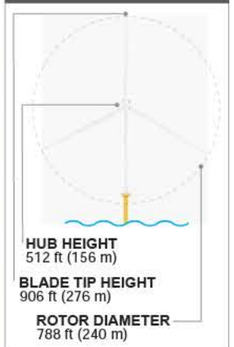
Atlantic City, Atlantic County

ALTERNATIVE C-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

EXISTING CONDITIONS

Ocean Wind
An Ørsted Initiative



NORMAL VIEW 2
EXISTING IMAGE

V14

Playground Pier

Atlantic City,
Atlantic County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

ORIGINAL LAYOUT VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW 2 VISUALIZATION

V14

Playground Pier

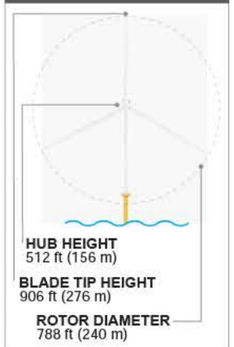
Atlantic City, Atlantic County

ORIGINAL VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW 2 VISUALIZATION

V14

Playground Pier

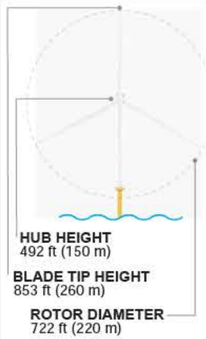
Atlantic City, Atlantic County

ALTERNATIVE B-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW 2 VISUALIZATION

V14

Playground Pier

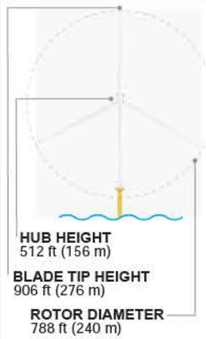
Atlantic City, Atlantic County

ALTERNATIVE B-2 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V14. Playground Pier

Atlantic City, Atlantic County

ALTERNATIVE C-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW 2 VISUALIZATION

V14

Playground Pier

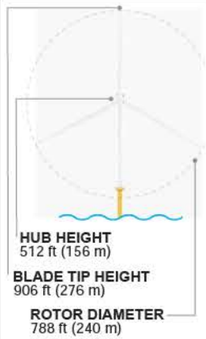
Atlantic City, Atlantic County

ALTERNATIVE C-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

tjd&a

1 December 2021

V19. Corson's Inlet State Park

Ocean City, Cape May County

LANDSCAPE INFORMATION

Field Identification Number. 140
Context Image Dates. 15 August 2018
Site Map Aerial Date. 26 July 2018
Physiographic Area. Shoreline
Landscape Similarity Zone (LSZ). Beachfront

Scenic Resources. Viewpoint from Corson's Inlet State Park, near Cape May Coastal Wetlands Wildlife Management Area.

SITE MAP



CONTEXT IMAGES



1. View looking northeast from Rush Chattin Bridge toward Corson's Inlet State Park.



2. View looking northeast from beachfront north of state park.



3. View looking southeast from end of trail connecting state park parking lot to beachfront.



4. View looking southwest from beach in state park toward Strathmere.



5. View looking northeast from state park beach toward Ocean City.



6. View looking southwest from west side of state park toward Corson's Inlet Bridge and Strathmere Bay.

V19. Corson's Inlet State Park

Ocean City, Cape May County

ORIGINAL LAYOUT VISUALIZATION

Ocean Wind
An Ørsted Initiative

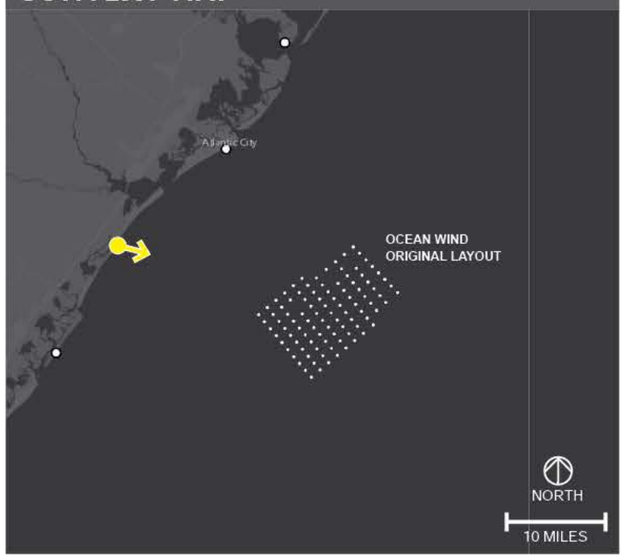
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

CONTEXT MAP

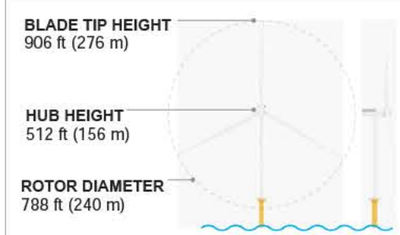


ALTERNATIVES ANALYSIS

Original Layout: Turbine layout submitted in COP.

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	15 August 2018
Time	4:55 PM
Latitude	39.213474°
Longitude	-74.642627°
Direction of View	Southeast
LSZ	Beachfront

PHOTO

Field ID	140
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	15'

PROJECT INFRASTRUCTURE

Number of Turbines	99
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	90°
Humidity	45%
Visibility	10 mi
Wind Direction	W
Wind Speed	12 mph
Weather Conditions	Sunny

PROJECT VIEW

Distance to Project	16.22 miles
Project Horizontal Field of View (HFOV)	34°

V19

Corson's Inlet State Park

Ocean City, Cape May County

OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

ALTERNATIVE B-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative

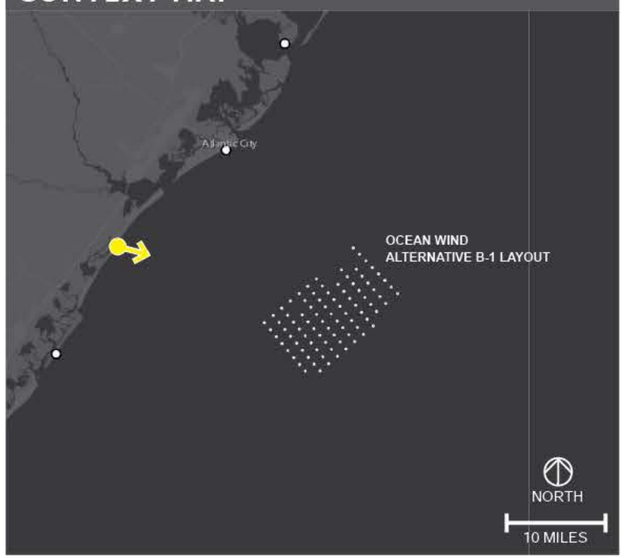
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

CONTEXT MAP

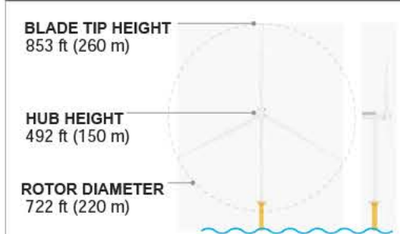


ALTERNATIVES ANALYSIS

Alternative B-1: Exclusion of up to nine turbine positions in the first two shoreward strings of turbines that includes F01 to K01 and B02 to D02.

Turbine dimensions: 853 ft blade tip height, 492 ft hub height, 722 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	15 August 2018
Time	4:55 PM
Latitude	39.213474°
Longitude	-74.642627°
Direction of View	Southeast
LSZ	Beachfront

PHOTO

Field ID	140
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	15'

PROJECT INFRASTRUCTURE

Number of Turbines	89
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	90°
Humidity	45%
Visibility	10 mi
Wind Direction	W
Wind Speed	12 mph
Weather Conditions	Sunny

PROJECT VIEW

Distance to Project	17.07 miles
Project Horizontal Field of View (HFOV)	33°

V19

Corson's Inlet State Park

Ocean City, Cape May County

OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

ALTERNATIVE B-2 VISUALIZATION

Ocean Wind
An Ørsted Initiative

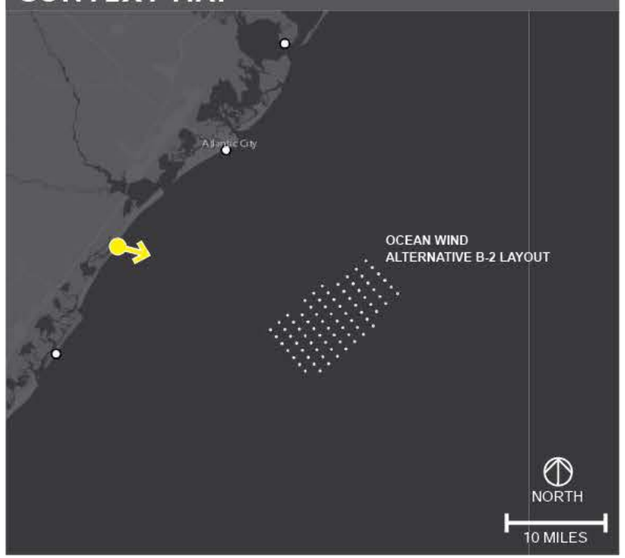
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

CONTEXT MAP

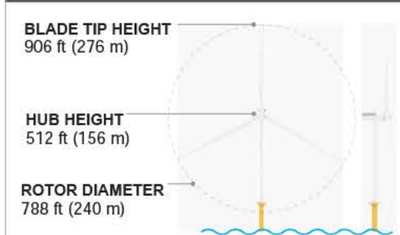


ALTERNATIVES ANALYSIS

Alternative B-2: Exclusion of up to 19 turbine positions in the first three shoreward strings of turbines that includes F01 to K01, A02 to K02, A03 and C03.

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	15 August 2018
Time	4:55 PM
Latitude	39.213474°
Longitude	-74.642627°
Direction of View	Southeast
LSZ	Beachfront

PHOTO

Field ID	140
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	15'

PROJECT INFRASTRUCTURE

Number of Turbines	79
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	90°
Humidity	45%
Visibility	10 mi
Wind Direction	W
Wind Speed	12 mph
Weather Conditions	Sunny

PROJECT VIEW

Distance to Project	17.92 miles
Project Horizontal Field of View (HFOV)	30°

V19

Corson's Inlet State Park

Ocean City, Cape May County

OCEAN WIND

tjd&a Landscape Architects & Planners

V19. Corson's Inlet State Park

Ocean City, Cape May County

ALTERNATIVE C-1 VISUALIZATION

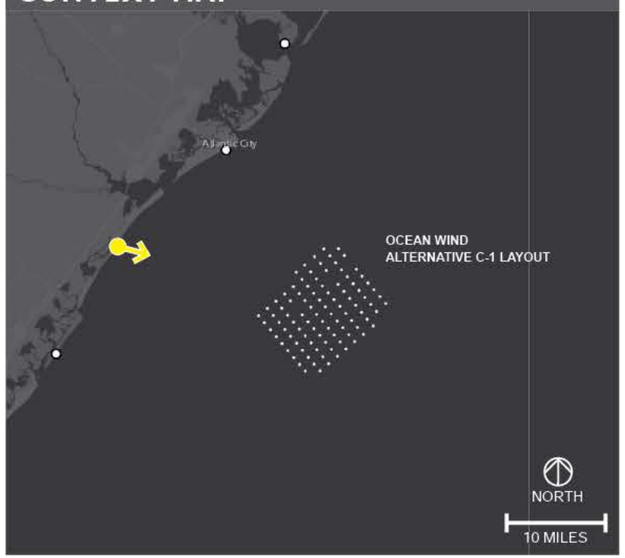
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

CONTEXT MAP

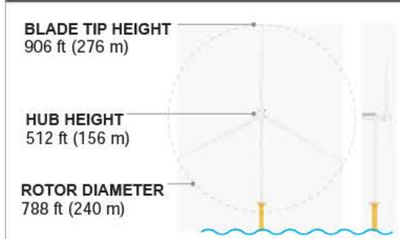


ALTERNATIVES ANALYSIS

Alternative C-1: Exclusion of eight turbine positions (A02 to A09), relocation of eight turbine positions to the northern portion of the Ocean Wind Lease Area (C00 to F00 and B01 to E01).

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	15 August 2018
Time	4:55 PM
Latitude	39.213474°
Longitude	-74.642627°
Direction of View	Southeast
LSZ	Beachfront

PHOTO

Field ID	140
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	15'

PROJECT INFRASTRUCTURE

Number of Turbines	98
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	90°
Humidity	45%
Visibility	10 mi
Wind Direction	W
Wind Speed	12 mph
Weather Conditions	Sunny

PROJECT VIEW

Distance to Project	16.22 miles
Project Horizontal Field of View (HFOV)	33°

V19

Corson's Inlet State Park

Ocean City, Cape May County

OCEAN WIND

tjd&a Landscape Architects & Planners

V19. Corson's Inlet State Park

Ocean City, Cape May County

EXISTING CONDITIONS



NORMAL VIEW I EXISTING IMAGE

V19

Corson's Inlet State Park

Ocean City, Cape May County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

ORIGINAL LAYOUT VISUALIZATION



NORMAL VIEW I VISUALIZATION

V19

Corson's Inlet State Park

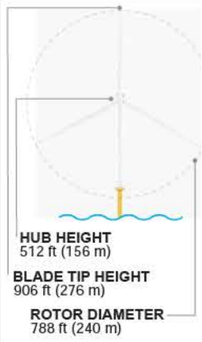
Ocean City, Cape May County

ORIGINAL VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

tjd&a

V19. Corson's Inlet State Park

Ocean City, Cape May County

ALTERNATIVE B-1 VISUALIZATION



NORMAL VIEW I VISUALIZATION

V19

Corson's Inlet State Park

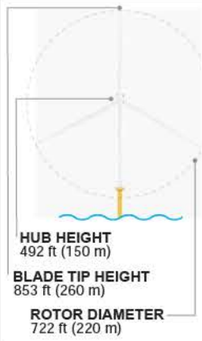
Ocean City, Cape May County

ALTERNATIVE B-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW I VISUALIZATION

V19

Corson's Inlet State Park

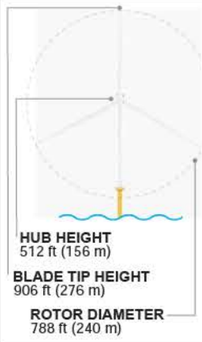
Ocean City, Cape May County

ALTERNATIVE B-2 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

ALTERNATIVE C-1 VISUALIZATION



NORMAL VIEW I VISUALIZATION

V19

Corson's Inlet State Park

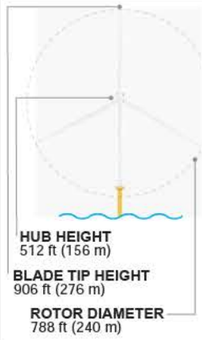
Ocean City, Cape May County

ALTERNATIVE C-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

EXISTING CONDITIONS



NORMAL VIEW 2
EXISTING IMAGE

V19

Corson's Inlet State Park

Ocean City, Cape May County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

ORIGINAL LAYOUT VISUALIZATION



NORMAL VIEW 2 VISUALIZATION

V19

Corson's Inlet State Park

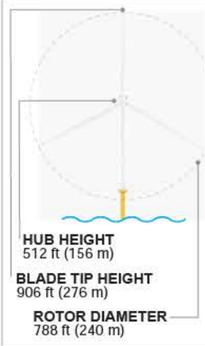
Ocean City, Cape May County

ORIGINAL VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

ALTERNATIVE B-1 VISUALIZATION

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NORMAL VIEW 2 VISUALIZATION

V19

Corson's Inlet State Park

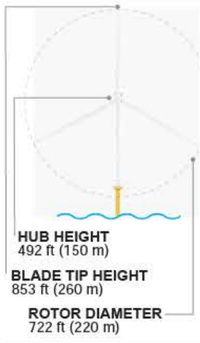
Ocean City, Cape May County

ALTERNATIVE B-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County



NORMAL VIEW 2 VISUALIZATION

V19

Corson's Inlet State Park

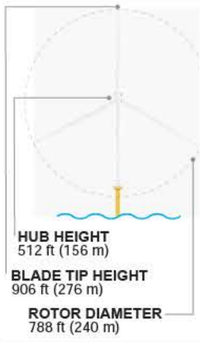
Ocean City, Cape May County

ALTERNATIVE B-2 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V19. Corson's Inlet State Park

Ocean City, Cape May County

ALTERNATIVE C-1 VISUALIZATION



NORMAL VIEW 2 VISUALIZATION

V19

Corson's Inlet State Park

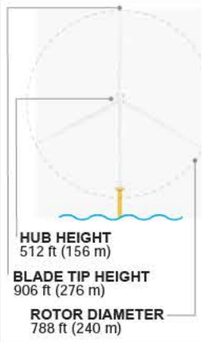
Ocean City, Cape May County

ALTERNATIVE C-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

LANDSCAPE INFORMATION

Field Identification Number. 59
Context Image Dates. 14 August 2018
Site Map Aerial Date. 26 July 2018
Physiographic Area. Shoreline
Landscape Similarity Zone (LSZ). Beachfront

Scenic Resources. Viewpoint from a public beach conservation area. Viewpoint is near Stone Harbor Downtown Commercial Block (identified historic district - no official NRHP eligibility designation).

SITE MAP



CONTEXT IMAGES



1. View looking southeast from the end of 95th Street toward Stone Harbor Beach Patrol, and public beach access.



2. View looking east toward gazebo on 95th Street beach access dune viewing platform.



3. View looking northwest toward 95th Street from 95th Street beach access dune viewing platform.



4. View looking southeast from 95th Street beach access dune viewing platform.



5. View looking southwest from visualization location on the 95th Street beach access ramp.

V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

ORIGINAL LAYOUT VISUALIZATION

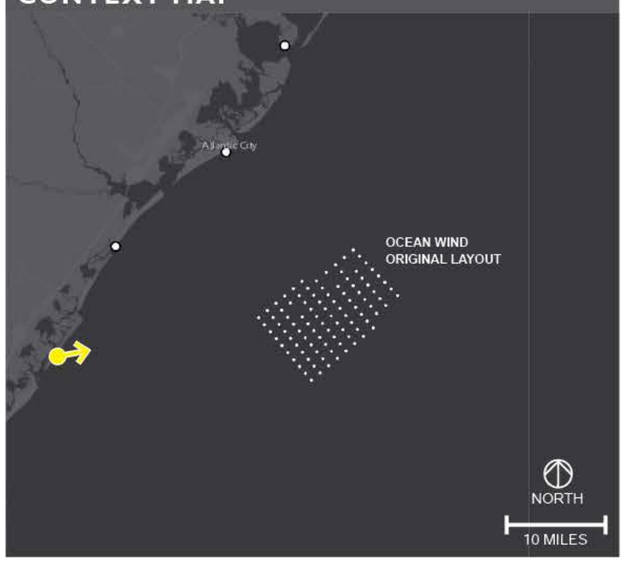
Ocean Wind
An Ørsted Initiative

PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP

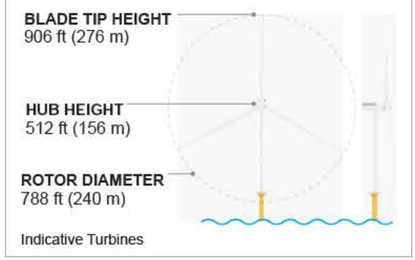


ALTERNATIVES ANALYSIS

Original Layout: Turbine layout submitted in COP.

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	14 August 2018
Time	4:22 PM
Latitude	39.052389°
Longitude	-74.754855°
Direction of View	East
LSZ	Beachfront

PHOTO

Field ID	59
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	13′

PROJECT INFRASTRUCTURE

Number of Turbines	99
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	83°
Humidity	63%
Visibility	10 mi
Wind Direction	W
Wind Speed	14 mph
Weather Conditions	Partly Cloudy

PROJECT VIEW

Distance to Project	20.93 miles
Project Horizontal Field of View (HFOV)	25°

V22

Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

OCEAN WIND

tjd&a Landscape Architects & Planners

V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

ALTERNATIVE B-1 VISUALIZATION

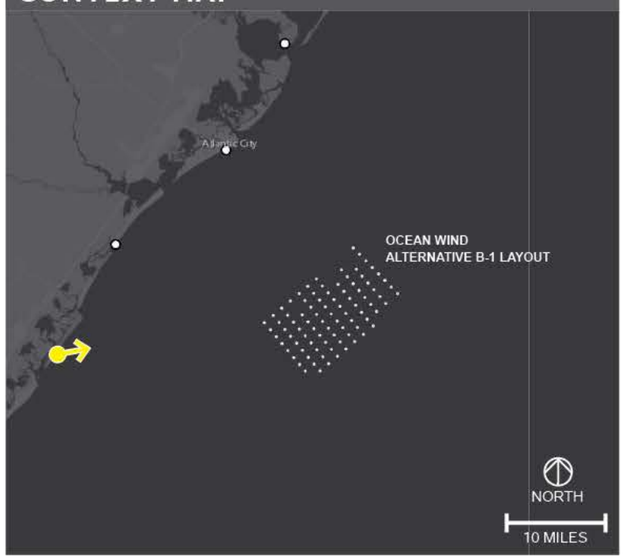
Ocean Wind
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PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP

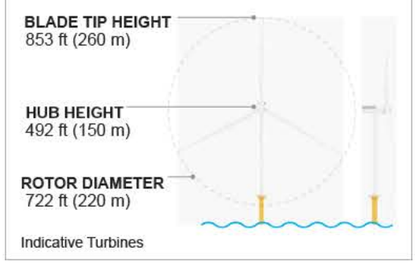


ALTERNATIVES ANALYSIS

Alternative B-1: Exclusion of up to nine turbine positions in the first two shoreward strings of turbines that includes F01 to K01 and B02 to D02.

Turbine dimensions: 853 ft blade tip height, 492 ft hub height, 722 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	14 August 2018
Time	4:22 PM
Latitude	39.052389°
Longitude	-74.754855°
Direction of View	East
LSZ	Beachfront

PHOTO

Field ID	59
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	13′

PROJECT INFRASTRUCTURE

Number of Turbines	89
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	83°
Humidity	63%
Visibility	10 mi
Wind Direction	W
Wind Speed	14 mph
Weather Conditions	Partly Cloudy

PROJECT VIEW

Distance to Project	21.4 miles
Project Horizontal Field of View (HFOV)	24°

V22

Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

OCEAN WIND

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V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

ALTERNATIVE B-2 VISUALIZATION

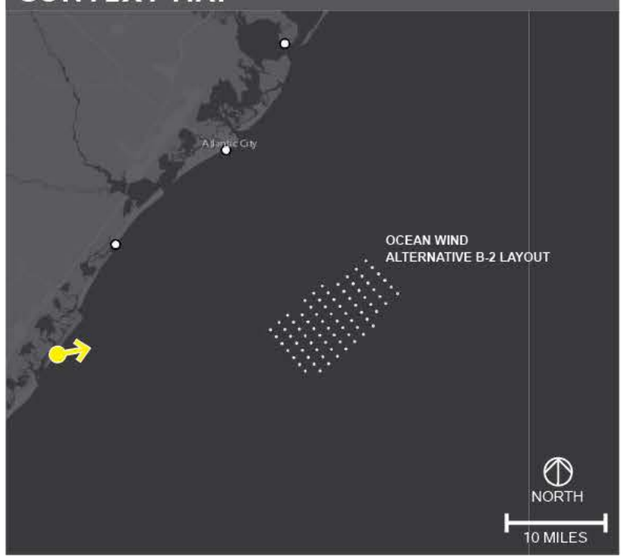
Ocean Wind
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PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP

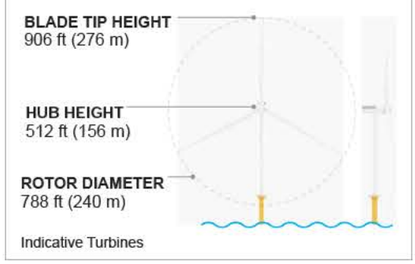


ALTERNATIVES ANALYSIS

Alternative B-2: Exclusion of up to 19 turbine positions in the first three shoreward strings of turbines that includes F01 to K01, A02 to K02, A03 and C03.

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	14 August 2018
Time	4:22 PM
Latitude	39.052389°
Longitude	-74.754855°
Direction of View	East
LSZ	Beachfront

PHOTO

Field ID	59
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	13'

PROJECT INFRASTRUCTURE

Number of Turbines	79
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	83°
Humidity	63%
Visibility	10 mi
Wind Direction	W
Wind Speed	14 mph
Weather Conditions	Partly Cloudy

PROJECT VIEW

Distance to Project	21.89 miles
Project Horizontal Field of View (HFOV)	21°

V22

Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

OCEAN WIND

tjd&a Landscape Architects & Planners

V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

ALTERNATIVE C-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative

PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP

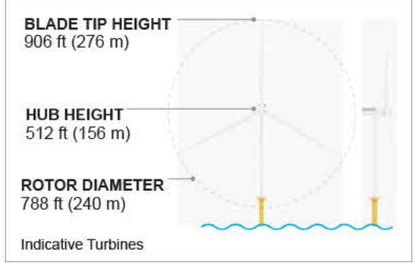


ALTERNATIVES ANALYSIS

Alternative C-1: Exclusion of eight turbine positions (A02 to A09), relocation of eight turbine positions to the northern portion of the Ocean Wind Lease Area (C00 to F00 and B01 to E01).

Turbine Dimensions: 906 ft blade tip height, 512 ft hub height, 788 ft rotor diameter.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	14 August 2018
Time	4:22 PM
Latitude	39.052389°
Longitude	-74.754855°
Direction of View	East
LSZ	Beachfront

PHOTO

Field ID	59
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	13′

PROJECT INFRASTRUCTURE

Number of Turbines	98
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	83°
Humidity	63%
Visibility	10 mi
Wind Direction	W
Wind Speed	14 mph
Weather Conditions	Partly Cloudy

PROJECT VIEW

Distance to Project	20.93 miles
Project Horizontal Field of View (HFOV)	25°

V22

Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

OCEAN WIND

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V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

EXISTING CONDITIONS



NORMAL VIEW EXISTING IMAGE

V22

Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

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V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

ORIGINAL LAYOUT VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW VISUALIZATION

V22

Stone Harbor Beach Access (Day)

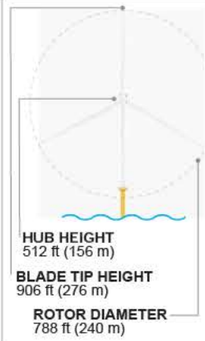
Stone Harbor, Cape May County

ORIGINAL VISUALIZATION

VIEW NOTE

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TURBINE DIMENSIONS



OCEAN WIND

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V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

Ocean Wind
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NORMAL VIEW VISUALIZATION

V22

Stone Harbor Beach Access (Day)

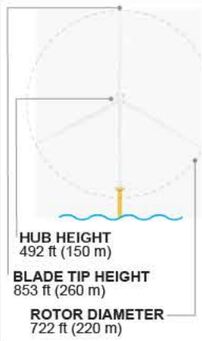
Stone Harbor, Cape May County

ALTERNATIVE B-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

ALTERNATIVE B-2 VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW VISUALIZATION

V22

Stone Harbor Beach Access (Day)

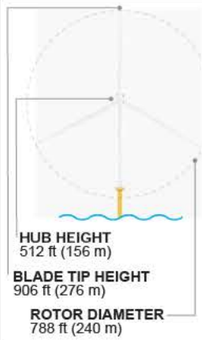
Stone Harbor, Cape May County

ALTERNATIVE B-2 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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V22. Stone Harbor Beach Access (Day)

Stone Harbor, Cape May County

ALTERNATIVE C-1 VISUALIZATION

Ocean Wind
An Ørsted Initiative



NORMAL VIEW VISUALIZATION

V22

Stone Harbor Beach Access (Day)

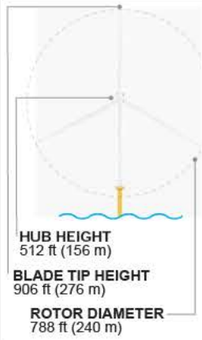
Stone Harbor, Cape May County

ALTERNATIVE C-1 VISUALIZATION

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

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1 December 2021

ATTACHMENT M-4
NIGHTTIME VISUAL SIMULATIONS

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V13. Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

Ocean Wind
An Ørsted Initiative

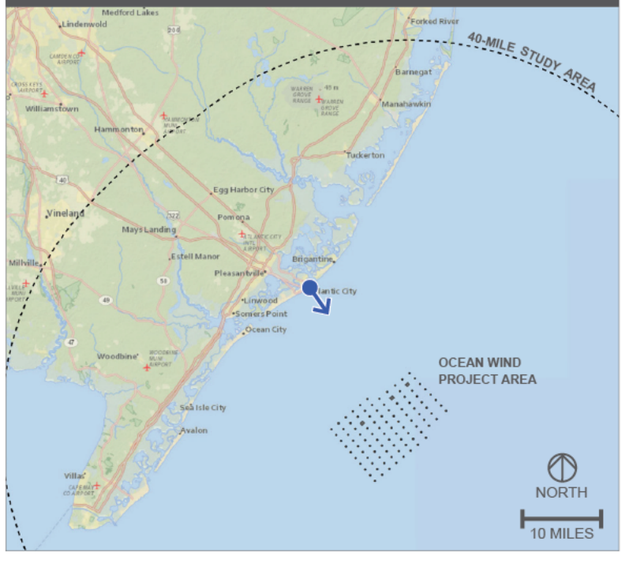
PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW 1

EXTENT OF NORMAL VIEW 2

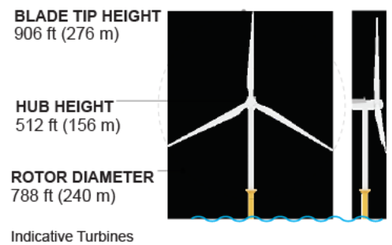
CONTEXT MAP



LOCATION

Viewpoint is located on beach access ramp between Steel Pier and Schiff's Central Pier, approximately 140 feet south of the boardwalk.

TURBINE DIMENSIONS



Indicative Turbines

IMAGE DATA

LOCATION

Date	26 July 2018
Time	10:45 PM
Latitude	39.357197°
Longitude	-74.422929°
Direction of View	Southeast
LSZ	Dunes

PHOTO

Field ID	318
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	22'

PROJECT INFRASTRUCTURE

Number of Turbines	99
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	77°
Humidity	90%
Visibility	10 mi
Wind Direction	SW
Wind Speed	3 mph
Weather Conditions	Clear

PROJECT VIEW

Distance to Project	16.04 miles
Proiect Horizontal Field of View (HFOV)	41°

V13

Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

OCEAN WIND

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V13. Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW I EXISTING IMAGE

V13

Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

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V13. Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW I VISUALIZATION

V13

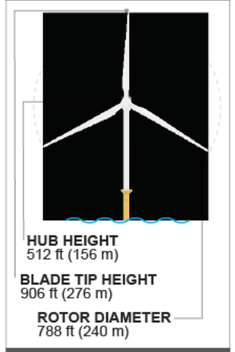
Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

tjd&a

V13. Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW 2
EXISTING IMAGE

V13

Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

tjd&a

V13. Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW 2 VISUALIZATION

V13

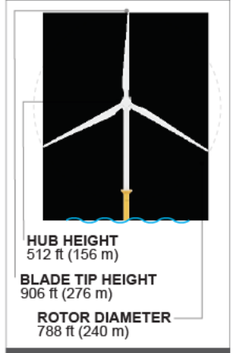
Atlantic City Beachfront (Night)

Atlantic City, Atlantic County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

tjd&a

1 March 2021

V23. Stone Harbor Beach Access (Night)

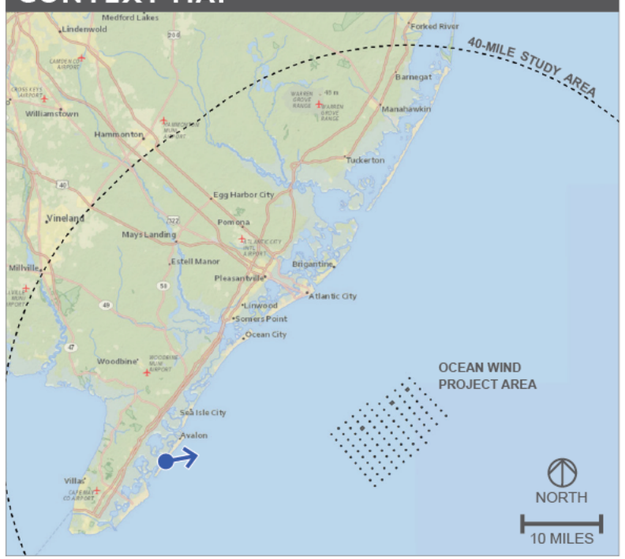
Stone Harbor, Cape May County

PANORAMIC VISUALIZATION



EXTENT OF NORMAL VIEW

CONTEXT MAP



LOCATION

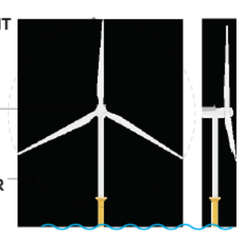
The viewpoint is from the access ramp to the Stone Harbor beachfront, located at 95th Street adjacent to the Beach Patrol building and municipal parking lot.

TURBINE DIMENSIONS

BLADE TIP HEIGHT
906 ft (276 m)

HUB HEIGHT
512 ft (156 m)

ROTOR DIAMETER
788 ft (240 m)



Indicative Turbines

IMAGE DATA

LOCATION

Date	August 14, 2018
Time	8:49 PM
Latitude	39.052389°
Longitude	-74.754855°
Direction of View	East
LSZ	Beachfront

PHOTO

Field ID	77
Camera	NIKON D750
Resolution	300 dpi
Focal Length	50mm
Viewer Eye Elevation	13’

PROJECT INFRASTRUCTURE

Number of Turbines	99
Number of offshore Substations	3

ENVIRONMENTAL

Temperature (°F)	79°
Humidity	69%
Visibility	10 mi
Wind Direction	SW
Wind Speed	8 mph
Weather Conditions	Mostly Cloudy

PROJECT VIEW

Distance to Project	20.93 miles
Proiect Horizontal Field of View (HFOV)	25°

V23

Stone Harbor Beach Access (Night)

Stone Harbor, Cape May County

OCEAN WIND

tjd&a Landscape Architects & Planners

V23. Stone Harbor Beach Access (Night)

Stone Harbor, Cape May County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW EXISTING IMAGE

V23

Stone Harbor Beach Access (Night)

Stone Harbor, Cape May County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

OCEAN WIND

tjd&a

V23. Stone Harbor Beach Access (Night)

Stone Harbor, Cape May County

Ocean Wind
An Ørsted Initiative



NORMAL VIEW VISUALIZATION

V23

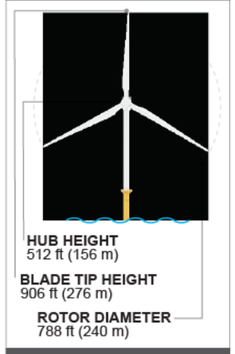
Stone Harbor Beach Access (Night)

Stone Harbor, Cape May County

VIEW NOTE

When printed on 11x17 inch paper, viewer should hold this image approximately 21 inches from eye to replicate actual view.

TURBINE DIMENSIONS



OCEAN WIND

tjd&a

Appendix N. Finding of Adverse Effect for the Ocean Wind 1 Construction and Operations Plan

BOEM has made a Finding of Adverse Effect under Section 106 of the NHPA pursuant to 36 CFR 800.5 for the Ocean Wind 1 Project. BOEM finds that the undertaking would adversely affect the following historic properties:

- Brigantine Hotel, Brigantine City, Atlantic County
- Absecon Lighthouse, Atlantic City, Atlantic County
- Atlantic City Boardwalk, Atlantic City, Atlantic County
- Atlantic City Convention Hall, Atlantic City, Atlantic County
- Ritz-Carlton Hotel, Atlantic City, Atlantic County
- Riviera Apartments, Atlantic City, Atlantic County
- Vassar Square Condominiums, Ventnor City, Atlantic County
- House at 114 South Harvard Avenue, Ventnor City, Atlantic County
- Lucy the Margate Elephant, Margate City, Atlantic County
- Great Egg Coast Guard Station, Longport Borough, Atlantic County
- Ocean City Boardwalk, Ocean City, Cape May County
- Ocean City Music Pier, Ocean City, Cape May County
- The Flanders Hotel, Ocean City, Cape May County
- Hereford Inlet Lighthouse, North Wildwood, Cape May County
- North Wildwood Lifesaving Station, North Wildwood, Cape May County
- U.S. Lifesaving Station #35, Stone Harbor Borough, Cape May County
- Little Egg Harbor U.S. Lifesaving Station #23 (U.S. Coast Guard Station #119), Little Egg Harbor Township, Ocean County
- Thirteen ancient submerged landforms (Targets 21–26, 28–31, and 33–35)

The Project would introduce visual and add cumulative effects from WTG visibility to 17 historic properties where ocean views are character-defining features that contribute to their NRHP eligibility. Thirteen of the 16 identified ancient submerged landforms within the Lease Area (Targets 21–26, 28–31, 33–35) cannot be avoided and would be affected by the Proposed Action, as WTGs, inter-array cables, export cables, and associated work zones are proposed for locations within the defined areas of these resources. As a result, the Project is considered to have the potential to have adverse effects on these marine cultural resources, which are historic properties potentially eligible for listing in the NRHP. For compliance with NHPA Section 110(f) at 36 CFR 800.10, which applies specifically to NHL properties, BOEM has identified two NHLs in the visual APE and determined they will both be visually adversely affected by the undertaking.

The Project would avoid the defined spatial extent of 3 of the 16 identified ancient submerged landforms (Targets 20, 27, and 32), which includes a buffer area. The Project would not encroach on the 50-meter buffer for any of the 19 potential submerged archaeological resources in the Wind Farm Area (Targets 01–03, 06–08, 10–11, and 16–19), BL England Export Cable Route Corridor (Targets 12–14) or Oyster Creek Export Cable Route Corridor (Targets 04, 05, 09, and 15).

BOEM elected to use the NEPA substitution process for Section 106 purposes, as described in 36 CFR 800.8(c), during its review. The regulations at 36 CFR 800.8(c) provide for use of the NEPA substitution process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR 800.3 through 800.6. The NEPA substitution process is described at http://www.achp.gov/integrating_nepa_106. Both processes allow participation of consulting parties. Consistent with use of the NEPA substitution process to fulfill Section 106 requirements, BOEM has decided to codify the resolution of adverse effects through a Memorandum of Agreement pursuant to 36 CFR 800.8(c)(4)(i)(B). See Attachment A.

N.1. Project Overview

On August 15, 2019, BOEM received a COP from Ocean Wind 1 proposing an offshore wind energy project within Lease Area OCS-A 0498 offshore New Jersey. In addition, Ocean Wind submitted updates to the COP on March 13, 2020, September 24, 2020, March 24, 2021, November 16, 2021/December 10, 2021, October 14, 2022, and April 24, 2023. In its COP, Ocean Wind is proposing the construction, operation, and eventual decommissioning of a minimum 1,100-MW wind energy project consisting of offshore WTGs and their foundations, OSS and their foundations, scour protection for foundations, inter-array cables linking the individual turbines to the OSS, substation interconnector cables linking the substations to each other, offshore export cables and an onshore export cable system, onshore substations, and connections to the existing electrical grid in New Jersey (see Figure N-1). At their nearest points, WTG and OSS components of the Project would be approximately 13 nm (15 statute miles) southeast of Atlantic City, New Jersey. Offshore Project elements would be on the OCS, with the exception of a portion of the offshore export cables within state waters. Ocean Wind is utilizing a PDE in its COP, which represents a reasonable range of design parameters that may be used for the Project. In reviewing the PDE, BOEM is analyzing the maximum-case scenario that could occur from any combination of the contemplated parameters. This includes alternatives that may require phased identification of historic properties (see Section N.5). BOEM's analysis and review of the PDE may result in the approval of a project that is constructed within that range or a subset of design parameters within the proposed range.

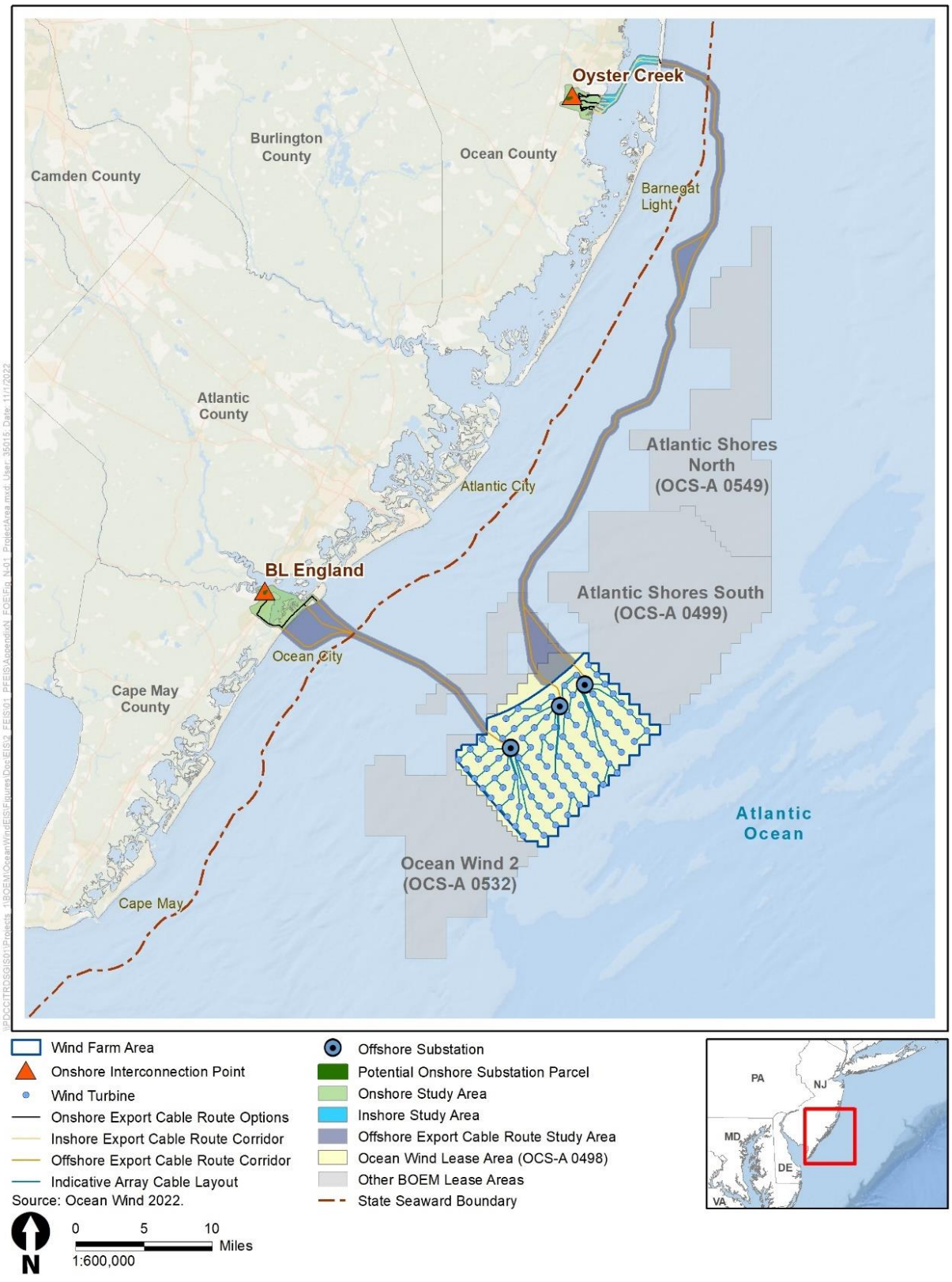


Figure N-1 Ocean Wind 1 COP Proposed Project Elements

If approved by BOEM and other agencies with authority to approve Project components outside BOEM's jurisdiction, Ocean Wind 1 would be allowed to construct and operate WTGs, export cables to shore, and associated facilities, including those outside BOEM's jurisdiction, for a specified term. BOEM is now conducting its environmental and technical reviews of the COP and, on June 24, 2022, published a Draft EIS under NEPA for its decision regarding approval of the plan (BOEM 2022). A detailed description of the proposed Project can be found in Chapter 2, Section 2.1.2, of the Final EIS. This Final EIS considers reasonably foreseeable impacts of the Project, including impacts on cultural resources, including historic properties.

N.1.1 Background

The Project is within a commercial lease area that has received previous Section 106 review by BOEM regarding the issuance of the commercial lease and approval of site assessment activities and is subject to two prior Programmatic Agreements. In 2012, BOEM executed a Programmatic Agreement among the SHPOs of Delaware, Maryland, New Jersey, and Virginia, the ACHP, the Narragansett Indian Tribe, and the Shinnecock Indian Nation (see https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/HP/MidAtlantic-PA_Executed.pdf). Additionally, in 2016, BOEM executed a Programmatic Agreement among the SHPOs of New York and New Jersey, the Shinnecock Indian Nation, and ACHP to consider renewable energy activities offshore New York and New Jersey (see https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/HP/NY-NJ-Programmatic-Agreement-Executed.pdf).

BOEM prepared an environmental assessment to analyze the environmental impacts associated with issuing commercial wind leases and approving site assessment activities within the New Jersey WEA and approved the SAP for Lease Area OCS-A 0498 on May 17, 2018. On December 8, 2020, Ocean Wind submitted an application to BOEM to assign a portion of Lease Area OCS-A 0532. BOEM approved this lease on March 26, 2021.

The Ocean Wind 1 COP proposed installing a maximum of 98 WTGs extending up to 906 feet (276 meters) above MLLW. Ocean Wind would mount the WTGs on monopile foundations. The proposed facility includes up to three OSS, which would be built on either monopile or pile jacket foundations. Where required, scour protection would be placed around foundations to stabilize the seabed near the foundations as well as the foundations themselves. The scour protection would be a maximum of 8.2 feet (2.5 meters) in height, would extend away from the foundation as far as 73 feet (22.3 meters), and would have a maximum seabed penetration of 164 feet (50 meters). Array cables would transfer electrical energy generated by the WTGs to the OSS. OSS would include step-up transformers and other electrical equipment needed to connect the inter-array cables to the offshore export cables. Substations would be connected to one another via substation interconnector cables. Up to two interconnector cables would be buried beneath the seabed floor.

Up to three offshore export cables would be buried under the seabed floor within the two offshore export cable route corridors to connect the proposed wind energy facility to the onshore electrical grid. Up to two offshore export cables would make landfall and deliver electrical power to the Oyster Creek substation. The offshore export cable route corridor to Oyster Creek would begin within the Wind Farm Area and proceed northwest to the Atlantic Ocean side of Island Beach State Park. The inshore export cable route corridor to Oyster Creek would exit the bay side of the Island Beach State Park and cross Barnegat Bay southwest to make landfall near Oyster Creek in either Lacey or Ocean Township. One offshore export cable would make landfall and deliver electrical power to the BL England substation. The BL England offshore export cable route corridor would begin within the Wind Farm Area and proceed west to make landfall in Ocean City, New Jersey.

Landfall locations in Lacey or Ocean Township and Ocean City would include TJBs to connect the offshore export cable to the onshore export cable. Transition of the export cables from offshore to onshore would be accomplished by using open-cut trenching or trenchless methods. Onshore export cables would be buried and housed within a single duct bank buried along the onshore export cable route with a target burial of 4 feet. Installation of onshore export cables would require up to a 50-foot-wide construction corridor. The onshore export cable routes would terminate at the Oyster Creek substation and BL England substation sites.

Dredging may be required in shallow areas in Barnegat Bay to facilitate vessel access for export cable installation west of Island Beach State Park and near the landfall at Lacey or Ocean Township and may occupy a Federal Civil Works Project. Ocean Wind proposes to dredge Barnegat Inlet and the Oyster Creek Channel; operated and maintained by USACE under the Barnegat Inlet Navigation Project. Cable installation may also alter or occupy Federal Civil Works Projects through cable installation beneath the Ocean City beach and dunes/Great Egg Harbor Inlet to Townsend Inlet Project, and cable installation beneath the channel at the Roosevelt Boulevard Bridge and a second location prior to making landfall in Lacey Township/New Jersey Intracoastal Waterway Federal Navigational Project.

The proposed Project has a designed life span of approximately 35 years; some installations and components may remain fit for continued service after this time. Ocean Wind would rehabilitate an existing retired marine terminal to serve as an onshore O&M facility in Atlantic City, New Jersey. The City of Atlantic City intends to secure authorization for marina upgrades; that project is being separately reviewed and authorized by USACE and state and local agencies. The improvements to the O&M facility are not dependent on the proposed Project analyzed in the EIS.

O&M activities would include inspections, preventative maintenance, and, as needed, corrective maintenance for onshore substations, onshore export cables, and grid connections. Ocean Wind would conduct inspections of foundations, bathymetry, scour (and associated scour protection, if deployed), and cable burial. Multi-beam echosounder surveys would be conducted during years 1, 4, and 5 post-commissioning, after which an optimal survey frequency would be determined based on initial findings. Sonar, remotely operated vehicles, drones, and divers may be required. Ocean Wind would conduct annual maintenance of WTGs, including safety surveys, blade maintenance, and painting as needed. OSS would be routinely maintained for preventative maintenance up to 12 times per year. Although the offshore export cables, inter-array cables, and OSS interconnector cables typically have no maintenance requirements unless a failure occurs, cable failures may result from anchors and fishing gear. During these low-probability events, cables would be located, unburied, and lifted above sea level for repair or replacement aboard the cable-handling vessel. Upon completion of the repair, the cable would be lowered onto the seabed, assessed to determine its proximity to the original location, and reburied using a jetting tool. Portions of the cables are anticipated to become exposed due to natural sediment transport processes and would require scour protection replenishment or reburial. Ocean Wind would conduct multi-beam echo sounder bathymetry survey along the cable routes immediately following installation and at 1 year, 2–3 years, and 5–8 years post-commissioning, after which survey frequency would depend on prior survey findings. Additional surveys may be conducted after major storm events as otherwise needed. Ocean Wind would need to use vessels, vehicles, and aircraft during O&M activities described above.

Although the proposed Project is anticipated to have an operation life of 35 years, it is possible that some installations and components may remain fit for continued service after this time. Ocean Wind would have to apply for and be granted an extension if it wanted to operate the proposed Project for more than the 25-year operations term stated in its lease. The process of decommission would remove all facilities, projects, cables, pipelines, and obstructions and clear the seafloor of all obstructions created by the proposed Project. All facilities would need to be removed 15 feet (4.6 meters) below the mudline (30 CFR 285.910(a)). Absent permission from BOEM, Ocean Wind would have to achieve complete

decommissioning within 2 years of termination of the lease and either reuse, recycle, or responsibly dispose of all materials removed. Section 106 review will be conducted at the decommissioning stage.

N.1.2 Undertaking

BOEM has determined that the Project constitutes an undertaking subject to Section 106 of the NHPA as amended (54 USC 306108) and its implementing regulations (36 CFR 800), and that the Project activities proposed under the COP have the potential to affect historic properties. Confidential appendices to the COP referenced in this document were sent electronically or by mail depending on expressed preference to all consulting parties on March 21, 2022, and April 1, 2022. The COP, as well as its public and confidential appendices, is hereby incorporated by reference.

The undertaking for this Section 106 review is the Proposed Action. As described in Section 2.1.2 of the Final EIS, the Proposed Action would include the construction, O&M, and eventual decommissioning of an 1,100-MW wind energy facility on the OCS offshore New Jersey, occurring within the range of design parameters outlined in the Ocean Wind 1 COP (Ocean Wind 2023), subject to applicable mitigation measures.

N.1.3 Area of Potential Effects

In general, BOEM defines the APE for such an undertaking to include the following geographic areas:

- The depth and breadth of the seabed potentially affected by any bottom-disturbing activities, constituting the marine archaeological resources portion of the APE;
- The depth and breadth of terrestrial areas potentially affected by any ground-disturbing activities, constituting the terrestrial archaeological resources portion of the APE;
- The viewshed from which renewable energy structures, whether offshore or onshore, would be visible, constituting the viewshed portion of the APE; and
- Any temporary or permanent construction or staging areas, both onshore and offshore, which may fall into any of the above portions of the APE.

These are described below in greater detail with respect to the proposed activities, consistent with BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (BOEM 2020).

N.1.3.1. Marine Archaeological Resources APE

The marine archaeological resources portion of the APE (hereafter marine APE) for the Project is the depth and breadth of the seabed potentially affected by any bottom-disturbing activities and temporary or permanent offshore construction or staging areas. It includes a conservative PDE that can accommodate a number of potential designs, whether monopile or jacketed foundations are used, installed by up to two jack-up vessels, as well as necessary support vessels and barges. The marine APE encompasses activities within the Lease Area (Attachment B, Figure 1), activities within the Oyster Creek export cable route corridor (Attachment B, Figure 2), and activities within the BL England export cable route (Attachment B, Figure 3).

The Lease Area encompasses 75,525 acres (30,564 hectares) with water depths ranging from 52 to 125 feet (16 to 38 meters). Within the Lease Area, the wind farm development would occur in a smaller footprint of 35,353 acres (14,307 hectares). Ocean Wind proposes up to 98 WTGs and up to three OSS within the extent of the PDE. Construction activities would occur within an 850-foot (259-meter) work zone around WTG locations (WTG work zones around Targets 20, 27, and 32 are reduced to 200 meters).

The marine APE includes all offshore areas where seafloor-disturbing activities from inter-array cable trenching and installation, boulder relocation, and vessel anchoring may occur. The maximum vertical extent of seafloor impact would be approximately 164 feet (50 meters) below the seafloor for WTGs and approximately 230 feet (70 meters) for OSS. The array and substation interconnector cables have a target burial depth of 4 to 6 feet (1.2 to 1.8 meters) below the stable seabed. Seafloor disturbance for anchoring of construction vessels would be approximately 26 feet (8 meters). Each main vessel would have up to eight anchors spaced 984 to 1,640 feet (300 to 500 meters) from the vessel.

The marine APE also includes offshore export cable corridors extending from the Lease Area to the sea-to-shore transition at landfall locations in Lacey or Ocean Township and Ocean City, which is inclusive of the landfall on Island Beach State Park in Berkeley Township. The export cable corridors would vary in width between 869 and 3,117 feet (265 and 950 meters). The BL England export cable route would be approximately 32 miles (51 kilometers) and approximately 3,406 acres (1,378 hectares). The Oyster Creek export cable route would be approximately 71 miles (114 kilometers) and approximately 10,775 acres (4,360 hectares). Offshore export cables would typically be buried below the seabed similarly to the array cables. The maximum vertical seafloor disturbance from export cable burial is approximately 6 feet (1.8 meters) and 26 feet (8 meters) for associated anchoring/spudding of construction vehicles.

N.1.3.2. Terrestrial Archaeological Resources APE

The terrestrial archaeological resources portion of the APE (hereafter terrestrial APE) includes areas of potential ground disturbance associated with the onshore construction and operation of the Project. The APE is presented as a conservative PDE and includes the landfall sites, underground cable routes, substation sites, and equipment laydown areas. The depth and breadth of potential ground-disturbing activities are described below for each location. Attachment A, Figure 4, depicts the terrestrial APE for onshore cable and landfall site alternatives for BL England in detail. Attachment B, Figure 5, depicts the terrestrial archaeological resources for onshore cable and landfall site alternatives for Oyster Creek.

The terrestrial APE includes the sea-to-shore transition landfall sites. Transition of the export cables from offshore to onshore would be accomplished by using open-cut trenching or trenchless methods. Ground-disturbing activities from installation of the TJB and associated excavation would occur at the BL England landfall sites options illustrated in Attachment A, Figure 4, and Oyster Creek landfall site options illustrated in Attachment B, Figure 5.

From the TJB at the landfall sites, Ocean Wind would install the onshore export cable underground. Burial of the export cable in a single duct bank would require up to a 50-foot-wide (15-meter-wide) construction corridor and up to a 30-foot-wide (9-meter-wide) permanent easement for Oyster Creek and BL England cable corridors excluding landfall locations and cable splice locations. The northern Oyster Creek onshore cable route option that crosses Route 9 and Oyster Creek on a southwest diagonal would be installed using trenchless technology to avoid opening Route 9 in an area that has had recent utility work.

The onshore cable would connect to the proposed onshore substation parcels. Ground-disturbing activities associated with construction of the Oyster Creek substation would occur on a previously disturbed 31.5-acre (127,476-m^2) parcel at the former Oyster Creek nuclear plant in Lacey Township. Ground-disturbing activities associated with construction of the BL England substation would occur within a previously disturbed 13-acre (52,609-m^2) parcel at the former coal, oil, and diesel plant in Upper Township.

N.1.3.3. Visual APE

The APE for visual effects analysis (hereafter visual APE) includes the viewshed from which renewable energy structures—whether offshore or onshore—would be visible. Offshore, the visual APE includes a boundary of 40 miles radial distance from the Wind Farm Area, which is the approximate maximum theoretical distance—a distance that does not factor in certain environmental factors such as weather or environmental conditions—at which the WTGs could be visible (COP Volume III, Appendix F-3, page 23; Ocean Wind 2023). However, subsequent desktop analysis, visualizations, and field verification determined that the actual visibility of Wind Farm Area infrastructure beyond 25 miles is unlikely (COP Volume III, Appendix F-3, page 23; Ocean Wind 2023). See Attachment B, Figure 6, Sheets 1–16.

Geographic information system analysis and subsequent field investigation delineated the visual APE methodically through a series of steps, beginning with the maximum theoretical distance WTGs could be visible. This was determined by first considering the visibility of a WTG from the water level to the tip of an upright rotor blade at a height of 906 feet. The analysis then accounted for how distance and EC impede visibility as the distance increases between the viewer and WTGs (i.e., by a 40-mile distance, even blade tips would be below the sea level horizon line). The mapping effort then removed all areas with obstructed views toward WTGs, such as those views impeded by intervening topography, vegetation, and structures. Areas with unobstructed views of offshore Project elements then constituted the APE. Attachment B, Figure 6 Map Index, also depicts reasonably foreseeable future project areas for consideration of cumulative effects within the APE.

Onshore, the visual APE includes a 0.25-mile boundary around the BL England substation location (see Attachment B, Figure 7) and a minimum 0.25-mile boundary around the Oyster Creek substation location (see Attachment B, Figure 8). Any overhead lines would fall within these boundaries (COP Volume III, Appendix F-3, page 19; Ocean Wind 2023). All other elements would be underground and would not be visible.

N.2. Steps Taken to Identify Historic Properties

N.2.1 Technical Reports

To support the identification of historic properties within the APE, Ocean Wind provided survey reports detailing the results of cultural resource investigations within the terrestrial, marine, and visual portions of the APE. Table N-1 provides a summary of these efforts to identify historic properties, including results and key findings of each investigation.

Collectively, BOEM finds that these reports represent a good-faith effort to identify historic properties within the Project APE. The documents summarized in Table N-1 have been shared with consulting parties and are hereby incorporated by reference.

BOEM has reviewed the reports summarized in Table N-1, found them sufficient, and reached the following conclusions:

- The marine archaeological investigations include surveys of most areas of potential seafloor disturbance following BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585*. BOEM has reviewed the data currently available in the marine archaeological survey report and, for portions of the APE that have been surveyed, has determined that the data are sufficient for identifying historic properties within the marine APE.
- BOEM has reviewed the terrestrial archaeological reports submitted to date and has determined that the investigations summarized in the reports are sufficient for identifying historic properties within

the terrestrial APE.

- BOEM has reviewed the VIA with visual simulations and the assessment of visual effects on historic properties for the entire PDE and determined the studies and reports are sufficient for identifying and assessing effects on historic properties within the visual APE. BOEM finds that the APE for potential visual effects analyzed is appropriate for the scale and scope of the undertaking. BOEM further finds that the inventory of historic properties is sufficient to consult on the undertaking, and represents a good-faith effort to identify historic properties within the visual APE potentially affected by the undertaking, as defined at 36 CFR 800.4.

In addition to the conclusions summarized above, BOEM has found that the assessment of effects on historic properties within the marine, terrestrial, and visual APEs contained within these reports is sufficient to apply the criteria of adverse effects and to continue consultations with consulting parties for resolving adverse effects on historic properties. *Assessment of Effects on Historic Properties in the Visual APE* (Section N.3.1.3) considers recommendations from the assessment of visual effects on historic properties technical report and comments provided by consulting parties during the consultation process described in Section N.2.2. Therefore, BOEM's findings herein deviate from the technical report recommendations, as BOEM has determined seven additional historic properties to be adversely affected by the Project.

Consequent to the reports prepared for the COP submittal, ICF prepared for BOEM a technical report to support BOEM's cumulative effects analysis, the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Farm Project* (BOEM 2022). The Cumulative Historic Resources Visual Effects Analysis presents the analysis of cumulative visual effects where BOEM has determined, in review of the Historic Resources Visual Effects Assessment (COP Volume III, Appendix F-3; Ocean Wind 2023), that historic properties would be adversely affected by the Project. The effects of other reasonably foreseeable wind energy development activities are additive to those adverse effects from the Project itself, resulting in cumulative effects. Seventeen historic properties within the viewshed of WTGs for the Project and other reasonably foreseeable offshore wind energy development activities would be adversely affected by cumulative visual effects. These 17 historic properties are the Brigantine Hotel in Brigantine City; Absecon Lighthouse, Atlantic City Boardwalk, Atlantic City Convention Hall, Ritz-Carlton Hotel, and Riviera Apartments in Atlantic City; Vassar Square Condominiums and the house at 114 South Harvard Avenue in Ventnor City; Lucy the Margate Elephant in Margate City; Great Egg Coast Guard Station in Longport Borough; Ocean City Boardwalk, Ocean City Music Pier, and the Flanders Hotel in Ocean City; Hereford Inlet Lighthouse and North Wildwood Lifesaving Station in North Wildwood; U.S. Lifesaving Station #35 in Stone Harbor Borough; and Little Egg Harbor U.S. Lifesaving Station #23 in Little Egg Harbor Township. Two of these adversely affected properties—Atlantic City Convention Hall and Lucy the Margate Elephant—are NHLs.

Table N-1 Summary of Cultural Resources Investigations Performed by Ocean Wind in the Terrestrial, Marine, and Visual APE

Portion of APE	Report	Description	Key Findings / Recommendation
Onshore	Phase I Archaeological Investigation, Ocean Wind Offshore Wind Farm (Lease Area CS-A0498), Oyster Creek and BL England, Terrestrial Archaeological Resource Assessment, Cape May and Ocean Counties, New Jersey (COP Volume III, Appendix F-2; Ocean Wind 2023).	A desktop study of known archaeological sites within 0.33 mile (0.53 kilometer) of the landfall locations and cable routes; an analysis of potential historic structures within the preliminary APE that may have archaeological components; a shovel probe survey of substation locations and cable routes. The terrestrial preliminary APE includes the footprint of the proposed onshore facilities associated with construction, operations, and maintenance, including the onshore substation and onshore export cable route corridors, as well as temporary work areas including staging and laydown areas.	This report identified or revisited six archaeological resources within 250 meters of the terrestrial preliminary APE; five of these resources are within the terrestrial preliminary APE, and one immediately adjacent. These archaeological resources date to pre-contact and post-contact periods. A total of 1,312 shovel test and seven 1- by 1-meter units were excavated throughout the terrestrial preliminary APE. Of the six sites intersecting or abutting the preliminary APE, two (28-CM-032 and 28-OC-249) have been recommended or determined to be eligible for listing on the NRHP. The remaining four sites have undetermined NRHP eligibility. All six sites are anticipated to be avoided by Project-related impacts, and one site (28-OC-249) also has recommendations for specific avoidance measures including temporary fencing and archaeological monitoring during construction. Avoidance measures and monitoring will be detailed in stipulations in the Memorandum of Agreement. A recommendation of “No Adverse Effect” is made for all six archaeological sites.
Offshore	Marine Archaeological Resources Assessment for the Ocean Wind Offshore Wind Farm for Lease Area OCS-A 0498 Construction and Operations Plan (COP Volume III, Appendix F-1; Ocean Wind 2023).	A marine archaeological resource assessment of HRG survey data collected by both intrusive and non-intrusive surveying methods. The marine preliminary APE for submerged cultural resources consists of areas affected by ground-disturbing activities associated with construction and O&M, including the seafloor footprint of the Wind Farm Area and export cable route corridors, extending to maximum of 50 meters (164 feet) beneath the seafloor and 70 meters (230 feet) for OSS. Survey was conducted using a suite of marine vessel-based remote-sensing instruments to locate submerged cultural resources including	This report identified 19 potential submerged archaeological resources within the marine preliminary APE—12 within the Wind Farm Area, three along the BL England corridor, and four along the Oyster Creek corridor. The majority of these are either known shipwrecks or potential shipwrecks. Avoidance buffers are recommended for each potential submerged archaeological resource. The report concluded that Ocean Wind would be able to follow the recommended 50-meter avoidance buffer for all of the 19 resources. Further archaeological investigation is recommended if avoidance is infeasible. The report also identified 16 ancient submerged landforms within the marine preliminary APE: 13 of these are within the Wind Farm Area, one is in the BL

Portion of APE	Report	Description	Key Findings / Recommendation
		side-scan sonars, multibeam echosounders, sub-bottom profilers, and marine magnetometers. Marine survey was conducted by Alpine Ocean Seismic Survey, Inc., Earth Sciences & Surveying International, Fugro USA Marine, Inc., and Gardline Limited over five separate survey periods between July 2018 and March 2020. A 2023 update to the report provided supplemental survey data to Table 13 and Figure 30, and revision to the Marine Post-Review Discovery Plan, but did not result in any revision to the findings or recommendations.	England export cable route corridor, and two are in the Oyster Creek export cable route corridor. Coring of these features, along with laboratory analysis, suggested they are similar to features previously determined to be TCPs. It has therefore been presumed that they are eligible for listing in the NRHP, and they may also contain archaeological components. Archaeological mitigation was recommended if avoidance of ancient submerged landforms is infeasible, and the report outlines a proposed approach to mitigation for impacts on geomorphic features of archaeological interest.
Offshore	Ocean Wind Offshore Wind Farm, Cape May and Ocean Counties, New Jersey Memorandum of March 2023 Fieldwork HAA 5614-22; NJ SHPO #18-1184; HPO-E2022-239 (April 2023)	A terrestrial archaeological resource assessment for the Ocean Wind Terrestrial Archaeological Resource Assessment: eight discrete previously unsurveyed areas now included in the Project's APE resulting from minor changes in the Project alternative, including site visits and systematic archaeological shovel testing.	Terrestrial archaeology survey of eight discrete locations in response to changes to Project alternatives in the terrestrial APE: six in the Oyster Creek segment and two in the BL England segment. Two historic artifacts were recovered, but both were recommended not significant. Archaeological monitoring was recommended for the Crook Horn Creek portion of BL England Terrestrial APE.
Visual	Ocean Wind Visual Effects on Historic Properties (COP Volume III, Appendix F-3; Ocean Wind 2023)	A study evaluating visual impacts on historic properties. The preliminary APE for visual effects from the Project generally extends from Wildwood in Cape May County in the south to Beach Haven in Ocean County to the north for the Project's offshore components. Onshore, the visual preliminary APE includes a 0.25-mile boundary around the BL England substation location and a minimum 0.25-mile boundary around the Oyster Creek substation location. The offshore visual preliminary APE was initially	This report identified nine historic districts and 40 individual buildings or structures within the Offshore Infrastructure preliminary APE. A "No Adverse Effect" recommendation was made for 39 properties, and a potential for adverse effect was recommended for 10 properties. These 10 properties included the Brigantine Hotel in Brigantine City; Atlantic City Boardwalk, Atlantic City Convention Hall, Ritz-Carlton Hotel, and Riviera Apartments in Atlantic City; Vassar Square Condominiums and the house at 114 South Harvard Avenue in Ventnor City; Lucy the Margate Elephant in Margate City; and Ocean City Boardwalk and Ocean City Music Pier in Ocean City. The visual effects

Portion of APE	Report	Description	Key Findings / Recommendation
		established based on the theoretical limits of visibility of Project components. These limits were then refined based on computer-based viewshed analysis that incorporated topography and the presence of intervening vegetation, buildings, and structures in the landscape to determine the extent of visibility of offshore components. The preliminary APE was further refined through desktop analysis and field verification to confirm previous analyses and establish the maximum visibility threshold of 25 miles from select locations with direct views of the Project. The onshore visual preliminary APE was established as parcels adjacent to or intersected by the proposed underground onshore export cable routes and properties within a buffer around the proposed substation sites and associated overhead grid connections representing the maximum extent of visual and atmospheric effects based on the density of intervening development and vegetation.	analysis included two designated NHL properties in the offshore infrastructure preliminary APE. A Potential for Adverse Effect was recommended for both properties: Atlantic City Convention Hall and Lucy the Margate Elephant. This report also analyzed visual effects on historic properties within the onshore infrastructure preliminary APE. Three properties were analyzed, and a recommendation of No Adverse Effect was made for all of them. Mitigation options to resolve adverse effects from visual impacts were recommended for BOEM's consideration.

Portion of APE	Report	Description	Key Findings / Recommendation
Visual	Architectural Intensive Level Survey, Ocean Wind Offshore Windfarm, New Jersey (SEARCH, Inc. 2021)	An architectural survey of aboveground resources supporting the analysis presented in the Historic Resources Visual Effects Assessment. The preliminary APE for visual effects from the Project generally extends from Wildwood in Cape May County in the south to Beach Haven in Ocean County to the north for the Project's offshore components. Onshore, the visual preliminary APE includes a 0.25-mile boundary around the BL England substation location and a minimum 0.25-mile boundary around the Oyster Creek substation location. The offshore visual preliminary APE was initially established based on the theoretical limits of visibility of Project components. These limits were then refined based on computer-based viewshed analysis that incorporated topography and the presence of intervening vegetation, buildings, and structures in the landscape to determine the extent of visibility of offshore components. The preliminary APE was further refined through desktop analysis and field verification to confirm previous analyses and establish the maximum visibility threshold of 25 miles from select locations with direct views of the Project. Two additional criteria were evaluated to determine if properties merited intensive survey in addition to views of Project components: a property's specific orientation toward the ocean and architectural features indicative of a design that was responsive to a property's beachfront location. The onshore visual preliminary APE was established as parcels adjacent to or intersected by the proposed underground onshore export cable routes and properties within a buffer around the proposed substation sites and	This report delineated the preliminary APE for visual effects for onshore architectural properties, identified historic properties within the preliminary APE, and provided eligibility recommendations for those historic properties identified in the preliminary APE. The preliminary APE includes portions of Atlantic, Cape May, and Ocean Counties with views of Project components. An intensive-level survey was completed for 304 historic properties within the offshore preliminary APE, 21 of which are NRHP-listed or -eligible properties. An intensive-level survey of the 32 historic properties identified in the onshore preliminary APE determined that three properties were NRHP-listed or -eligible. Effect evaluations were not addressed in this report and are included in the separate *Ocean Wind Visual Effects on Historic Properties* report (COP Volume III, Appendix F-3; Ocean Wind 2023).

Portion of APE	Report	Description	Key Findings / Recommendation
		associated overhead grid connections representing the maximum extent of visual and atmospheric effects based on the density of intervening development and vegetation.	
Visual	March 2023 Survey of Eight Additional Built Resources in Atlantic County (March 2023)	A study evaluating visual effects on eight historic properties in Atlantic County not previously included in the *Ocean Wind Visual Effects on Historic Properties Report* (February 2023) or *Architectural Intensive Level Survey* (October 2022), including research, completed NJ SHPO Inventory Forms, and NRHP eligibility recommendations for each resource.	All eight historic properties were recommended not eligible for listing in the NRHP, including Holiday Inn, 2201 Boardwalk, Atlantic City, New Jersey; Malibu Motel, 108 S. Montpelier Avenue, Atlantic City, New Jersey; The Plaza, 101 S. Plaza Place, Atlantic City, New Jersey; 5000 Boardwalk, Ventnor City, New Jersey; Regency Towers, 5200 Boardwalk, New Jersey; The Oxford, 112 S. Oxford Avenue; 111 S. Cambridge Avenue, Ventnor City, New Jersey

Sources: COP Volume III, Appendix F-1, F-2, F-3; Ocean Wind 2023; Hartgen Archeological Associates, Inc. 2021; SEARCH, Inc. 2021.

N.2.2 Consultation and Coordination with the Parties and Public

N.2.2.1. Early Coordination

Since 2009, BOEM has coordinated OCS renewable energy activities offshore New Jersey with its federal, state, local, and tribal government partners through its Intergovernmental Renewable Energy Task Force. BOEM has met regularly with federally recognized tribes that may be affected by renewable energy activities in the area since 2011, specifically during planning for the issuance of leases and review of site assessment activities. BOEM also hosts public information meetings to help keep interested stakeholders updated on major renewable energy milestones. Information pertaining to BOEM's Intergovernmental Renewable Energy Task Force meetings is available at https://www.boem.gov/renewable-energy/state-activities/renewable-energy-task-force-meetings-1 and information pertaining to BOEM's stakeholder engagement efforts is at https://www.boem.gov/renewable-energy/state-activities/new-jersey-public-information-meetings.

N.2.2.2. NEPA Scoping and Public Hearings

On March 30, 2021, BOEM announced its Notice of Intent to prepare an EIS for the Ocean Wind 1 COP. This purpose of the Notice of Intent was to solicit input on issues and potential alternatives for consideration in the EIS. Throughout the scoping process, federal agencies; state, tribal, and local governments; and the general public had the opportunity to help BOEM determine significant resources and issues, IPFs, reasonable alternatives, and potential mitigation measures to be analyzed in the EIS, as well as provide additional information. BOEM also used the NEPA commenting process to allow for public involvement in the NHPA Section 106 consultation process, as permitted by 36 CFR 800.2(d)(3). Through this notice, BOEM announced its intention to inform its NHPA Section 106 consultation using the NEPA commenting process and invited public comment and input regarding the identification of historic properties or potential effects on historic properties from activities associated with approval of the Ocean Wind 1 COP.

Additionally, BOEM held virtual public scoping meetings, which included specific opportunities for engaging on issues relative to NHPA Section 106 for the undertaking, on April 13, 15, and 20, 2021. Virtual public scoping meeting materials and records are available at https://www.boem.gov/Ocean-Wind-Scoping-Virtual-Meetings.

Through this NEPA scoping process, BOEM received comments related to cultural, historic, archaeological, or tribal resources. These are presented in BOEM's EIS Scoping Report (BOEM 2021) and are summarized as follows:

- Several commenters stated that BOEM should comply with Section 106 of the NHPA including adequate consultation with SHPOs and other stakeholders.
- Several commenters stated that BOEM should recognize tribal sovereignty and provide adequate government-to-government consultation with tribal governments.
- Several commenters opined that the foundations of historic structures (including those in the Ocean City Historic District) are likely to be damaged by excavation for the installation of cables.
- Some commenters expressed concern that the Project might cause physical disturbance to archaeological resources, historic architectural resources, or historic properties.
- One commenter stated that the EIS should consider offshore shipwrecks that are not currently listed in the NRHP but have the potential to be listed.

- One commenter expressed the opinion that information about Project noise in the COP was inadequate and expressed concern about operational and construction noise in the historic district could affect its setting.
- One commenter asked what impact the Project would have on historic structures that rely on a microclimate of cooler air created by the barrier island.

On June 24, 2022, BOEM published a Notice of Availability for the Draft EIS. As part of this process, BOEM announced three virtual public hearings on July 14, 20, and 26, 2022. The public comment period was extended by 15 days and closed on August 23, 2022. The input received via this process has been used to inform preparation of the Final EIS.

N.2.2.3. NHPA Section 106 Consultations

On March 9, 2021, BOEM contacted ACHP and New Jersey SHPO to provide Project information and notify of BOEM's intention to use the NEPA process to fulfill Section 106 obligations in lieu of the procedures set forth in 36 CFR 800.3 through 800.6.

On March 17, 2021, BOEM mailed letters to Absentee-Shawnee Tribe of Indians of Oklahoma, the Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, the Rappahannock Tribe, the Narragansett Indian Tribe, Shawnee Tribe, Stockbridge-Munsee Community Band of Mohican Indians, and the Shinnecock Indian Nation to provide information about the Project, an invitation to be a consulting party to the NHPA Section 106 review of the COP, and the Notice of Intent to prepare an EIS. BOEM also used this correspondence to notify of its intention to use the NEPA substitution process for Section 106 purposes, as described in 36 CFR 800.8(c), during its review. BOEM identified these tribes for outreach based on associations with geographic areas known to be ancestral homelands and thus potentially containing historic properties of religious and cultural significance to them. On March 19, 2021, BOEM contacted Absentee-Shawnee Tribe of Indians of Oklahoma, the Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, the Rappahannock Tribe, the Narragansett Indian Tribe, Shawnee Tribe, Stockbridge-Munsee Community Band of Mohican Indians, and the Shinnecock Indian Nation by email. This correspondence included electronic versions of documents mailed on March 17, 2021. BOEM also notified the tribal governments that the agency found it necessary to delay the formal issuance of the NOI and provided corrections to information in the previously mailed letters, including clarification that the Project website (https://www.boem.gov/ocean-wind at the time of the NOI)[1] would not be active until the day of NOI issuance, and notification that comment deadline would be extended based on the date of NOI issuance and, therefore, would no longer be April 23, 2021.

On March 30, 2021, BOEM corresponded with 205 points of contact from local, state, and federal government agencies and agencies and organizations due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties by mail and email, including information about the project, an invitation to be a consulting party to the NHPA Section 106 review of the COP, and the Notice of Intent to prepare an EIS. BOEM also used this correspondence to notify of its intention to use the NEPA substitution process for Section 106 purposes, as described in 36 CFR 800.8(c), during its review. To aid those consulting parties not familiar with the NEPA substitution process, BOEM developed a *National Environmental Policy Act (NEPA) Substitution for Section 106 Consulting Party Guide* (available at https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/NEPA-Substitution-Consulting-Party-

[1] The Project website has since been updated to https://www.boem.gov/renewable-energy/state-activities/ocean-wind-1.

Guide.pdf), which it attached to this correspondence. This correspondence also included outreach to previously contacted tribes to provide updated information about the Notice of Intent, which had changed subsequent to the March 19, 2021, correspondence. In addition, this correspondence to tribes included an invitation to participate as NEPA cooperating agencies and provided an associated Memorandum of Understanding.

During the period of April 13–16, 2021, outreach was conducted by phone to confirm receipt of correspondence among the governments and organizations that had not responded to the invitation to consult. The list of the governments and organizations contacted is included in Attachment C. Entities that responded to BOEM's invitation or were subsequently made known to BOEM and added as consulting parties are listed in Attachment D.

On May 5, 2021, BOEM invited Absentee-Shawnee Tribe of Indians of Oklahoma, the Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, the Narragansett Indian Tribe, Shawnee Tribe, Stockbridge-Munsee Community Band of Mohican Indians, and the Shinnecock Indian Nation to participate in a government-to-government consultation meeting. The email outreach also notified the tribes that public scoping meeting recordings and materials could be accessed via the virtual meeting website.

On May 17, 2021, BOEM corresponded with tribes who responded to the government-to-government consultation meeting invitation—the Delaware Nation and Delaware Tribe of Indians—to schedule the meeting during a day and time of mutual availability. BOEM followed up the request for scheduling on May 27 and June 1, 2021.

On June 8, 2021, BOEM invited the Delaware Nation and Delaware Tribe of Indians to participate in a government-to-government consultation meeting on Thursday, June 17, 2021, from 10:00 a.m. to 12:30 p.m. Eastern time.

BOEM hosted a government-to-government consultation meeting with the Delaware Nation and Delaware Tribe of Indians on June 17, 2021. During the meeting, BOEM presented information about the Project and solicited input regarding reasonable alternatives for consideration in the EIS; the identification of historic properties or potential effects on historic properties from activities associated with the proposed Project; and potential measures to avoid, minimize, or mitigate impacts on environmental and cultural resources to be analyzed in the EIS.

On July 2, 2021, BOEM distributed a draft meeting summary of the June 17, 2021, government-to-government consultation meeting and requested representatives from the Delaware Nation and Delaware Tribe of Indians provide comment. BOEM provided maps showing the Project, adjacent projects, and excerpts from the COP showing the preliminary APE. BOEM also provided additional information about terrestrial and marine archaeological surveys performed prior to COP submission, and provided BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (BOEM 2020), which provides recommendations to lessees to ensure their cultural resources investigations contain sufficient technical information for BOEM COP reviews. BOEM also offered to facilitate a call among the Delaware Nation and Delaware Tribe of Indians with the New Jersey SHPO to discuss the issue of pre-investigation consultation activities within New Jersey.

On August 5, 2021, BOEM conduced outreach by phone to Absentee-Shawnee Tribe of Indians of Oklahoma, Eastern Shawnee Tribe of Oklahoma, the Narragansett Indian Tribe, Shawnee Tribe, and the Shinnecock Indian Nation.

On August 17, 2021, and September 3, 2021, BOEM reached out via email to Absentee-Shawnee Tribe of Indians of Oklahoma, the Eastern Shawnee Tribe of Oklahoma, the Narragansett Indian Tribe, Shawnee Tribe, and the Shinnecock Indian Nation to remind them of the March 30, 2021, invitations to participate as Section 106 consulting parties or NEPA cooperating agencies and requested their feedback.

In response to a request for Section 106 consulting party status and participation as a sovereign tribal nation in the NEPA cooperating agency review process by the Mashantucket Pequot Indian Tribal Nation, BOEM distributed materials on November 19, 2021, which included presentations provided at the virtual public scoping meetings; the NEPA Substitution for Section 106 Consulting Party Guide; the June 17, 2021, government-to-government consultation meeting agenda and PowerPoint presentation; the Ocean Wind 1 COP Scoping Report; and Ocean Wind 1 Cooperating Agency interagency meeting records. However, in a letter dated November 22, 2021, the Mashantucket Pequot Tribal Nation indicated that they no longer wanted to consult on the Project.

On January 24, 2022, BOEM conducted outreach to New Jersey SHPO to request input regarding options for scheduling the Ocean Wind 1 Section 106 Consultation Meeting #1. Katherine J. Marcopol responded on January 25, 2022, with date and time preferences. The meeting invitation with a meeting agenda was distributed to consulting parties on January 30, 2022.

At the request of consulting parties, BOEM elected to reschedule Ocean Wind 1 Section 106 Consultation Meeting #1. On February 14, 2022, BOEM distributed a Doodle Poll to request input on preferences for the rescheduled meeting date by February 18, 2022. A meeting invitation with virtual meeting participation details was distributed to consulting parties on February 23, 2022.

BOEM distributed correspondence to remind consulting parties of the upcoming consulting parties meeting and share materials including meeting agenda, presentation slides, Section 106 consultation Milestones Schedule and Approximate Dates summary, and Notification of Updates to the Ocean Wind 1 Offshore Wind Farm Project letter on March 3, 2022.

On March 8, 2022, BOEM held virtual NHPA Section 106 Consultation Meeting #1. The presentation included a brief Project overview, review of NEPA Substitution for NHPA Section 106 Process, overview of Section 106 consultation opportunities for the Project, NHPA Section 110(f) compliance requirements, and question and answer session with discussion. On March 31, 2022, BOEM shared with consulting parties a summary of the NHPA Section 106 Consultation Meeting #1 and materials presented at that meeting.

On March 21, 2022, BOEM shared with consulting parties the complete terrestrial archaeological resources report, complete marine archaeological resources report, complete Historic Resources Visual Effects Assessment, and complete Cumulative Historic Resources Visual Effects Analysis. At that time, BOEM also shared with consulting parties a technical memorandum detailing the delineation of the APE for the Project.

On April 1, 2022, BOEM shared with consulting parties a supplemental architectural intensive-level survey report.

On March 28, 2022, and April 4 and 14, 2023, BOEM conducted outreach to consulting parties to request input regarding options for scheduling the Ocean Wind 1 Section 106 Consultation Meeting #2. The meeting invitation with a meeting agenda was distributed to consulting parties on April 26, 2022.

BOEM held virtual NHPA Section 106 Consultation Meeting #2 on May 4, 2022. The presentation included a discussion of the documents distributed for consulting party review, and included a question and answer session with discussion.

BOEM distributed a Notice of Availability to notify the consulting parties that the Draft EIS was available for public review and comment for the period of June 24 to August 8, 2022. BOEM subsequently distributed a notice that the Draft EIS comment period was extended by 15 days to conclude on August 23, 2022.

On October 17, 2022, USACE, Philadelphia District formally accepted BOEM's invitation to be a NEPA Cooperating Agency and acknowledged BOEM as the lead federal agency for Section 106 in writing. USACE was added as a participating Section 106 Consulting Party.

On November 2, 2022, BOEM held a government-to-government consultation meeting with The Shinnecock Indian Nation and the Delaware Tribe of Indians. The Shinnecock Indian Nation was added as a participating Section 106 Consulting Party.

On November 11, 2022, BOEM shared with consulting parties the revised terrestrial archaeological resources report, revised marine archaeological resources report, revised Historic Resources Visual Effects Assessment, revised architectural intensive-level survey report, revised Cumulative Historic Resources Visual Effects Analysis, and revised Appendix N, *Finding of Adverse Effect for the Ocean Wind 1 Construction and Operations Plan*, with attachments including the draft Memorandum of Agreement. BOEM also distributed a consulting parties comments response matrix, which itemizes consultation comments received from consulting parties on documents distributed by BOEM on March 21 and April 1, 2022, and provides BOEM's responses to those comments.

On November 18, 2022, BOEM distributed additional consultation invitations to property owners associated with adversely affected properties who had not previously accepted consulting party status including Legacy Vacation Resorts (Brigantine Hotel), New Jersey Casino Reinvestment Development Authority (Atlantic City Convention Hall), Ritz Condominium Association (Ritz-Carlton Hotel), Max Gurwicz Enterprises (Riviera Apartments), Vassar Square Condominium Association (Vassar Square Condominiums), private homeowners of 114 South Harvard Avenue, and The Save Lucy Committee, Inc. (Lucy the Margate Elephant).

On November 7, 2022, BOEM conducted outreach to consulting parties to request input regarding options for scheduling the Ocean Wind 1 Section 106 Consultation Meeting #3 by November 11, 2022. The meeting invitation with a meeting agenda was distributed to consulting parties on November 16, 2022.

BOEM held virtual NHPA Section 106 Consultation Meeting #3 on November 30, 2022. The presentation included a discussion of revised technical reports for historic properties identification and effects assessment, including the marine archaeological resources assessment, terrestrial archaeological resources assessment, Historic Resources Visual Effects Assessment, and Cumulative Historic Resources Visual Effects Analysis. The meeting also included review of the revised finding of effect, review of the draft Memorandum of Agreement, and included a question-and-answer session with discussion.

On February 2, 2023, BOEM distributed additional consultation invitations to property owners associated with adversely affected properties who had not previously accepted consulting party status including The Inlet Public/Private Association (Absecon Lighthouse), Long Port Historical Society (Great Egg Coast Guard Station), Flanders Condominium Association (Flanders Hotel), North Wildwood (Hereford Inlet Lighthouse), New Jersey Division of Law & Public Safety, Marine Service Bureau (North Wildwood Lifesaving Station), Stone Harbor Museum (U.S. Lifesaving Station #35), and Rutgers University, School of Environmental and Biological Sciences (Little Egg Harbor U.S. Lifesaving Station #23).

On February 3, 2023, BOEM shared with consulting parties the revised marine archaeological resources assessment, Historic Resources Visual Effects Assessment, Cumulative Historic Resources Visual Effects

Analysis, finding of effect, draft Memorandum of Agreement, and updated Ocean Wind 1 COP Volume I, Volume II, Volume III Appendix L, and Volume III Appendix AD. BOEM also distributed a consulting parties comments response matrix, which itemizes consultation comments received from consulting parties on documents distributed by BOEM.

On February 15, 2023, BOEM distributed additional consultation invitations to New Jersey Office of Historic Sites and Parks as property owners associated with adversely affected Absecon Lighthouse.

On January 19, 2023, BOEM conducted outreach to consulting parties to request input regarding options for scheduling the Ocean Wind 1 Section 106 Consultation Meeting #4. That meeting was originally scheduled for February 10, 2022.

At the request of consulting parties, BOEM elected to reschedule Ocean Wind 1 Section 106 Consultation Meeting #4. On February 7, 2023, BOEM distributed a Doodle Poll to request input on preferences for the rescheduled meeting date by February 10, 2023. A meeting invitation with virtual meeting participation details and meeting materials was distributed to consulting parties on February 15, 2023.

BOEM held virtual NHPA Section 106 Consultation Meeting #4 on February 22, 2023. The presentation included a review of the Section 106 consultation schedule; discussion of BOEM's response to consulting party comments; review of the revised marine archaeological resources assessment, revised Cumulative Historic Resources Visual Effects Analysis, finding of effect, and draft Memorandum of Agreement; and included a question and answer session with discussion.

Given New Jersey SHPO was unable to participate in NHPA Section 106 Consultation Meeting #4, BOEM held a virtual meeting with New Jersey SHPO on February 24, 2023, to brief them and receive input on topics discussed during the consultation meeting on February 22, 2023.

Given Delaware Tribe of Indians was unable to participate in NHPA Section 106 Consultation Meeting #4, BOEM held virtual meetings with Delaware Tribe of Indians on March 20, 2023, and April 3, 2023, to brief them and receive input on topics discussed during the consultation meeting on February 22, 2023. The Stockbridge-Munsee Community Band of Mohican Indians also joined the April 3, 2023, meeting.

On March 20, 2023, BOEM held a virtual meeting with Rutala Associates, LLC, representative for the City of Margate and the Save Lucy Committee, Inc., the respective owner and manager of the Lucy the Margate Elephant property, to brief them on the Project and receive input on BOEM's determination of adverse effect on Lucy the Margate Elephant and BOEM's proposed mitigation for the property.

On March 28, 2023, BOEM distributed additional consultation invitations to property owners associated with adversely affected properties who had not previously accepted consulting party status including Legacy Vacation Resorts (Brigantine Hotel); New NJDEP, Office of Historic Sites & Parks (Absecon Lighthouse); Atlantic City (Atlantic City Boardwalk); New Jersey Casino Reinvestment Development Authority (Atlantic City Convention Hall); Max Gurwicz Enterprises (Riviera Apartments); Donald & June Feith (House at 114 South Harvard Avenue); Longport Historical Society (Great Egg Harbor Lighthouse); Flanders Condominium Association (Flanders Hotel); New Jersey Department of Law & Public Safety, Marine Service Bureau (North Wildwood Lifesaving Station); and Stone Harbor Museum (U.S. Lifesaving Station #35). In addition to consultation invitations, BOEM requested individual meetings with these property owners to discuss BOEM's proposed mitigation for their respective property.

On March 28, 2023, BOEM also distributed meeting requests to property owners associated with adversely affected properties who are participating in consultation to discuss Ocean Wind's proposed mitigation for their respective property including Ritz Condominium Association (Ritz-Carlton Hotel);

Vassar Square Condominium Association (Vassar Square Condominiums); Rutala Associates, LLC (Lucy the Margate Elephant); USCG (Great Egg Harbor Lighthouse and Hereford Inlet Lighthouse); Ocean City (Ocean City Boardwalk and Ocean City Music Pier); Flanders Condominium Association (Flanders Hotel); Michael J. Donohue, Blaney Donohue & Weinberg, P.C., representing City of North Wildwood (Hereford Inlet Lighthouse); and University of Rutgers, Department of Marine and Coastal Sciences, School of Environmental and Biological Sciences (Little Egg Harbor U.S. Lifesaving Station #23).

On March 30, 2023, New Jersey SHPO concurred with BOEM's Finding of Effect for the Project, including for the 17 historic properties in the visual APE and 13 ancient submerged landforms in the marine APE.

On April 10, 2023, BOEM held a virtual meeting with the Flanders Condominium Association to brief them on the Project and receive input on BOEM's determination of adverse effect on the Flanders Condominium t and BOEM's proposed mitigation for the property.

On April 17, 2023, BOEM held a virtual meeting with the property owner for 114 South Harvard Avenue to brief them on the Project and receive input on BOEM's determination of adverse effect on their property and BOEM's proposed mitigation for the property.

BOEM held virtual NHPA Section 106 Consultation Meeting #5 on April 24, 2023. The presentation included a review of the Section 106 consultation schedule, discussion of BOEM's response to consulting party comments, and review of March 2023 historic property and terrestrial archaeological resources surveys and draft Memorandum of Agreement; and included a question-and-answer session with discussion.

Additional consultation meetings may be scheduled prior to issuance of the ROD if further consultation is needed to resolve adverse effects via a Memorandum of Agreement. Additional consultation will occur if alternatives that required phased identification (see Section N.5) are selected.

N.3. Application of the Criteria of Adverse Effect

The Criteria of Adverse Effect under NHPA Section 106 (36 CFR 800.5(a)(1)) states that an undertaking has an adverse effect on a historic property

> when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association…Adverse Effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

According to the Section 106 regulations, adverse effects on historic properties include, but are not limited to (36 CFR 800.5(a)(2)):

i. Physical destruction of or damage to all or part of the property;

ii. Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary of the Interior's standards for the treatment of historic properties (36 CFR part 68) and applicable guidelines;

iii. Removal of the property from its historic location;

iv. Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;

v. Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;

vi. Neglect of a property, which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and

vii. Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

N.3.1 Assessment of Effects on Historic Properties

This section documents assessment of effects for the affected historic properties in the marine APE, terrestrial APE, and visual APE.

N.3.1.1. Assessment of Effects on Historic Properties in the Marine APE

This section assesses effects on shipwrecks, potential shipwrecks, and ancient submerged landforms in the marine APE. Based on the information presented below, BOEM finds the Project would result in no adverse effects on the 19 known submerged archaeological resources and adverse effects on 13 of the 16 ancient submerged landforms. More substantial impacts could occur if the final Project design cannot avoid known resources or if previously undiscovered resources are discovered during construction.

N.3.1.1.1 Shipwrecks and Potential Shipwrecks

Marine remote-sensing studies within the marine APE identified a total of 19 submerged cultural resources, the majority of which are either known shipwrecks (Targets 1, 9, 12–14, 17, 18) or potential shipwrecks (Targets 2–8, 10, 11, 15, 16, 19) from the Historic period (COP Volume III, Appendix F-1, pages 168–169; Ocean Wind 2023). All 19 submerged cultural resources would be avoided, with 50-meter avoidance buffers, by all Project activities that are part of the undertaking. As a result, the Project is not anticipated to result in adverse effects on these 19 resources.

N.3.1.1.2 Ancient Submerged Landforms

Marine geophysical remote-sensing studies performed in the marine APE identified 16 ancient submerged landforms with the potential to contain Native American archaeological resources within the Lease Area and two export cable route corridors. Remnant submerged landscape features are considered by Native American tribes in the region to be culturally significant resources as the lands where their ancestors lived and as locations where events described in tribal histories occurred prior to inundation. In addition, BOEM recognizes these ancient submerged landforms are similar to features previously determined to be TCPs and presumed to be eligible for listing in the NRHP under Criterion A.

Ancient submerged landforms in the marine APE are considered archaeologically sensitive. Although the marine geophysical remote-sensing studies performed to identify historic properties did not find direct evidence of pre-contact Native American cultural materials, they do represent a good-faith effort to identify submerged historic properties within the APE potentially affected by the undertaking, as defined at 36 CFR 800.4. If undiscovered archaeological resources are present within the identified ancient

submerged landforms and they retain sufficient integrity, these resources could be eligible for listing on the NRHP under Criterion D (COP Volume III, Appendix F-1; Ocean Wind 2023).

Due to the size of the offshore remote-sensing survey areas in the marine APE, the full extent or size of individual ancient submerged landforms cannot be defined. Thirteen ancient submerged landforms (Targets 21–26, 28–31, and 33–35) within the Lease Area cannot be avoided by the Project, as WTGs and associated work zones are proposed for locations within the defined areas of these resources. The Project commits to avoiding impacts on three ancient submerged landforms (Targets 20, 27, and 32), all within the Lease Area. As such, the undertaking would result in adverse effects on 13 ancient submerged landforms due to potential permanent, physical destruction of or damage to areas within the defined location of the resources.

N.3.1.2. Assessment of Effects on Historic Properties in the Terrestrial APE

Archaeological survey performed within the terrestrial APE identified six archaeological sites. Two are expansions of previously reported sites, one is an adjacent previously reported site for which additional data are lacking, and three are newly reported. All six archaeological sites would be avoided by all Project activities that are part of the undertaking. Therefore, BOEM finds no adverse effect on historic properties in the terrestrial APE (COP Volume III, Appendix F-2; page 221; Ocean Wind 2023).

Furthermore, an Terrestrial Archaeological Monitoring Plan has been developed (see Attachment A, *Memorandum of Agreement*, Attachment 5, *Terrestrial Archaeological Monitoring Plan*). The plan outlines terrestrial archaeological monitoring protocols, goals for construction crew training, expectations for documentation, requirements for archaeological and tribal monitors, temporary avoidance measures, process for determining if monitoring construction activity is necessary, reporting requirements, post-review discoveries, notifications contact list, and attachments including maps to identify areas where monitoring is required and areas for avoidance.

N.3.1.3. Assessment of Effects on Historic Properties in the Visual APE

Review of the offshore visual area identified 9 historic districts and 40 individual historic properties, and review of the onshore visual area identified three historic properties. Of these, 17 historic properties would be adversely affected by visual impacts from the proposed Project (COP Volume III, Appendix F-3; Ocean Wind 2023). The 17 adversely affected historic properties within the visual APE are those that retain maritime setting, and where maritime setting contributes to the properties' NRHP eligibility. Each property continues to offer significant seaward views that support the integrity of its maritime setting. Those seaward views include vantage points with the potential for an open view from each property toward the offshore Project elements. BOEM's analysis considers potential for visual adverse effects from the ADLS-controlled obstruction lighting system at night. Based on historical air traffic data obtained from FAA, the total duration that an ADLS-controlled lighting system for the Project would have been activated is 1 hour 19 minutes and 17 seconds over a 1-year period (COP Volume III, Appendix AD; Ocean Wind 2023). Given the ADLS is triggered so infrequently, this source of nighttime lighting is not contributing to visual adverse effects on historic properties. However, other temporary nighttime lighting from construction would contribute to visual adverse effects for the 17 properties.

Where BOEM found adverse visual effects on these historic properties, BOEM also determined that the undertaking would cause cumulative visual effects (BOEM 2022). Cumulative effects are additive effects; where BOEM has determined adverse effects would occur from Project actions on historic properties, BOEM then assessed if those effects would add to the potential adverse effects of other reasonably foreseeable actions and thereby result in cumulative effects.

N.3.1.3.1 Brigantine Hotel, Brigantine City, New Jersey

This property is at 1400 Ocean Avenue in Brigantine City and is approximately 16.0 miles from the Wind Farm Area. It consists of an 11-story Art-Deco-inspired hotel constructed in 1926–1927. It was surveyed for the Project in January 2021 and recommended eligible for individual listing in the NRHP under Criterion A for Ethnic Heritage: Black, due to its associations with prominent African American figures and its role in integrating the Jersey Shore. While it may have held significance under Criterion C as an example of an Art Deco low-rise hotel, it is no longer able to convey that potential significance due to diminished integrity of design, materials, and workmanship (COP Volume III, Appendix F-3, page 50; Ocean Wind 2023).

This property is directly on the beach, ocean views were an important consideration in the building's design and siting, and the property retains clear views of the ocean into the present. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, both ground-level and above-ground-level views may be affected by the presence of the Project on the horizon. Because seascape views are considered a character-defining feature of the property because it represents a recreational property type associated with tourist activity in New Jersey, which heightens the importance of its setting, in particular those of sea views within the setting, the Project "may affect significant character-defining features of the property or may diminish one or more aspects of integrity," and a Potential for Adverse Effect finding is therefore recommended (COP Volume III, Appendix F-3, page 50; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Brigantine Hotel is 16.3 miles from the nearest WTG associated with the Project and 9.2 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from the Brigantine Hotel is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Brigantine Hotel when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.2 Absecon Lighthouse, Atlantic City, Atlantic County

This property is at the intersection of Pacific Avenue and Rhode Island Avenue in Atlantic City and is approximately 15.3 miles from the Wind Farm Area. Constructed in 1856, the lighthouse originally marked the inlet between Absecon and Brigantine Islands, although that channel has since shifted northward. The Absecon Lighthouse consists of a 171-foot-tall iron and brick tower that tapers from a diameter of 27 feet at its base to 13 feet, 7.5 inches at the lantern. A catwalk at a storage level just below the lens provided lightkeepers with views of the Absecon Inlet. Original secondary structures included a keeper's house, assistant keeper's house, and oil house, now all demolished. The building was surveyed in January 2021 and was individually listed in the NRHP in 1970. Absecon Lighthouse is significant for navigational history (Criterion A) and architecture (Criterion C) but does not include additional information regarding historic integrity (COP Volume III, Appendix F-3, page 51; Ocean Wind 2023).

While sea views are not listed as a character-defining feature of the property, the resource type and height were identified as characteristics of the historic property and, due to the property type, sea views may be character-defining features. The Project would not be visible at ground level, as the ocean is completely screened by intervening development. However, the Project would be partially visible from the lighthouse's lantern, with the southern half of the Wind Farm Area screened by Ocean Resort and Casino tower (built circa 2010) and the northern half of the Wind Farm Area visible. A finding of No Adverse Effect was recommended for the Absecon Lighthouse, as its integrity has been diminished by the loss of its secondary structures and the property's complete surrounding by modern development, and given

views of the Project are limited only to partial views from the lantern. However, through consultation BOEM determined that the Project would result in an Adverse Effect on Absecon Lighthouse (COP Volume III, Appendix F-3, pages 53–54; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Absecon Lighthouse is 15.6 miles from the nearest WTG associated with the Project and 9.0 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Absecon Lighthouse is 618 WTGs. Of these, 98 theoretically visible WTGs (16 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Absecon Lighthouse when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.3 Atlantic City Boardwalk, Atlantic City, New Jersey

This property is along the oceanfront between South New Jersey and South Georgia Avenue in Atlantic City and is approximately 15.3 miles from the Wind Farm Area. The first iteration of the Atlantic City Boardwalk was constructed in 1870, with a seasonal structure built between South Massachusetts Avenue and what is now Columbia Place (between South Mississippi and Missouri Avenues). A widened but still seasonal boardwalk was constructed in 1880. A permanent structure was constructed in 1884 with electric lighting, which was replaced in 1890 due to hurricane damage and replaced again by a steel-braced boardwalk in 1898. Several piers were added in the 1890s, including Playground Pier, Central Pier, and Steel Pier. The Atlantic City Boardwalk was identified as a potential historic property in 1978, with New Jersey SHPO data indicating a boundary extending from the Atlantic City Convention Hall (South Georgia Avenue) to just northeast of South New Jersey Avenue. New Jersey SHPO data indicate the property's potential significance is associated with the commercial and recreation-related growth of Atlantic City (Criterion A) (COP Volume III, Appendix F-3, page 55; Ocean Wind 2023).

This property is directly on the oceanfront, ocean views were an important consideration in the structure's design and siting and influenced in the construction of commercial and recreational properties along the seashore. The property retains clear views of the ocean into the present. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, ground-level views may be affected by the presence of the Project on the horizon. Because seascape views are considered a character-defining feature of the property, the Project "may affect significant character-defining features of the property or may diminish one or more aspects of integrity," and a Potential for Adverse Effect finding is therefore recommended (COP Volume III, Appendix F-3, page 56; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Atlantic City Boardwalk is 15.2 miles from the nearest WTG associated with the Project and 8.8 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Atlantic City Boardwalk is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Atlantic City Boardwalk when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.4 Atlantic City Convention Hall, Atlantic City, New Jersey

This property is at 2301 Boardwalk in Atlantic City and is approximately 15.5 miles from the Wind Farm Area. Constructed in 1929, the building consists of a massive barrel-roofed auditorium behind the two-story entrance loggia and a one-story curved limestone exedra (arcade) along the Boardwalk. It was

surveyed for the Project in January 2021 and was individually listed in the NRHP in 1987 and designated an NHL in 1987. The property is listed in the NRHP under Criterion A as a recreational venue that hosted concerts, pageants, and sporting and political events. The property is also an NHL-designated property (COP Volume III, Appendix F-3, pages 63–64; Ocean Wind 2023).

This property is directly on the Atlantic City Boardwalk, ocean views were an important consideration in the building's design and siting, and the property retains ocean views from its interior at its ground floor entrances, screened partially by the exedra, and from the second-floor ballroom. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, both ground-level and above-ground-level views may be affected by the presence of the Project on the horizon. Because seascape views are considered a character-defining feature of the property, the Project "may affect significant character-defining features of the property or may diminish one or more aspects of integrity," and a Potential for Adverse Effect finding is therefore recommended (COP Volume III, Appendix F-3, page 63; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind Offshore Wind Farm Project*, the Atlantic City Convention Hall is 15.5 miles from the nearest WTG associated with the Project and 9.2 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Atlantic City Convention Hall is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Atlantic City Convention Hall when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.5 Ritz-Carlton Hotel, Atlantic City, New Jersey

This property is at 2715 Boardwalk in Atlantic City and is approximately 15.3 miles from the Wind Farm Area. It consists of a five-story hotel, designed by Philadelphia's Horace Trumbauer in association with New York-based Warren and Wetmore and constructed in 1921, that has been converted to a condominium building. It was surveyed for the Project in January 2021 and recommended eligible for individual listing in the NRHP under Criterion A for Commerce as an urban hotel on the seashore and Criterion C for Architecture for Trumbauer's design, which maximized rooms with northeast and southwest sea views (COP Volume III, Appendix F-3, page 66; Ocean Wind 2023).

This property is directly on the Atlantic City Boardwalk, ocean views were an important consideration in the building's design and siting, and the property retains clear views of the ocean into the present, although architectural elements oriented toward the Wind Farm Area have been subject to modification, most notably at the mezzanine level on the exterior, where a redesign with replacement materials creates a solid screen in front of double-height arched windows. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, both ground-level and above-ground-level views may be affected by the presence of the Project on the horizon. Because seascape views are considered a character-defining feature of the property, the Project "may affect significant character-defining features of the property or may diminish one or more aspects of integrity," and a Potential for Adverse Effect finding is therefore recommended (COP Volume III, Appendix F-3, pages 66–67; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Ritz-Carlton Hotel is 15.5 miles from the nearest WTG associated with the Project and 9.3 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from the Ritz-Carlton Hotel is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM

determined the Project would incrementally add to the cumulative visual effects on the Ritz-Carlton Hotel when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.6 Riviera Apartments, Atlantic City, New Jersey

This property is at 116 South Raleigh Avenue in Atlantic City and is approximately 15.6 miles from the Wind Farm Area. It consists of a nine-story apartment building constructed in 1930. It was surveyed for the Project in January 2021 and recommended eligible for individual listing in the NRHP under Criterion C for its Spanish-influenced Art Deco architectural style (COP Volume III, Appendix F-3, page 68; Ocean Wind 2023).

This property is directly on the Atlantic City Boardwalk, ocean views were an important consideration in the building's design and siting, and the property retains clear views of the ocean into the present. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, both ground-level and above-ground-level views may be affected by the presence of the Project on the horizon. Because seascape views are considered a character-defining feature of the property, the Project "may affect significant character-defining features of the property or may diminish one or more aspects of integrity," and a Potential for Adverse Effect finding is therefore recommended (COP Volume III, Appendix F-3, page 69; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Riviera Apartments are 15.6 miles from the nearest WTG associated with the Project and 8.8 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Riviera Apartments is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Riviera Apartments when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.7 Vassar Square Condominiums, Ventnor City, New Jersey

This property is at 116 South Vassar Square in Ventnor City and is approximately 16 miles from the Wind Farm Area. It consists of a 21-story building constructed in 1969. The building was surveyed in January 2021 and recommended individually eligible for the NRHP under Criterion C as a good example of mid-century high-rise design that embodies the New Formalist architectural style (COP Volume III, Appendix F-3, page 72; Ocean Wind 2023).

The Vassar Square Condominiums building is directly on the Atlantic City Boardwalk, the building was designed to maximize ocean view for residents, and the property continues to have clear open views of the seascape. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, ground-level and above-ground-level views may be affected by the presence of the Project on the horizon. Because seascape views were an important consideration in the building's design, the Project "may alter a characteristic of the property that qualifies it for NRHP-eligibility," and a Potential for Adverse Effect finding is therefore recommended (COP Volume III, Appendix F-3, page 74; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Vassar Square Condominiums are 15.6 miles from the nearest WTG associated with the Project and 9.7 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Vassar Square

Condominiums is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Vassar Square Condominiums when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.8 House at 114 South Harvard Avenue, Ventnor City, New Jersey

This property is approximately 15.7 miles from the Wind Farm Area. It consists of a 2.5-story French Eclectic style residence constructed in 1925. The building was surveyed in January 2021 and recommended eligible for individual listing in the NRHP under Criterion C as a good example of early 20th century beachfront housing (COP Volume III, Appendix F-3, page 81; Ocean Wind 2023).

The viewshed of this property features views of the seascape with limited visual obstructions. As a result, the Project is anticipated to be visible on the horizon. Although the building does not face the water, ocean views seem to have been an important consideration to its design. The Project would not affect the building's integrity of location, design, materials, and workmanship; however, integrity of setting, feeling, and association may be affected by the Project. Because seascape views were an important consideration in the building's design, the Project "may alter a characteristic of the property that qualifies it for NRHP-eligibility," and a Potential for Adverse Effect finding was therefore recommended (COP Volume III, Appendix F-3, page 82; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the house at 114 South Harvard Avenue is 15.7 miles from the nearest WTG associated with the Project and 9.9 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from the house at 114 Harvard Avenue is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the house at 114 South Harvard Avenue when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.9 Lucy the Margate Elephant, Margate City, New Jersey

This property is at 9200 Atlantic Avenue in Margate City and is approximately 15.3 miles from the Wind Farm Area. Lucy the Margate Elephant, originally known as Elephant Bazaar, was built in 1881 to promote real estate development in what is now Margate City. It consists of a six-story, elephant-shaped building. Alterations to the property include the partitioning of the domed interior space in 1902 and replacement of the original howdah (canopied seat) after it was destroyed in a storm in 1928. In 1970, the building was moved a few blocks from its original location to its current location. The building was surveyed in January 2021 and was individually listed in the NRHP in 1971 and designated an NHL in 1976. Lucy's significance as an architectural folly and sculpture, while not specified in its NRHP nomination, likely falls under Criteria A and C (COP Volume III, Appendix F-3; pages 83–84; Ocean Wind 2023).

This property is situated between Atlantic Avenue and the oceanfront and continues to have open views of the ocean from its upper levels, including the Project area; ground-level ocean views from the property have been partially screened by infill. Views of the seascape and beachfront were important considerations of the building's design and purpose as a tourist attraction that represents the vision of a late nineteenth-century entrepreneur for seaside development that continued through the 20th century, a vision reflected in Margate's growth all around the building. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, it could affect its integrity of setting,

feeling, and association. Therefore, a Potential for Adverse Effect finding was recommended (COP Volume III, Appendix F-3, pages 84–85; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, Lucy the Margate Elephant is 16.0 miles from the nearest WTG associated with the Project and 10.8 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Lucy the Margate Elephant is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on Lucy the Margate Elephant when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.10 Great Egg Coast Guard Station, Longport Borough, Atlantic County

This property is at 2301 Atlantic Avenue in Longport Borough and is approximately 15.2 miles from the Wind Farm Area. Constructed in 1938 to replace an 1888 lifesaving station at the same site, the Great Egg Coast Guard Station is an example of the 1934 Roosevelt Design for Coast Guard stations. The main massing of building is two and a half stories with a central three-story tower, with a stylistic overlay of Colonial Revival features such as a symmetrical fenestration, dormers, and front porch with Doric columns topped with a balustrade. The building was surveyed in January 2021 and was individually listed in the NRHP in 2005. Great Egg Coast Guard Station is listed under Criterion C as an example of the 1934 Roosevelt Design for Coast Guard stations (COP Volume III, Appendix F-3, pages 86–87; Ocean Wind 2023).

This property is one and a half blocks (approximately 0.14 mile) from the ocean front, with intervening development ranging from one to three stories. Due its location and intervening development, the Wind Farm Area would not be visible at ground level. However, the Wind Farm Area would be partially visible from the station's tower, although it is approximately the same height as other two and a half- to three-story buildings between the property and the ocean. The U.S. Government Lifesaving Stations, Houses of Refuge, and pre-1950 U.S. Coast Guard Lifeboat Stations Multiple-Property Documentation Form advises that a station's relationship to the shoreline and ocean views may be important for evaluating a lifesaving station's setting. A finding of No Adverse Effect was recommended for the Great Egg Coast Guard Station because its integrity will not be affected, as views of the Wind Farm Area are limited and therefore do not qualify as a substantial alteration of the property's setting. However, through consultation BOEM determined that the Project would result in an Adverse Effect on Absecon Lighthouse (COP Volume III, Appendix F-3, pages 53–54; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Great Egg Coast Guard Station is 16.1 miles from the nearest WTG associated with the Project and 10.9 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Great Egg Coast Guard Station is 592 WTGs. Of these, 98 theoretically visible WTGs (17 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Great Egg Coast Guard Station when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.11 Ocean City Boardwalk, Ocean City, New Jersey

This property is along the oceanfront between East 6th Street and East 14th Street in Ocean City and is approximately 15.0 miles from the Wind Farm Area. The first iteration of the Ocean City Boardwalk was constructed in 1880, with a seasonal structure built between 2nd Street to 4th Street and West Avenue. The

Boardwalk was expanded to in 1885, extending to a amusement pavilion at 11th Street. The Boardwalk was reconstructed in 1928 following a fire that destroyed the original structure the year before. The 1928 boardwalk was built on a concrete foundation, with some portions of the structure reconstructed after the Ash Wednesday Storm in 1962 and other portions of the structure's 1928 concrete foundation reconstructed with wood in the 2000s. Due to local ordinance restrictions on oceanfront construction east of the Boardwalk, only the Ocean City Music Pier stands on the ocean side of the structure. For the purposes of the Project's Section 106 compliance, the Ocean City Boardwalk was treated as eligible for the NRHP under Criterion A as a result of the survey undertaken for the Project, with a boundary extending from East 6th Street to East 14th Street, reflecting the concentration of commercial development along its length (COP Volume III, Appendix F-3, pages 98–99; Ocean Wind 2023).

This property is directly on the beach, and ocean views were an important consideration in the structure's design and siting and influenced the construction of commercial and recreational properties along the seashore. The property retains clear views of the ocean into the present. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, ground-level views may be affected by the presence of the Project on the horizon. Because seascape views are considered a character-defining feature of the property, the Project "may affect significant character-defining features of the property or may diminish one or more aspects of integrity," and a Potential for Adverse Effect finding is therefore recommended (COP Volume III, Appendix F-3, page 56; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Ocean City Boardwalk is 15.6 miles from the nearest WTG associated with the Project and 10.9 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Ocean City Boardwalk is 581 WTGs. Of these, 98 theoretically visible WTGs (17 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Ocean City Boardwalk when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.12 Ocean City Music Pier, Ocean City, New Jersey

This property is at 811 Boardwalk in Ocean City and is approximately 15.0 miles from the Wind Farm Area. The property consists of a multi-story Mediterranean Revival-style building constructed in 1928. According to New Jersey SHPO records, the building was determined to be eligible for individual listing in the NRHP under Criteria A and C in 1990. Although these records do not explain under which significance criteria the property is eligible, a subsequent review determined that it was likely eligible under Criterion A for its prominent role as an entertainment venue on the Ocean City Boardwalk and under Criterion C for being a good example of the Mediterranean Revival style (COP Volume III, Appendix F-3, page 102; Ocean Wind 2023).

This property is on the Ocean City Boardwalk, is situated between the boardwalk and the oceanfront, and continues to have open views of the ocean, including the Project area. Views of the seascape and beachfront were important considerations of the building's design. Although the Project would not affect the building's integrity of location, design, materials, and workmanship, it could affect its integrity of setting, feeling, and association. Therefore, a Potential for Adverse Effect finding was recommended (COP Volume III, Appendix F-3, page 103; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Ocean City Music Pier is 15.6 miles from the nearest WTG associated with the Project and 11.0 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Ocean City Music Pier is 581 WTGs. Of

these, 98 theoretically visible WTGs (17 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Ocean City Music Pier when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.13 The Flanders Hotel, Ocean City, Cape May County

This property is at 719 East 11th Street in Ocean City and is approximately 15.0 miles from the Wind Farm Area. The Flanders Hotel, built in 1923, consists of a nine-story U-shaped Spanish-Colonial Revival style hotel, a two-story commercial and solarium annex, a pool, and a parking lot. The hotel's eighth-story terrace on the north wing was enclosed in 1960 and the original three saltwater pools adjacent to the solarium on the building's east side were removed in 1978. A two-story addition was constructed on the hotel's south wing in the 1990s. The Flanders Hotel was surveyed in January 2021 and was individually listed in the NRHP in 2005. The property is listed under Criterion A in the areas of Entertainment and Recreation and Community Planning and Development for its historical development as a seaside resort and under Criterion C for its Spanish-Colonial Revival style design (COP Volume III, Appendix F-3, pages 104–106; Ocean Wind 2023).

This property is a half-block removed from the Ocean City Boardwalk. The property continues to have open views of the ocean from the guest rooms on the upper floors of the building. However, alterations and additions have limited or blocked views of the ocean from original spaces such as the eighth-story terrace, tower at the southeast corner of the building, and guest rooms on lower-level floors of the south wing. Furthermore, the adjacent development of the amusement park Playland's Castaway Cove partially screens ocean views from the property on its north and east sides. As the historic spaces designed to provide expansive ocean views have been altered themselves, or have had these views limited by new construction at and in the vicinity of the property, a Finding of No Adverse Effect was recommended for the Flanders Hotel. However, through consultation BOEM determined that the Project would result in an Adverse Effect on the Flanders Hotel (COP Volume III, Appendix F-3, pages 104–107; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Flanders Hotel is 15.8 miles from the nearest WTG associated with the Project and 11.3 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from the Flanders Hotel is 662 WTGs. Of these, 98 theoretically visible WTGs (15 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Flanders Hotel when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.14 Hereford Inlet Lighthouse, North Wildwood, Cape May County

This property is at 113 North Central Avenue in North Wildwood and is approximately 23.4 miles from the Wind Farm Area. Constructed in 1874 and relocated in the early twentieth century, the Hereford Inlet Lighthouse originally marked the Hereford Inlet between North Wildwood and Stone Harbor, 150 feet to the west of the building's present site. The building consists of one- and two-story masses surrounding a central four-story tower. USCG automated the lighthouse in 1964 and has since converted it to a museum. The Hereford Inlet Lighthouse was listed in the NRHP in 1977. The property is listed under Criterion A in the area of Commerce for its role as a navigational aid of the Hereford Inlet, an important waterway for local commerce, and under Criterion A for its design (COP Volume III, Appendix F-3, page 119; Ocean Wind 2023).

The property is situated near the ocean front, with a tidal flat between the property and the ocean. The Project would not be visible at ground level, as the southern half of the Wind Farm Area would be obscured by intervening development. However, the Wind Farm Area would be visible from the lighthouse's lantern. A finding of No Adverse Effect was recommended for the Hereford Inlet Lighthouse, as its integrity has been diminished by its relocation and the introduction of modern development in the vicinity of the property. However, through consultation BOEM determined that the Project would result in an Adverse Effect on Hereford Inlet Lighthouse (COP Volume III, Appendix F-3, pages 53–54; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Hereford Inlet Lighthouse is 23.6 miles from the nearest WTG associated with the Project and 15.9 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Hereford Inlet Lighthouse is 549 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Hereford Inlet Lighthouse when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.15 North Wildwood Lifesaving Station, North Wildwood, Cape May County

This property is at 113 North Central Avenue in North Wildwood and is approximately 23.4 miles from the Wind Farm Area. Constructed in 1938 to replace an 1888 lifesaving station at the same site, the North Wildwood Lifesaving Station is an example of the 1934 Roosevelt Design for Coast Guard stations. The main massing of building is two and a half stories with a central three-story tower, with a stylistic overlay of Colonial Revival features such as a symmetrical fenestration, dormers, and front porch with Doric columns topped with a balustrade. While New Jersey SHPO records do not include information on the building's significance, it is likely significant under Criterion A for Maritime History and under Criterion C as an example of the 1934 Roosevelt Design for Coast Guard stations. The building was surveyed in January 2021 and for the purposes of the Project's Section 106 compliance, and was treated as eligible for the NRHP under Criteria A and C (COP Volume III, Appendix F-3, page 116; Ocean Wind 2023).

The property is situated near the ocean front, with a tidal flat between the property and the ocean. The Project would be minimally visible at ground level, as the southern half of the Wind Farm Area would be partially obscured by intervening development. However, this half of the Wind Farm Area would be visible from the lifesaving station's tower. A finding of No Adverse Effect was recommended for the North Wildwood Lifesaving Station because its tower was a consequence of its architectural design, rather than its historic function as before and immediately after World War II manned lookouts were replaced automated technologies and administrative nature of stations replaced lookout functions. Furthermore, its integrity would not be affected, as views of the Wind Farm Area would be limited and therefore do not qualify as a substantial alteration of the property's setting. However, through consultation BOEM determined that the Project would result in an Adverse Effect on North Wildwood Lifesaving Station (COP Volume III, Appendix F-3, pages 53–54; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the North Wildwood Lifesaving Station is 23.6 miles from the nearest WTG associated with the Project and 15.9 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from North Wildwood Lifesaving Station is 528 WTGs. Of these, 98 theoretically visible WTGs (19 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the North Wildwood Lifesaving Station when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.16 U.S. Lifesaving Station #35, Stone Harbor Borough, Cape May County

This property is at 11617 2nd Avenue in Stone Harbor and is approximately 21.9 miles from the Wind Farm Area. Constructed in 1895, U.S. Lifesaving Station #35 (now the Steven C. Ludlum American Legion Post 331) is an example of the 1893 Duluth Design by George R. Tolman. The station consists of three sections: the southern primary lifesaving station building, a central four-story tower, and northern boat room. U.S. Lifesaving Station #35 was surveyed in January 2021 and was individually listed in the NRHP in 2008. The property is listed under Criterion A in the areas of Transportation and Maritime History for its role as a historic lifesaving station and under Criterion C as an example of the Tolman's 1893 Duluth Design for lifesaving stations (COP Volume III, Appendix F-3, page 113; Ocean Wind 2023).

Although originally on the ocean front, the property is now one block from the ocean front due to the dense residential infill and sand deposits to the east along the shoreline. The Project would be minimally visible at ground level, as the Wind Farm Area would be partially obscured by intervening development and planted trees within the center median of 2nd Avenue. The building's tower projects slightly above the infill buildings to the east and would have views of the of Wind Farm Area from its upper section. A finding of No Adverse Effect was recommended for U.S. Lifesaving Station #35, as its integrity of setting and association have already been diminished since its construction and later decommissioning in 1948 and views of the Project from the property would be limited to only the upper sections of the tower. However, through consultation BOEM determined that the Project would result in an Adverse Effect on U.S. Lifesaving Station #35 (COP Volume III, Appendix F-3, pages 113–114; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the U.S. Lifesaving Station #35 is 21.9 miles from the nearest WTG associated with the Project and 14.5 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from U.S. Lifesaving Station #35 is 561 WTGs. Of these, 98 theoretically visible WTGs (18 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on U.S. Lifesaving Station #35 when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.1.3.17 Little Egg Harbor U.S. Lifesaving Station #23, Little Egg Harbor Township, Ocean County

This property is at 800 Great Bay Boulevard in Little Egg Harbor Township and is approximately 21.3 miles from the Wind Farm Area. The Little Egg Harbor U.S. Lifesaving Station #23 was built in 1937 to replace the original station in this area, which was first constructed on Tucker Island in 1869 and moved several times due to beach erosion. The building is an example of the 1934 Roosevelt Design for Coast Guard stations. The station consists of a two-story rectangular building with a central cupola and features Colonial Revival elements. The building and its associated boathouses are constructed on elevated piers to accommodate the tides and are accessed by a long pedestrian boardwalk from Great Bay Boulevard. It remained a USCG station until the 1960s and was then purchased by Rutgers University in 1972 for use as a marine field station. The property was surveyed in January 2021 and determined individually eligible for listing in the NRHP by New Jersey SHPO in 2014. While New Jersey SHPO records do not include information on the building's significance, it is likely significant under Criterion A for Maritime History and under Criterion C as an example of the 1934 Roosevelt Design for Coast Guard stations (COP Volume III, Appendix F-3, page 44; Ocean Wind 2023).

The property is situated on southern point of Little Egg Harbor's salt marsh peninsula within the Great Bay Boulevard Wildlife Management Area, in the vicinity of the Little Egg Inlet. The Wind Farm Area

would be partially visible from the property, with the northern reach visible across Little Egg Inlet and the southern three quarters obscured by Dog Island. A finding of No Adverse Effect was recommended for Little Egg Harbor U.S. Lifesaving Station #23 because its sea view to open ocean beyond Little Egg Inlet is a consequence of its location and not related to its historical function, which was primarily concerned with views and expeditious access to the channels within the bay and Little Egg Inlet. Furthermore, its integrity would not be affected, as views of the Wind Farm Area would be limited and therefore do not qualify as a substantial alteration of the property's setting. However, through consultation BOEM determined that the Project would result in an Adverse Effect on Little Egg Harbor U.S. Lifesaving Station #23. (COP Volume III, Appendix F-3, pages 44 and 46; Ocean Wind 2023).

As described in the *Cumulative Historic Resources Visual Effects Analysis – Ocean Wind 1 Offshore Wind Farm Project*, the Little Egg Harbor U.S. Lifesaving Station #23 is 21.9 miles from the nearest WTG associated with the Project and 11.6 miles from the nearest potential WTG location for other wind energy development activities. The total number of potentially visible turbines from Little Egg Harbor U.S. Lifesaving Station #23 is 575 WTGs. Of these, 98 theoretically visible WTGs (17 percent) would be from the proposed Project. As such, BOEM determined the Project would incrementally add to the cumulative visual effects on the Little Egg Harbor U.S. Lifesaving Station #23 when combined with the effects of other past, present, or reasonably foreseeable future actions (BOEM 2022).

N.3.2 Summary of Adversely Affected Historic Properties

N.3.2.1. Adverse Effects on Historic Properties in the Marine APE

Ocean Wind 1 will avoid effects on all 19 submerged archaeological resources and their associated avoidance buffers. Ocean Wind 1 also commits to avoiding the defined spatial extent of 3 of 16 ancient submerged landforms. Thirteen of the 16 ancient submerged landforms within the Lease Area cannot be avoided by the Project, as WTGs, OSS, cables, and associated work zones are proposed for locations within the defined areas of these resources. Therefore, BOEM has determined the undertaking would have adverse effects on historic properties within the marine APE.

N.3.2.2. Adverse Effects on Historic Properties in the Terrestrial APE

The Project has been sited to avoid adverse effects on terrestrial archaeological resources by siting onshore facilities within previously disturbed areas and existing road right-of-way to the extent practicable. Archaeological survey of these areas revealed six archaeological sites within the terrestrial APE, including previously disturbed areas. Two are expansions of previously reported sites, one is an adjacent previously reported site for which additional data are lacking, and three are newly reported. All six archaeological sites would be avoided by all Project activities that are part of the undertaking. Therefore, BOEM finds no adverse effect on these historic properties.

N.3.2.3. Adverse Effects on Historic Properties within the Visual APE

Based on the information BOEM has available from the studies conducted to identify historic properties within the visual APE of the Project and the assessment of effects upon those properties determined in consultation with the consulting parties, BOEM has determined that the Project would have adverse visual effects on the following historic properties:

- Brigantine Hotel, Brigantine City
- Absecon Lighthouse, Atlantic City
- Atlantic City Boardwalk, Atlantic City
- Atlantic City Convention Hall, Atlantic City

- Ritz-Carlton Hotel, Atlantic City
- Riviera Apartments, Atlantic City
- Vassar Square Condominiums, Ventnor City
- House at 114 South Harvard Avenue, Ventnor City
- Lucy the Margate Elephant in Margate City
- Great Egg Coast Guard Station, Longport Borough
- Ocean City Boardwalk, Ocean City
- Ocean City Music Pier, Ocean City
- The Flanders Hotel, Ocean City
- Hereford Lighthouse, North Wildwood
- North Wildwood Lifesaving Station, North Wildwood
- U.S. Lifesaving Station #35, Stone Harbor Borough
- Little Egg Harbor U.S. Lifesaving Station #23, Little Egg Harbor Township

The undertaking would affect the character of the properties' settings that contributes to their historic significance by introducing visual elements that are out of character with the historic setting of the properties. BOEM did, however, determine that, due to the distance and open viewshed, the integrity of the properties would not be so diminished as to disqualify any of them for NRHP eligibility.

The adverse effects on the viewshed of the above-ground historic properties would occupy the space for approximately 35 years, but they are unavoidable for reasons discussed in Section N.3.1.3. This application of the criteria of adverse effect and determination that the effects are direct are based on pertinent NRHP bulletins, subsequent clarification and guidance by the National Park Service and ACHP, and other documentation, including professionally prepared viewshed assessments and computer-simulated photographs.

While the historic resources visual affects assessment distributed to consulting parties on March 21, 2022, recommended a finding of adverse effect on the six historic properties, the historic resources visual affects assessment was revised in November 2022 to incorporate consulting party input and new data. Two of the properties (Villa Maria by the Sea in Stone Harbor, New Jersey, and Charles Fischer House at 115 S. Princeton Avenue, Ventnor City, New Jersey) were demolished and six properties were newly recommended as being adversely affected (COP Volume III, Appendix F-3; Ocean Wind 2023). The finding of adverse effect has been further revised in February 2023 to incorporate consulting party input. BOEM finds seven additional properties are adversely affected.

N.4. Actions to Avoid, Minimize, or Mitigate Adverse Effects

BOEM will stipulate measures to avoid, minimize, and mitigate adverse effects for certain historic properties identified in the APE as adversely affected by the Project, as well as cumulative adverse visual effects caused by the Project. Specifically, BOEM will stipulate measures to avoid known terrestrial archaeological resources and submerged archaeological and ancient submerged landforms, minimize visual effects on historic properties, and stipulate implementation of an terrestrial archaeological monitoring plan. BOEM will also stipulate mitigation measures to resolve adverse effects for 13 adversely effected ancient submerged landforms that cannot be avoided, or in cases where there is post-

review discovery of previously unknown terrestrial or marine archaeology that are not currently found to be subject to adverse effects from the Project. BOEM, with the assistance of Ocean Wind, will develop and implement two Historic Property Treatment Plans in consultation with consulting parties who have demonstrated interest in specific historic properties and property owners. This will include a treatment plan to address impacts on ancient submerged landforms and a treatment plan that will provide details and specifications for actions consisting of mitigation measures to resolve adverse visual effects and cumulative adverse visual effects. The terrestrial archaeological monitoring plan and two treatment plans are included as attachments to the Memorandum of Agreement (Attachment A).

As part of the NRHP Section 106 process, Ocean Wind has committed to APMs as conditions for approval of issuance of BOEM's permit (COP Volume III, Appendix F-4), including:

1. Ocean Wind would apply a paint color to the WTGs no lighter than RAL 9010 pure white and no darker than RAL 7035 light gray to help reduce potential visibility of the turbines against the horizon during daylight hours.
2. Ocean Wind would implement an ADLS to automatically activate lights when aircraft approach. The WTGs and OSS would be lit and marked in accordance with FAA and USCG lighting standards and consistent with BOEM best practices.
3. Implementation of the terrestrial archaeological monitoring plan, terrestrial post-review discovery plan, and marine post-review discovery plan would reduce potential impacts on any previously undiscovered archaeological resources (if present) encountered during construction and operation. Archaeological monitoring and the implementation of a post-review discoveries plan would reduce potential impacts on undiscovered archaeological resources to a negligible level by preventing further physical impacts on the archaeological resources encountered during construction.
4. Ocean Wind cannot avoid 13 of the 16 ancient submerged landforms (Targets 21–26, 28–31, and 33–35) and will complete the mitigation measures as outlined in COP Volume III, Appendix F-4 for the purposes of resolving adverse effects per 36 CFR 800.6, including:
    a. Geoarchaeological analysis consisting of archaeological core processing and artifact screening, tribal participation in lab processing of core samples, data analysis, update to paleolandscape reconstruction model, and public or professional presentations summarizing the results of the investigations, developed with the consent of the consulting tribes/tribal nations
    b. Tribal outreach and preparation of educational materials developed with participating tribes in the form of open-source geographic information system and story maps or equivalent digital/media presentations that address traditional past land uses associated with the submerged landforms
    c. In consultation with BOEM, ancient submerged landform post-construction seafloor impact inspection, including development of a 3D model throughout ancient submerged landforms designated for review; development of the remotely operated vehicle investigation methodology to conduct seafloor inspections along affected portions of the selected ancient submerged landforms; review of candidate datasets and attributes for inclusion in the geographic information system; delivery of data interpretive technical report draft; and delivery of final technical report
    d. Conducting an ethnographic study consisting of funding an ethnographic researcher and researcher travel; funding for Delaware Tribe of Indians, Delaware Nation, and Stockbridge Munsee technology upgrades associated with analysis of geographic information system data; funding for Delaware Tribe of Indians historic preservation oversight and indirect costs; funding for Stockbridge-Munsee Community Band of Mohican Indians Tribal Historic Preservation Officer collaboration; providing relevant ancient submerged landform geographic information system data layers to Delaware Tribe of Indians for use in this study as well as providing a

tutorial on the data; progress calls and report development; and funding for a presentation to highlight the results of the study to be coordinated and executed by Delaware Tribe of Indians

5. Ocean Wind would fund documentation preparation and public education material development, as outlined in COP Volume III, Appendix F-4, for properties adversely affected by visual impacts to resolve adverse effects per 36 CFR 800.6 including:
    I. National Historic Landmarks Mitigation
        A. Lucy the Margate Elephant
            1. Funding for Visitor Experience and Public Access for Lucy the Margate Elephant
    II. Multi-property and Multi-county Mitigation
        A. Historic Context addressing early 20th century New Jersey Shore Hotels
        B. Historic Context addressing mid-century High-rise residential buildings at the New Jersey Shore
        C. Historic Context addressing Boardwalks of the New Jersey Shore, with Surveys and Evaluations of Atlantic City Boardwalk, Ocean City Boardwalk, and Wildwood Boardwalk
    III. Atlantic County Historic Properties Mitigation
        A. Absecon Lighthouse, Atlantic City, Atlantic County
            1. Funding for Visitor Experience and Public Access for Absecon Lighthouse
        B. Atlantic City Boardwalk, Atlantic City, Atlantic County
            1. Funding for Visitor Experience and Public Access for Atlantic City Boardwalk
6. Ocean Wind will contribute funding to a Mitigation Fund, as outlined in the Memorandum of Agreement (Attachment A), for properties adversely affected by visual impacts to resolve adverse effects per 36 CFR 800.6 including:
        A. Funding to resolve adverse effects on 14 historic properties: Brigantine Hotel, Brigantine City; Atlantic City Convention Hall, Atlantic City; Ritz-Carlton Hotel, Atlantic City; Riviera Apartments, Atlantic City; Vassar Square Condominiums, Ventnor City; House at 114 South Harvard Avenue, Ventnor City; Great Egg Coast Guard Station, Longport Borough; Ocean City Boardwalk, Ocean City; Ocean City Music Pier, Ocean City; Hereford Lighthouse, North Wildwood; North Wildwood Life Saving Station, North Wildwood; U.S. Lifesaving Station #35, Stone Harbor Borough; Flanders Hotel, Ocean City; and Little Egg Harbor U.S. Life Saving Station #23 (U.S. Coast Guard Station #119), Little Egg Harbor Township.
        B. Mitigation measures to be developed in consultation with consulting parties but could include activities such as HABS documentation and HABS-like documentation, Historic Structure Reports, and funding for visitor experience, public access, and climate resiliency.

Ocean Wind has not identified the 5th Street cable route option for BL England interconnection as the preferred cable route. However, in the event that the 5th Street cable route option is selected by Ocean Wind, BOEM will require Ocean Wind to use construction approaches to avoid or minimize vibration impacts on foundations of historic properties adjacent to right-of-way construction areas, to prepare and implement a vibration monitoring plan, and to avoid instances of slate sidewalk remnants if feasible, or remove and replace them prior to and following construction activities.

The NHPA Section 106 consultation process is ongoing for the Project, and will culminate in a Memorandum of Agreement detailing avoidance, minimization, and mitigation measures to resolve adverse effects on historic properties, including cumulative adverse visual effects caused by the Project. See Attachment A. BOEM will continue to consult in good faith with the New Jersey SHPO and other consulting parties to resolve adverse effects.

N.5. Phased Identification

Information pertaining to identification of historic properties within certain portions of the marine APE related to Alternatives B-1, B-2, C-1, C-2, and D will not be available until after the ROD is issued and the COP is approved. If Alternative B-1, B-2, C-1, C-2, or D is selected, BOEM will use the Memorandum of Agreement to establish commitments for phased identification and evaluation of historic properties within the marine APE in accordance with BOEM's existing *Guidelines for Providing Archaeological and Historic Property Information Pursuant to Title 30 Code of Federal Regulations Part 585*, ensuring potential historic properties are identified, effects assessed, and adverse effects resolved prior to construction (Memorandum of Agreement Stipulation IV). If Alternative C-1 is selected, previously unsurveyed areas associated with one WTG and potentially the inter-array cable routing will need to be surveyed for marine archaeology. If Alternative C-2 is selected, previously unsurveyed areas associated with 22 WTG positions and potentially the inter-array cable routing will need to be surveyed for marine archaeology. If Alternative B-1, B-2, or D is selected, previously unsurveyed areas associated with the inter-array cable may need to be surveyed for marine archaeology.

The Memorandum of Agreement will specify the Section 106 consultation process in the event one of these alternatives is selected (Alternative B-1, B-2, C-1, C-2, or D). If one of these alternatives is selected, Ocean Wind will be required to complete underwater archaeology surveys for portions of the marine APE that have not been surveyed in accordance with BOEM's existing *Guidelines for Providing Archaeological and Historic Property Information Pursuant to Title 30 Code of Federal Regulations Part 585*. BOEM will review the results of these surveys and, after its final agreement that these surveys and survey results are sufficient, BOEM will making a finding of effect if any historic properties could potentially be affected by one of these selected alternatives. If BOEM identifies no additional historic properties or determines that no historic properties are adversely affected due to the selection of one of these alternatives, BOEM, with the assistance of Ocean Wind, will notify and consult with the signatories, invited signatories, and consulting parties by providing a written summary of the surveyed area including any maps, a summary of any additional surveys and research conducted to identify historic properties and assess effects, and copies of the surveys. BOEM and Ocean Wind will allow the signatories, invited signatories, and consulting parties 30 calendar days to review and comment on the proposed change, BOEM's determination, and the documents. After the 30-calendar-day review period has concluded and no comments require additional consultation, Ocean Wind will notify the signatories and consulting parties that BOEM has received concurrence from the New Jersey SHPO regarding the finding of effect and, if i received any comments, provide a summary of the comments and BOEM's responses. BOEM, with the assistance of Ocean Wind, will conduct any consultation meetings if requested by the signatories or consulting parties.

If BOEM determines new adverse effects on historic properties will occur due to the selection of one of these alternatives and based on the results of the underwater archaeology surveys, BOEM with the assistance of Ocean Wind, will notify and consult with the signatories, invited signatories, and consulting parties regarding BOEM's finding and the proposed measures to resolve the adverse effect(s) including the development of a new treatment plan(s) following the consultation process set forth in the Memorandum of Agreement. Ocean Wind will notify all signatories, invited signatories, and consulting parties about the selection of one of these alternatives, the results of the surveys and copies of the survey

reports, BOEM's determination, and the proposed resolution measures for the adverse effect(s). The signatories, invited signatories, and consulting parties will have 30 calendar days to review and comment on the survey reports, the results of the survey reports, the adverse effect finding, and the proposed resolution of adverse effect(s), including a draft treatment plan(s). BOEM, with the assistance of Ocean Wind, will conduct additional consultation meetings, if necessary, during consultation on the adverse effect finding and during drafting and finalization of the treatment plan(s). BOEM, with the assistance of Ocean Wind, will respond to the comments and make necessary edits to the documents. Ocean Wind will send the revised draft final documents to the other signatories, invited signatories, and consulting parties for review and comment during a 30-calendar-day review and comment period. With this same submittal of draft final documents, Ocean Wind will provide a summary of all the comments received on the documents and BOEM's responses. BOEM, with the assistance of Ocean Wind, will respond to the comments on the draft final documents and make necessary edits to the documents. Ocean Wind will notify all the signatories, invited signatories, and consulting parties and will provide the final document(s) including the final treatment plan(s) and a summary of comments and BOEM's responses to comments, if it receives any on the draft final documents, after BOEM has received concurrence from the New Jersey SHPO on the finding of new adverse effect(s), and BOEM has accepted the final treatment plan(s).

N.6. National Historic Landmarks and the NHPA Section 106 Process

The National Park Service, which administers the NHL program for the Secretary of the Interior, describes NHLs and requirements for NHLs as follows:

> National Historic Landmarks (NHL) are designated by the Secretary under the authority of the Historic Sites Act of 1935, which authorizes the Secretary to identify historic and archaeological sites, buildings, and objects which "possess exceptional value as commemorating or illustrating the history of the United States" Section 110(f) of the NHPA requires that Federal agencies exercise a higher standard of care when considering undertakings that may directly and adversely affect NHLs. The law requires that agencies, "to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark." In those cases when an agency's undertaking directly and adversely affects an NHL, or when Federal permits, licenses, grants, and other programs and projects under its jurisdiction or carried out by a state or local government pursuant to a Federal delegation or approval so affect an NHL, the agency should consider all prudent and feasible alternatives to avoid an adverse effect on the NHL.

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

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

The Historic Resources Visual Effects Assessment identified two NHLs in the visual APE for the Project: the Atlantic City Convention Hall and Lucy the Margate Elephant.

Atlantic City Convention Hall (Jim Whelan Boardwalk Hall), built in 1929, was a focal point of the Atlantic City Boardwalk in the early 20th century. The building features a massive barrel-roofed auditorium behind the two-story entrance loggia and a one-story curved limestone exedra (arcade) along the Boardwalk. The convention hall was used as a recreational venue, hosting concerts, sporting and political events, and pageants in its large auditorium. A smaller auditorium above the building's Boardwalk entrance was historically used as a ballroom and now serves as a multi-function space for gatherings and small events. The Atlantic City Convention Hall was listed in the NRHP and designated as an NHL in 1987; it was listed in the New Jersey Register of Historic Places in 1993. The convention hall is listed under Criterion A, in the area of recreation and culture, as a recreational venue associated with social and civic events in Atlantic City in the early and mid-20th century. The building is listed under Criterion C, in the area of engineering, for the design of the main auditorium's massive barrel roof, entrance loggia, and Boardwalk exedra. In a 2021 review of the property, it was noted that:

> The Project will have a visual effect on the Atlantic City Convention Hall, largely borne by the exedra walkway, a contributing structure of the site, located across the Boardwalk from the Convention Hall. While the Project would not alter any characteristics or physical features within the Convention Hall that contribute to its historic significance, BOEM determined that the Project would diminish its integrity of setting, an aspect of its historic integrity that relates to its significance. The Atlantic City Convention Hall is significant under Criterion A for Recreation and Criterion C for Engineering. The building's location on Atlantic City's Boardwalk is paramount to its history and associated significance…To the extent that the [Wind Farm Area] would be visible along the horizon approximately 15.5 mi from the historic property, BOEM has determined that the impact to setting rises to the level of adverse effect. (COP Volume III, Appendix F, page 64; Ocean Wind 2023).

Lucy the Margate Elephant was built in 1881 to promote real estate development in what is now Margate City. In 1970, the building was moved a few blocks from its original location to its current location at 9200 Atlantic Avenue. The building's original location was two blocks northeast, near the intersection of present-day Atlantic Avenue and South Cedar Grove Avenue. The building was listed in the NRHP in 1971 and designated an NHL in 1976 under Criteria A and C. Modifications to Lucy include the partitioning of the domed interior space in 1902 and replacement of the original howdah (canopied seat) after it was destroyed in a storm in 1928. Both alterations occurred prior to the building being listed in the NRHP. In a 2021 review of the property, it was noted that:

> At a distance of 15.3 mi, characterized in the VIA as apparent, the [Wind Farm Area] will be visible on the horizon, altering the property's setting and potentially, the experience of visitors to the site. Lucy's significance as an architectural folly and sculpture, while not specified in its NRHP nomination, likely falls under Criteria A and C. Sea views are a key component of the building's property type and contribute to its significance. Therefore, a finding of Adverse Effect is recommended for Lucy the Margate Elephant. (COP Volume III, Appendix F-3, page 85; Ocean Wind 2023).

BOEM has determined these two properties would be adversely affected by the Project, as both properties have seaside locations and these ocean views that are considered a character-defining feature of their significance (COP Volume III, Appendix F-3, pages 64 and 85; Ocean Wind 2023).

N.7. References Cited

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ATTACHMENT A
MEMORANDUM OF AGREEMENT

Version dated April 19, 2023

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DRAFT MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND 1 OFFSHORE WIND FARM PROJECT

WHEREAS, the Bureau of Ocean Energy Management (BOEM) plans to authorize construction and operation of the Ocean Wind 1 Offshore Wind Farm Project (Project) pursuant to Section 8(p)(1)(C) of the Outer Continental Shelf (OCS) Lands Act (43 U.S.C. 1337(p)(1)(C)), as amended by the Energy Policy Act of 2005 (Public Law No. 109-58) and in accordance with Renewable Energy Regulations at 30 Code of Federal Regulations (CFR) Part 585; and

WHEREAS, BOEM determined that the Project constitutes an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA), as amended (54 USC 306108), and its implementing regulations (36 CFR 800), and consistent with the Programmatic Agreement (NJ-NY PA) regarding the review of OCS renewable energy activities offshore New Jersey and New York (*Programmatic Agreement Among The U.S. Department of the Interior, Bureau of Ocean Energy Management, The State Historic Preservation Officers of New Jersey and New York, The Shinnecock Indian Nation, and The Advisory Council on Historic Preservation Regarding Review of Outer Continental Shelf Renewable Energy Activities Offshore New Jersey and New York Under Section 106 of the National Historic Preservation Act*); and

WHEREAS, BOEM plans to approve with conditions the Construction and Operations Plan (COP) submitted by Ocean Wind LLC (Ocean Wind) hereafter referred to as the lessee; and

WHEREAS, BOEM determined the construction, operation, maintenance, and eventual decommissioning of the Project, planned for up to 98 offshore Wind Turbine Generators (WTGs), up to three offshore substations, two onshore substations, offshore and onshore export cables, could potentially adversely affect historic properties as defined under 36 CFR 800.16(l); and

WHEREAS, BOEM is preparing an Environmental Impact Statement (EIS) for the Project pursuant to the National Environmental Policy Act (42 USC 4321 et seq.) (NEPA) and elected to use the NEPA substitution process with its Section 106 consultation pursuant to 36 CFR 800.8(c); and

WHEREAS, BOEM notified in advance the New Jersey State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) on March 8, 2021, of their decision to use NEPA substitution and followed the standards for developing environmental documents to comply with the Section 106 consultation for this Project pursuant to 36 CFR 800.8(c), and ACHP responded with acknowledgement and guidance regarding NEPA substitution on March 23, 2021; and

WHEREAS, in accordance with 36 CFR 800.3, BOEM invited New Jersey SHPO to consult on the Project on March 30, 2021, and New Jersey SHPO accepted on April 21, 2021; and

WHEREAS, in accordance with 36 CFR 800.3, BOEM invited ACHP to consult on the Project on March 30, 2021; and

WHEREAS, the Project is within a commercial lease area that was subject to previous NHPA Section 106 review by BOEM regarding the issuance of the commercial lease and approval of site assessment activities, which underwent Section 106 review pursuant to the NJ-NY PA and concluded with No Historic Properties Affected on October 18, 2017.

WHEREAS, consistent with 36 CFR 800.16(d) and BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (May 27, 2020), BOEM

defined the area of potential effects (APE) for the undertaking as the depth and breadth of the seabed potentially impacted by any bottom-disturbing activities, constituting the marine archaeological resources portion of the APE (marine APE); the depth and breadth of terrestrial areas potentially impacted by any ground disturbing activities, constituting the terrestrial archaeological resources portion of the APE (terrestrial APE); the viewshed from which offshore or onshore renewable energy structures would be visible, constituting the visual portion of the APE (visual APE); and any temporary or permanent construction or staging areas that may fall into any of the aforementioned offshore or onshore portions of the APE (see Attachment 1 APE Maps); and

WHEREAS, BOEM identified 19 submerged historic properties and 16 ancient submerged landforms features (ASLFs) in the marine APE; six historic properties, all archaeological sites, in the terrestrial APE; and nine historic districts and 40 aboveground historic properties in the offshore Project components' portion of the visual APE and three historic properties in the onshore Project components' portion of the visual APE; and

WHEREAS, BOEM identified two National Historic Landmarks (NHLs) in the offshore Project components' portion of the visual APE, Lucy the Margate Elephant and Atlantic City Convention Hall, and BOEM determined the Project could potentially visually adversely affect these two NHLs due to their seaside locations and their character-defining ocean views will be altered and diminished; and

WHEREAS, BOEM has determined that the undertaking will adversely affect 13 ASLFs (Targets 21–26, 28–31, and 33–35) from physical disturbance in the lease area and export cable construction; and will visually adversely affect aboveground historic properties: Atlantic City Convention Hall, Atlantic City; Lucy the Margate Elephant, Margate City; Absecon Lighthouse, Atlantic City; Great Egg Coast Guard Station, Longport Borough; Hereford Lighthouse, North Wildwood; U.S. Lifesaving Station #35, Stone Harbor Borough; Flanders Hotel, Ocean City, which are listed in the National Register of Historic Places (NRHP); and Brigantine Hotel, Brigantine City; Atlantic City Boardwalk, Atlantic City; Ritz-Carlton Hotel, Atlantic City; Riviera Apartments, Atlantic City; Vassar Square Condominiums, Ventnor City; House at 114 South Harvard Avenue, Ventnor City; Ocean City Boardwalk, Ocean City; and Ocean City Music Pier, Ocean City; North Wildwood Life Saving Station, North Wildwood; Little Egg Harbor U.S. Life Saving Station #23 (U.S. Coast Guard Station #119), Little Egg Harbor Township, which are eligible for listing in the NRHP; and

WHEREAS, BOEM determined that the implementation of the avoidance measures identified in this MOA will avoid adversely affecting all nineteen submerged cultural resources (Targets 01–19) and three ASLFs in the marine APE (Targets 20, 27, and 32), all six historic properties in the terrestrial APE, nine historic districts and 23 aboveground historic properties in the offshore visual APE, and three historic properties in the onshore visual APE; and

WHEREAS, BOEM determined all of the ASLFs identified in the marine APE are eligible for the National Register of Historic Places (NRHP) under Criteria A and D and determined, under each of the Project alternatives analyzed in the EIS, that the undertaking will adversely affect the following 13 ASLFs: Targets 21 through 26, 28 through 31, and 33 through 35; and

WHEREAS, under each of the Project alternatives analyzed in the EIS, BOEM determined the Project would visually adversely affect these 17 aboveground historic properties in New Jersey: Brigantine Hotel, Brigantine City, Atlantic County; Absecon Lighthouse, Atlantic City, Atlantic County; Atlantic City Boardwalk, Atlantic City, Atlantic County; Atlantic City Convention Hall, Atlantic City, Atlantic County; Ritz-Carlton Hotel, Atlantic City, Atlantic County; Riviera Apartments, Atlantic City, Atlantic County; Vassar Square Condominiums, Ventnor City, Atlantic County; House at 114 South Harvard Avenue, Ventnor City, Atlantic County; Lucy the Margate Elephant, Margate City, Atlantic County; Great Egg Coast Guard Station, Longport Borough, Atlantic County; Ocean City Boardwalk,

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Ocean City, Cape May County; Ocean City Music Pier, Ocean City, Cape May County; Hereford Lighthouse, North Wildwood, Cape May County; North Wildwood Life Saving Station, North Wildwood, Cape May County; U.S. Lifesaving Station #35, Stone Harbor Borough, Cape May County; Flanders Hotel, Ocean City, Cape May County; and Little Egg Harbor U.S. Life Saving Station #23 (U.S. Coast Guard Station #119), Little Egg Harbor Township, Ocean County; and

WHEREAS, upon receiving the Draft EIS, including Appendix N. Finding of Adverse Effects, ACHP notified BOEM that it will formally participate in this Section 106 consultation via letter sent on August 15, 2022; and

WHEREAS, New Jersey SHPO concurred with BOEM's finding of adverse effect on March 30, 2023; and

WHEREAS, throughout this document the term 'Tribe,' has the same meaning as 'Indian Tribe,' as defined at 36 CFR 800.16(m); and

WHEREAS, BOEM invited the following federally recognized Tribes to consult on this Project: Absentee-Shawnee Tribe of Indians of Oklahoma, Eastern Shawnee Tribe of Oklahoma, Shawnee Tribe, Mashantucket Pequot Tribal Nation, the Narragansett Indian Tribe, the Rappahannock Tribe, and the Shinnecock Indian Nation; the Delaware Tribe of Indians, Delaware Nation, the Stockbridge-Munsee Community Band of Mohican Indians, and the Wampanoag Tribe of Gay Head (Aquinnah); and

WHEREAS, the Delaware Tribe of Indians, Delaware Nation, the Stockbridge-Munsee Community Band of Mohican Indians, and the Wampanoag Tribe of Gay Head (Aquinnah) accepted BOEM's invitation to consult and BOEM invited these Tribes to sign this MOA as concurring parties; and

WHEREAS, in accordance with 36 CFR 800.3, BOEM invited other federal agencies, state and local governments, and consulting parties with a demonstrated interest in the undertaking to participate in this consultation, the list of those accepting participation and declining to participate by either written response or no response to direct invitations are listed in Attachment 2; and

WHEREAS, BOEM has consulted with the lessee in its capacity as applicant seeking federal approval of the COP, and, because the lessee has responsibilities under the MOA, BOEM has invited the applicant to be an invited signatory to this MOA; and

WHEREAS, construction of the Project requires a Department of the Army permit from the United States Army Corps of Engineers (USACE) for activities which result in the discharge of dredged or fill material into jurisdictional wetlands and/or other waters of the United States pursuant to Section 404 of the Clean Water Act, and activities occurring in or affecting navigable waters of the United States pursuant to Section 10 of the Rivers and Harbors Act; and

WHEREAS, BOEM invited USACE to consult since USACE has authority to issue any needed permits for this Project under Section 404 of the Clean Water Act (33 USC 1344) and Section 10 of the Rivers and Harbors Act (33 USC 403); and

WHEREAS, the USACE designated BOEM as the Lead Federal Agency pursuant to 36 CFR 800.2(a)(2) to act on its behalf for purposes of compliance with Section 106 for this Project (in a letter dated October 17, 2022), BOEM invited the USACE to sign this MOA as a concurring party; and

WHEREAS, BOEM notified and invited the Secretary of the Interior (represented by the National Park Service (NPS) to consult regarding this Project pursuant to the Section 106 regulations, including consideration of the potential effects to the NHLs as required under NHPA Section 110(f) (54 USC

306107) and 36 CFR 800.10, the NPS accepted BOEM's invitation to consult, and BOEM invited the NPS to sign this MOA as a concurring party; and

WHEREAS, BOEM has consulted with the signatories, invited signatories, and consulting parties participating in the development of this MOA regarding the definition of the undertaking, the delineation of the APEs, the identification and evaluation of historic properties, the assessment of potential effects to the historic properties, and on measures to avoid, minimize, and mitigate adverse effects to historic properties; and

WHEREAS, pursuant to 36 CFR 800.6, BOEM invited the lessee to sign as invited signatory and the consulting parties as listed in Attachment 2 to sign as concurring parties; however, the refusal of any consulting party to sign this MOA or otherwise concur does not invalidate or affect the effective date of this MOA, and consulting parties who choose not to sign this MOA will continue to receive information if requested and have an opportunity to participate in consultation as specified in this MOA; and

WHEREAS, the signatories (required signatories and invited signatories) agree, consistent with 36 CFR 800.6(b)(2), that adverse effects will be resolved in the manner set forth in this MOA; and

WHEREAS, BOEM sought and considered the views of the public regarding Section 106 for this Project through the NEPA process by holding virtual public scoping meetings when initiating the NEPA and NHPA Section 106 review on April 13, 15, and 20, 2021 and virtual public hearings related to the Draft EIS on July 14, 20, and 26, 2022; and

WHEREAS, BOEM made the first Draft MOA available to the public for review and comment from June 24, 2022, to August 23, 2022, and provided updated versions of the Draft MOA to the public using BOEM's Project website; and

NOW, THEREFORE, BOEM, the New Jersey SHPO, and the ACHP agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

BOEM, with the assistance of the lessee, shall ensure that the following measures are carried out as conditions of its approval of the undertaking:

I. MEASURES TO AVOID ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. BOEM will include the following avoidance measures for adverse effects within the marine APE as conditions of approval of the Ocean Wind 1 COP:

    i. The lessee will avoid known shipwrecks (Targets [Targets 1, 9, 12-14, 17, 18]) previously identified during marine archaeological surveys by a distance of no less than 50 meters from the known extent of the resource for placement of Project structures and when conducting seafloor-disturbing activities.

    ii. The lessee will avoid potential shipwrecks (Targets 2-8, 10, 11, 15, 16, 19) and potentially significant debris fields previously identified during marine archaeological surveys by a distance of no less than 50 meters from the known extent of the resource, unless the buffer would preclude the installation of facilities at their engineered locations,

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but in no event would the buffer be less than 50 meters from the known extent of the resource.

iii. The lessee will avoid three ASLFs (Targets 20, 27, and 32). No additional avoidance buffer is required for these ASLFs given avoidance of the ASLFs is based on the defined spatial extent of each ASLF, which has been determined based on the maximum observed presence of the seismic reflector and unique buffer area designed to account for minimal positioning errors or lack of resolution.

B. Visual APE

1. BOEM will include the following avoidance measures for adverse effects within the visual APE as conditions of approval of the Ocean Wind 1 COP:

i. To maintain avoidance of adverse effects to historic properties in the visual APE where BOEM determined no adverse effects or where no effects would occur, BOEM will require the lessee to ensure Project structures are within the design envelope, sizes, scale, locations, lighting prescriptions, and distances that were used by BOEM to inform the definition of the APE for the Project and for determining effects in the Finding of Effect (see the Construction & Operations Plan: Ocean Wind 1 Offshore Wind Farm Project, October, 2022).

II. MEASURES TO MINIMIZE ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Visual APE

1. BOEM has undertaken planning and actions to minimize adverse effects to aboveground historic properties in the visual APE. BOEM will include these minimization measures for adverse effects within the visual APE as conditions of approval of the Ocean Wind 1 COP:

i. The lessee will use uniform WTG design, speed, height, and rotor diameter to reduce visual contrast and decrease visual clutter.

ii. The lessee will use uniform spacing of 1 NM (1.15 mile) by 0.8 NM (0.92 mile) to decrease visual clutter, aligning WTGs to allow for safe transit corridors.

iii. The lessee will apply a paint color to the WTGs no lighter than RAL 9010 pure white and no darker than RAL 7035 light gray to help reduce potential visibility of the turbines against the horizon during daylight hours.

iv. The lessee will implement an aircraft detection lighting system (ADLS) to automatically activate lights when aircraft approach. The WTGs and OSS would be lit and marked in accordance with FAA and USCG lighting standards and consistent with BOEM's *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development* (April 28, 2021) to reduce light intrusion.

III. MEASURES TO MITIGATE ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. The lessee cannot avoid 13 ASLFs (Targets 21–26, 28–31, and 33–35). To resolve the adverse effects to the 13 ASLFs, BOEM will include the following as conditions of approval

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of the Ocean Wind 1 COP. The lessee will fund mitigation measures in accordance with Attachment 3 (Historic Property Treatment Plan for the Ocean Wind 1 Farm Ancient Submerged Landform Features, Federal Waters on the Outer Continental Shelf). See Attachment 8 for proposed budgets for each mitigation effort, reflecting good faith estimates, based on the experience of qualified consultants with similar activities and comparable historic properties. The lessee agrees to the following measures:

i. Preconstruction Geoarchaeology. The lessee will fulfill the following commitments in accordance with Attachment 3: collaborative review of existing geophysical and geotechnical data with consulting Tribes; selection of coring locations in consultation with consulting Tribes; collection of two to three vibracores within each affected ASLF that has not been previously sampled, with a sampling focus on areas that will be disturbed by Project construction activities; written verification to BOEM that the samples collected are sufficient for the planned analyses and consistent with the agreed scope of work; collaborative laboratory analyses at a laboratory located in Rhode Island or New Jersey; screening of recovered sediments for debitage or micro-debitage associated with indigenous land uses; third-party laboratory analyses, including micro- and macro-faunal analyses, micro- and macro-botanical analyses, radiocarbon dating of organic subsamples, and chemical analyses for potential indirect evidence of indigenous occupations; temporary curation of archival core sections; draft reports for review by consulting Tribes; and final reporting. Signatories will be notified of completion of this measure. The collection of vibracores must be completed prior to commencing seabed disturbing activities.

ii. Open-Source GIS and Story Maps. The lessee will fulfill the following commitments in accordance with Attachment 3: consultation with the Tribes to determine the appropriate open-source GIS platform; review of candidate datasets and attributes for inclusion in the GIS; data integration; development of custom reports or queries to assist in future research or tribal maintenance of the GIS; work Sessions with consulting Tribes to develop Story Maps content, and inclusion of stories associated with other federally recognized Tribes; training session with Tribes to review GIS functionality; review of Draft Story Maps with Tribes; delivery of GIS to Tribes; and delivery of Final Story Maps. Signatories will be notified of completion of this measure. This measure may be completed during or post-construction.

iii. ASLF Post-Construction Seafloor Impact Inspection. The lessee will fulfill the following commitments in accordance with Attachment 3: development of a 3D model throughout ASLFs designated for review; development of the remotely operated vehicle (ROV) investigation methodology, including consultation with BOEM; ROV inspection of the seafloor along impacted portions of the selected ASLFs; review of candidate datasets and attributes for inclusion in the GIS; delivery of data interpretive technical report draft; delivery of final technical report. The lessee will provide consulting Tribes and BOEM, draft and final technical reports including 3D models and resulting seafloor impact assessments. Signatories will be notified of completion of this measure. This measure must be completed as early as possible and no later than one-month post-construction. If unanticipated issues arise during the course of offshore construction that prevent this measure from being completed within one-month post-construction, the lessee must notify BOEM and propose an alternate completion timeframe for consulting Tribes and BOEM approval.

iv. Ethnographic Study. The lessee will fulfill the following commitments in accordance with Attachment 3: funding ethnographic researcher selected by DTI for 2-year period;

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funding for researcher travel to New Jersey for research and site visits; funding for Delaware Tribe of Indians, Delaware Nation, and Stockbridge Munsee technology upgrades associated with analysis of GIS data; funding for Delaware Tribe of Indians historic preservation oversight and indirect costs; funding for Stockbridge-Munsee Community Band of Mohican Indians THPO collaboration; provide relevant ASLF GIS data layers to Delaware Tribe of Indians for use in this study as well as provide a tutorial on the data; hold quarterly progress update calls lasting approximately one-half hour with Delaware Tribe of Indians until the final technical reports are issued; delivery of Final deliverables consisting of one confidential report that may contain sensitive resource information and one report that could be made available to the public (both reports will be distributed by the Tribes, at their discretion); and funding for a presentation to highlight the results of the study to be coordinated and executed by Delaware Tribe of Indians. Other consulting parties will be notified of completion of this measure. This measure may be completed pre, during or post-construction.

B. Visual APE

1. BOEM will include the following as conditions of approval of the Ocean Wind 1 COP and as mitigation measures to resolve the adverse effects, including direct, indirect, and cumulative effects, to the 17 historic properties that will be visually adversely affected (Brigantine Hotel, Brigantine City, Atlantic County; Absecon Lighthouse, Atlantic City, Atlantic County; Atlantic City Boardwalk, Atlantic City, Atlantic County; Atlantic City Convention Hall, Atlantic City, Atlantic County; Ritz-Carlton Hotel, Atlantic City, Atlantic County; Riviera Apartments, Atlantic City, Atlantic County; Vassar Square Condominiums, Ventnor City, Atlantic County; House at 114 South Harvard Avenue, Ventnor City, Atlantic County; Lucy the Margate Elephant, Margate City, Atlantic County; Great Egg Coast Guard Station, Longport Borough, Atlantic County; Ocean City Boardwalk, Ocean City, Cape May County; Ocean City Music Pier, Ocean City, Cape May County; Hereford Lighthouse, North Wildwood, Cape May County; North Wildwood Life Saving Station, North Wildwood, Cape May County; U.S. Lifesaving Station #35, Stone Harbor Borough, Cape May County; Flanders Hotel, Ocean City, Cape May County; and Little Egg Harbor U.S. Life Saving Station #23 (U.S. Coast Guard Station #119), Little Egg Harbor Township, Ocean County). See Attachment 8 for proposed budgets for each mitigation effort, reflecting good faith estimates, based on the experience of qualified consultants with similar activities and comparable historic properties. Tasks associated with the Historic Context Mitigation Measures can occur during and/or after construction. Mitigation measures under III.B.1 must be completed within four years of MOA execution, unless a different timeline is agreed upon by Participating Parties and accepted by BOEM and may be completed simultaneously, as applicable. The lessee will fund mitigation measures in accordance with Attachment 4 (Historic Properties Treatment Plan for the Ocean Wind 1 Offshore Wind Farm Project Historic Properties Subject to Adverse Effects Cape May and Atlantic Counties, New Jersey) and the following:

    i. Multi-property and Multi-county Mitigation Measures
        a. Historic Context addressing early 20th century New Jersey Shore Hotels. To resolve adverse effects to Brigantine Hotel, Atlantic County, Ritz-Carlton Hotel, Atlantic County, and Flanders Hotel, Cape May County, the lessee will coordinate with BOEM to consult with New Jersey SHPO and interested Consulting Parties and property owners to determine what properties or areas will be the subject of the historic context and appropriate information to include.

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b. Historic Context addressing Mid-century High-rise residential buildings at the New Jersey shore. To resolve adverse effects on Riviera Apartments, Atlantic City, Atlantic County and Vassar Square Condominiums, Ventnor City, Atlantic County, the lessee will coordinate with BOEM to consult with New Jersey SHPO and interested Consulting Parties and property owners to determine what properties or areas will be the subject of the historic context and appropriate information to include.

c. Historic Context addressing Boardwalks of the New Jersey Shore, with Surveys and Evaluations of Atlantic City Boardwalk, Ocean City Boardwalk, and Wildwood Boardwalk. To resolve adverse effects on Atlantic City Boardwalk, and Ocean City Boardwalk, the lessee will prepare a historic context and complete surveys and evaluations of Atlantic City boardwalk, Ocean City boardwalk, and Wildwood boardwalk. The historic context will consider significance of historic boardwalks as potential cultural landscapes. the lessee, in coordination with BOEM, will consult with New Jersey SHPO and interested Consulting Parties and property owners to determine what properties or areas will be the subject of survey and evaluation, and appropriate information to include.

ii. Lucy the Margate Elephant. The lessee agrees to the following measures:

1) Funding for Visitor Experience and Public Access for Lucy the Margate Elephant. The lessee will: determine priority projects in collaboration with the representatives for the property owner; use already available plans or develop plans appropriate to the identified project, and submit plans for review by BOEM and representatives of the property owner; take necessary steps to ensure the project is carried out by qualified contractors, including staff who meet SOI Professional Qualifications for Architecture or Architectural History, who will execute plans; and take necessary steps to ensure planned work is completed. The lessee will fund these activities consistent with Attachment 8.

iii. Atlantic County Historic Properties Mitigation

a. Absecon Lighthouse, Atlantic City, Atlantic County.

1) Funding for Visitor Experience and Public Access for Absecon Lighthouse. The lessee will: determine priority projects in collaboration with the representatives for the property owner; use already available plans or develop plans appropriate to the identified project, and submit plans for review by BOEM and representatives of the property owner; take necessary steps to ensure the project is carried out by qualified contractors, including staff who meet SOI Professional Qualifications for Architecture or Architectural History, who will execute plans; and take necessary steps to ensure planned work is completed. The lessee will fund these activities consistent with Attachment 8.

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b. Atlantic City Boardwalk, Atlantic City, Atlantic County.

1) Funding for Visitor Experience and Public Access for Atlantic City Boardwalk. The lessee will: determine priority projects in collaboration with the representatives for the property owner; use already available plans or develop plans appropriate to the identified project, and submit plans for review by BOEM and representatives of the property owner; take necessary steps to ensure the project is carried out by qualified contractors, including staff who meet SOI Professional Qualifications for Architecture or Architectural History, who will execute plans; and take necessary steps to ensure planned work is completed. The lessee will fund these activities consistent with Attachment 8.

C. Mitigation Fund

1. The lessee will contribute funding to the mitigation fund to resolve visual adverse effects to the following 14 historic properties: Brigantine Hotel, Brigantine City, Atlantic County; Atlantic City Convention Hall, Atlantic City, Atlantic County; Ritz-Carlton Hotel, Atlantic City, Atlantic County; Riviera Apartments, Atlantic City, Atlantic County; Vassar Square Condominiums, Ventnor City, Atlantic County; House at 114 South Harvard Avenue, Ventnor City, Atlantic County; Great Egg Coast Guard Station, Longport Borough, Atlantic County; Ocean City Boardwalk, Ocean City, Cape May County; Ocean City Music Pier, Ocean City, Cape May County; Hereford Lighthouse, North Wildwood, Cape May County; North Wildwood Life Saving Station, North Wildwood, Cape May County; U.S. Lifesaving Station #35, Stone Harbor Borough, Cape May County; Flanders Hotel, Ocean City, Cape May County; and Little Egg Harbor U.S. Life Saving Station #23 (U.S. Coast Guard Station #119), Little Egg Harbor Township, Ocean County). See Attachment 8 for funding amounts, based on input of qualified consultants with experience fulfilling activities similar to those that can be funded through the mitigation fund and for historic properties comparable to those adversely effected by the Project.

2. In order to mitigate the undertaking's adverse visual impacts to historic properties, the lessee must provide the amount of $1,080,000 in support of historic preservation and public interpretive and commemorative activities, which is the total amount of the cost estimates in Attachment 8 of this MOA for visually adversely affected historic properties other than the historic properties mentioned in Stipulations III.B.1.ii and III.B.1.iii. The measures listed in Attachment 8 were proposed by the lessee and included in draft documents BOEM circulated to consulting parties and included in the appendix to the Ocean Wind 1 Draft EIS. These measures are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected, and the heightened significance and concerns of the NHLs. In the specific context of this undertaking, including the numerous privately owned properties involved, the signatories agree that it is appropriate to provide flexibility to implement these or other specific activities for preservation, interpretation, and commemoration to mitigate adverse effects to historic properties, and the signatories agree that the level of funding identified in Attachment 8 is appropriate.

3. Within 90 days of initiating offshore construction of wind turbines the lessee must pay this amount to an escrow account. Those funds will be deposited into a fund which will be managed by a third-party administrator for the purpose of providing grants until the fund balance is expended. The lessee's deposit of such funds into this fund will satisfy the lessee's

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obligations as it relates to mitigation for adverse visual impacts to the historic properties listed in Stipulation III.C.1, unless additional consultation is required in the event of unallocated funds, as described below. These grants are to support mitigation activities for the preservation, interpretation, or commemoration of historic sites, buildings, or events. Grants will be awarded for the long-term protection, preservation, and commemoration of adversely affected historical properties in the following order of preference. Grants must first be awarded to the historic properties listed in Stipulation III.C.1. If after 2 years from the date the administrator begins accepting grant applications there are funds still unapplied, then grants should be awarded for activities for any adversely affected historic property identified in Appendix N, Finding of Effect.

4. If after five years from the date the administrator begins accepting applications any funds are unallocated, then BOEM will consult with the consulting parties on appropriate use of the remaining funds to resolve adverse effects. The signatories agree that the existence of unapplied funds does not constitute a breach of this agreement.

5. BOEM and the lessee will identify an appropriate non-profit or governmental historic preservation organization, such as New Jersey Historic Trust or another similarly situated entity, to administer the fund and the funded activities, to ensure the effectiveness of these activities as mitigation for the undertaking's adverse effect to the historic properties. The 3rd party administrator shall consult with BOEM and the NJHPO prior to making any grants. The 3rd party administrator's fees and administrative costs will be paid from the fund and must not exceed 6% of the fund amount. The 3rd party administrator must ensure that all granted funds are used exclusively for the purposes described in Stipulation III.C for direct costs of preservation, interpretation, or commemoration of the historic properties adversely affected by the undertaking and the mitigation fund administrative must prohibit the use of grant funds for indirect costs, such as accountant fees, employee salary or benefits or legal fees. BOEM and the lessee will consult on the selection of this fund administrator with the consulting parties and must be acceptable to BOEM. The same consultation process would be followed in the case of replacement of a fund administrator, if needed. BOEM will consult with the third-party administrator to develop operating procedures for the mitigation fund, and BOEM will review and approve the final operating procedures. BOEM will ensure that the 3rd party administrator has procedures under which it will provide a copy of all grants made and an annual report on expenditure of funds and activities to BOEM, HPO and the lessee. Funded mitigation activities, progress, completion, and outcomes will also be provided in the annual report per Stipulation XV, with sufficient detail for BOEM to ensure that the mitigation is being implemented according to this section.

6. BOEM will ensure that the operating procedures include the following: Where Historic Architectural Building Survey documentation and HABS-like documentation mitigation is implemented, the grantee shall first consult with historic property owner to identify photographic documentation specifications. Where Historic Structure Report mitigation is implemented, the documentation shall be prepared in accordance with the Historic Structure Reports and Preservation Plans: A Preparation Guide – Second Edition, as may be amended, and the project team must include an individual meeting the Secretary of Interior's qualifications standards for Historic Architecture. Where applicable, such as funding for visitor experience, public access and climate resiliency is implemented all projects must meeting the Secretary of Interior standards for the Treatment of Historic Properties and these projects should not constitute adverse effects themselves on the historic properties.

7. Consistent with NHPA Sec. 110(f) and as described in Appendix N, Finding of Effect, BOEM has undertaking planning and actions as may be necessary to minimize harm to

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NHLs. The mitigation funding for NHLs under this MOA does not replace BOEM's any other planning and actions BOEM has taken to comply with that statutory requirement.

IV. PHASED IDENTIFICATION

A. Information pertaining to identification of historic properties within certain portions of the Marine APE related to Alternatives B-1, B-2, C-1, C-2, and D will not be available until after the ROD is issued and the COP is approved. If Alternative B-1, B-2, C-1, C-2, or D is selected, BOEM will implement the following consultation steps for phased identification and evaluation of historic properties within the Marine APE in accordance with BOEM's existing *Guidelines for Providing Archaeological and Historic Property Information Pursuant to Title 30 Code of Federal Regulations Part 585*. Survey efforts shall comply with the New Jersey Historic Preservation Office Requirements for Phase I Archaeological Survey at N.J.A.C. 7:4-8.4. Reports of archaeological survey results shall conform to the Requirements for Archaeological Survey Reports - Standards for Report Sufficiency at N.J.A.C. 7:4-8.5. The final identification and evaluation of historic properties within the APE may occur after publication of the Draft EIS, but prior to the initiation of construction. In this circumstance, the Signatories agree that the following describes how BOEM will conduct phased identification and of historic properties, pursuant to 36 CFR § 800.4(b)(2).

1. If Alternative C-1 is selected, previously un-surveyed areas associated with one WTG and potentially the inter-array cable routing may need to be surveyed for marine archaeology. If Alternative C-2 is selected, previously un-surveyed areas associated with 22 WTG positions and potentially the inter-array cable routing may need to be surveyed for marine archaeology. If Alternative B-1, B-2, or D is selected, previously un-surveyed areas associated with the inter-array cable may need to be surveyed for marine archaeology.

2. For identification of historic properties within the marine archaeological, portions of the APE, supplemental technical studies will be conducted by the lessee in accordance with state guidelines and recommendations presented in BOEM's most recent *Guidelines*. The developer will coordinate with the SHPO prior to the initiation of any such identification efforts.

    i. BOEM will require that identification efforts for historic properties associated with marine archaeology be documented in a technical report that addresses the identification of historic properties and includes an evaluation of effects due to the Project.

3. BOEM will consult on the results of historic property identification surveys for any portions of the APE that were not addressed in the pre-COP approval consultations.

4. BOEM will treat all identified potential historic properties as eligible for inclusion in the NRHP unless BOEM determines, and the SHPO agrees, that a property is ineligible, pursuant to 36 CFR § 800.4I.

5. If effects on identified historic properties cannot be avoided, BOEM will evaluate the NRHP eligibility of the potentially affected properties, in accordance with 36 CFR § 800.4(c).

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6. If BOEM identifies no additional historic properties or determines that no historic properties are adversely affected due to the selection of one of these alternatives, BOEM, with the assistance of the lessee, will notify and consult with the signatories, invited signatories, and consulting parties following the consultation process set forth here in this stipulation.

    a. BOEM, with the assistance of the lessee, will notify all the signatories, invited signatories, and consulting parties about the selected alternative and BOEM's determination by providing a written summary of the alternative including any maps, a summary of the surveys and/or research conducted to identify historic properties and assess effects, and copies of the surveys.

    b. BOEM, with the assistance of the lessee, will allow the signatories, invited signatories, and consulting parties 30 calendar days to review and comment on the survey reports, the results of the surveys, BOEM's determination, and the documents.

    c. After the 30-calendar review period has concluded and no comments require additional consultation, BOEM with the assistance of the lessee, will notify the signatories and consulting parties that the NJHPO has concurred with BOEM's determination, if they received any comments, provide a summary of the comments and BOEM's responses.

    d. BOEM, with the assistance of the lessee, will conduct any consultation meetings if requested by the signatories or consulting parties.

    e. This MOA will not need to be amended if no additional historic properties are identified and/or adversely affected.

7. If BOEM determines new adverse effects to historic properties will occur due to the selection of one of these alternatives, BOEM with the assistance of the lessee will notify and consult with the signatories, invited signatories, and consulting parties regarding BOEM's finding and the proposed measures to resolve the adverse effect(s) including the development of a new treatment plan(s) following the consultation process set forth here in this stipulation.

    i. BOEM, with the assistance of the lessee, will notify all signatories, invited signatories, and consulting parties about the selected alternative and BOEM's determination by providing a written summary of the alternative including any maps, a summary of the surveys and/or research conducted to identify historic properties and assess effects, copies of the surveys, BOEM's determination, and the proposed resolution measures for the adverse effect(s).

    ii. The signatories, invited signatories, and consulting parties will have 30 calendar days to review and comment on the documents including the adverse effect finding and the proposed resolution of adverse effect(s), including a draft treatment plan(s).

    iii. BOEM, with the assistance of the lessee, will conduct additional consultation meetings, if necessary, during consultation on the adverse effect finding and during drafting and finalization of the treatment plan(s).

    iv. BOEM, with the assistance of the lessee, will respond to the comments and make necessary edits to the documents.

    v. BOEM, with the assistance of the lessee, will send the revised draft final documents to the other signatories, invited signatories, and consulting parties for review and comment during a 30-calendar day review and comment period. With this same submittal of draft

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final documents, the lessee will provide a summary of all the comments received on the documents and BOEM's responses.

vi. BOEM, with the assistance of the lessee, will respond to the comments on the draft final documents and make necessary edits to the documents.

vii. BOEM, with the assistance of the lessee, will notify all the signatories, invited signatories, and consulting parties and provide the final document(s) including the final treatment plan(s) and a summary of comments and BOEM's responses to comments, if they receive any on the draft final documents, after BOEM has received concurrence from the New Jersey SHPO on the finding of new adverse effect(s), and BOEM has accepted the final treatment plan(s).

viii. The MOA will not need to be amended after the treatment plan(s) is accepted by BOEM.

8. If a SHPO disagrees with BOEM's determination regarding whether an affected property is eligible for inclusion in the NRHP, or if the ACHP or the Secretary so request, the agency official will obtain a determination of eligibility from the Secretary pursuant to 36 CFR Part 63 (36 CFR § 800.4(c)(2)).

V. VIBRATION MONITORING

A. If the 5th Street cable route option for BL England interconnection is selected by the lessee as the preferred cable route, BOEM will require the lessee to:

1. Employ the expertise of a qualified vibration expert to identify construction approaches to avoid or minimize vibration impacts to foundations of historic properties adjacent to right-of-way construction areas for the 5th Street cable route option. BOEM and the lessee will offer SHPO an opportunity to review and comment on these construction approaches.

2. Avoid instances of slate sidewalk remnants in the Ocean City Historic District, or remove them prior to construction activities and replace them following completion of construction activities.

3. Prepare and implement a Vibration Monitoring Plan that will identify:

i. Construction means and methods to avoid or minimize vibration impacts and how they will be carried out in such a way as to ensure vibrations do not reach a level that causes structural or architectural damage to historic properties.

ii. Process for identification of historic properties adjacent to the 5th Street cable route option that are potentially vulnerable to vibration, as well as required qualifications for vibration expert conducting vulnerability assessment, process for describing the results of this assessment, and process for making the findings of this assessment available to consulting parties.

iii. Approach to perform a condition assessment on potentially vulnerable properties adjacent to the cable route prior to construction and again when construction of the cable route is complete.

iv. If damage is identified by the owner of a potentially vulnerable property during construction, the process for how property owners will be able to notify the lessee,

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including establishment of a reasonable period within which the lessee will respond. If onshore cable route construction activities are resulting in structure or architectural damage to historic properties, the lessee will stop construction until appropriate safeguards can be put in place.

v. Process for temporary removal of slate sidewalk remnants prior to construction and replacement of slate sidewalk remnants after construction and how the process will be carried out in such a way as to ensure construction activities will not damage these features of the Ocean City Historic District.

B. If any structural or architectural damage to historic properties occurs during cable route construction, the lessee will be required to assess the cause of the damage, identify and provide for any necessary repairs, consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties. BOEM with the assistance of the lessee will notify and consult with the signatories, invited signatories, and consulting parties regarding instances of damage and repair. BOEM will offer SHPO the opportunity to review and comment on the consistency of any repairs with the Standards.

VI. REVIEW PROCESS FOR DOCUMENTS

A. The following process will be used for any document, report, or plan produced in accordance with Stipulations I–XIII of this MOA:

1. Draft Document

i. The lessee shall provide the document to BOEM for technical review and approval.

a. BOEM has 15 calendar days to complete its technical review.

b. If BOEM does not provide approval, it shall submit its comments back to the lessee, who will have 15 calendar days to address the comments.

ii. BOEM, with the assistance of the lessee, shall provide the draft document to consulting parties, except the ACHP, for review and comment.

a. Consulting parties shall have 30 calendar days to review and comment.

b. BOEM, with the assistance of the lessee, shall coordinate a meeting with consulting parties to facilitate comments on the document if requested by a consulting party.

c. BOEM shall consolidate comments received and provide them to the lessee within 15 calendar days of receiving comments from consulting parties.

d. BOEM, with the assistance of the lessee, will respond to the comments and make necessary edits to the documents.

2. Draft Final Document

i. The lessee shall provide BOEM with the draft final document for technical review and approval.

a. BOEM has 15 calendar days to complete its technical review.

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b. If BOEM does not provide approval, it shall submit its comments back to the lessee, who will have 15 calendar days to address the comments.

ii. BOEM, with the assistance of the lessee, shall provide the draft final document to consulting parties, except the ACHP, for review and comment. With this same submittal of draft final documents, the lessee will provide a summary of all the comments received on the documents and BOEM's responses.

a. Consulting parties have 30 calendar days to review and comment.

b. BOEM, with the assistance of the lessee, shall coordinate a meeting with consulting parties to facilitate comments on the document if requested by a consulting party.

c. BOEM shall consolidate comments received and provide them to the lessee within 15 calendar days of receiving comments from consulting parties.

d. BOEM, with the assistance of the lessee, will respond to the comments and make necessary edits to the documents.

3. Final Document

i. The lessee shall provide BOEM with the final document for approval.

a. BOEM has 15 calendar days to complete its technical review.

b. If BOEM does not provide approval, it shall submit its comments back to the lessee, who will have 15 calendar days to address the comments.

c. BOEM, with the assistance of the lessee, shall provide the final document to consulting parties, except the ACHP, within 30 calendar days of approving the final document. With this same submittal of final documents, the lessee will provide a summary of all the comments received on the documents and BOEM's responses.

VII. SUBMISSION OF DOCUMENTS

A. New Jersey SHPO, ACHP, NPS, Tribes, and Consulting Parties

1. All submittals to the New Jersey SHPO, ACHP, NPS, Tribes, and consulting parties will be submitted electronically unless a specific request is made for the submittal be provided in paper format.

VIII. PROJECT MODIFICATIONS

A. If the lessee proposes any modifications to the Project that expands the Project beyond the Project Design Envelope included in the COP and/or occurs outside the defined APEs or the proposed modifications change BOEM's final Section 106 determinations and findings for this Project, the lessee shall notify and provide BOEM with information concerning the proposed modifications. BOEM will determine if these modifications require alteration of the conclusions reached in the Finding of Effect and, thus, will require additional consultation with the signatories, invited signatories and consulting parties. If BOEM determines additional consultation is required, the lessee will provide the signatories, invited signatories, and consulting parties with the information concerning the proposed changes, and they will have 30 calendar days from receipt of this information to comment on the proposed changes. BOEM shall take into account any comments from signatories, invited signatories, and consulting parties prior to agreeing to any proposed

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changes. Using the procedure below, BOEM will, as necessary, consult with the signatories, invited signatories, and consulting parties to identify and evaluate historic properties in any newly affected areas, assess the effects of the modification, and resolve any adverse effects.

1. If the Project is modified and BOEM identifies no additional historic properties or determines that no historic properties are adversely affected due to the modification, BOEM, with the assistance of the lessee, will notify and consult with the signatories, invited signatories, and consulting parties following the consultation process set forth in this Stipulation VII.A.1.

    i. The lessee will notify all the signatories, invited signatories, and consulting parties about this proposed change and BOEM's determination by providing a written summary of the project modification including any maps, a summary of any additional surveys and/or research conducted to identify historic properties and assess effects, and copies of the surveys.

    ii. BOEM and the lessee will allow the signatories, invited signatories, and consulting parties 30 calendar days to review and comment on the proposed change, BOEM's determination, and the documents.

    iii. After the 30-calendar review period has concluded and no comments require additional consultation, the lessee will notify the signatories and consulting parties that BOEM has approved the project modification and, if they received any comments, provide a summary of the comments and BOEM's responses.

    iv. BOEM, with the assistance of the lessee, will conduct any consultation meetings if requested by the signatories or consulting parties.

    v. This MOA will not need to be amended if no additional historic properties are identified and/or adversely affected.

2. If BOEM determines new adverse effects to historic properties will occur due to a Project modification, BOEM with the assistance of the lessee will notify and consult with the signatories, invited signatories, and consulting parties regarding BOEM's finding and the proposed measures to resolve the adverse effect(s) including the development of a new treatment plan(s) following the consultation process set forth in this Stipulation VII.A.2.

    i. The lessee will notify all signatories, invited signatories, and consulting parties about this proposed modification, BOEM's determination, and the proposed resolution measures for the adverse effect(s).

    ii. The signatories, invited signatories, and consulting parties will have 30 calendar days to review and comment on the adverse effect finding and the proposed resolution of adverse effect(s), including a draft treatment plan(s).

    iii. BOEM, with the assistance of the lessee, will conduct additional consultation meetings, if necessary, during consultation on the adverse effect finding and during drafting and finalization of the treatment plan(s).

    iv. BOEM, with the assistance of the lessee, will respond to the comments and make necessary edits to the documents.

    v. The lessee will send the revised draft final documents to the other signatories, invited signatories, and consulting parties for review and comment during a 30-calendar day

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review and comment period. With this same submittal of draft final documents, the lessee will provide a summary of all the comments received on the documents and BOEM's responses.

vi. BOEM, with the assistance of the lessee, will respond to the comments on the draft final documents and make necessary edits to the documents.

vii. The lessee will notify all the signatories, invited signatories, and consulting parties that BOEM has approved the project modification and will provide the final document(s) including the final treatment plan(s) and a summary of comments and BOEM's responses to comments, if they receive any on the draft final documents, after BOEM has received concurrence from the New Jersey SHPO on the finding of new adverse effect(s), BOEM has accepted the final treatment plan(s), and BOEM has approved the Project modification.

viii. The MOA will not need to be amended after the treatment plan(s) is accepted by BOEM.

3. If any of the signatories, invited signatories, or consulting parties object to determinations, findings, or resolutions made pursuant to these measures (Stipulation VII.A.1 and 2), BOEM will resolve any such objections pursuant to the dispute resolution process set forth Stipulation XIII.

IX. CURATION

A. Collections from federal lands or the OCS:
   1. Any archaeological materials removed from federal lands or the OCS as a result of the actions required by this MOA shall be curated in accordance with 36 CFR 79, "Curation of Federally Owned and Administered Archaeological Collections," ACHP's "Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites" published in the Federal Register (64 Fed. Reg. 27085-27087 (May 18, 1999)), or other provisions agreed to by the consulting parties and following applicable State guidelines. No excavation should be initiated before acceptance and approval of a curation plan.

B. Collections from state, local government, and private lands:

   1. Archaeological materials from state or local government lands in the APE and the records and documentation associated with these materials shall be curated within the state of their origin at a repository preferred by the NJHPO, or an approved and certified repository, in accordance with the standards and guidelines required by the NJHPO. Lands as described here may include the seafloor in state waters. No excavation should be initiated before acceptance and approval of a curation plan.

   2. Collections from private lands that would remain private property: In cases where archaeological survey and testing are conducted on private land, any recovered collections remain the property of the land owner. In such instances, BOEM and the lessee, in coordination with the SHPO, and affected Tribe(s), will encourage land owners to donate the collection(s) to an appropriate public or Tribal entity. To the extent a private landowner requests that the materials be removed from the site, the lessee will seek to have the materials donated to the repository identified under Stipulation VII.B.1 through a written donation agreement developed in consultation with the consulting parties. BOEM, assisted by the lessee, will seek to have all materials from each state curated together in the same curation facility within the state of origin. In cases where the property owner wishes to transfer ownership of the collection(s) to a public or Tribal entity, BOEM and the lessee will ensure

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that recovered artifacts and related documentation are curated in a suitable repository as agreed to by BOEM, NJHPO, and affected Tribe(s), and following applicable State guidelines. To the extent feasible, the materials and records resulting from the actions required by this MOA for private lands, shall be curated in accordance with 36 CFR 79. No excavation should be initiated before acceptance and approval of a curation plan.

X. PROFESSIONAL STANDARDS AND QUALIFICATIONS

A. Secretary's Standards for Archaeology and Historic Preservation. The lessee will ensure that all work carried out pursuant to this MOA will meet the SOI Standards for Archaeology and Historic Preservation, 48 FR 44716 (September 29, 1983), taking into account the suggested approaches to new construction in the SOI's Standards for Rehabilitation.

B. SOI Professional Qualifications Standards. The lessee will ensure that all work carried out pursuant to this MOA is performed by or under the direction supervision of historic preservation professionals who meet the SOI's Professional Qualifications Standards (48 FR 44738-44739). A "qualified professional" is a person who meets the relevant standards outlined in such SOI's Standards. BOEM, or its designee, will ensure that consultants retained for services pursuant to the MOA meet these standards.

C. Investigations of ASLFs. The lessee will ensure that the additional investigations of ASLFs will be conducted and reports and other materials produced by one or more qualified marine archaeologists and geological specialists who meet the SOI's Professional Qualifications Standards and has experience both in conducting High Resolution Geophysical (HRG) surveys and processing and interpreting the resulting data for archaeological potential, as well as collecting, subsampling, and analyzing cores.

D. Tribal Consultation Experience. The lessee will ensure that all work carried out pursuant to this MOA that requires consultation with Tribes is performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

XI. DURATION

A. This MOA will expire at (1) the decommissioning of the Project in the lease area, as defined in the lessee's lease with BOEM (Lease Number OCS-A 0498) or (2) 25-years from the date of COP approval, whichever occurs first. Prior to such time, BOEM may consult with the other signatories and invited signatories to reconsider the terms of the MOA and amend it in accordance with Amendment Stipulation (Stipulation XIV).

XII. TERRESTRIAL ARCHAEOLOGICAL MONITORING

A. Implementation of Terrestrial Archaeological Monitoring Plan. The lessee will implement the archaeological monitoring plan found in Attachment 5 (Terrestrial Archaeological Monitoring Plan), which applies to areas identified for archaeological monitoring.

B. In the event of a post-review discovery during archaeological monitoring, the process identified under Stipulation XII. Post-Review Discoveries will apply.

XIII. POST-REVIEW DISCOVERIES

A. Implementation of Post-Review Discovery Plans. If properties are discovered that may be historically significant or unanticipated effects on historic properties found, BOEM with the assistance of the lessee shall implement the post-review discovery plans found in Attachment 6

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(Post-Review Discovery Plan for Submerged Cultural Resources for the Ocean Wind 1 Offshore Wind Farm for Lease OCF A-0498 Construction and Operations Plan) and Attachment 7 (Post-Review Discovery Plan for Terrestrial Cultural Resources for the Ocean Wind 1 Offshore Wind Farm for Lease OCF A-0498 Construction and Operations Plan).

1. The signatories acknowledge and agree that it is possible that additional historic properties may be discovered during implementation of the Project, despite the completion of a good faith effort to identify historic properties throughout the APEs.

B. All Post-Review Discoveries. In the event of a post-review discovery of a property or unanticipated effects to a historic property prior to or during construction, operation, maintenance, or decommissioning of the Project, the lessee will implement the following actions which are consistent with the post-review discovery plan:

1. Immediately halt all ground- or seafloor-disturbing activities within the area of discovery;

2. Notify BOEM in writing via report within 72 hours of the discovery;

3. Keep the location of the discovery confidential and take no action that may adversely affect the discovered property until BOEM or its designee has made an evaluation and instructs the lessee on how to proceed; and

4. Conduct any additional investigations as directed by BOEM or its designee to determine if the resource is eligible for listing in the NRHP (30 CFR 585.702(b)). BOEM will direct the lessee to complete additional investigations, as BOEM deems appropriate, if:

   i. the site has been impacted by the lessee Project activities; or

   ii. impacts to the site from the lessee Project activities cannot be avoided.

5. If investigations indicate that the resource is eligible for the NRHP, BOEM, with the assistance of the lessee, will work with the other relevant signatories, invited signatories, and consulting parties to this MOA who have a demonstrated interest in the affected historic property and on the further avoidance, minimization or mitigation of adverse effects.

6. If there is any evidence that the discovery is from an indigenous society or appears to be a preserved burial site, the lessee will contact the Tribes as identified in the notification lists included in the post-review discovery plans within 72 hours of the discovery with details of what is known about the discovery, and consult with the Tribes pursuant to the post review discovery plan.

7. If BOEM incurs costs in addressing the discovery, under Section 110(g) of the NHPA, BOEM may charge the lessee reasonable costs for carrying out historic preservation responsibilities, pursuant to its delegated authority under the OCS Lands Act (30 CFR 585.702 (c-d)).

XIV. EMERGENCY SITUATIONS

A. In the event of an emergency or disaster that is declared by the President or the Governor of New Jersey, which represents an imminent threat to public health or safety, or creates a hazardous condition due to impacts from this Project's infrastructure damaged during the emergency and affecting historic properties in the APEs, BOEM with the assistance of the lessee will notify the consulting Tribes, SHPO, and the ACHP of the condition which has

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initiated the situation and the measures taken to respond to the emergency or hazardous condition. BOEM will make this notification as soon as reasonably possible, but no later than 48 hours from when it becomes aware of the emergency or disaster. Should the consulting Tribes, SHPO, or the ACHP desire to provide technical assistance to BOEM, they shall submit comments within seven calendar days from notification if the nature of the emergency or hazardous condition allows for such coordination.

XV. MONITORING AND REPORTING

At the beginning of each calendar year by January 31, following the execution of this MOA until it expires or is terminated, the lessee will prepare and, following BOEM's review and agreement to share this summary report, provide all signatories, invited signatories, and consulting parties to this MOA a summary report detailing work undertaken pursuant to the MOA. Such report shall include a description of how the stipulations relating to avoidance and minimization measures (Stipulations I and II) were implemented; any scheduling changes proposed; any problems encountered; and any disputes and objections received in BOEM's efforts to carry out the terms of this MOA. The lessee can satisfy its reporting requirement under this stipulation by providing the relevant portions of the annual compliance certification required under 30 CFR 285.633.If requested by the signatories, BOEM will convene an annual meeting with the other signatories, invited signatory, and consulting parties to discuss the annual report, the implementation of this MOA, and other requested topics.

XVI. DISPUTE RESOLUTION

A. Should any signatory, invited signatory, or consulting party to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, they must notify BOEM in writing of their objection. BOEM shall consult with such party to resolve the objection. If BOEM determines that such objection cannot be resolved, BOEM will:

   1. Forward all documentation relevant to the dispute, including the BOEM's proposed resolution, to the ACHP. The ACHP shall provide BOEM with its advice on the resolution of the objection within 30 calendar days of receiving adequate documentation. Prior to reaching a final decision on the dispute, BOEM shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories, invited signatories, and/or consulting parties, and provide them with a copy of this written response. BOEM will make a final decision and proceed accordingly.

   2. If the ACHP does not provide its advice regarding the dispute within the 30 calendar-day time period, BOEM may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, BOEM shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories, invited signatories, or consulting parties to the MOA, and provide them and the ACHP with a copy of such written response.

B. BOEM's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged.

C. At any time during the implementation of the measures stipulated in this MOA, should a member of the public object in writing to the signatories regarding the manner in which the measures stipulated in this MOA are being implemented, that signatory will notify BOEM. BOEM shall review the objection and may notify the other signatories as appropriate, and respond to the objector.

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XVII. AMENDMENTS

A. This MOA may be amended when such an amendment is agreed to in writing by all signatories and invited signatories. The amendment will be effective on the date a copy signed by all of the signatories and invited signatories is filed with the ACHP.

B. Revisions to any attachment may be proposed by any signatory or invited signatory by submitting a draft of the proposed revisions to all signatories and invited signatories with a notification to the consulting parties. The signatories and invited signatories will consult for no more than 30 calendar days (or another time period agreed upon by all signatories and invited signatories) to consider the proposed revisions to the attachment. If the signatories and invited signatories unanimously agree to revise the attachment, BOEM will provide a copy of the revised attachment to the other signatories, invited signatories, and consulting parties. Revisions to any attachment to this MOA will not require an amendment to the MOA.

XVIII. TERMINATION

If any signatory or invited signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other signatories, invited signatories, and consulting parties to attempt to develop an amendment per Stipulation XIV. If within 30 calendar days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory or invited signatory may terminate the MOA upon written notification to the other signatories.

Once the MOA is terminated, and prior to work continuing on the undertaking, BOEM must either(a) execute an MOA pursuant to 36 CFR 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR 800.7. BOEM shall notify the signatories and invited signatories as to the course of action it will pursue.

XIX. COORDINATION WITH OTHER FEDERAL AGENCIES

A. In the event that another federal agency not initially a party to or subject to this MOA receives an application for funding/license/permit for the undertaking as described in this MOA, that agency may fulfill its Section 106 responsibilities by stating in writing it concurs with the terms of this MOA and notifying the signatories and invited signatories that it intends to do so. Such federal agency may become a signatory, invited signatory, or a concurring party (collectively referred to as signing party) to the MOA as a means of complying with its responsibilities under Section 106 and based on its level of involvement in the undertaking. To become a signing party to the MOA, the agency official must provide written notice to the signatories and invited signatories that the agency agrees to the terms of the MOA, specifying the extent of the agency's intent to participate in the MOA. The participation of the agency is subject to approval by the signatories and invited signatories who must respond to the written notice within 30 calendar days or the approval will be considered implicit. Any necessary amendments to the MOA as a result will be considered in accordance with the Amendment Stipulation (Stipulation XIV).

B. Should the signatories and invited signatories approve the federal agency's request to be a signing party to this MOA, an amendment under Stipulation XIV will not be necessary if the federal agency's participation does not change the undertaking in a manner that would require any modifications to the stipulations set forth in this MOA. BOEM will document these conditions and involvement of the federal agency in a written notification to the signatories, invited signatories, and consulting parties, and include a copy of the federal agency's executed signature page, which will codify the addition of the federal agency as a signing party in lieu of an amendment.

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XX. ANTI-DEFICIENCY ACT

Pursuant to 31 USC 1341(a)(1), nothing in this MOA will be construed as binding the United States to expend in any one fiscal year any sum in excess of appropriations made by Congress for this purpose, or to involve the United States in any contract or obligation for the further expenditure of money in excess of such appropriations.

Execution of this MOA by BOEM, the New Jersey SHPO, and the ACHP, and implementation of its terms evidence that BOEM has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

[SIGNATURES COMMENCE ON FOLLOWING PAGE]

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

Signatory:

Bureau of Ocean Energy Management (BOEM)

_____ Date:_____

Elizabeth A. Klein
Director
Bureau of Ocean Energy Management

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

Signatory:

New Jersey State Historic Preservation Officer (SHPO)

_____ Date:_____

Katherine J. Marcopul, Ph.D., CPM
Administrator and
Deputy State Historic Preservation Officer
New Jersey Department of Environmental Protection

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

Signatory:

Advisory Council on Historic Preservation (ACHP)

_____ Date:_____

Reid J. Nelson
Executive Director
Advisory Council on Historic Preservation

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

Invited Signatory:

Ocean Wind LLC (lessee)

_____ Date:_____

Peter Allen
Head of Finance
Ocean Wind LLC

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

The Delaware Tribe of Indians

_____ Date:_____

Brad KillsCrow
Chief
The Delaware Tribe of Indians

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

The Delaware Nation

_____ Date:_____

Deborah Dotson
President of the Executive Committee
The Delaware Nation

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

The Stockbridge-Munsee Community Band of Mohican Indians

_____ Date:_____
Shannon Holsey
President
The Stockbridge-Munsee Community Band of Mohican Indians

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

Organization

_____ Date:_____

Name
Title
Organization

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MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE OCEAN WIND OFFSHORE WIND FARM PROJECT

LIST OF ATTACHMENTS TO THE MOA

ATTACHMENT 1 – APE MAPS

ATTACHMENT 2 – LISTS OF INVITED AND PARTICIPATING CONSULTING PARTIES

ATTACHMENT 3 – HISTORIC PROPERTY TREATMENT PLAN FOR THE OCEAN WIND 1 FARM ANCIENT SUBMERGED LANDFORM FEATURES, FEDERAL WATERS ON THE OUTER CONTINENTAL SHELF

ATTACHMENT 4 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE OCEAN WIND 1 OFFSHORE WIND FARM PROJECT, HISTORIC PROPERTIES SUBJECT TO ADVERSE VISUAL EFFECT, CAPE MAY AND ATLANTIC COUNTIES, NEW JERSEY

ATTACHMENT 5 – TERRESTRIAL ARCHAEOLOGICAL MONITORING PLAN

ATTACHMENT 6 – POST-REVIEW DISCOVERY PLAN FOR SUBMERGED CULTURAL RESOURCES FOR THE OCEAN WIND 1 OFFSHORE WIND FARM FOR LEASE OCS A-0498 CONSTRUCTION AND OPERATIONS PLAN

ATTACHMENT 7 – POST-REVIEW DISCOVERY PLAN FOR TERRESTRIAL RESOURCES FOR THE OCEAN WIND 1 OFFSHORE WIND FARM FOR LEASE AREA OCS A-0498 CONSTRUCTION AND OPERATIONS PLAN

ATTACHMENT 8 – MITIGATION FUNDING AMOUNTS PROPOSED BY SIGNATORIES

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ATTACHMENT 1 – APE MAPS

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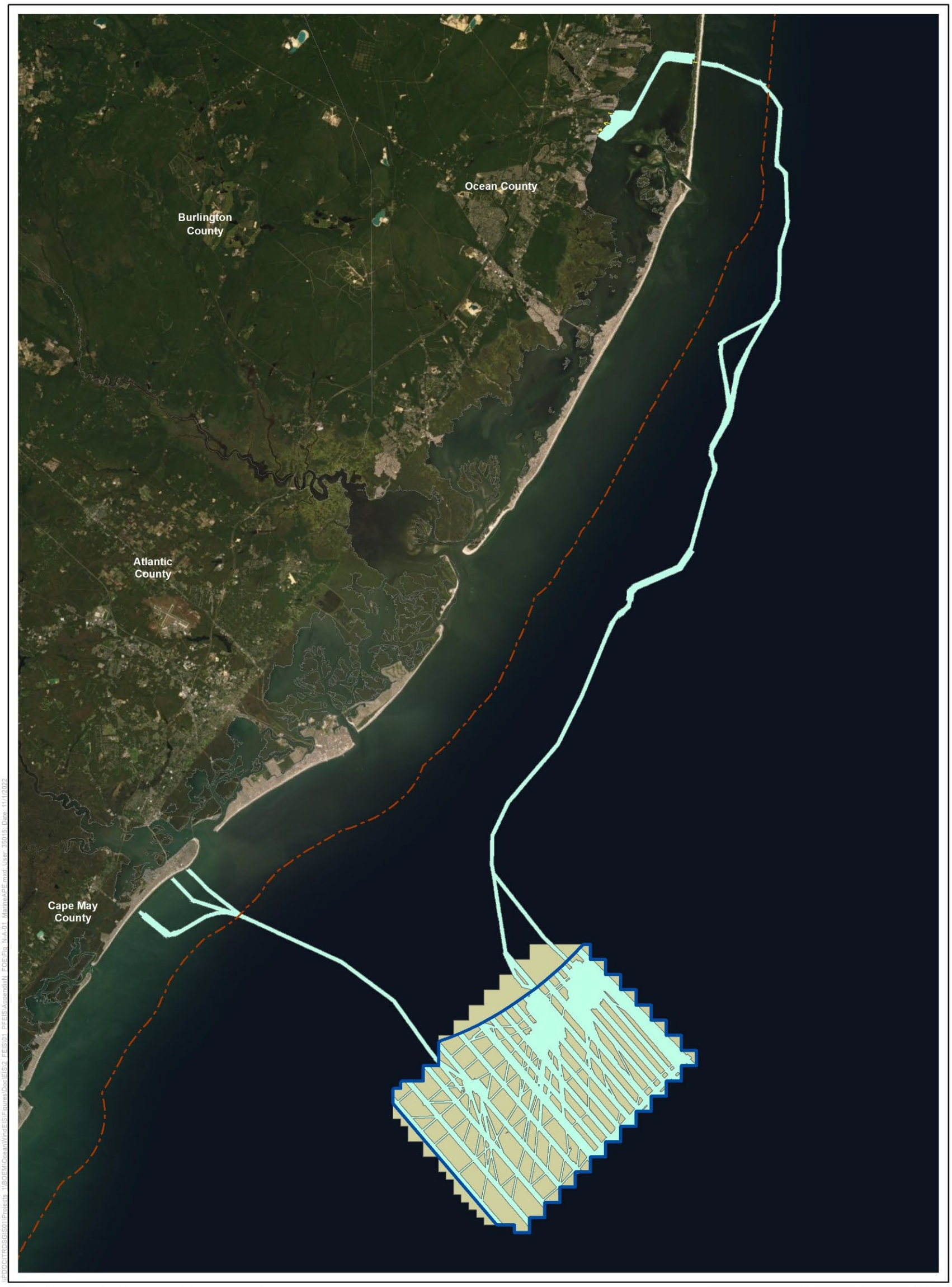


Figure 1 Marine Archaeological Resources APE for Activities within the Lease Area



Figure 2 **Marine Archaeological Resources APE for Activities within the Oyster Creek Export Cable Route Corridor**



Figure 3 Marine Archaeological Resources APE for Activities within the BL England Export Cable Route Corridor



Figure 4 **Terrestrial Archaeological Resources APE with Onshore Cable and Landfall Site Alternatives for BL England**

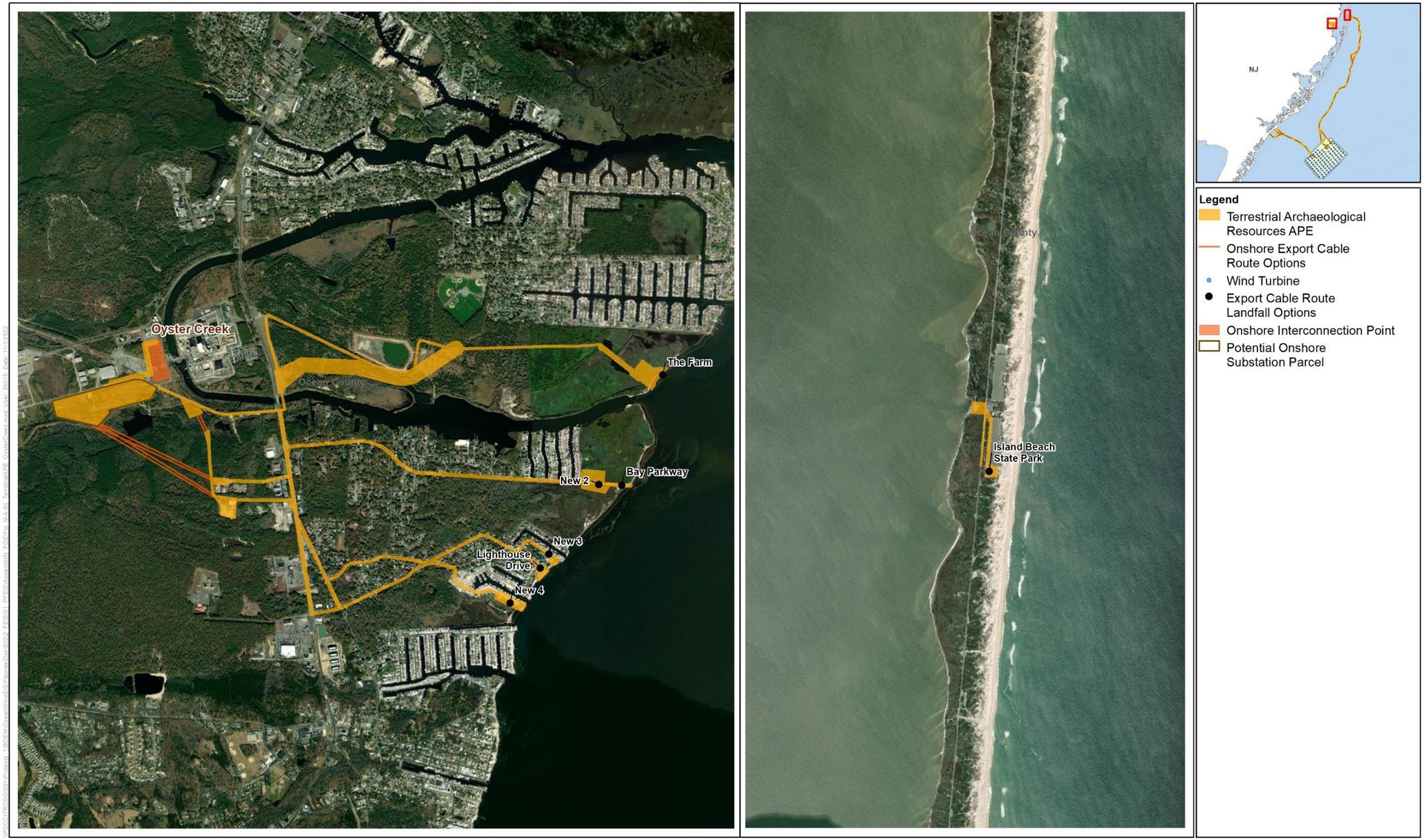


Figure 5 **Terrestrial Archaeological Resources APE with Onshore Cable and Landfall Site Alternatives for Oyster Creek**

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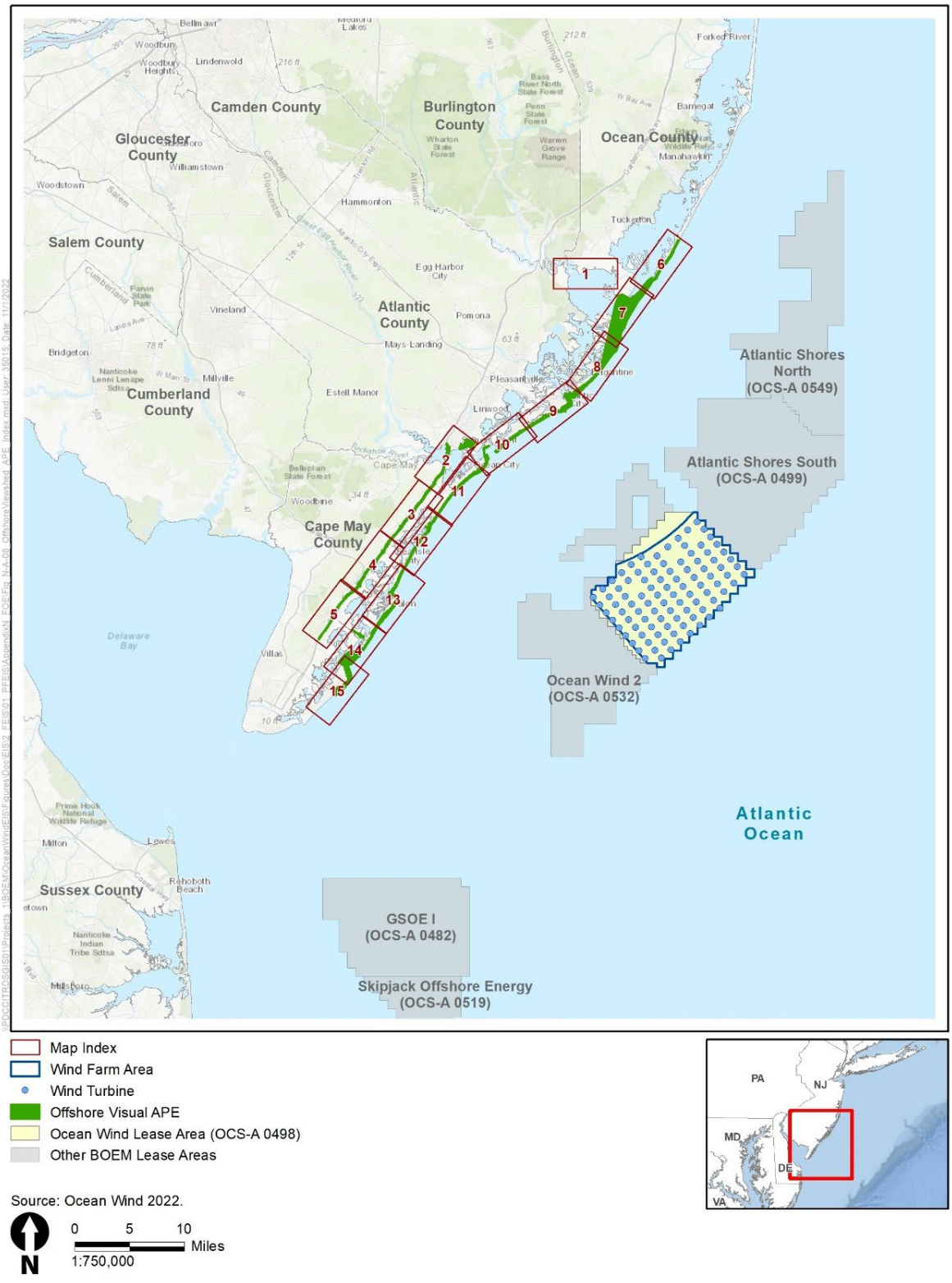
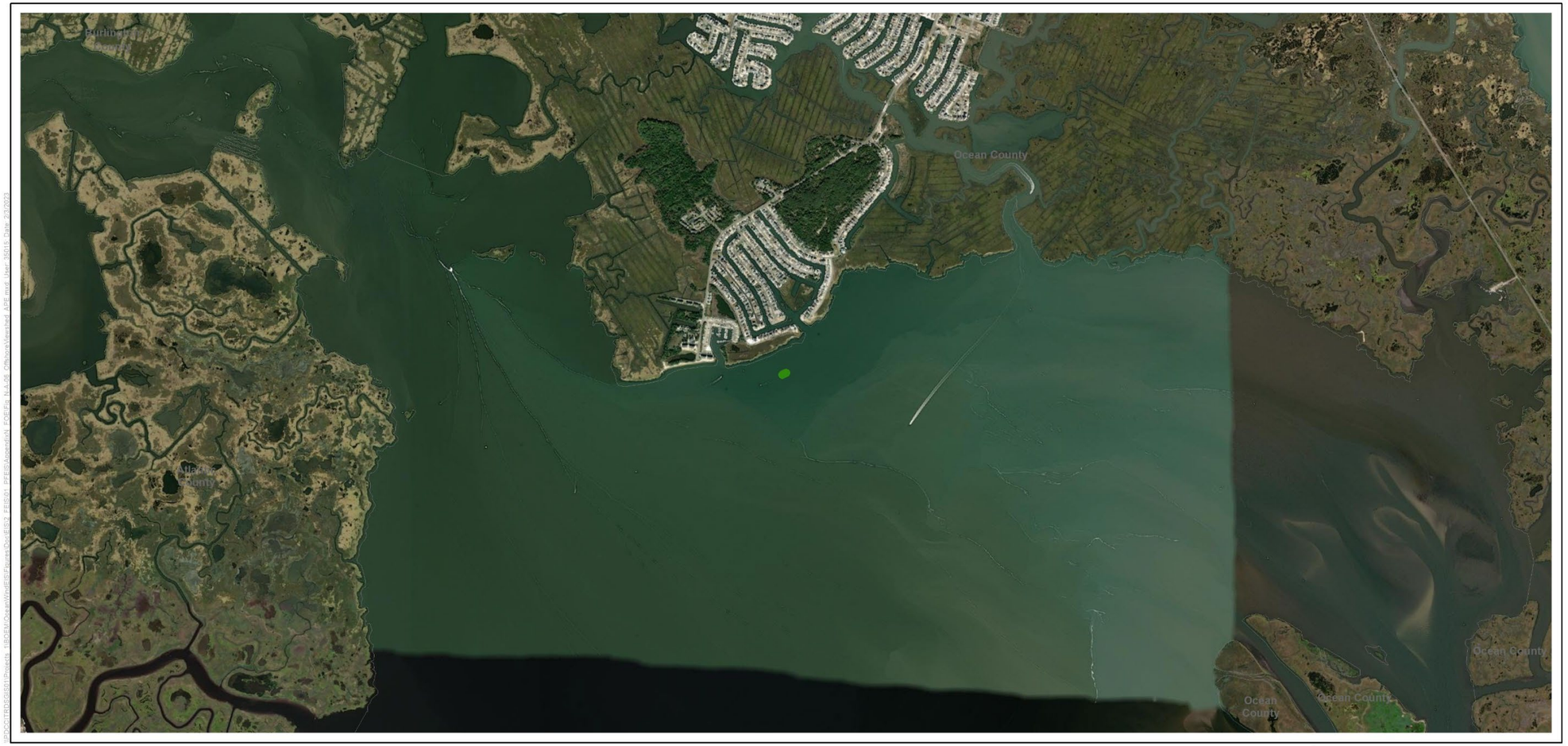


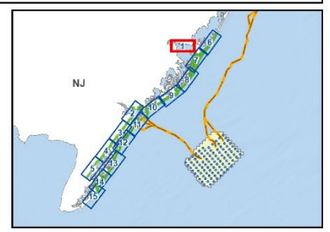
Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Index

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Legend

- Offshore Visual APE (Not to Scale)
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



Sheet: 1 of 15

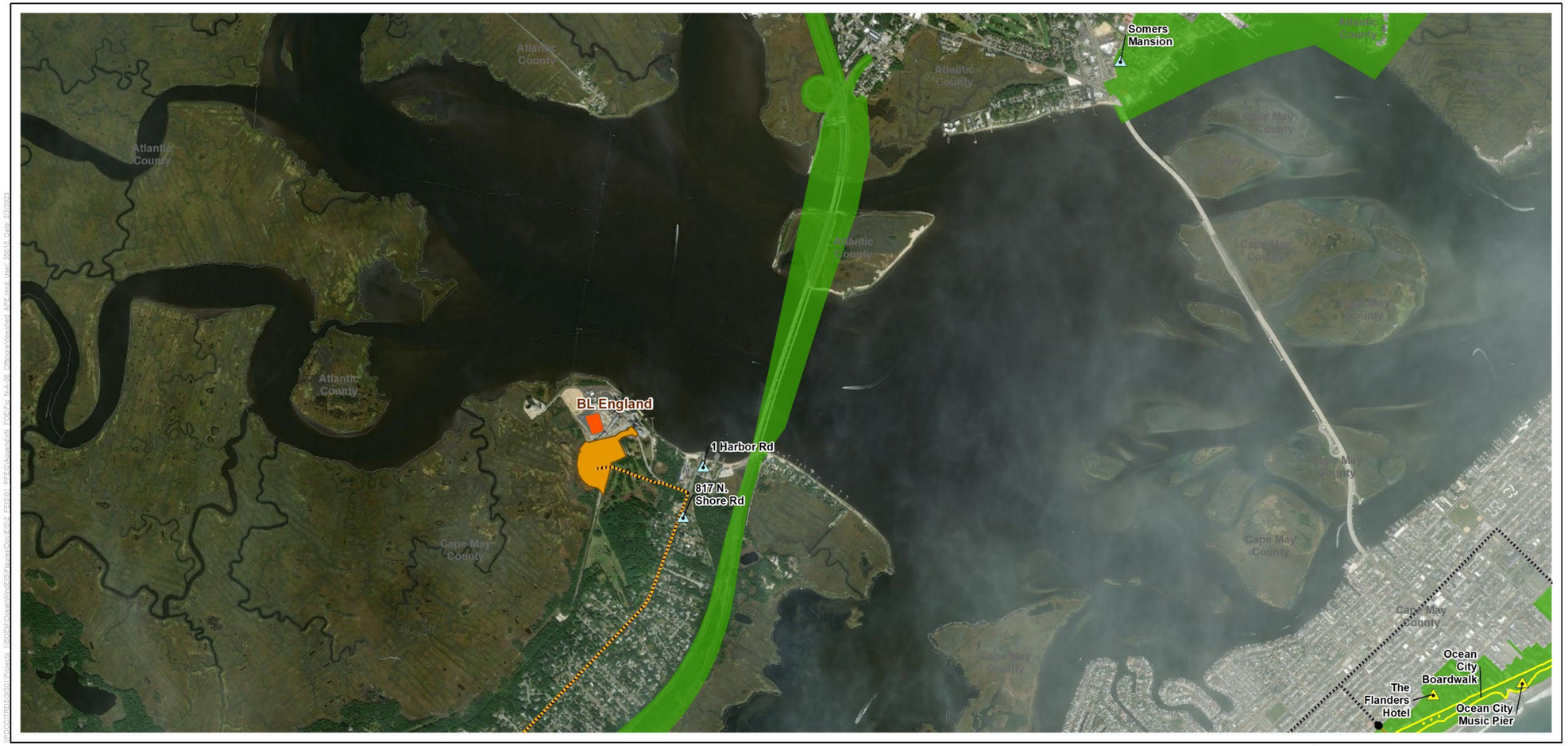
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Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 1



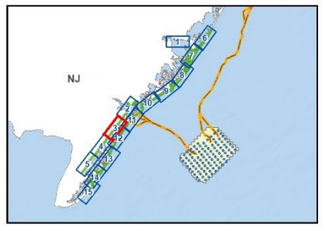
Sheet: 2 of 15

Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 2**



Legend

- Offshore Visual APE
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



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Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 3**



Sheet: 4 of 15

Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 4**

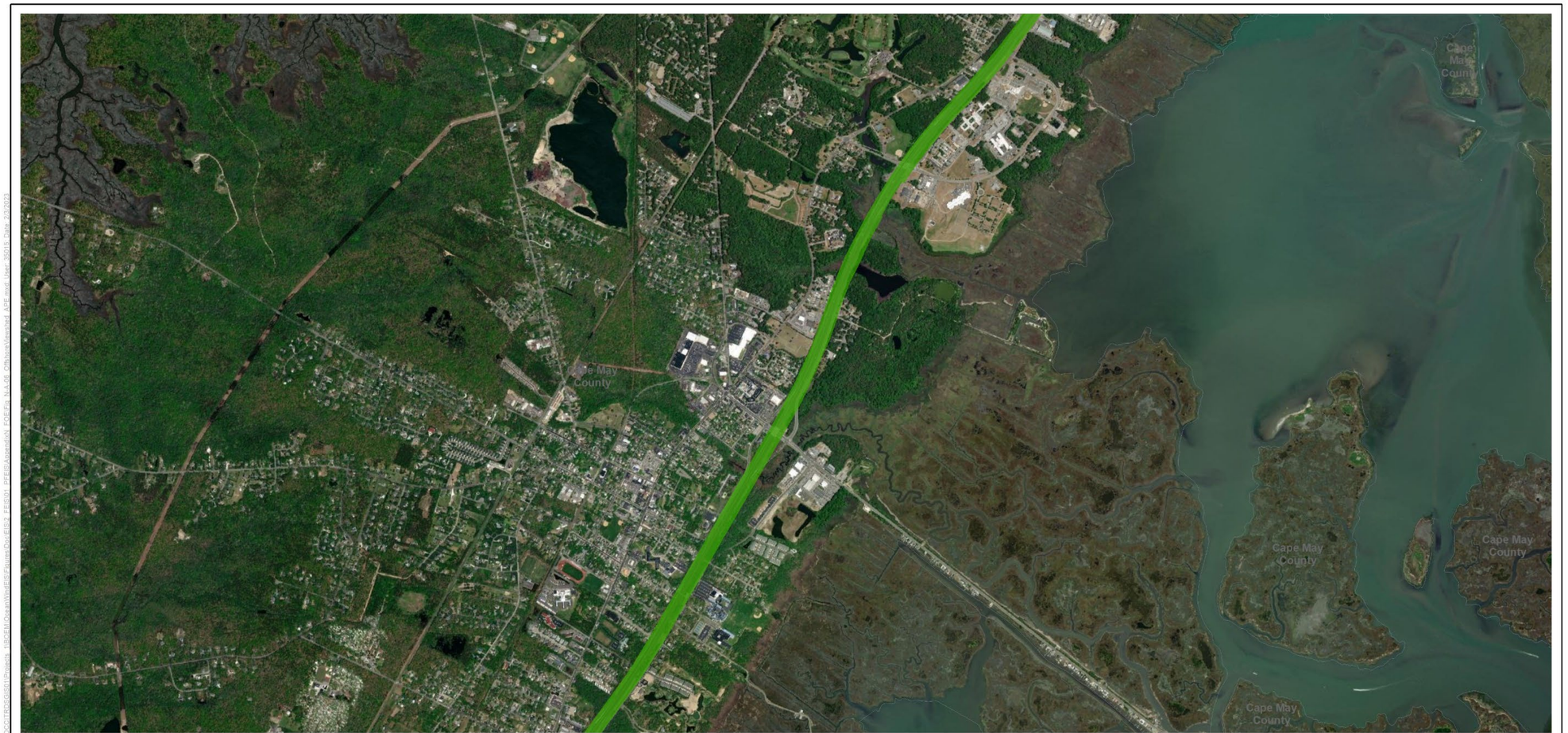
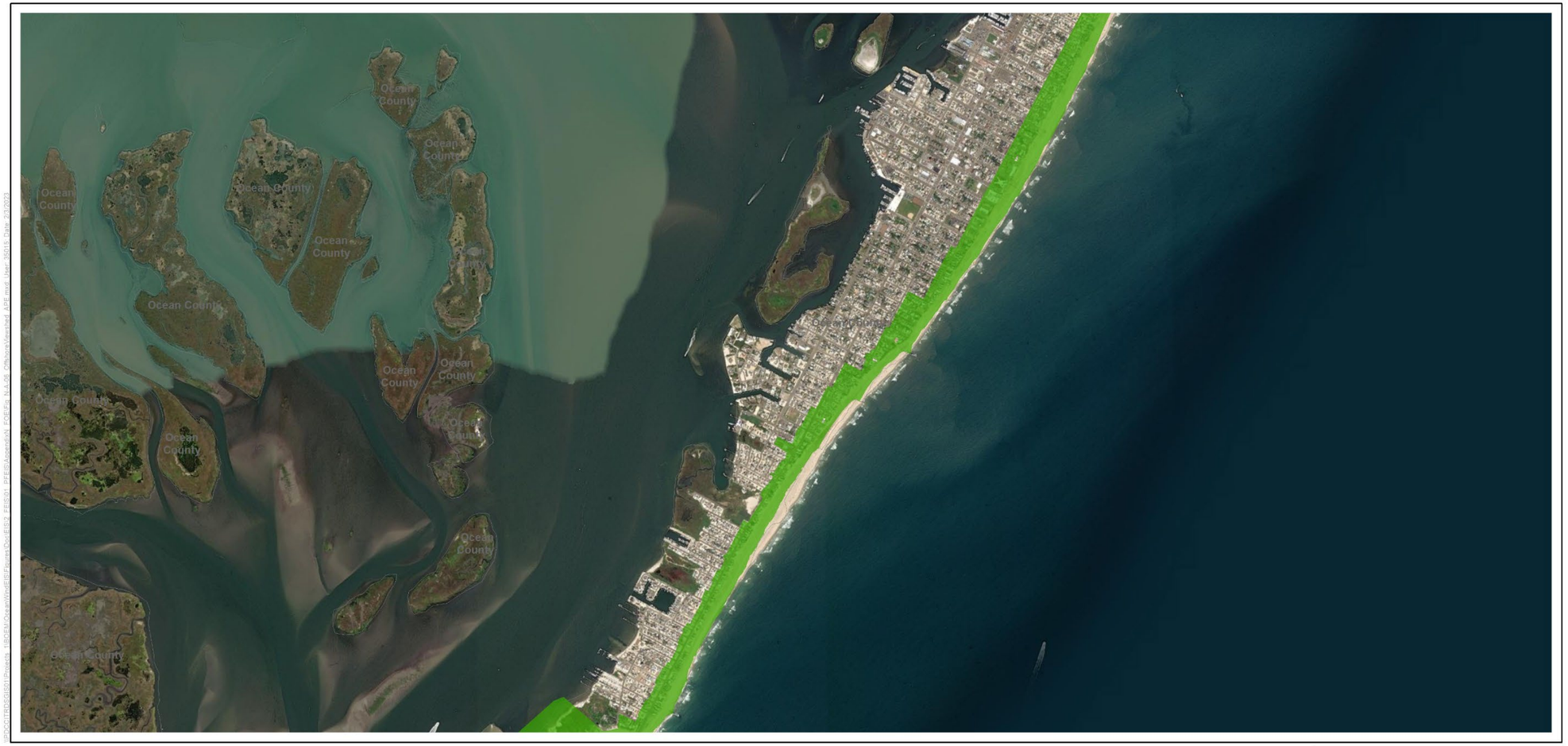


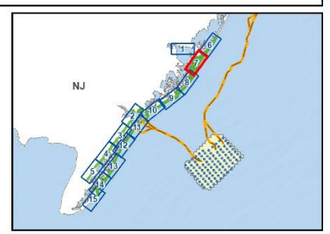
Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 5**


Ocean County
Ocean County
Ocean County



Legend

- Offshore Visual APE
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



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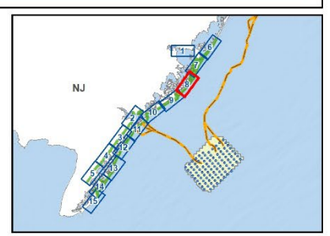
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Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 7



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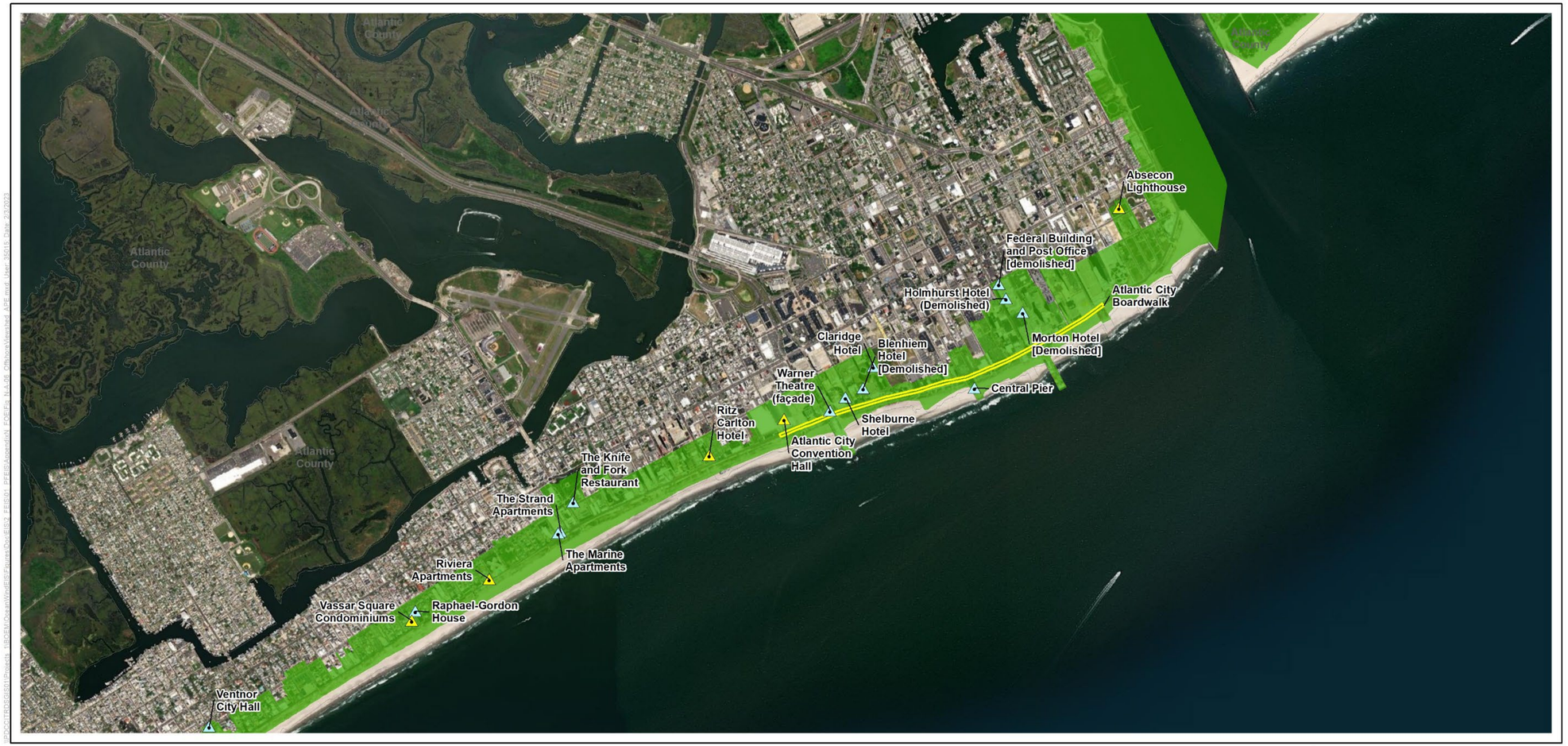
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- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



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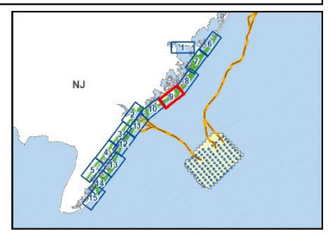
Sheet: 8 of 15

Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 8**



Legend

- Offshore Visual APE
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



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Sheet: 9 of 15

Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 9**

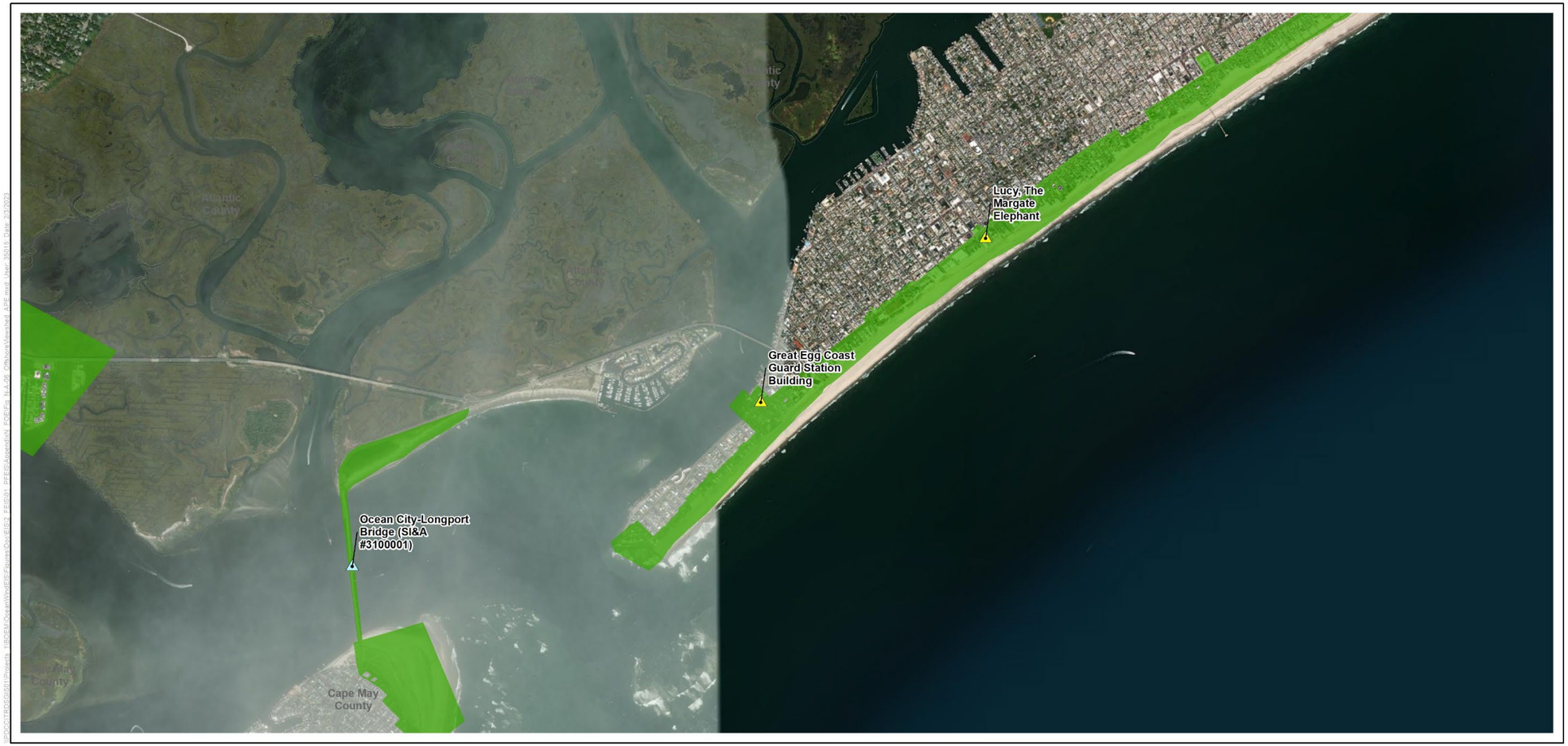
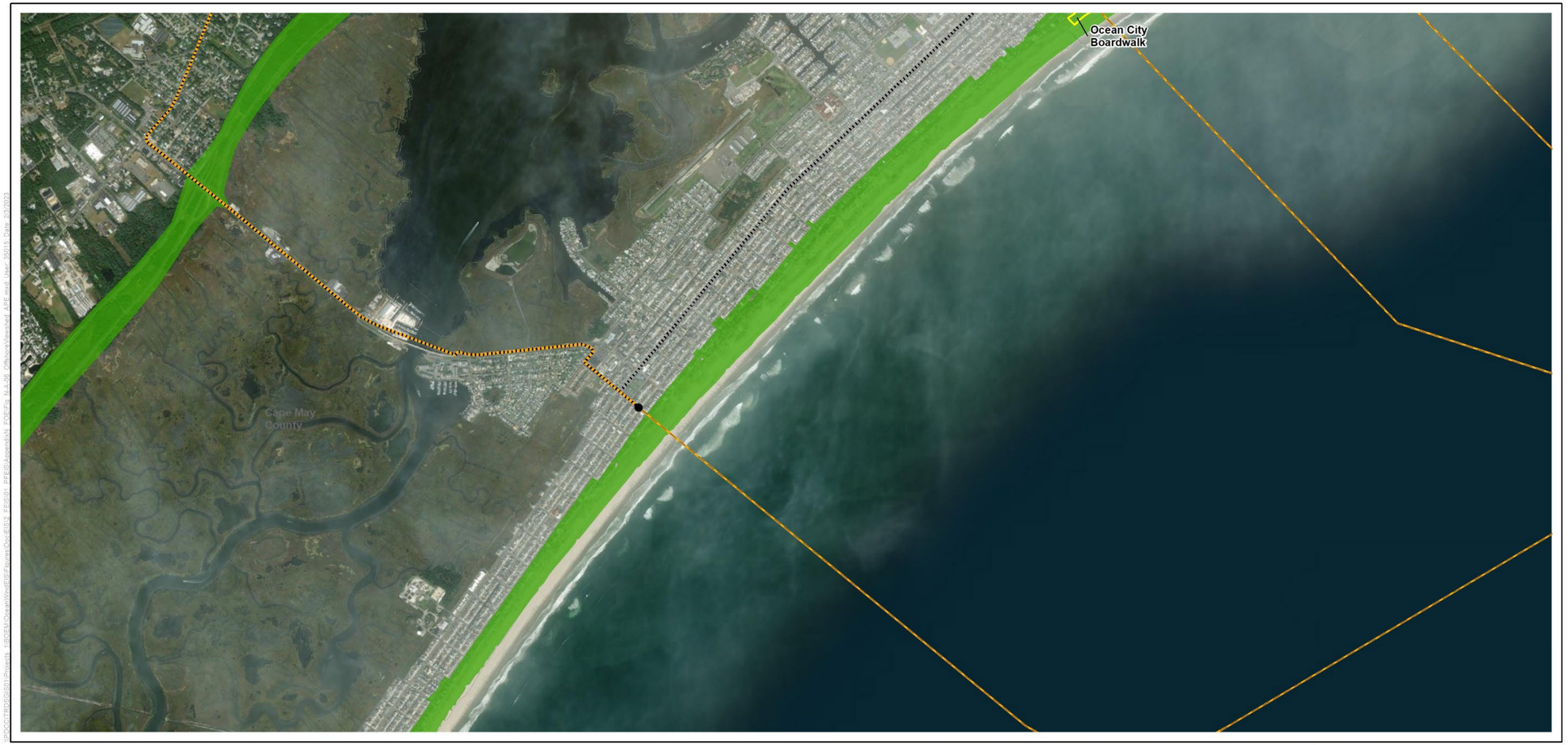
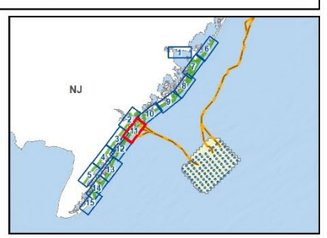


Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 10**



Legend

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- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



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Sheet: 11 of 15

Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 11**

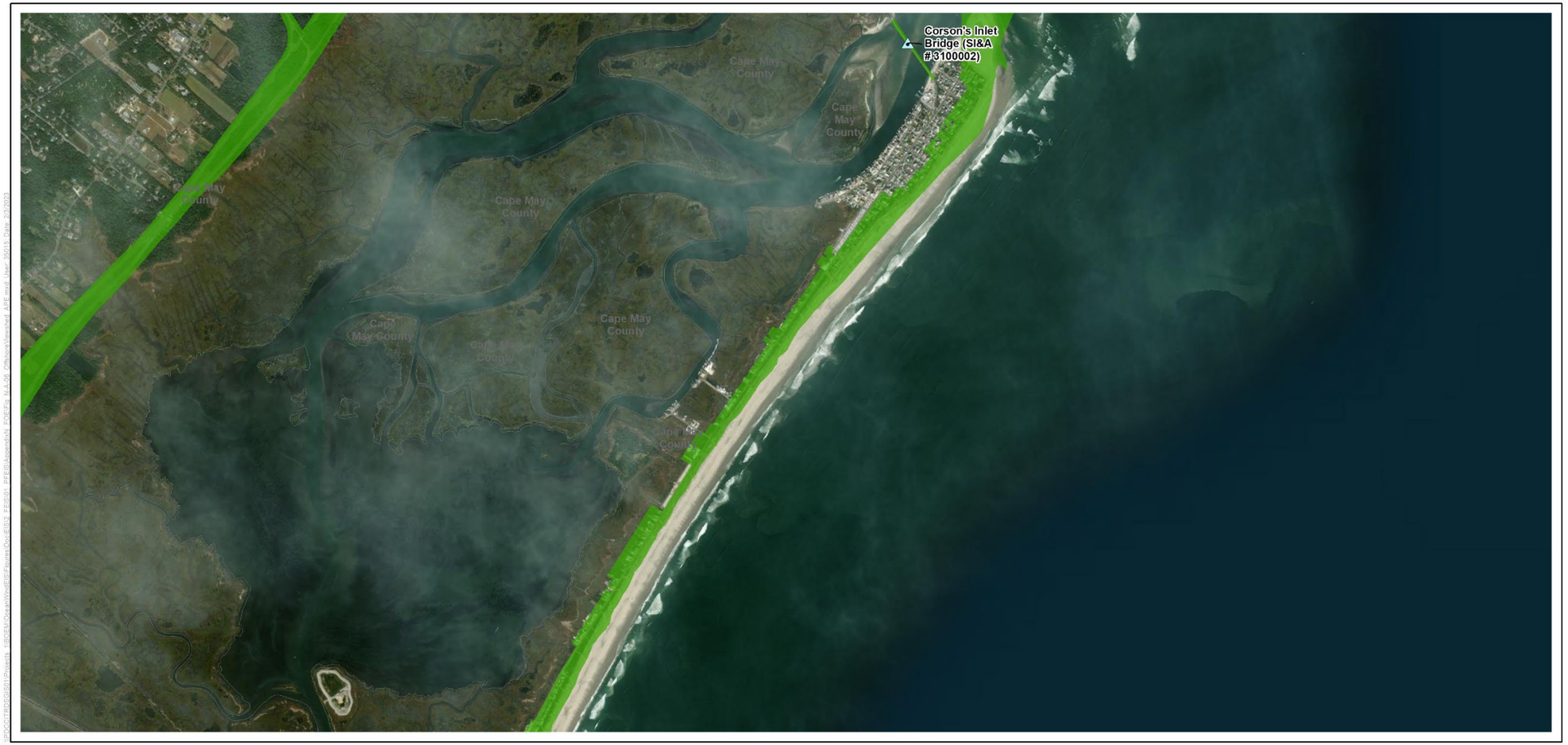
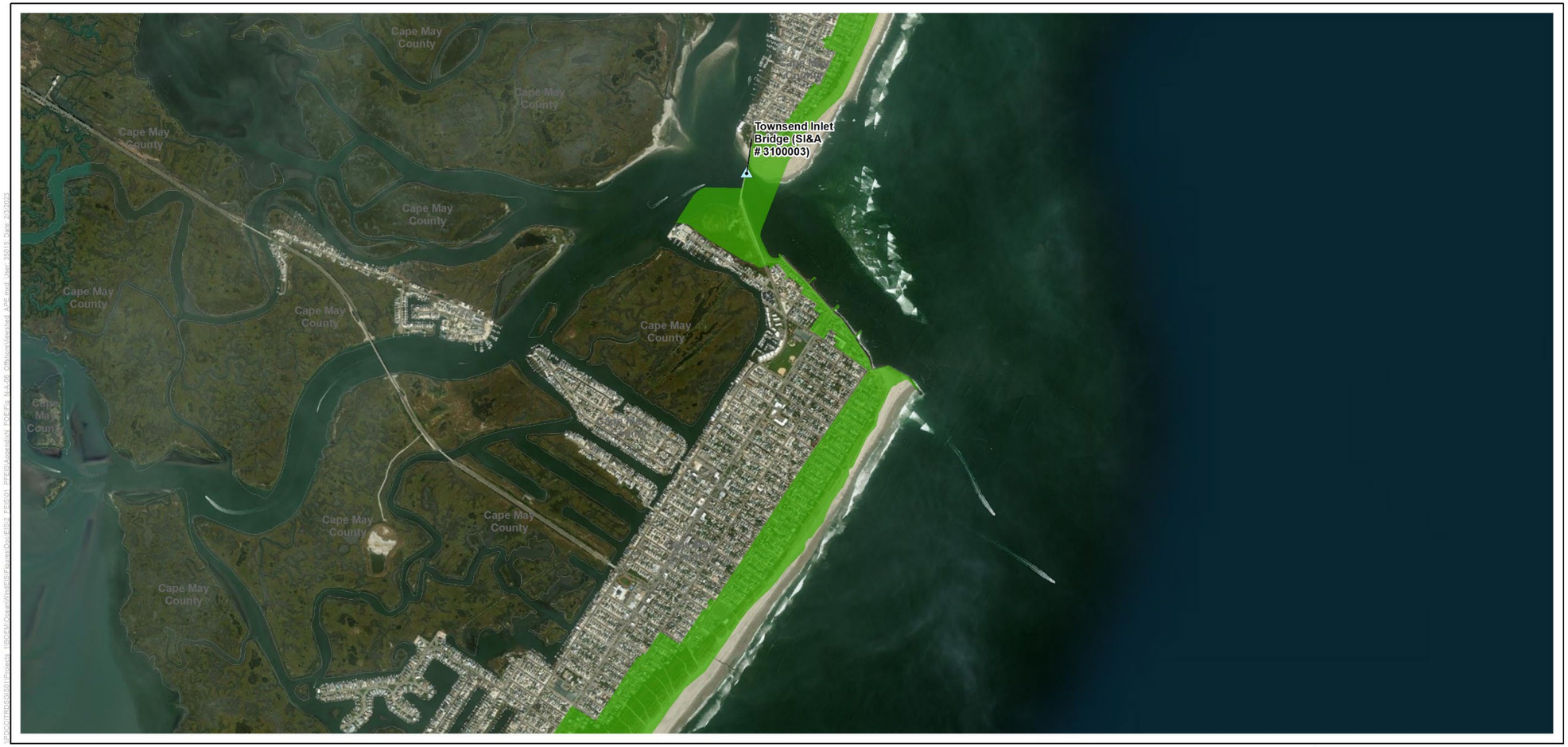
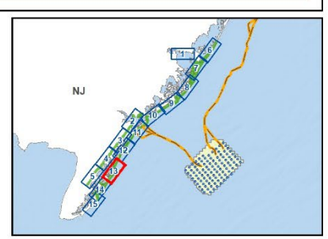


Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 12**



Legend

- Offshore Visual APE
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



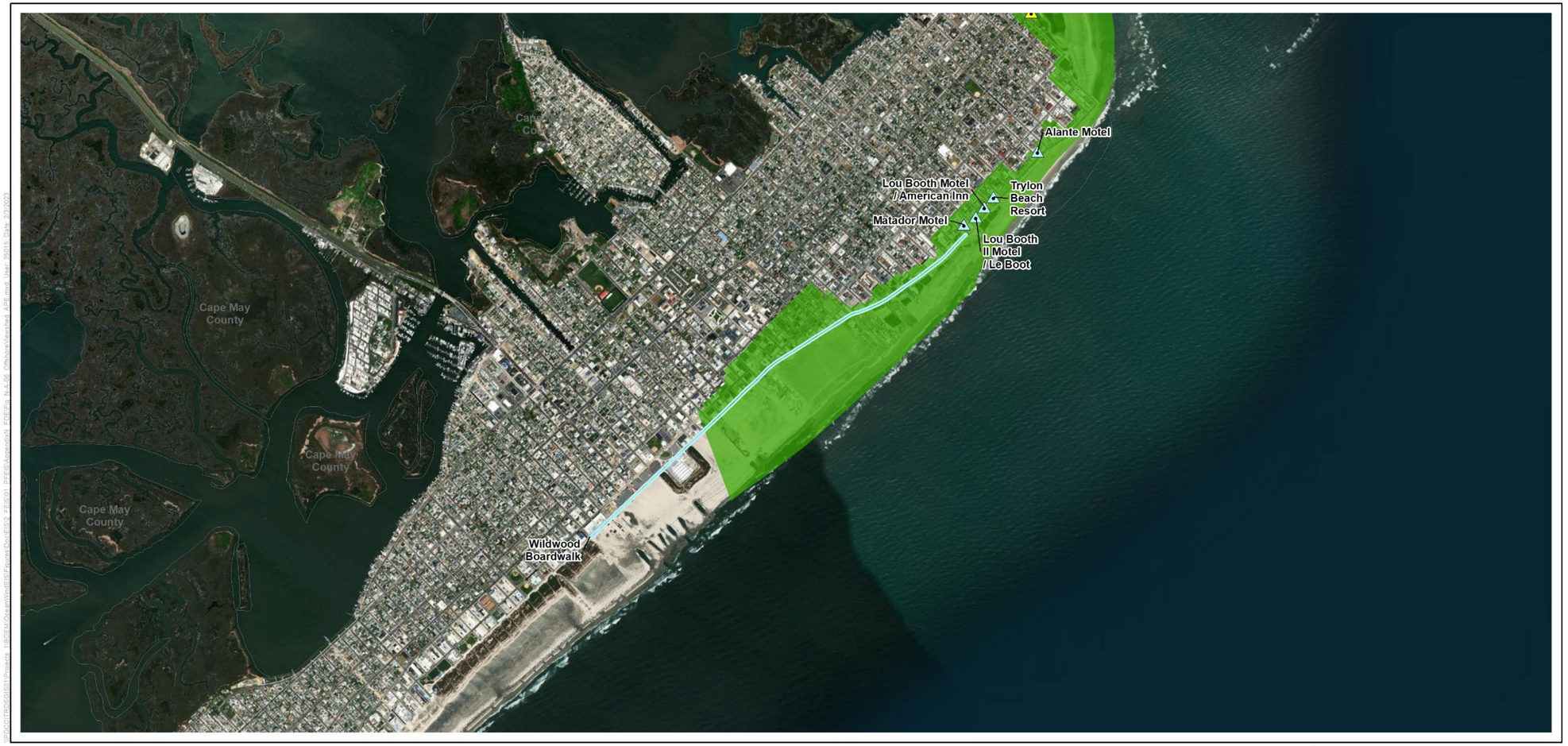
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Sheet: 13 of 15

Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 13**

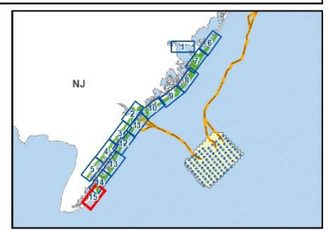


Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 14**



Legend

- Offshore Visual APE
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



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Sheet: 15 of 15

Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 15

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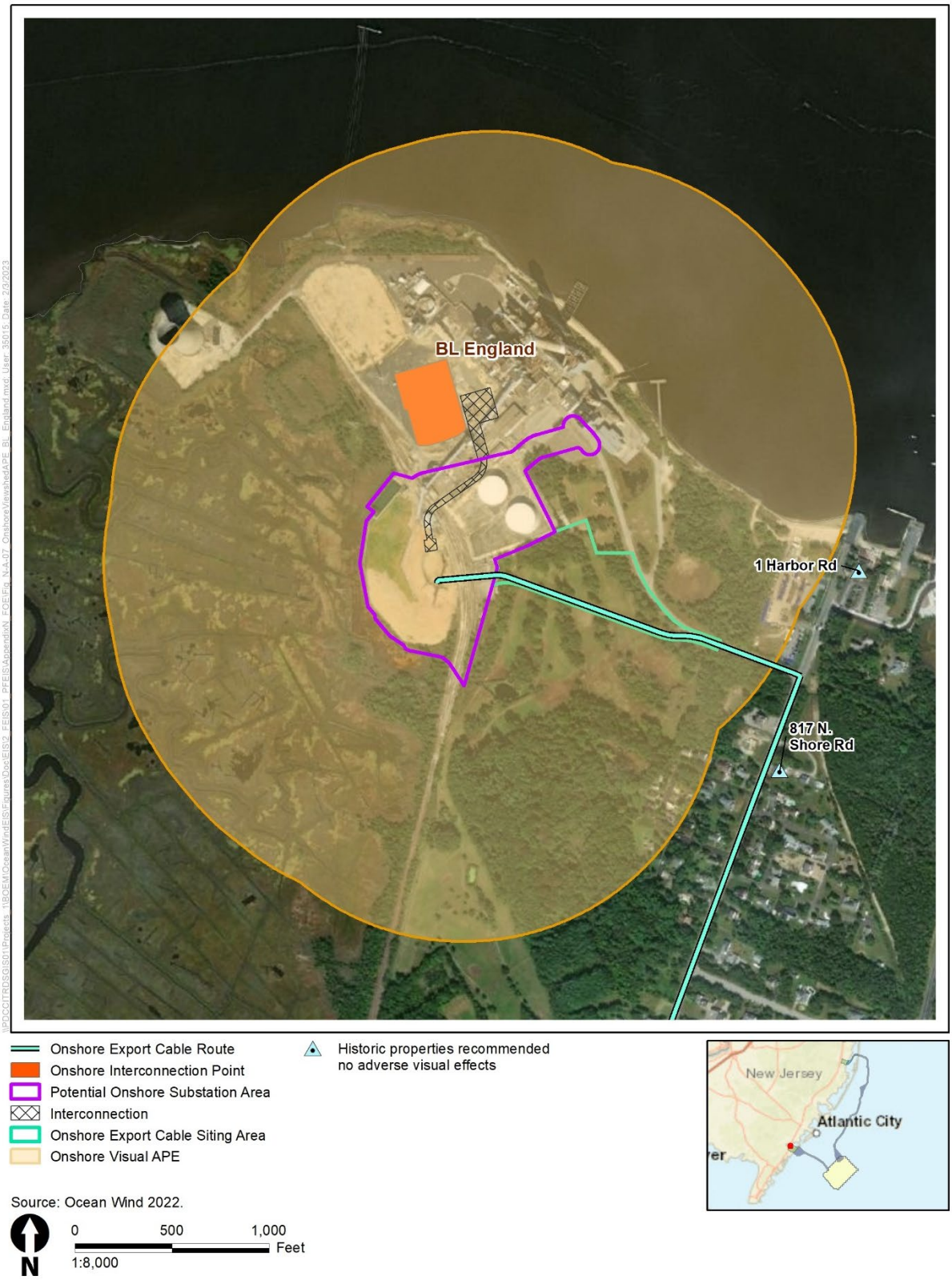


Figure 7 Onshore Visual APE for BL England Substation

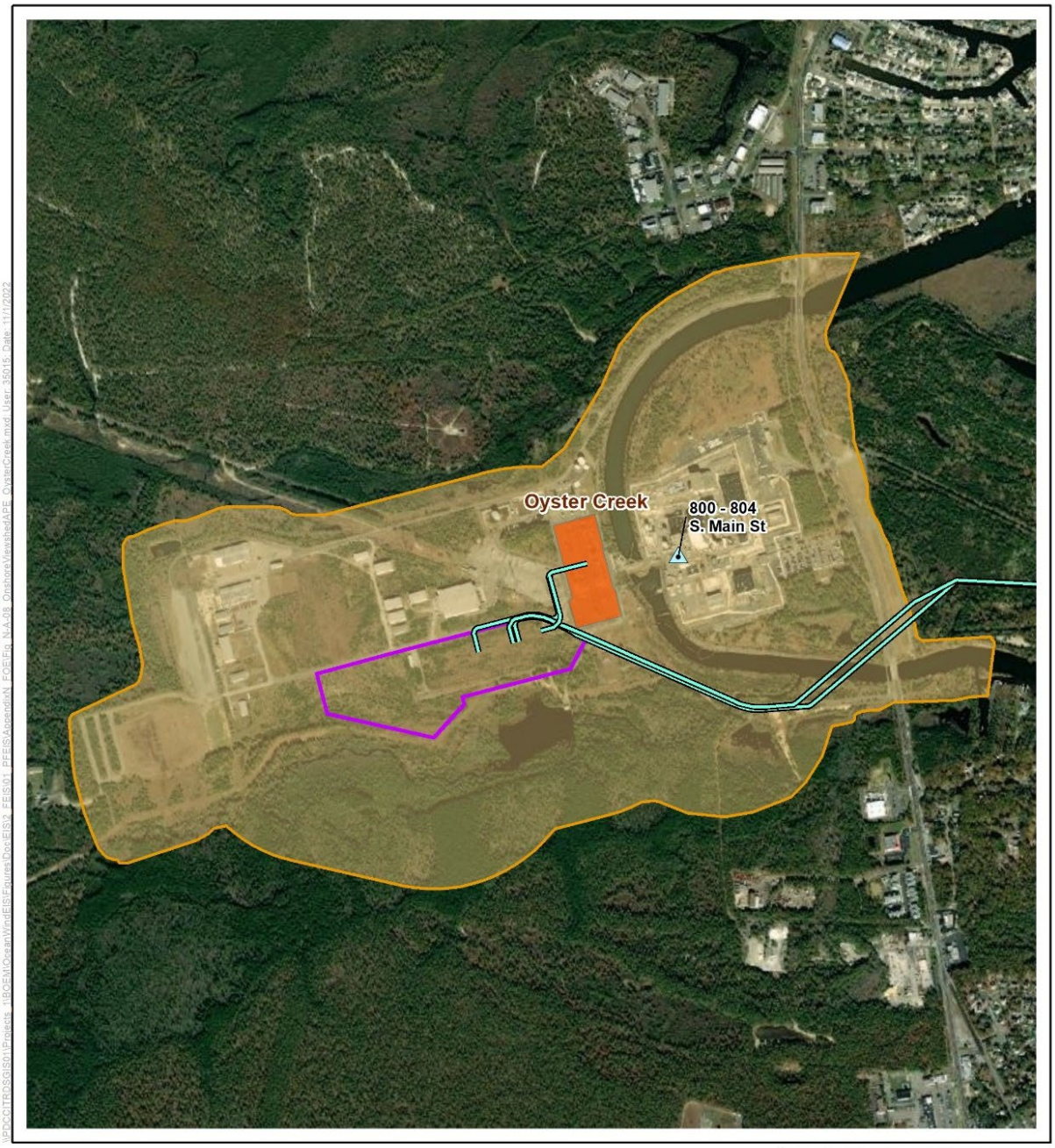


Figure 8 Onshore Visual APE for Oyster Creek Substation

ATTACHMENT 2 – LIST OF CONSULTING PARTIES

Table 1. Parties Invited to Participate in NHPA Section 106 Consultation

Participants in the Section 106 Process	Invited Parties
SHPOs and State Agencies	NJDEP, Historic Preservation Office
	NJDEP, Office of Historic Sites & Parks
	NJDLPS, Marine Service Bureau
	New Jersey Casino Reinvestment Development Authority
	New Jersey Historic Trust
Federal Agencies	ACHP
	NOAA
	USACE
	USCG
	USEPA
	USFWS
	National Park Service
	National Park Service, Region 1
Federally Recognized Tribes	Absentee-Shawnee Tribe of Indians of Oklahoma
	Delaware Tribe of Indians
	Eastern Shawnee Tribe of Oklahoma
	Shawnee Tribe
	The Delaware Nation
	Mashantucket Pequot Tribal Nation
	The Narragansett Indian Tribe
	The Rappahannock Tribe
	The Shinnecock Indian Nation
	Stockbridge-Munsee Community Band of Mohican Indians
Non-Federally Recognized Tribes	Lenape Indian Tribe of Delaware
	Nanticoke Indian Association, Inc.
	Nanticoke Lenni-Lenape Tribal Nation
	Nanticoke Lenni-Lenape Tribe
	Powhatan Renape Nation
	Ramapough Lenape Indian Nation
	Ramapough Mountain Indians
Local Governments	Absecon City
	Atlantic City
	Atlantic County
	Atlantic County, Department of Regional Planning and Development

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Participants in the Section 106 Process	Invited Parties
	Avalon Borough
	Barnegat Light Borough
	Barnegat Township
	Beach Haven Borough
	Brigantine Beach City
	Cape May City
	Cape May County
	Cape May Point Borough
	Dennis Township
	Eagleswood Township
	Egg Harbor City
	Egg Harbor Township
	Galloway Township
	Hamilton Township
	Hammonton Town
	Harvey Cedars Borough
	Linwood City
	Little Egg Harbor Township
	Long Beach Township
	Longport Borough
	Lower Township
	Margate City
	Middle Township
	North Wildwood City
	Ocean City
	Ocean County
	Pleasantville City
	Sea Isle City
	Ship Bottom Borough
	Somers Point City
	Stafford Township
	Stone Harbor Borough
	Surf City Borough
	Tuckerton Borough
	Upper Township
	Ventnor City
	West Cape May Borough
	West Wildwood Borough

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Participants in the Section 106 Process	Invited Parties
	Wildwood City
	Wildwood Crest Borough
	Woodbine Borough
Nongovernmental Organizations or Groups	Absecon Historical Society
	Absecon Lighthouse
	Atlantic City Convention Center
	Atlantic County
	Atlantic County Historical Society
	Avalon History Center
	Barnegat Light Museum
	Barnegat Lighthouse State Park
	Brigantine Beach Historical Museum
	Cape May Lighthouse
	Caribbean Motel
	Converse Cottage
	Donald & June Feith (114 South Harvard Avenue, Ventnor City, New Jersey)
	Dr. Edward H. Williams House
	Eagleswood Historical Society
	Emlen Physick Estate
	Flanders Condominium Association
	Friends of Barnegat Lighthouse
	Friends of the Cape May Lighthouse
	Friends of the World War II Tower
	Greater Cape May Historic Society
	Greater Egg Harbor Township Historical Society
	Hereford Inlet Lighthouse
	Historic Cold Spring Village
	Legacy Vacation Resorts
	Linwood Historical Society
	Long Beach Island Historical Association
	Long Beach Island Historical Association
	Longport Historical Society
	Madison Hotel
	Max Gurwicz Enterprises
	Museum of Cape May County
	New Jersey Lighthouse Society
	New Jersey Maritime Museum

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Participants in the Section 106 Process	Invited Parties
	Ocean City Historical Museum
	Ocean City Music Pier
	Ocean County Historical Society
	Patriots for the Somers Mansion
	Preservation New Jersey
	Raphael-Gordon House
	Ritz Condominium Association
	Rutgers University, Department of Marine and Coastal Sciences, School of Environmental and Biological Sciences
	Save Lucy Committee, Inc.
	Stone Harbor Museum
	The Museum of Cape May County
	The Noyes Museum of Art
	Tuckerton Historical Society
	Vassar Square Condominium Association
	Wildwood Crest Historical Society
	Wildwood Historical Society

Table 2. Parties Participating in Section 106 Consultation

Participants in the Section 106 Process	Participating Parties
SHPOs and State Agencies	NJDEP, Historic Preservation Office
	NJDEP, Office of Historic Sites & Parks
	New Jersey Historic Trust
Federal Agencies	ACHP
	USACE
	USEPA
	USCG
	National Park Service
	U.S. Naval History and Heritage Command
Federally Recognized Tribes	Delaware Nation
	Delaware Tribe of Indians
	Stockbridge-Munsee Community Band of Mohican Indians
	The Shinnecock Indian Nation
	Wampanoag Tribe of Gay Head (Aquinnah)
Local Governments	Atlantic County
	Cape May City

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Participants in the Section 106 Process	Participating Parties
	Cape May County
	Harvey Cedars Borough
	Linwood City
	Margate City
	North Wildwood City
	Ocean City
	Sea Isle City
	Somers Point City
	Stafford Township
Non-governmental Organizations or Groups	Absecon Lighthouse
	Donald & June Feith (114 South Harvard Avenue, Ventnor City, New Jersey)
	Flanders Condominium Association
	Garden State Seafood Association
	Long Beach Island Historical Association
	Save Lucy Committee, Inc.
	Ritz Condominium Association
	Rutgers University, School of Environmental and Biological Sciences
	The Noyes Museum of Art
	Vassar Square Condominiums

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Table 3. Parties Invited to Consult under Section 106 and That Did Not Participate in Consultation

Participants in the Section 106 Process	Invited Consulting Parties
State Agencies	NJDEP, Office of Historic Sites & Parks
	NJDLPS, Marine Service Bureau
	New Jersey Casino Reinvestment Development Authority
Federal Agencies	NOAA
	USFWS
	National Park Service, Region 1
Federally Recognized Tribes	Absentee-Shawnee Tribe of Indians of Oklahoma
	Eastern Shawnee Tribe of Oklahoma
	Shawnee Tribe
	Mashantucket Pequot Tribal Nation
	The Narragansett Indian Tribe
	The Rappahannock Tribe
Non-Federally Recognized Tribe	Lenape Indian Tribe of Delaware
	Nanticoke Indian Association, Inc.
	Nanticoke Lenni-Lenape Tribal Nation
	Nanticoke Lenni-Lenape Tribe
	Powhatan Renape Nation
	Ramapough Lenape Indian Nation
	Ramapough Mountain Indians
Local Governments	Absecon City
	Atlantic City
	Atlantic County, Department of Regional Planning and Development
	Avalon Borough
	Barnegat Light Borough
	Barnegat Township
	Beach Haven Borough
	Brigantine Beach City
	Cape May Point Borough
	Dennis Township
	Eagleswood Township
	Egg Harbor City
	Egg Harbor Township
	Galloway Township
	Hamilton Township
	Hammonton Town
	Linwood City

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Participants in the Section 106 Process	Invited Consulting Parties
	Little Egg Harbor Township
	Long Beach Township
	Longport Borough
	Lower Township
	Middle Township
	Ocean County
	Pleasantville City
	Ship Bottom Borough
	Stone Harbor Borough
	Surf City Borough
	Tuckerton Borough
	Upper Township
	Ventnor City
	West Cape May Borough
	West Wildwood Borough
	Wildwood City
	Wildwood Crest Borough
	Woodbine Borough
Nongovernmental Organizations or Groups	Absecon Historical Society
	Atlantic City Convention Center
	Atlantic County
	Atlantic County Historical Society
	Avalon History Center
	Barnegat Light Museum
	Barnegat Lighthouse State Park
	Brigantine Beach Historical Museum
	Cape May Lighthouse
	Caribbean Motel
	Converse Cottage
	Dr. Edward H. Williams House
	Eagleswood Historical Society
	Emlen Physick Estate
	Friends of Barnegat Lighthouse
	Friends of the Cape May Lighthouse
	Friends of the World War II Tower
	Greater Cape May Historic Society
	Greater Egg Harbor Township Historical Society
	Hereford Inlet Lighthouse

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Participants in the Section 106 Process	Invited Consulting Parties
	Historic Cold Spring Village
	Legacy Vacation Resorts
	Linwood Historical Society
	Longport Historical Society
	Madison Hotel
	Max Gurwicz Enterprises
	Museum of Cape May County
	New Jersey Lighthouse Society
	New Jersey Maritime Museum
	Ocean City Historical Museum
	Ocean City Music Pier
	Ocean County Historical Society
	Patriots for the Somers Mansion
	Preservation New Jersey
	Raphael-Gordon House
	Stone Harbor Museum
	The Museum of Cape May County
	Tuckerton Historical Society
	Wildwood Crest Historical Society
	Wildwood Historical Society

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ATTACHMENT 3 – HISTORIC PROPERTY TREATMENT PLAN FOR THE OCEAN WIND 1 FARM ANCIENT SUBMERGED LANDFORM FEATURES, FEDERAL WATERS ON THE OUTER CONTINENTAL SHELF

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Ocean Wind 1
An Ørsted & PSEG project

Applicant-Proposed Draft with BOEM Revisions – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Ocean Wind 1 Farm

Ancient Submerged Landform Features
Federal Waters on the Outer Continental Shelf

Submitted to:

BOEM
Bureau of Ocean Energy Management

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Ocean Wind 1
An Ørsted & PSEG project

Ocean Wind 1,
https://oceanwind.com/

Prepared by:

SEARCH

www.searchinc.com

April 2023

ABSTRACT

Federal Undertaking:	Ocean Wind 1 Offshore Wind Farm Project
Location:	Outer Continental Shelf, New Jersey
Federal and State Agencies:	Bureau of Ocean Energy Management U.S. Army Corps of Engineers New Jersey Department of Environmental Protections/State Historic Preservation Office Advisory Council on Historic Preservation
ACHP Project No.:	
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act
Regulatory Action:	Cultural Resources Mitigation pursuant to Bureau of Ocean Energy Management approval of the *Ocean Wind 1 Wind Farm Construction and Operations Plan*
Potential Adverse Effect Finding for:	13 Properties in Cape May, Ocean, and Atlantic Counties
Date:	April 2023

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
APE	Area of Potential Effects
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
FEIS	Final Environmental Impact Statement
FR	Federal Regulation
HDR	HDR, Inc.
HPTP	Historic Properties Treatment Plan
MOA	Memorandum of Agreement
N/A	Not Applicable
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NJ DEP	New Jersey Department of Environmental Protection
NJHPO	New Jersey State Historic Preservation Office(r)
NPS	National Park Service
NRHP	National Register of Historic Places
OCS	Outer Continental Shelf
OCW1	Ocean Wind1 Offshore Wind Farm Project
QMA	Qualified Marine Archaeologist
PRDP	Post-Review Discoveries Plan
RFP	Request for Proposals
ROD	Record of Decision
SOI	Secretary of the Interior
TCP	Traditional Cultural Property
USCG	United States Coast Guard
WTG	Wind Turbine Generator

1.0 INTRODUCTION

Executive Summary

This Historic Properties Treatment Plan (HPTP) provides background data, historic property information, and detailed steps that will be implemented to carry out the potential cultural resources mitigation actions identified by the Bureau of Ocean Energy Management (BOEM) for the OCW1 Offshore Wind Farm (OCW1). The mitigation actions, if required, will be developed in consultation with the New Jersey State Historic Preservation Officer (NJHPO) and other National Historic Preservation Act (NHPA) Section 106 review consulting parties as elements of the Final Environmental Impact Statement (FEIS) and issued in accordance with 40 CFR parts 1500-1508, 36 CFR §§ 800.8, 800.10. This HPTP outlines the mitigation measures, implementation steps, and timeline for actions.

Section 1.0 Introduction: Outlines the content of this HPTP.

Section 2.0 Cultural Resources Regulatory Context: Briefly summarizes the OCW1 (the Undertaking) while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the 13 historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent conditions that guided the development of this document.

Section 3.0 Existing Conditions and Historic Significance: Provides a physical description of each historic property included in this HPTP. Set within their historic context, the applicable National Register of Historic Places (NRHP) criteria for each resource is discussed with a focus on the contribution of an ocean setting to its significance and integrity.

Section 4.0 Mitigation Measures: Presents specific steps to carry out the mitigation actions identified proposed by OCW1 in the COP. Each mitigation action includes a detailed description, intended outcome, and specifications that include maximum cost, methods, standards, requirements for documentation, and reporting instructions. Property-specific challenges, if any have been identified, are outlined as well.

Section 5.0 Implementation: Establishes the process for executing mitigation actions at the Historic Properties, as identified in Section 4.0 of this HPTP. For each action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

Section 6.0 References: A list of works cited in this HPTP.

2.0 CULTURAL RESOURCES REGULATORY CONTEXT

Project Overview: Ocean Wind1 Offshore Wind Farm (OCW1)

BOEM has determined that approval, approval with modification, or disapproval of the OCW1 COP constitutes an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA; 54 U.S.C. § 306108) and its implementing regulations (36 CFR 800), and that the activities proposed under the COP have the potential to affect historic properties. The OCW1 undertaking is defined as a wind-powered electric generating facility composed of up to 98 wind turbine generators (WTGs) and associated foundations, up to three offshore substations, and inter-array cables connecting the WTGs and the offshore substations (**Figure 2-1**). The WTGs, foundations, offshore substations, and inter-array cables will all be in federal waters on the Outer Continental Shelf (OCS), approximately 15 statute miles (mi) (13 nautical miles [nm]) southeast of Atlantic City, New Jersey. Cables will be buried below the seabed.

Export cables from the offshore substations will extend along the seabed and connect to buried onshore export cables, which will connect to two interconnection points, at Oyster Creek and BL England. Onshore cables will be buried within and up to a 15-meters (m)-wide (50-feet[ft]-wide) construction corridor with a permanent easement up to 9.8-m-wide (30-ft-wide) for BL England. Two new onshore substations are proposed at Oyster Creek and BL England along with grid connections to the existing grid for each substation. Onshore substation locations would be sited on existing parcels containing decommissioned power facilities at BL England and Oyster Creek. The Oyster Creek and BL England onshore substation locations would require a permanent site up to 31.5 acres (ac) (12.7 hectares [ha]) and 13 ac (5.3 ha) respectively, for the substation equipment and buildings, energy storage, and stormwater management and associated landscaping. Underground or overhead transmission lines would connect the substations to the planned interconnection point (grid connections).

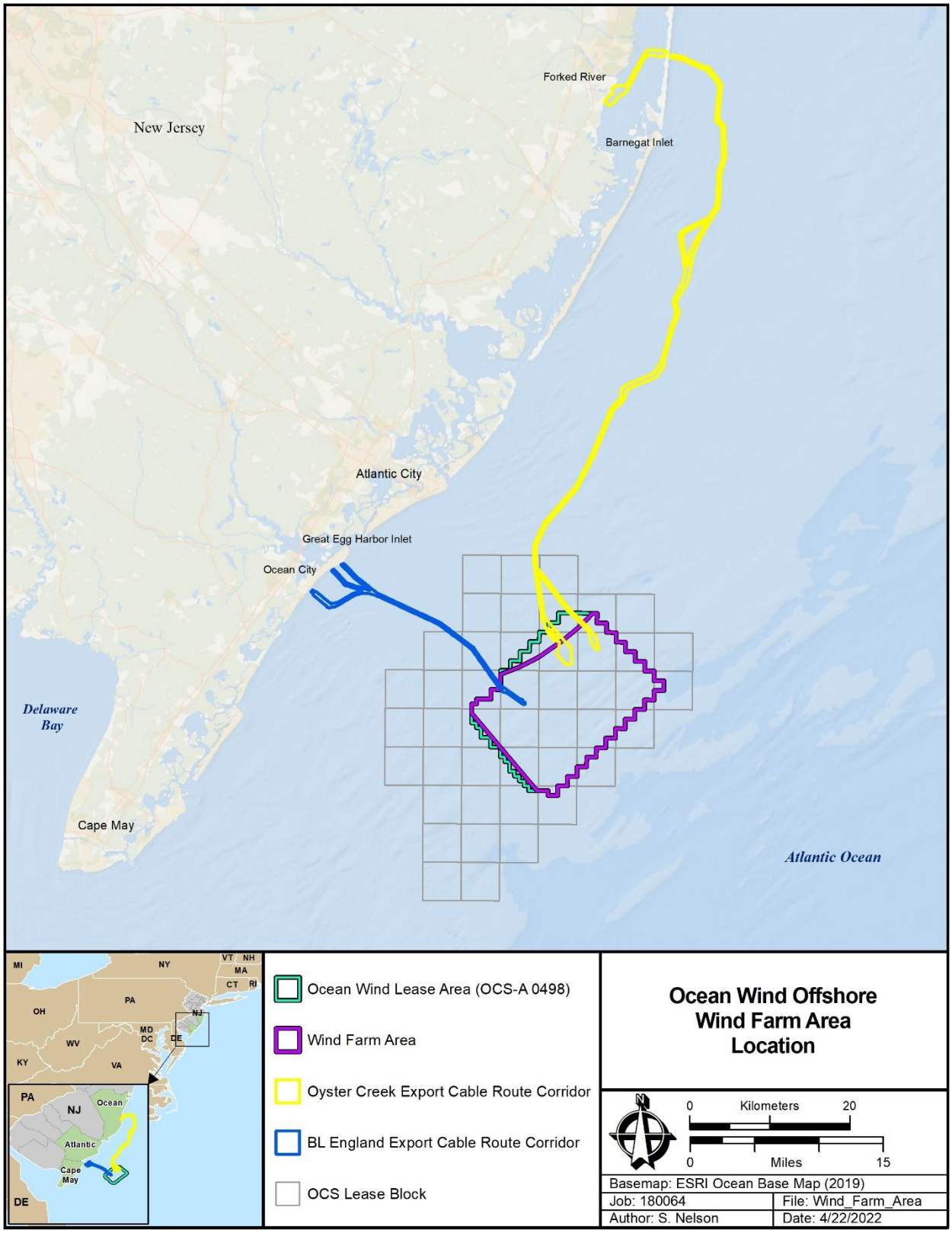


Figure 2-1. Project Location

Section 106 of the National Historic Preservation Act (NHPA)

This HPTP was developed based on coordination with BOEM and reflects consultations conducted by BOEM with multiple consulting parties, including the NJHPO and Tribes for whom the historic properties have traditional cultural and/or religious significance. The regulations at 36 CFR § 800.8 provide for use of the National Environmental Policy Act (NEPA) process to fulfill a federal agency's National Historic Preservation Act (NHPA) Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of a Record of Decision (ROD) and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking. BOEM may also choose to develop an NHPA Section 106 Memorandum of Agreement (MOA) to resolve adverse effects to historic properties. As defined in 36 CFR § 800.6 (c), a project specific MOA will record the terms and conditions agreed upon to resolve adverse effects of the undertaking (i.e., the approval, approval with modification, or disapproval of the OCW1 COP). If BOEM chooses to approve the OCW1 COP or approve the COP with modifications, implementation of the NHPA Section 106 MOA will be included in the ROD).

OCW1 will implement the following applicant-proposed environmental protection measures to avoid and minimize potential impacts to marine archaeological resources:

- Tribal representatives were involved, and will continue to be involved, in marine survey protocol design, execution of the surveys, and review of the results;
- An anchoring plan for vessels will be developed prior to construction to identify avoidance/no-anchorage areas around historic properties to avoid anchoring impacts to these resources; and
- A Post-Review Discoveries Plan (PRDP) will be implemented that will include stop-work and notification procedures to be followed if a potentially significant archaeological resource is encountered during construction (refer to the Project's Marine Archaeological Resource Assessment Report [COP Appendix F-1]).

This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-listed measures. The mitigation measures reflect refinement of the conceptual mitigation framework proposed by Ocean Wind1 (see COP Appendix F-4).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state, and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.0, Organizational Responsibilities.

Participating NHPA Section 106 Consulting Parties

BOEM initiated consultation under Section 106 with invitations to potential consulting parties in March 2021, including the NJHPO and ACHP. BOEM invited the following federally and state recognized Tribes with historic and cultural ties to the OCW1 project areas to participate in the Section 106 review as consulting parties:

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Delaware Tribe of Indians
- Eastern Shawnee Tribe of Oklahoma
- Shawnee Tribe
- Stockbridge-Munsee Community Band of Mohican Indians
- The Delaware Nation
- The Narragansett Indian Tribe
- The Shinnecock Indian Nation

In addition to the federally and state recognized Tribes, BOEM invited the following state recognized Tribes to participate as Section 106 consulting parties.

- Nanticoke Indian Association, Inc.
- Nanticoke Lenni-Lenape Tribal Nation
- Nanticoke Lenni-Lenape Tribe
- Powhatan Renape Nation
- Ramapough Lenape Indian Nation
- Ramapough Mountain Indians
- Lenape Indian Tribe of Delaware

OCW1 anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

After its initial invitation, BOEM hosted the following Section 106 consultation meetings with consulting parties on the following dates:

- April 13, 15, and 20, 2021: NEPA Public Scoping Meeting
- March 8, 2022: Section 106 Consulting Party Meeting 1
- May 4, 2022: Section 106 Consulting Party Meeting 2

Ocean Wind1 anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Consulting Parties referred to in this HPTP include the consulting parties, federally and state recognized Tribes, and state recognized Tribes detailed above. No additional Consulting Parties are expected to be involved in the implementation of this HPTP, not all parties identified may choose to provide input or participate in the HPTP mitigation process.

3.0 EXISTING CONDITIONS AND HISTORIC SIGNIFICANCE

Affected Ancient Submerged Landforms

This HPTP involves thirteen (13) historic properties, as identified below in **Table 3-1**. All 13 historic properties are ancient, submerged landform features (ASLFs) identified during geophysical and

geotechnical investigations within the OCW1 Wind Farm Area (WFA) and within the BL England and Oyster Creek Export Cable Routes (ECRs) Corridors.

Table 3-1. Historic Properties included in the HPTP.

Name	Project Component Area
Target 21	Wind Farm Area
Target 22	Wind Farm Area
Target 23	Wind Farm Area
Target 24	Wind Farm Area
Target 25	Wind Farm Area
Target 26	Wind Farm Area
Target 28	Wind Farm Area
Target 29	Wind Farm Area
Target 30	Wind Farm Area
Target 31	Wind Farm Area
Target 33	BL England Export Cable Route Corridor
Target 34	Oyster Creek Export Cable Route Corridor
Target 35	Oyster Creek Export Cable Route Corridor

Adversely Affected Historic Properties

Physical Description and Existing Conditions

Target 21: Target 21 represents the northern portion of an interfluve of U30/H30 flanked on the west by a meandering channel and a possible sinuous channel on the east. This topographical high between two channels was most likely a vegetative-rich area. Covering approximately 29.4 ha (146.2 ac), the acoustic imagery of Target 21 indicates a well-preserved margin between two divergent river channels. The reflector is buried 7.5 m (24.7 ft) below seabed (bsb) and is 874.3 m (2,868.4 ft) at its widest. Approximately 40% (23.6 ha [58.2 ac]) of Target 21 is present within the APE around a proposed turbine location and the inter-array cable corridor.

Target 22: Target 22 represents two possible landscapes based on the ground model and the seismic data. Seismic data appears to represent a preserved interfluve associated with U30/H30, while the ground model depicts a margin adjacent to a deeply incised channel. Marine transgression removed a large portion of the possible eastern tributary, resulting in two possible interpretations. Either environment would have been a vegetative rich landscape; archaeological core AC-15 recovered an intact paleosol from this area, aiding in the interpretation of Target 22. Covering approximately 181.9 ha (449.6 ac), the acoustic imagery of Target 22 suggests a well-preserved margin between a major paleochannel and a tributary. The reflector is buried 7.8 m (25.6 ft) bsb and is 1,478.9 m (4,852.0 ft) at its widest. Approximately 70% (127.8 ha [315.7 ac]) of Target 22 is present within the APE around a proposed turbine location and the inter-array cable corridor.

Target 23: Target 23 represents the western flank of a meandering paleochannel associated with U30/H30. Marine transgression removed portions of this margin, downcutting into the potential former subaerial landscape. Nearby archaeological core AC-03_rev did not yield any evidence of a paleosol as it penetrated through the channel. Covering approximately 202.0 ha (499.2 ac), the acoustic imagery of Target 23 evidences a slightly eroded, yet preserved paleochannel flank. The reflector is buried 6.2 m (20.3 ft) bsb and is 2,468.7 m (8,099.4 ft) at its widest. Approximately 76% (154.5 ha [381.7 ac]) of Target 23 is present within the APE around a proposed turbine location and the inter-array cable corridor.

Target 24: Target 24 represents the eastern flank of a meandering paleochannel associated with U30/H30. Marine transgression removed portions of this margin, downcutting into the former subaerial landscape. Archaeological core AC-16 recovered an intact paleosol from this area, aiding in the interpretation of Target 24. Covering approximately 126.5 ha (312.5 ac), the acoustic imagery of Target 24 indicates a slightly eroded, yet preserved paleochannel flank. The reflector, , is buried 3.2 m (10.5 ft) bsb and is 1,178.7 m (3867.1 ft) at its widest. Approximately 60% (75.6 ha [186.9 ac]) of Target 24 is present within the APE around a proposed turbine location and the inter-array cable corridor.

Target 25: Target 25 represents the eastern flank and floodplain of a major paleochannel associated with U30/H30. This geomorphic feature of archaeological interest is an extensive, well-preserved surface represented by a dark reflector in seismic imagery covering approximately 650.6 ha (1,607.6 ac). Archaeological cores AC-13_rev and AC-14_rev recovered similar intact paleosols from within Target 25, aiding in the interpretation of Target 25. The reflector is buried 5.8 m (19.0 ft) bsb and is 2,364.3 m (7,756.9 ft) at its widest. Approximately 41% (268.1 ha [662.5 ac]) of Target 25 is present within the APE intersecting four turbine locations and inter-array cable corridors.

Target 26: Target 26 represents a discrete portion of the western flank and floodplain of a meandering paleochannel associated with U30/H30, similar to Target 23. Covering approximately 33.9 ha (83.7 ac), the acoustic imagery of Target 26 suggests a well-preserved paleochannel flank and floodplain. The reflector is buried 1.8 m (5.9 ft) bsb and is 763.1 m (2,503.6 ft) at its widest. Nearby archaeological core AC-01 did not yield any evidence of a paleosol as it penetrated through the channel (see 2020 Marine Archaeological Geotechnical Campaign). Approximately 99% (33.4 ha [82.5 ac]) of Target 26 is present within the APE around a proposed turbine location and the inter-array cable corridor.

Target 28: Target 28 represents an interfluve between a bifurcation or convergence of a major paleochannel and a tributary associated with U30/H30. A significant portion of this geomorphic feature of archaeological interest remains intact, although marine transgression removed portions of this feature in the northeast, downcutting into the potential former subaerial landscape. Nearby archaeological cores AC-09a and AC-10 did not yield any evidence of a paleosol, as both penetrated the paleochannel. Covering approximately 210.8 ha (520.9 ac), the acoustic imagery of Target 28 indicates a well-preserved surface between two paleochannels. The reflector is buried 2.5 m (8.2 ft) bsb and is 1,7551.1 m (5,758.2 ft) at its widest. Approximately 24% (50.6 ha [125.1 ac]) of Target 28 is present within the APE around a proposed turbine location and the inter-array cable corridor.

Target 29: Target 29 represents an interfluve between a meandering paleochannel and a straight paleochannel associated with U30/H30. Marine transgression removed portions of this margin, truncating the floodplains. Additionally, portions of the meandering paleochannel cut through Target 29 for a period. Nearby archaeological core AC-05a did not yield evidence of a paleosol as it penetrated through a thin portion of U30/H30 to capture lower stratigraphic units. Covering approximately 203.4 ha (502.7 ac), the acoustic imagery of Target 29 suggests a slightly eroded, yet preserved paleochannel flank. The reflector is buried 1.1 m (3.6 ft) bsb and is 1,907.7 m (6,258.8 ft) at its widest. Approximately 41% (83.0 ha [205.2 ac]) of Target 29 is present within the APE around four proposed turbine locations and inter-array cable corridors.

Target 30: Target 30 represents a discrete portion of the eastern flank of a major paleochannel associated with U30/H30. Nearby archaeological core AC-04 captured evidence of a paleosol; however, the spatial extent of this surface is highly truncated ephemeral due to marine transgression. Covering approximately 23.7 ha (58.5 ac), the acoustic imagery of Target 30 indicates a slightly eroded, yet preserved paleochannel flank. The reflector is buried 2.5 m (8.2 ft) bsb and is 417.3 m (1,369.1 ft) at its widest. Approximately 69% (16.3 ha [40.4 ac]) of Target 30 is present within the APE around a proposed turbine location and the inter-array cable corridor.

Target 31: Target 31 represents an extensive portion of the western flank of a major paleochannel associated with U30/H30. Marine transgression removed portions of this margin, downcutting into the potential former subaerial landscape. Nearby archaeological core AC-08 did not yield any evidence of a paleosol as it penetrated through the channel. Radiocarbon dating from Target 31 suggests the former subaerial landscape is older than the archaeological framework for human settlement in North America; however, overlying stratigraphic units dated within the accepted timeframe. Covering approximately 59.6 ha (147.6 ac), the acoustic imagery of Target 31 indicates a slightly eroded, yet preserved paleochannel flank. The reflector is buried 1.8 m (5.9 ft) bsb and is 1,828.9 m (6,000.3 ft) at its widest. Approximately 79% (47.3 ha [116.9 ac]) of Target 31 is present within the APE around two proposed turbine locations and array cable corridors.

Target 33: Target 33 is located along the BL England ECR Corridor and represents the flank and floodplain of a paleochannel associated with U30/H30. Marine transgression removed portions of this paleolandform, downcutting into the potential former subaerial landscape. Acoustic imagery of Target 33 is similar to other targets within the WFA (i.e., Target 29). Covering approximately 55.9 ha (138.2 ac), the acoustic imagery of Target 33 indicates a slightly eroded, yet preserved paleochannel flank. The reflector is buried 2.3 m (7.5 ft) bsb and is 1,198.8 m (3,933.1 ft) at its widest. Approximately 69% (38.4 ha [94.8 ac]) of Target 33 is present within the APE.

Target 34: Target 34 is within the Oyster Creek ECR Corridor and represents the preserved channel margins of a minor tributary associated with U30/H30. Marine transgression removed portions of this paleolandform, downcutting into the potential former subaerial landscape. Acoustic imagery of Target 34 is similar to other targets within the WFA (i.e., Target 29). Covering approximately 13.1 ha (32.3 ac), the acoustic imagery of

Target 34 is indicative of a slightly eroded, yet preserved paleochannel flank. The reflector is buried 4.0 m (13.1 ft) bsb and is 743.2 m (2,438.3 ft) at its widest. Approximately 80% (10.5 ha [25.8 ac]) of Target 34 is present within the APE.

Target 35: Target 35 is in the Oyster Creek ECR Corridor and a small portion of the WFA and represents the eastern flank of a major paleochannel associated with U30/H30. Marine transgression removed portions of this margin, downcutting into the potential former subaerial landscape. Acoustic imagery of Target 35 is similar to other targets within the WFA (i.e., Target 29). Covering approximately 20.4 ha (50.5 ac), the acoustic imagery of Target 35 suggests a slightly eroded, yet preserved paleochannel flank. The reflector is buried 4.3 m (14.1 ft) bsb and is 1,110.8 m (3,644.3 ft) at its widest. Target 35 exists entirely within the APE.

Historic Context

The paleolandscape reconstruction for the APE based on the geophysical and geotechnical data indicated that unit 30 and its corresponding basal horizon (U30/H30) represented the last subaerial surface available for human occupation prior to the terminal Pleistocene sea level transgression. Radiocarbon data collected during the geoarchaeological campaign confirmed that U30/H30 dated to 9,351 cal BP to 13,646 cal BP. This timeframe correlates to the archaeologically defined Paleoindian Period (Lothrop et al. 2016) and Early Archaic Period (Kraft and Mournier 1982). Targets 21-26, 28-31, and 33-35 represent discontinuous portions of this surface and are the preserved margins adjacent to the paleo-fluvial network that once dominated this landscape. The interpretation of these ASLFs suggests that stable, former subaerial surfaces, such as these, are the most likely locations where evidence of human occupation could be preserved.

Although direct evidence of the former inhabitants does not exist within the current dataset, the paleoenvironmental reconstruction and correlation to similar, known terrestrial archaeological sites suggest the ASLFs are types of locations frequented by indigenous peoples in the region. Paleoindian and early Archaic peoples were highly mobile populations that relied on resource rich areas for survival, such as river valleys. Coastal adaptation during this time is not well-understood due to the nature of marine transgression. It is highly likely that the former coastline now drowned and buried on the OCS also was a locale frequented and utilized by the same indigenous populations.

The ASLFs discussed above represent preserved elements of a former subaerial surface, one that was likely home to the indigenous peoples. These types of features are recognized as having traditional cultural significance to the consulting Tribes, many of whom are ancestors of the people that once traversed this landscape. Several of the Tribes maintain within their traditions that their people have always been present here. Their Tribal histories possess accounts of their ancestors existing and interacting with these former subaerial surfaces, a place that holds value and importance to their heritage and identity.

NRHP Criteria

Based on prior BOEM consultations for the South Fork Wind Farm and Vineyard Wind 1 Wind Farm undertakings and the lessee's assessments, the identified ASLFs are potentially eligible for listing in the

National Register of Historic Places, per 36 CFR 60.4, under Criterion D for their potential to yield important information about the indigenous settlement of the northeastern United States and development of coastal subsistence adaptations. Each ASLF may also be eligible for listing under Criterion A for their association with and importance in maintaining the cultural identities of multiple Tribes.

4.0 MITIGATION MEASURES

This section details the proposed mitigation measures to resolve adverse effects to historic properties. The conceptual mitigation measures were developed on behalf of OCW1 by individuals who meet Secretary of the Interior (SOI) Qualifications Standards for Archeology and/or History (62 FR 33708) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project to the NRHP-qualifying characteristics of each historic property that would be affected. OCW1 has prepared this draft HPTP for inclusion in the DEIS and subsequent review by consulting parties.

BOEM, OCW1, and NHPA Section 106 consulting parties with demonstrated interest in the affected properties will identify steps to implement the following proposed measures. The final mitigation measures agreed upon at the conclusion of the NHPA Section 106 consultations will be led by a Qualified Marine Archaeologist (QMA) pursuant to 30 CFR 585 and who meets SOI Qualifications Standards for Archeology and Historic Preservation (48 FR 44738-44739).

Preconstruction Geoarchaeology

Purpose and Intended Outcome

This mitigation measure will consist of, prior to construction, the collection of vibracores within the affected portions of each ASLF that was not previously investigated during the 2020 Geotechnical Survey campaign. Target 22, 24, 25, and 30 have already been sampled during the 2020 geoarchaeological effort and will not be sampled during this effort. The focus will be on the effected landforms not previously investigated. The collected cores, the locations which will be selected in consultation with Tribes, BOEM, and the NJHPO, and will be analyzed in collaboration with the Tribes to provide a more detailed understanding of ancient, former terrestrial landscapes within the OCW1 WFA and ECR corridors and how such settings may have been used by Late Pleistocene-Early Holocene indigenous peoples. Data acquired from this effort is expected to refine the age estimates for each stable landform, the timing and character of ecological transitions evidenced in the MARA report and provide an additional opportunity to recover evidence of ancient indigenous use of each ASLF.

This measure will provide for a more detailed analysis of the stratigraphy, chronology, and evolving ecological conditions at each ancient landform. Two separate reports on the analyses and interpretations will be developed. The first will be focused on content of specific interest to the consulting tribes, including a broad approach to integrating available data collected from other recent archaeological research and surveys on the Atlantic OCS. The specific content and formatting of this report will be refined in consultation

with the tribes to align the work product with intended intra- and inter-tribal audiences. The second report will be geared primarily toward technical, Tribal/State Historic Preservation Officer and agency audiences.

Research Agendas

Research surrounding localized regression models and the potential for landscape preservation is growing as development along the Atlantic OCS continues. Results from additional geotechnical sampling may inform a detailed paleoshoreline regression model for this area. Integration of this data with adjacent regression models would serve to increase the understanding of the Pleistocene/Holocene transition and inundation. Additionally, sampling will reveal extant sediment profiles indicative of preserved landforms and living surfaces. The results of this study could inform numerous research agendas including, but not limited to, the following:

1) Inform scientific community of larger inundation trends;
2) Shift shoreline modeling based on localized dates;
3) Provide robust paleoenvironmental reconstruction data;
4) Indicate time frames associated with preserved landforms and cultural complexes;
5) Inform localized preservation potential based on environmental contexts;
6) Determine possible evidence of human presence in the environment.

Additional research agendas and specific research questions will be determined through consultation. The OCS represents the last preserved portion of a former subaerial landscape originally home to the Tribes now scattered along the eastern seaboard and across the United States. This mitigation effort (**Table 4.1**)is designed to be a dynamic interaction between scientific research and tribal knowledge. Combining these two factors will serve to produce an understanding of not only the former physical landscape of the OCS, but also the potential interactions of humans with and on this landscape.

Table 4-1. Proposed ASLF Mitigation

ASLF ID	Paleolandform Type	Geotechnical Testing/Results	Proposed Mitigation	Research Agenda
Target 21	Interfluve w/possible meandering and sinuous channels	No testing	2-3 geoarchaeological cores	1-6
Target 22	Possible interfluve or margin adjacent to a large paleochannel	AC-15/preservation	No additional testing recommended	N/A
Target 23	Flank of meandering paleochannel	AC-03/No preservation	2-3 geoarchaeological cores	1-6

ASLF ID	Paleolandform Type	Geotechnical Testing/Results	Proposed Mitigation	Research Agenda
Target 24	Flank of meandering paleochannel	AC-16/preservation	No additional testing recommended	N/A
Target 25	Flank and floodplain of major paleochannel	AC-13, AC-14/preservation	No additional testing recommended	N/A
Target 26	Flank and floodplain of meandering paleochannel	AC-01/No preservation	2-3 geoarchaeological cores	1-6
Target 28	Interfluve between bifurcation/convergence of major paleochannel and tributary	AC-09a, AC-10/No preservation	2-3 geoarchaeological cores	1-6
Target 29	Interfluve between meandering paleochannel and straight paleochannel	AC-05a/No preservation	2-3 geoarchaeological cores	1-6
Target 30	Flank of major paleochannel	AC-04/preservation	No additional testing recommended	N/A
Target 31	Extensive flank of major paleochannel	AC-08/No preservation	2-3 geoarchaeological cores	1-6
Target 33	Flank and floodplain of paleochannel	No testing	2-3 geoarchaeological cores	1-6
Target 34	Channel margins of minor tributary	No testing	2-3 geoarchaeological cores	1-6
Target 35	Flank of major paleochannel	No testing	2-3 geoarchaeological cores	1-6

Scope of Work

The scope of work will consist of the following:

- Collaborative review of existing geophysical and geotechnical data with Tribes;

- Selection of coring locations in consultation with Tribes;
- Collection of two to three vibracores within each affected ASLF that has not been previously sampled, with a sampling focus on areas that will be disturbed by Project construction activities;
- Written verification to BOEM that the samples collected are sufficient for the planned analyses and consistent with the agreed scope of work;
- Collaborative laboratory analyses at a laboratory located in Rhode Island or New Jersey;
- Screening of recovered sediments for debitage or micro-debitage associated with indigenous land uses;
- Third-party laboratory analyses, including micro- and macro-faunal analyses, micro- and macro-botanical analyses, radiocarbon dating of organic subsamples, and chemical analyses for potential indirect evidence of indigenous occupations;
- Temporary curation of archival core sections;
- Draft reports for review by Consulting Parties;
- Final reporting;
- Public or professional presentations summarizing the results of the investigations, developed with the consent of the consulting Tribes.

Methodology

OCW1 will conduct the Preconstruction Geoarchaeology in consultation with the Tribes, BOEM, and the NJHPO. Although BOEM and the NJHPO will be consulted, the research, analyses, and interpretations are intended to be a collaborative effort between OCW1 and the consulting Tribes, who will be invited by OCW1 to a series of working sessions to:

- Review existing data;
- Develop specific research questions addressing the Tribes' interests in the ASLFs;
- Select candidate coring locations;
- Split, document, and sample recovered vibracores in the laboratory;
- Review analytic results and preliminary interpretations; and
- Review draft reporting.

Vibracores placed within the affected sections of each ASLF will extend a maximum depth of approximately 20 ft (6 m) below the seafloor. The cores will be cut on the survey vessel into approximately 1-meter-long sections and sealed to minimize the risk of environmental contamination. The core segments will be logged on the survey vessel and a chain of custody will be maintained to ensure all samples are accounted for and that all samples are transferred to the laboratory for geoarchaeological analyses. Once the core segments are transferred to the onshore laboratory, OCW1 will invite Tribal representatives to participate in the splitting, documentation, and subsampling of each core.

Each core segment will be split longitudinally into working and archival halves. Subsamples collected from working halves for specific third-party analyses will be packaged in a manner appropriate to the specific

analysis for which they are intended. Archival halves will be sealed and stored horizontally on shelves or racks in a climate-controlled facility for at least one year following completion of laboratory analyses. OCW1 will prioritize reasonable access to archival core segments by consulting parties and researchers when selecting the storage facility. All samples collected from the working halves will be submitted to third party laboratories within approximately 6 months of core transfer to the Qualified Marine Archaeologist facilities.

OCW1 will prepare a presentation of the preliminary results and interpretations for discussion with the Tribes (see work session schedule above). OCW1 will consider the Tribes' comments and suggestions when preparing the draft reports and will seek to resolve any disagreements among the parties through supplemental consultations prior to preparing the draft reports. OCW1 will submit the draft reports to the Consulting Parties for review and comment. OCW1 will consider all comments received when developing the final reports. Final digital copies of the completed reports will be provided to all Consulting Parties. Hard copies of the final reports will be submitted to the State Historic Preservation Officers, Tribes governments or other parties upon request.

Following the one-year retention period, OCW1 will offer transfer of the archival core segments to the Consulting Tribes, SHPOs and related state agencies, and regional research institutions with an interest in and capacity to conduct further analyses. OCW1 currently anticipates research institutions with potential interests/capacities to include the Princeton University, Rutgers University, New Jersey Institute of Technology, and the University of Rhode Island. OCW1 will notify the Consulting Parties of its intent to transfer archival core segments to any party at least 45 days prior to initiating such transfer and will consider any comments provided by Consulting Parties before proceeding. If no external parties agree to accept the archival core segments, OCW1 will water-screen the retained segments to identify and collect potential physical evidence of ancient Native American activity at the ASLFs. In such circumstances, OCW1 will prepare a technical memorandum summarizing the results of the archival core segment processing and analyses and submit that memorandum to the Consulting Parties.

Standards

The Preconstruction Geoarchaeology effort will be conducted in accordance with BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (May 2020). The qualified professional archaeologists leading the research will meet the SOI professional qualification standards for archeology (62 FR 33708) and BOEM's standards for Qualified Marine Archaeologists.

Documentation

The following documentation is to be provided for review by Consulting Parties:

- Draft Tribe Audience Report;
- Draft Technical Report;
- Final Tribes Audience Report;
- Final Technical Report; and

- Draft Public or Professional Presentations.

Funds and Accounting

OCW1 will be responsible for funding and implementation of this mitigation measure.

Open-Source GIS and Story Maps

Purpose and Intended Outcome

This mitigation measure will consist of the compilation and transfer of relevant geophysical, geotechnical, and geoarchaeological datasets pertaining to the ASLFs to a non-proprietary GIS system for use by Tribes. The datasets will include sub-bottom (seismic) data used to characterize the seabed and ASLF features, the location of all geotechnical/geoarchaeological samples collected, and the vertical and horizontal extents of the affected features or sub-features within each ASLF. The GIS will be, to the extent feasible and practicable, compatible with GIS datasets compiled for other OCS projects to assist in the Tribes on-going research and stewardship efforts. Story Maps or equivalent digital media presentations will be prepared to integrate and present the complex technical data compiled during the MARA and mitigation investigations in a manner best suited for inter- and intra-tribal audiences. Story Map content would be developed in close consultation and collaboration with the consulting Tribes.

Incorporation of OCW1 datasets into a broader GIS framework will allow the Tribes to better understand and protect preserved elements of the ASLF of traditional cultural significance. The intent of this measure is to enhance the Tribes understanding of existing conditions for a range of ASLFs located in the northeastern Atlantic OCS. This knowledge would allow for more effective Government to Government consultations regarding similar features that may be affected by future federal undertakings. The value of the GIS will increase as additional datasets are acquired and incorporated. Access to the GIS will support each Tribes capacity to pursue their own research or intra-tribal educational programs related to the OCS and traditional cultural uses of the now-submerged landscapes of their ancestors.

The combined MARA and Preconstruction Geoarchaeology investigations will provide an important perspective on the preservation of submerged Traditional Cultural Properties within formerly glaciated sections of the OCS and within the footprint of former glacial lakes. Integrated GIS that can accommodate datasets collected from other OCS development projects and surveys would allow for comparisons to areas south of the maximum glacial limits on the OCS to provide a more comprehensive view of the ancient landscapes within the region. OCW1 will provide reasonable compensation to tribal representatives working with OCW1 on implementation of this measure. Story Maps created within the GIS will provide a flexible approach to incorporating media from a variety of sources, including geospatial data, interviews with traditional knowledge-holders, photographs, audio recordings, and archival cartography for a compelling interpretive experience. Story Maps can be tailored for specific tribal audiences and uses and would be developed in consultation with the consulting Tribes.

Scope of Work

The scope of work will consist of the following:

- Consultation with the Tribes to determine the appropriate open-source GIS platform;
- Review of candidate datasets and attributes for inclusion in the GIS;
- Data integration;
- Development of custom reports or queries to assist in future research or tribal maintenance of the GIS;
- Work Sessions with Tribes to develop Story Map content;
- Training session with Tribes to review GIS functionality;
- Review of Draft Story Maps with Tribes;
- Delivery of GIS to Tribes; and
- Delivery of Final Story Maps.

Methodology

OCW1 will develop the GIS in consultation with the Consulting Parties. At least one work session will be scheduled to refine specific functionality of interest to the Tribes. That session will be conducted after the preliminary data analyses for the Preconstruction Geoarchaeology effort has been completed. This will allow for a more focused walk-through of the data and options for organizing and integrating different datasets. OCW1 will request from the Tribes details on any existing open-source GIS systems currently in use by each Tribe/Tribal Nation to minimize any issues with data integration or interoperability.

Once the work session has been conducted OCW1 will proceed with development of the GIS, considering the Tribes' comments and suggestions. The draft GIS system will be shared with the Tribes in a training session that presents the functions of the GIS and familiarizes the Tribal representatives with the interfaces, data organization, and any custom features developed to enhance useability. OCW1 will consider any feedback from the Tribes on the draft GIS before proceeding with finalizing the system design and implementation. OCW1 will provide the GIS to the Tribes by physical storage media or as a secure digital file transfer, as appropriate to each Tribes IT infrastructure and preference. OCW1 does not intend to be responsible for the upkeep of the GIS database.

Story Map content will be developed with the consulting Tribes through one or more scheduled work sessions. Potential options for content intended for youth audiences, tribal governments, and/or general tribal membership will be discussed to refine the conceptual framework and develop draft Story Maps for review by the Tribes. OCW1 will consider all comments and feedback provided by the Tribes when preparing the final Story Maps. All comments and feedback will be collated and provided back to the Consulting Parties as part of the process.

Standards

The GIS developed under this measure will be free to use and free to modify by the Tribes. To the extent feasible, all data will be provided in formats that allow for interoperability with other GIS platforms that the Tribes may use. All datasets incorporated in the GIS will comply with Federal Geographic Data Committee data and metadata standards.

Documentation

OCW1 will provide draft descriptions and documentation of the GIS for review by the Consulting Parties and will provide a description of the draft Story Maps to the consulting Tribes following the initial working sessions.

The following documentation is to be provided for review by Consulting Parties:

- Draft Description of the GIS with appropriate schema, data organization, and custom reports/queries;
- Draft Story Map descriptions with details on content, formatting, and intended audiences; and
- Final Technical Description of the GIS with schema, data organization, and custom reports/queries.

Funds and Accounting

OCW1 will be responsible for funding and implementation of this mitigation measure.

Post-Construction Seafloor Impact Inspection

Purpose and Intended Outcome

OCW1 proposes a mitigation measure to assess impacts to ASLFs via seafloor inspection due to construction activities. This effort will focus on areas of cable installation as this activity is more likely to disturb and redistribute shallow portions of a previously identified ASLF. OCW1 will construct a 3D model defining the spatial relationship of project components and installation methodology (e.g., cable installation via trenching or jetting) relative to the ASLFs. The 3D model will identify portions of the ASLFs within the vertical APE that will be impacted and possess a high preservation potential for evidence of human occupation. OCW1 will coordinate with BOEM and consulting parties on the results of this effort to select locations for post-construction visual inspection.

OCW1's QMA will design and direct the visual inspection of the seafloor at the selected locations identified through the above process to assess for the presence/absence of displaced cultural materials from the ASLF. BOEM and OCW1 will work together to determine the ROV inspection methodology. Post-construction inspection will focus on the areas of disturbance within the ASLFs. Various factors, including but not limited to environmental conditions, health and safety risks, the spatial extent of impacts, and the unique characteristics of each selected ASLFs will be considered before mobilization to conduct the visual inspection.

Scope of Work

The scope of work will consist of the following:

- Development of 3D model throughout ASLFs designated for review.
- Development of the ROV investigation methodology
- Review of candidate datasets and attributes for inclusion in the GIS;
- Data Interpretative technical report draft; and
- Final technical report.

Methodology

Inspection of the impacted portions of the ASLFs will consist of the following:

- Development of 3D model throughout ASLFs designated for review.
- Consultation with BOEM to discuss the ROV investigation methodology.
- QMA directed remotely operated vehicle (ROV) inspection of the seafloor along impacted portions of the selected ASLFs:
    - Multibeam Echosounder (MBES)
    - Scanning Sonar
    - Ultra-short baseline (USBL) positioning
    - HD photo & video camera with laser scale
    - Lowlight camera
    - ROV lighting
    - Forward-looking sonar (FLS) multibeam
- Data interpretative technical draft and final reports with accompanying investigation data.

SEARCH will define the spatial relationship of project components and installation methodology relative to the ASLFs. The upper and lower ranges of each ASLF are not static and undulate unpredictably. Detailed review of the 2D seismic data will allow for selection of the best suited ASLFs for post-construction inspection. Based on the preliminary 2D seismic assessment, SEARCH will develop a 3D model of the affected ASLFs to finalize the areas for review. The 3D model will identify portions of the ASLFs within the vertical APE that will be impacted and possess a high preservation potential for evidence of human occupation. SEARCH will coordinate with BOEM and consulting parties on the results of this effort to select locations for post-construction visual inspection.

This effort will focus on areas of cable installation as this activity is more likely to disturb and redistribute shallow portions of a previously identified ASLF. Therefore, the inspection process is designed to focus on the ASLFs with the shallowest subsurface expression and highest likelihood of containing intact deposits. The final number of ASLFs will be selected for this post-construction inspection based on a detailed review of the proposed cable route and the aforementioned factors. Review will focus on the disturbed sediments

around the as-laid cable route and attempt to delineate any materials indicative of human presence (i.e., lithics, pottery sherds, etc.). It is important to note that it will not be possible to scientifically correlate any archaeological material to a particular ASLF. Any material identified during this inspection will be located on the seafloor and outside of its original archaeological context after being disturbed/removed by construction activities. There is no demonstrable way to determine if those materials were removed from an ASLF during construction activities, were removed from seafloor deposits overlaying the ASLF, or washed in by erosional and/or environmental factors. The goal of the investigation, therefore, is to determine the presence or absence of archaeological material on the OCS, as well as determine the preservation potential of material located on the OCS away from a coastal environment.

SEARCH will design and direct the visual and multibeam echosounder inspection of the seafloor at the selected locations identified through the above process to assess for the presence/absence of displaced cultural materials from the ASLF. ROV investigation will occur over three separate mobilizations and be conducted in 12-hour/day operations. The investigation will utilize a vessel based USBL for subsea positioning of the ROV. The site investigation would include conducting numerous passes at different approaches and orientations to capture video and still imagery of the selected ASLFs, which may be built into composite images and models. The QMA will direct the ROV to other points of interest and data acquisition points for further inspection/investigations and viewing. SEARCH will maintain detailed logs of ROV diving missions and archaeological information, as well as record video with voice-over narration and positioning overlay. Video will be recorded continuously recorded throughout the duration of all divers for later analysis and archiving. Detailed photographs, including the use of a laser scale, will be captured at the discretion of the QMA and ROV operator.

Reporting will include processing of bathymetry and imagery. MBES data will be processed in QPS Qimera to produce final sounding grids and bathymetric results on the project datum. Positional and attitude data will be refined using Applanix POSPac and post-processed vertical positions to reference the project's vertical datum. Spurious data points will be removed from gridding subsets, and sound velocity corrections will be applied before final points, grids and images are produced. Multibeam backscatter processing will be completed in QPS FMGT for each sonar. Photo and camera imagery will be utilized to provide information on potential further understanding of the selected ASLFs. Additionally, the imagery data may be merged in post-processing to develop composite images and extract point clouds to develop models of the sites in combination with the bathymetry. The goal of data acquisition and processing is to determine presence or absence of potential cultural material on the seafloor, but no cultural material will be collected.

Standards

To be determined in consultation with BOEM.

Documentation

OCW1 will provide appropriate Consulting Parties draft and final technical reports including the development of the 3D models and any resulting seafloor impact assessments.

Funds and Accounting

OCW1 will be responsible for funding and implementation of this mitigation measure.

Ethnographic Study

Purpose and Intended Outcome

OCW1 proposes a mitigation measure to fund an ethnographic study focusing on one New Jersey coastal watershed, the Great Egg Harbor River, and its potential submerged extension onto the Outer Continental Shelf (OCS) to be coordinated by the Delaware Tribe of Indians (DTI) with collaboration by The Delaware Nation (DN) and the Stockbridge-Munsee Community Band of Mohican Indians (SM).

The study will focus on Native American resources, sites, places, and knowledge of the established Great Egg Harbor River Watershed and OCS. This study constitutes baseline research to compile and assess multiple levels of documentary evidence about the ancestral and contemporary connections to the landscape (both onshore and offshore) and will utilize new data on the offshore paleolandscape, including identified ancient, submerged landform features. The study will result in a written report that may follow the general format of an Ethnographic Overview and Assessment document utilized by the National Park Service. The scope of the study may include, but is not limited to, an overview of documentary evidence including historic maps, photographs, oral histories, research reports, archival data, and interviews. Relevant GIS data layers from sources available to the public and from the recent Ocean Wind high resolution geophysical surveys could also be used for predictive modeling purposes to help identify areas of potential archaeological or other resource sensitivity of importance to the Tribes.

This study could complement additional similar studies funded by other offshore wind projects along the New Jersey shore. Although not included in this scope, the goal is for the results of this study to be integrated into a potential larger report focusing on the New Jersey coast and offshore landscapes with the intent of increasing community knowledge of the landscape and for potential use in guiding consultations for future federal undertakings.

Scope of Work

The scope of work will consist of the following:

- Funding ethnographic researcher selected by DTI for 2-year period;
- Funding for researcher travel to New Jersey for research and site visits;
- Funding for DTI, DN, and SM technology upgrades associated with analysis of GIS data;
- Funding for DTI Historic Preservation office oversight and indirect costs;
- Funding for DTI, DN, and SM THPO Collaboration;
- OCW1 will provide relevant ASLF GIS data layers to DTI for use in this study as well as provide a tutorial on the data (see previous Open-Source GIS and Story Maps mitigation measure);

- OCW1 will hold quarterly progress update calls lasting approximately one-half hour with DTI until the final technical reports are issued.
- Final deliverables will consist of one confidential report that may contain sensitive resource information and one report that could be made available to the public. Both reports will be distributed by the Tribes, at their discretion.
- Funding for a presentation to highlight the results of the study to be coordinated and executed by DTI.

Methodology

In addition to consulting the Tribal Nation's archives, documents, and oral history interviews with DTI elders, this study will also require archival research at applicable repositories in New Jersey by the ethnographic researcher with the intent of acquiring available land transfer documents, historic maps, and other historic documents. Site visits and additional research at the NJHPO facilities may also be completed by the ethnographic researcher as part of the study. Relevant GIS data layers will also be analyzed for insight into the location of potential archaeological or other resource sensitivity of importance to the Tribe. No archaeological fieldwork or landowner permissions will be required as part of this study. No sensitive or other confidential information including archaeological site locations will be made available in the public document.

Standards

The ethnographic researcher and key team members shall be fully qualified personnel as experts in their areas of traditional knowledge and research as determined by the DTI.

Documentation

To be determined in consultation with BOEM and DTI.

Funds and Accounting

OCW1 will be responsible for funding and implementation of this mitigation measure. Funding levels will follow dollar amounts previously agreed to by OCW1 and DTI.

5.0 IMPLEMENTATION

Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with consulting parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with consulting parties as part of BOEM's NHPA Section 106 consultation and NEPA review schedule for OCW1 Wind Farm.

It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of ROD issuance or execution of a project specific MOA unless otherwise agreed by the consulting parties and accepted by BOEM. OCW1 assumes that the proposed scope of work will be completed within 5 years of ROD issuance or execution of the MOA, unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

Organizational Responsibilities

Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106 of the NHPA;
- BOEM, in consultation with the Consulting Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- Work with OCW1, the NJHPO, Consulting Parties including federally and state recognized Tribes with cultural and/or historic ties to the Project development area, and the ACHP using the previously agreed upon HPTP framework;
- Review and provide feedback on draft HPTP;
- BOEM must accept the final HPTP before OCW1 may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with consulting parties;
- BOEM is responsible for consultation related to dispute resolution; and
- If parties cannot reach concurrence, consult with ACHP and non-concurring party(s) to make final decision.

Ocean Wind LLC

Ocean Wind LLC will be responsible for:

- Funding the mitigation measures as required in the ROD and/or MOA and the final HPTP;
- Working with BOEM, the SHPO, federally and state recognized Tribes with cultural and/or historic ties to the Project development area, and the ACHP using the previously agreed upon HPTP framework;
- Considering the comments provided by the Consulting Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Consulting Parties for review and comment;
- Annual Reporting to BOEM; and

- OCW1 will be responsible for ensuring that all work that requires consultation with Tribes is performed by professionals who have demonstrated professional experience consulting with federally and state recognized Tribes.

New Jersey SHPO

The New Jersey SHPO will:

- Work with BOEM, Ocean Wind LLC, federally and state recognized Tribes with cultural and/or historic ties to the Project development area, and the ACHP using the previously agreed upon HPTP framework; and
- Review and provide feedback on draft HPTPs.

Federally and State recognized Tribes with cultural and/or historic ties to the Project development area

Federally recognized Tribes with cultural and/or historic ties to the Project development area will:

- Work with BOEM, Ocean Wind LLC, the SHPO, and the ACHP using the previously agreed upon HPTP framework;
- Review and provide feedback on draft HPTPs;
- Participate in all activities outlined in Section 4.0 and complete all associated reviews, comments, requests for feedback/input in agreed upon timeframes.

Advisory Council on Historic Preservation

The Advisory Council on Historic Preservation will:

- Work with BOEM, Ocean Wind, the SHPO, and federally and state recognized Tribes with cultural and/or historic ties to the Project development area using the previously agreed upon HPTP framework; and
- If parties cannot reach concurrence, consult with BOEM and non-concurring parties to make final decision.

Other Parties as Appropriate

OCW1 does not anticipate participation by any other NHPA Section 106 consulting parties. If BOEM determines additional consulting parties will participate in this plan, the plan will be updated to include those parties.

Participating Party Consultation

Consulting Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NHPA Section 106 review schedule for OCW1. OCW1 will provide this draft HPTP to BOEM for inclusion in the DEIS for review by consulting parties as part of BOEM's NHPA Section 106 review to provide meaningful input on the proposed mitigation measures to resolve adverse effects to historic

properties. OCW1 anticipates that further coordination to refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

6.0 REFERENCES

Federal Regulations

Code of Federal Regulations (CFR). 2022. 40 CFR 1500 – National Environmental Policy Act Implementing Regulations. Available at https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A.

CFR. 2021a. 36 CFR 800 – Protection of Historic Properties [incorporating amendments effective December 15, 2021]. Available at https://www.ecfr.gov/current/title-36/chapter-VIII/part-800.

CFR. 2021b. 36 CFR 61.4(e)(1) – Procedures for State, Tribal, and Local Government Historic Preservation Programs [incorporating amendments effective December 15, 2021]. Available at https://www.ecfr.gov/current/title-36/chapter-I/part-61#p-61.4(e)(1).

CFR. 2021c. 36 CFR 65.2(c)(2) – National Historic Landmarks Program – Effects of Designation [incorporating amendments effective December 15, 2021]. Available at https://www.ecfr.gov/current/title-36/chapter-I/part-65#p-65.2(c)(2). Accessed December 21, 2021.

Federal Register. 1997. 62 FR 33708 – The Secretary of the Interior's Historic Preservation Professional Qualifications Standards. Office of the Federal Register, National Archives and Records Administration. Washington, D.C. Available at https://www.govinfo.gov/app/details/FR-1997-06-20/97-16168.

United States Code. 2016. Title 54 - National Historic Preservation Act [as amended through December 16, 2016]. Available at https://www.achp.gov/sites/default/files/2018-06/nhpa.pdf.

State Regulations

New Jersey Register of Historic Places Act of 1970 (N.J.S.A. 13:1B-15.128 et seq.): https://www.state.nj.us/dep/hpo/2protection/njsa13.htm

Public documents related to Ocean Wind1

https://www.boem.gov/ocean-wind

Ocean Wind1 COP: https://www.boem.gov/ocean-wind-construction-and-operations-plan

Ocean Wind 1 DEIS: TBD

Ocean Wind 1 FEIS: TBD

Ocean Wind 1 ROD: TBD

General Information on Section 106

https://www.achp.gov/protecting-historic-properties/section-106-process/introduction-section-106

https://www.achp.gov/digital-library-section-106-landing/section-106-consultation-involving-national-historic-landmarks

Kraft, Herbert, C. and Alan R. Mournier. 1982 The Archaic Period in New Jersey (ca. 8000 BC–1000 BC). In New Jersey's Archaeological Resources, A Review of Research Problems and Survey Priorities: The Paleo-Indian Period to Present. Electronic resource, http://www.nj.gov/dep/hpo, accessed December 2018.

Lothrop Jonathan, Darrin Lowery, Arthur Spiess, and Christopher Ellis 2016. Early Human settlement of Northeastern North America. PaleoAmerica 2: 192-251

National Park Service (NPS). 1997. How to Apply the National Register Criteria for Evaluation. Rev. ed. National Register Bulletin 15. Available at: https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf. Accessed April 21, 2022.

ATTACHMENT 4 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE OCEAN WIND 1 OFFSHORE WIND FARM PROJECT, HISTORIC PROPERTIES SUBJECT TO ADVERSE VISUAL EFFECT, CAPE MAY AND ATLANTIC COUNTIES, NEW JERSEY

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Draft
Historic Properties Treatment Plan
for the
Ocean Wind 1 Offshore Wind Farm Project

Historic Properties Subject to Adverse Visual Effect
Cape May, Atlantic, and Ocean Counties, New Jersey

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Ocean Wind 1
https://oceanwind.com/

Prepared by:

HDR Engineering, Inc.
www.hdrinc.com

April 2023

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ABSTRACT

Federal Undertaking:	Ocean Wind 1 Offshore Wind Farm Project, OCS-A 0498
Location:	Outer Continental Shelf, New Jersey
Federal and State Agencies:	Bureau of Ocean Energy Management Bureau of Safety and Environmental Enforcement Environmental Protection Agency National Marine Fisheries Service U.S. Army Corps of Engineers New Jersey Department of Environmental Protection/State Historic Preservation Office Advisory Council on Historic Preservation
ACHP Project No.:	016649
HPO Project No.:	18-1184-30
Potential Adverse Visual Effect Finding for:	Properties in Cape May, Atlantic, and Ocean Counties
Date:	April 2023

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
APE	Area of Potential Effects
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
EPA	Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FR	Federal Regulation
HDR	HDR, Inc.
HPTP	Historic Preservation Treatment Plan
HRVEA	Historic Resources Visual Effects Analysis
N/A	Not Applicable
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NJ DEP	New Jersey Department of Environmental Protection
NJHPO	New Jersey State Historic Preservation Office(r)
NMFS	National Marine Fisheries Service
NPS	National Park Service
NRHP	National Register of Historic Places
OCS	Outer Continental Shelf
OW1	Ocean Wind 1 Offshore Wind Farm Project
RFP	Request for Proposal
ROD	Record of Decision
SOI	Secretary of the Interior
TCP	Traditional Cultural Property
USCG	United States Coast Guard
WFA	Wind Farm Area
WTG	Wind Turbine Generator

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INTRODUCTION

This Historic Properties Treatment Plan (HPTP) was prepared to support fulfillment of Stipulation III.B of the *Memorandum of Agreement (MOA) Among the Bureau of Ocean and Energy Management, The New Jersey State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Ocean Wind 1 Offshore Wind Farm Project*. This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation actions to resolve adverse visual effects to 10 historic properties identified by the Bureau of Ocean Energy Management (BOEM) through Section 106 consultation for the Ocean Wind 1 Offshore Wind Farm (OW1), as identified in the *Ocean Wind Visual Effects on Historic Properties* (VEHP), also commonly referred to as the HRVEA (Historic Resources Visual Effects Analysis), dated October 2022 (HDR and SEARCH 2022), as well as seven additional historic properties BOEM has determined will be visually adversely affected as a result of consultation. The mitigation measures and the process for implementation described herein were developed in consultation with the federally recognized Tribes, New Jersey Historic Preservation Officer (NJHPO), the Advisory Council on Historic Preservation (ACHP), and other consulting parties. This HPTP outlines mitigation measures, implementation steps, and timeline for actions.

Introduction: Outlines the content of this HPTP.

Background Information: Briefly summarizes the OW1 (the Undertaking) while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the seventeen historic properties discussed in this HPTP that will be visually adversely affected by the Undertaking, and summarizes the pertinent conditions that guided the development of this document.

Existing Conditions and Historic Significance: Provides a physical description of each historic property included in this HPTP. Set within its historic context, each resource is discussed in terms of the applicable National Register of Historic Places (NRHP) criteria, with a focus on the contribution of a seaside setting to its significance and integrity.

Mitigation Measures: Presents specific steps to carry out the mitigation measures proposed by OW1 in the Construction and Operations Plan (COP). Each mitigation measure includes a detailed description, intended outcome, and specifications that include maximum cost, methods, standards, requirements for documentation, and reporting instructions. Property-specific challenges, if any have been identified, are outlined as well.

Implementation: Establishes the process for executing mitigation measures at the historic properties, as identified in Section 4.0 of this HPTP. For each action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

References: A list of works cited in this HPTP.

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BACKGROUND INFORMATION

BOEM has determined that the construction, operation, maintenance, and decommissioning of the Ocean Wind 1 Offshore Wind Farm constitutes an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA; 54 U.S.C. § 306108) and its implementing regulations (36 CFR § 800), and that the activities proposed under the COP have the potential to affect historic properties. The Ocean Wind 1 Offshore Wind Farm undertaking (the Undertaking) includes a wind-powered electric generating facility composed of up to 98 wind turbine generators (WTGs) and associated foundations, up to three offshore substations, and inter-array cables connecting the WTGs and the offshore substations (Figure 1).

The WTGs, foundations, offshore substations, and inter-array cables will all be in federal waters on the Outer Continental Shelf (OCS), approximately 15 statute miles (mi) (13 nautical miles [nm]) southeast of Atlantic City, New Jersey. Cables will be buried below the seabed. Export cables from the offshore substations will extend along the seabed and connect to buried onshore export cables, which will connect to two interconnection points, at Oyster Creek and Bl England. Onshore cables will be buried within up to a 15-m-wide (50-ft-wide) construction corridor with a permanent easement up to 9.8-m-wide (30-ft-wide) for BL England. Two new onshore substations are proposed at Oyster Creek and BL England along with grid connections to the existing grid for each substation. Onshore substation locations would be sited on existing parcels containing decommissioned power facilities at BL England and Oyster Creek. The Oyster Creek and BL England onshore substation locations would require a permanent site up to 31.5 acres (ac) (12.7 hectares [ha]) and 13 ac (5.3 ha) respectively, for the substation equipment and buildings, energy storage, and stormwater management and associated landscaping. Underground or overhead transmission lines would connect the substations to the planned interconnection point (grid connections).

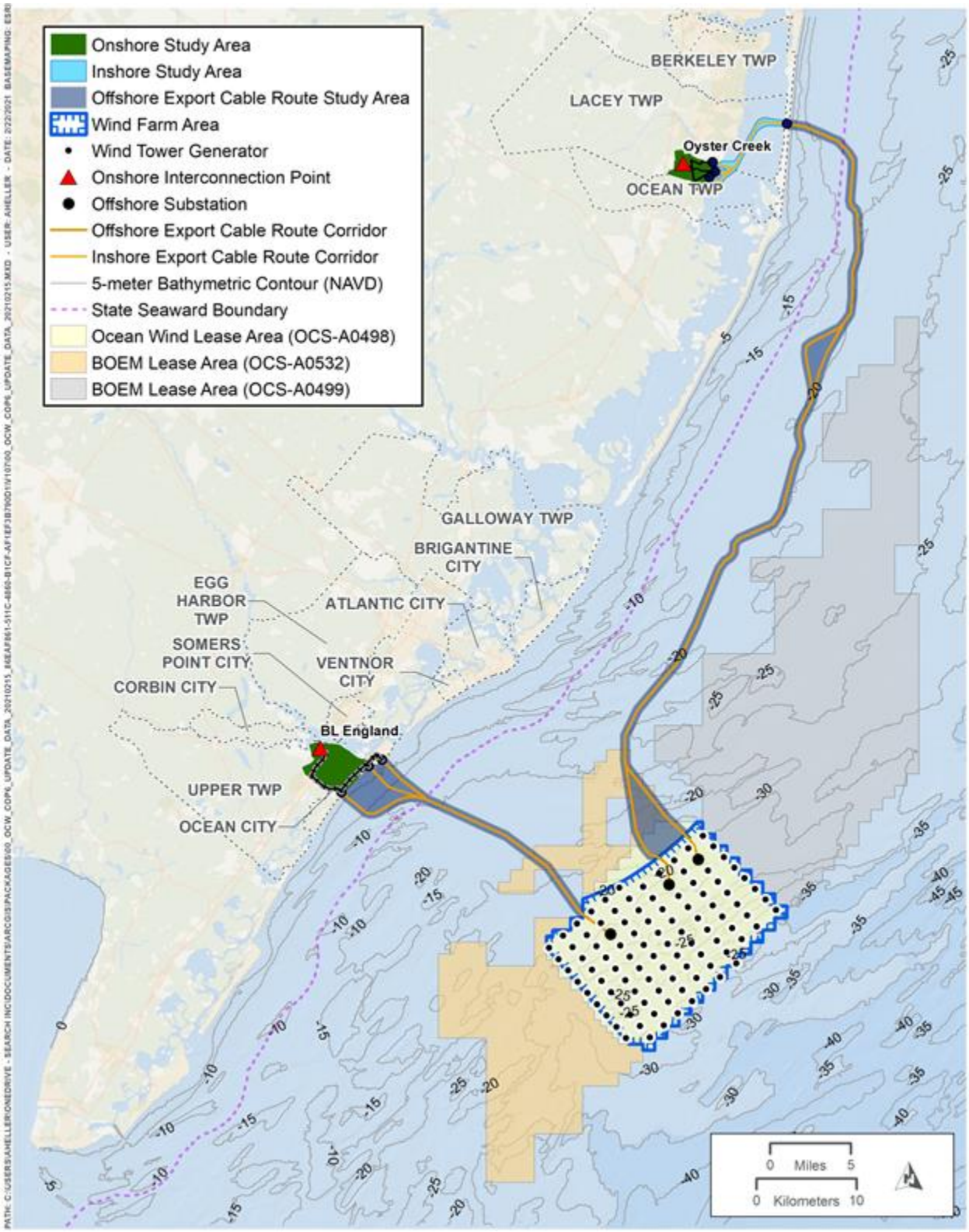
The maximum height of the offshore substations is 296 feet (ft) above mean lower low water (mllw) with a maximum length and width of 295 ft. The visible offshore components of the operational Undertaking will be located in Lease Area OCS-A 0532 (OCS-A 0498 prior to March 26, 2021) in water depths ranging from approximately 49 to 118 ft below mllw. See Figure 1, Project Location.

BOEM, as the lead federal agency for the NHPA Section 106 review, has defined the APE for the Undertaking as follows:

- The depth and breadth of the seabed potentially impacted by any bottom-disturbing activities;
- The depth and breadth of terrestrial areas potentially impacted by any ground disturbing activities;
- The viewshed from which renewable energy structures, whether located offshore or onshore, would be visible; and
- Any temporary or permanent construction or staging areas, both onshore and offshore.

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Figure 1: Project Location



To support BOEM's efforts to identify historic properties within the APEs, OW1 conducted a terrestrial archaeological resource assessment (TARA), marine archaeological resource assessment (MARA), and historic resources visual effects assessment (HRVEA) within the APEs. The results of these investigations can be found in Volume II, Section 2.4 of the Ocean Wind 1 COP. Based on a review of these documents and consultations with federally recognized Tribes and NHPA Section 106 consulting parties, BOEM has determined that the undertaking will result in adverse effects to historic properties. Information about BOEM's assessment of adverse effects can be found in BOEM's Finding of Adverse Effect (FoAE) for the Undertaking.

In the FoAE, BOEM determined that the OW1 undertaking will have an adverse visual effect on 17 historic properties. BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), New Jersey Historic Preservation Office (NJHPO), federally recognized Native American Tribes, and other NHPA Section 106 consulting parties to seek ways to avoid, minimize, or mitigate adverse effects to historic properties. BOEM has decided to codify the resolution of adverse effects through an NHPA Section 106 MOA pursuant to 36 CFR § 800.8(c)(4)(i)(B). As defined in 36 CFR § 800.6 (c), a project-specific MOA records the terms and conditions agreed upon to resolve adverse effects of the undertaking. This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation measures. The resolution measures to resolve adverse effects to historic properties are recorded in the *Memorandum of Agreement Among the Bureau of Ocean and Energy Management, The New Jersey State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Ocean Wind 1 Offshore Wind Farm Project.*

Pursuant to the terms and conditions of the MOA, OW1 will implement applicant-proposed environmental protection measures to avoid potential visual impacts to historic properties (see MOA Stipulations I.B and II.A). This HPTP was developed by the applicant to fulfill Stipulation III.B of the MOA to resolve adverse visual effects to 17 historic properties. Mitigation measures implemented under this HPTP will be conducted in accordance with all agreed upon terms and conditions in the MOA and with applicable local, state, and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local cities, towns, and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. See Table 1 for local government administrative departments that will be contacted as part of the mitigation measures for the adversely affected historic properties. Additional information regarding compliance with local requirements appears below in Section 5.0, Implementation.

Table 1. Municipal Departments Requiring On-Site Mitigation Coordination

Historic Property	Municipality	Departments
Ocean City Boardwalk	Ocean City	Construction Code Division, Planning Board, Historic Preservation Commission
Ocean City Music Pier	Ocean City	Construction Code Division, Planning Board, Historic Preservation Commission
Flanders Hotel	Ocean City	Construction Code Division, Planning Board, Historic Preservation Commission
U.S. Lifesaving Station #35	Stone Harbor	Planning Board, Zoning Board
North Wildwood Lifesaving Station	North Wildwood	Construction Office, Planning Board, Historic Preservation Commission
Hereford Inlet Lighthouse	North Wildwood	Construction Office, Planning Board, Historic Preservation Commission
Brigantine Hotel	Brigantine	Planning Board
Absecon Lighthouse	Atlantic City	Construction Division, Planning and Development, Historic Preservation Commission
Atlantic City Boardwalk	Atlantic City	Construction Division, Planning and Development, Historic Preservation Commission
Atlantic City Convention Hall	Atlantic City	Construction Division, Planning and Development, Historic Preservation Commission
Ritz-Carlton Hotel	Atlantic City	Construction Division, Planning and Development, Historic Preservation Commission
Riviera Apartments	Atlantic City	Construction Division, Planning and Development, Historic Preservation Commission
Vassar Square Condominiums	Ventnor City	Division of Construction Code Enforcement, Planning Board
114 S Harvard Avenue	Ventnor City	Division of Construction Code Enforcement, Planning Board
Lucy the Margate Elephant	Margate City	Planning Board and Zoning, Historical Society
Great Egg Coast Guard Station	Longport	Zoning/Planning Board
Little Egg Harbor U.S. Lifesaving Station #23 (U.S. Coast Guard Station #119)	Little Egg Harbor	Construction Department, Zoning and Code Enforcement

Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. Any mitigation work associated with a historic property will comply with the conditions of all extant historic

preservation legislation (see Table 2. Additional information regarding compliance with extant preservation legislation appears below in Section 5.0, Implementation.

Table 2. Applicable State/Local Legislation for Historic Properties

Legislation	Legislation	Agency
New Jersey Register of Historic Places Act	Chapter 268, Laws of 1970	Department of Environmental Protection
New Jersey Conservation Restriction and Historic Preservation Restriction Act	Chapter 378, Laws of 1979	Department of Environmental Protection
New Jersey Economic Recovery Act of 2020, Historic Property Reinvestment Program	Chapter 156, Laws of 2020, amended 2021	New Jersey Economic Development Authority
Municipal Land Use Law	Chapter 291, Laws of 1975	Municipal Historic Preservation Commissions/Planning Boards

Participating NHPA Section 106 Participating Parties

For the purposes of this HPTP, Participating Parties are defined as a subset of the NHPA Section 106 consulting parties that have a functional role in the process of fulfilling Stipulation III.B of the MOA and the mitigation measure implementation processes described herein. The roles of Participating Parties are identified for each mitigation measure in Section 4.0 of this document, including meeting participation and document reviews. Participating Parties with a demonstrated interested in the adversely affected historic properties are summarized in Table 3.

No other NHPA Section 106 consulting parties are anticipated to be Participating Parties for this Visual Effect HPTP. If BOEM determines additional consulting parties will participate in this plan, the plan will be updated to include those parties. The list of invited and participating of consulting parties is available as Attachment 3 of the MOA.

Table 3. Participating Parties involved with the Historic Property/s[1]

Name	Relationship to Historic Property	Address
Absecon Lighthouse	Interested Party	31 S Rhode Island Ave, Atlantic City, New Jersey 08401
Advisory Council on Historic Preservation	Federal Agency	Federal Property Management Section, 401 F St NW, Suite 308, Washington DC 20001
Atlantic City	Local Govt/Property Owner	1301 Bacharach Boulevard, Atlantic City, New Jersey 08401
Cape May County (Cultural Heritage Partners)	Interested Party	2101 L Street NW, Suite 800, Washington DC 20037
Delaware Nation	Tribal Govt	PO Box 825, Anadarko OK 73005
Delaware Tribe of Indians	Tribal Govt	5100 Tuxedo Blvd, Bartlesville OK 74006
Donald and June Feith	Property Owner	204 Marvin Road, Elkins Park, Pennsylvania 19027

Name	Relationship to Historic Property	Address
Environmental Protection Agency	Federal Agency	Region 2, 290 Broadway, 25th Fl, New York NY 10007
Flanders Condominium Association	Property Owner	Flanders Condominium Association, 719 East 11th Street, Ocean City, New Jersey 08226
Legacy Vacation Resorts	Property Owner	PO Box 690999, Orlando, Florida 32869
Margate City	Local Govt/Property Owner	Rutala Associates, LLC, 717 River Drive, Linwood, New Jersey, 08221-1226
Max Gurwicz Enterprises	Property Owner	331 Tilton Road, Northfield, New Jersey, 08225
Stockbridge-Munsee Community Band of Mohican Indians	Tribal Govt	N8705 MohHeConNuck Rd, Bowler WI 54416
MThirtySix PLLC	Tribal Advocacy	700 Pennsylvania Ave SE, 2nd Fl – The Yard, Washington DC 20003
National Park Service	Federal Agency	Region 1, 1234 Market Street, 20th Fl, Philadelphia PA 19107
New Jersey Casino Redevelopment Authority	State Agency/Property Owner	15 S. Pennsylvania Avenue, Atlantic City, New Jersey 08401
New Jersey Department of Environmental Protection – Historic Preservation Office	State Agency	Mail Code 501-048, NJDEP Historic Preservation Office, PO Box 420, Trenton, New Jersey 08625-0420
New Jersey Department of Environmental Protection – Office of Historic Sites & Parks	State Agency/Property Owner	NJDEP Office of Historic Sites & Parks, PO Box 420, Trenton, New Jersey 08625-0420
New Jersey Department of Law & Public Safety, Marine Service Bureau	State Agency/Property Owner	New Jersey Marine Service Bureau, 25 Market Street, Trenton, New Jersey, 08611
North Wildwood City	Interested Party	Blaney Donohue & Weinberg, P.C., 2123 Dune Drive, Suite 11, Avalon, New Jersey 08202
Ocean City	Local Govt/Property Owner	861 Asbury Ave, Ocean City, New Jersey 08226
Ritz Condominium Association	Property Owner	Ritz Condominium Association, 2715 Boardwalk, Atlantic City, New Jersey 08401
Rutgers University, Department of Marine and Coastal Sciences, School of Environmental and Biological Sciences	Property Owner	88 Lipman Drive, New Brunswick, New Jersey 08901
Save Lucy Committee, Inc.	Interested Party	Rutala Associates, LLC, 717 River Drive, Linwood, New Jersey, 08221-1226
Stone Harbor Museum	Property Owner	9410 2nd Avenue, Stone Harbor, New Jersey, 08247
US Coast Guard	Federal Agency/Property Owner	Sector Delaware Bay, 1 Washington Ave, Philadelphia PA 19147
US Coast Guard	Federal Agency/Property Owner	National Offshore Safety Advisory Committee, 2703 Martin Luther King Jr. Ave SE, Stop 7509, Washington DC 20593-7509
Vassar Square Condominiums	Property Owner	Vassar Square Condominiums, 4800 Boardwalk, Ventnor City, New Jersey 08406
Wampanoag Tribe of Gay Head (Aquinnah)	Tribal Govt	20 Black Brook Rd, Aquinnah MA 02535

[1] Ongoing consultation may result in refinement of this list of Participating Parties.

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EXISTING CONDITIONS AND HISTORIC SIGNIFICANCE

Historic Properties

This HPTP involves 17 resources, as identified below in Table 4. All 17 historic properties are located along the New Jersey shoreline within 15–24 miles of the Wind Farm Area (WFA), and ocean views are a character-defining feature of each property's significance.

Table 4. Historic Properties included in the Visual Effect HPTP

Name	Property Address	BOEM Effect Finding
Cape May County		
Ocean City Boardwalk	East 6th Street to East 14th Street, Ocean City	Adverse effect
Ocean City Music Pier	811 Boardwalk, Ocean City	Adverse effect
Flanders Hotel	719 East 11th Street, Ocean City	Adverse effect
U.S. Lifesaving Station #35	11617 2nd Avenue, Stone Harbor	Adverse effect
North Wildwood Lifesaving Station	113 North Central Avenue, North Wildwood	Adverse effect
Hereford Inlet Lighthouse	111 North Central Avenue, North Wildwood	Adverse effect
Atlantic County		
Brigantine Hotel	1400 Ocean Avenue, Brigantine City	Adverse effect
Absecon Lighthouse	Pacific and Rhode Island Avenues, Atlantic City	Adverse effect
Atlantic City Boardwalk	South New Jersey Avenue to South Georgia Avenue	Adverse effect
Atlantic City Convention Hall	Boardwalk at Pacific Avenue	Adverse effect
Ritz-Carlton Hotel	2715 Boardwalk, Atlantic City	Adverse effect
Riviera Apartments	116 South Raleigh Avenue, Atlantic City	Adverse effect
Vassar Square Condominiums	4800 Boardwalk, Ventnor City	Adverse effect
114 South Harvard Avenue	114 South Harvard Avenue, Ventnor City	Adverse effect
Lucy the Margate Elephant	Decatur and Margate Avenues, Margate City	Adverse effect
Great Egg Coast Guard Station	2301 Atlantic Avenue, Longport	Adverse effect
Ocean County		
Little Egg Harbor U.S. Lifesaving Station #23 (U.S. Coast Guard Station #119)	800 Great Bay Boulevard, Little Egg Harbor	Adverse effect

Adversely Affected Historic Properties

In Section 3.2, the resources are described generally both physically and historically, with a focus on the contribution of an ocean view to the properties' significance and integrity.

Physical Description and Existing Conditions

Ocean City Boardwalk

Origins of the Ocean City Boardwalk date to 1880, when the first seasonal structure was constructed from 2nd Street to 4th Street and West Avenue. The Boardwalk was expanded in 1885 to extend the length of the beach, accommodating a new amusement pavilion at 11th Street (The Shore Blog 2021). In keeping with Ocean City's history as a Methodist camp, the Boardwalk offered not only live music, restaurants, and shopping, but free educational seminars and church services (*Daily Intelligencer Journal* 1950:10). The Boardwalk burned in 1927 and was reconstructed the following year. The 1928 Boardwalk was built on a concrete foundation in response to the fire, but portions reconstructed in the 2000s removed the concrete and replaced it with more cost-effective wood (*The Morning Call* 2017). Two important outcomes of the Boardwalk fire were the relocation of a large section of the Boardwalk one block closer to the beachfront and the establishment of a city ordinance that banned building on the ocean side of the Boardwalk (Kelly 2018). The Boardwalk was again reconstructed after the Ash Wednesday Storm of 1962. The Ocean City Boardwalk currently extends approximately 2.5 mi. Like the boardwalks in neighboring Atlantic City and Wildwood, the Ocean City Boardwalk is home to hotels, motels, amusement parks and other entertainments, restaurants, and shopping, housed in buildings constructed throughout the twentieth century. The local ordinance prohibiting construction on the east side of the Ocean City Boardwalk has preserved open and unobstructed views of the ocean along its length. Only the Ocean City Music Pier stands on the ocean side of the Boardwalk, as it was built in 1928, immediately after the fire. The Ocean City Boardwalk was treated as eligible for the NRHP as a result of the survey undertaken for OW1, with a boundary extending from East 6th Street to East 14th Street, reflecting the concentration of commercial development along its length. The property's significance is associated with the commercial and recreation-related growth of Ocean City (Criterion A). The WFA is approximately 15 mi southeast of this historic property.

The Ocean City Boardwalk is integral to the history of commercial development and recreation on the Jersey Shore. While the physical infrastructure of the Boardwalk has changed through the years, due to expansion, general improvements, and storm-related replacement and repairs, its role as a conduit along the shoreline has remained constant. The Ocean City Boardwalk is home to resources from the early twentieth century through the twenty-first century, offering visitors accommodations, entertainment, and food. Upgrades and improvements made to the buildings that line the Boardwalk have impacted the overall setting and feeling of the Boardwalk, as have modern infill buildings and structures. The Boardwalk has offered commercial and recreational opportunities along the seashore since its inception, and it has been subject to ongoing investment and economic development along its route, which in fact attests to its ongoing vitality and viability. However, visitors walking along the Boardwalk in 2022 are offered similar unobstructed sea views as those who walked the Boardwalk 50 years ago and 100 years ago, due the ordinance restricting development on the ocean side of the Boardwalk. The WFA would be visible along the horizon approximately 15 mi from the Boardwalk. Views of the WFA from the entire length of Boardwalk will alter its setting, which has been preserved through the local ordinance passed in the 1920s. As a result, the project will have an adverse effect on the Ocean City Boardwalk.

Ocean City Music Pier

The Ocean City Music Pier was constructed as a concert hall in 1928, after a fire destroyed much of the Ocean City boardwalk. The Ocean City Music Pier was determined eligible for the NRHP in 1990. NJHPO online records do not include information on the building's NRHP significance; however, it appears to be

significant under Criterion A for Entertainment and Recreation due to its long history as an entertainment venue on the Ocean City Boardwalk, and under Criterion C for Architecture. The Ocean City Music Pier continues to function as a music venue. The building includes an enclosed concert hall and attached open-air loggia. The enclosed portion of the building features large arched windows, while the loggia has open arches. There are sea views from both inside the concert hall and inside the loggia, although the views have changed somewhat over the years. Originally, the pier was built over the water and views were exclusively of the ocean. In 1993, a major beach restoration project imported 6.4 million cubic ft of sand to widen Peck Beach in Ocean City (USACE 2011). Since 1993, the pier has been over sand rather than water and the views to the north and south primarily include the beach, with water views visible at an angle. The building's primary entrance faces west and is accessed via the Ocean City Boardwalk, and the rear of the building sits on piers driven into the sand. The WFA is due east of the Ocean City Music Pier, approximately 15.2 mi away.

The Ocean City Music Pier is the only building in Ocean City located on the east side of the Boardwalk. The building has a direct relationship with the ocean due to its location. Location and setting are both character-defining features that are echoed in the building's design and construction, and directly relate to its significance under Criterion A for Entertainment and Recreation, and Criterion C for Architecture. As a result of its location and lack of development on its north, east and west sides, the views of the beach and ocean are unobstructed for people enjoying programs inside of the facility and people observing the building from the Boardwalk. The building's significance under Criterion A for Entertainment and Recreation is historically tied to its prominent location on the Boardwalk. The building is at the center of activity in Ocean City and although there are other entertainment venues in Ocean City, the music pier is arguably the most popular due to its location and setting (Pritchard 2012). The property's significance under Criterion C is for its Mediterranean Revival style. The open loggia and expansive arched windows with sea views are key features of that significance. Given the proximity of the WFA to this property and that open shoreline and sea views are character-defining features, the proposed project's introduction of a modern visual element to the music pier's setting may diminish its integrity of setting, feeling, and association as it relates to its significance. Therefore, the project will have an adverse effect on the Ocean City Music Pier.

Flanders Hotel, Ocean City

The Flanders Hotel is an NRHP-listed property located one-half block from the boardwalk in Ocean City. The building is listed under Criterion A for Entertainment and Recreation, and Community Planning and Development, and under Criterion C for Architecture. The property currently includes a 1923 nine-story U-Shaped Spanish-Colonial style hotel, a two-story commercial and solarium annex, a pool, and a parking lot (Bethke 2009). The hotel is the tallest building in the area. Its upper floors (approximately floors 5–9) have unobstructed views of the ocean, while its lower levels (approximately floors 1–4) have views blocked or obscured by Playland's Castaway Cove and other nearby development.

The two-story solarium annex is located on the building's east side, and from 1927 to 1978, the solarium overlooked three saltwater pools located between the hotel and the Ocean City Boardwalk. When it was built, the two-story solarium annex featured large windows and an open central section, all with direct views to the water. The pools were removed in 1978 and the land was later redeveloped (Bethke 2009). The

building originally featured an 8th-story terrace overlooking the ocean. The terrace was a significant part of the original design meant to capture expansive sea views. According to the hotel's 2009 NRHP nomination, the terrace was enclosed in 1960. The building also originally featured a tower on the building's south wing with open sides that had unobstructed sea views. A 1990s remodeling project included the addition of two stories to the south wing. According to the NRHP nomination, much of the building's significance is associated with it being the first high-end hotel in Ocean City. The project is due east of the hotel, approximately 15.2 mi distant. BOEM has determined that the project will have an adverse effect on the Flanders Hotel.

U.S. Lifesaving Station #35, Stone Harbor

The U.S. Lifesaving Station #35 (now the Steven C. Ludlum American Legion Post 331) is a former US Life-Saving Service and US Coast Guard Station constructed in 1895. The building is located at 11617 2nd Avenue at the northwest corner of 2nd Avenue and 117th Street in Stone Harbor. The American Legion currently owns and operates the building after purchasing it in 1948 when its function as a lifesaving station became obsolete. The building is listed in the NRHP under Criterion A for Transportation and Maritime History and under Criterion C for Architecture. The station is a representative example of the 1893 Duluth Design by George R. Tolman (Koski-Karell et al. 2013). The main structure features three parts and includes the primary lifesaving station building along the south, a four-story tower in the center, and a boat room along the north façade. The NRHP nomination for U.S. Lifesaving Station #35 states that the structure was originally located on ocean front property but is now positioned two blocks to the west due to dense residential infill and sand deposits to the east along the shoreline. The building is approximately 21.9 mi from the project. BOEM has determined that the project will have an adverse effect on U.S. Lifesaving Station #35.

North Wildwood Lifesaving Station, North Wildwood

The North Wildwood Lifesaving Station is a former U.S. Coast Guard Station constructed in 1938. The building is located at 113 North Central Avenue and sits on the northeast corner of the intersection of North Central Avenue and East First Avenue, directly to the northeast of the Hereford Inlet Lighthouse. The building was determined eligible by the New Jersey HPO in 2001. It was constructed later than the Hereford Lighthouse, thus, the North Wildwood Lifesaving Station is not mentioned as a contributing resource to the Hereford Lighthouse in its the lighthouse's NRHP nomination. NJHPO's online records do not include information on the building's significance; however, it is likely significant under Criterion A for Maritime History and under Criterion C as an example of the 1934 Roosevelt Design for Coast Guard stations during that era (Koski-Karell et al. 2013). The station is positioned near the Hereford inlet between North Wildwood and Stone Harbor. The inlet was heavily trafficked by ships and an important entry location for the Intracoastal Waterway pivotal to local commerce. The building was constructed in 1938 as a U.S. Coast Guard station, then later converted to the NJ Marine Police Headquarters.

The station replaced an 1888 lifesaving station at this same site (Koski-Karell et al. 2013). The 1934 Roosevelt Design was transitional, incorporating design cues from previous lifesaving station designs with evolving missions and administrative duties after consolidation of predecessor services under the U.S. Coast Guard. Key to the station's significance is its intact representation of the 1934 standardized Roosevelt Design. The

station is approximately 23.4 mi from the project. BOEM has determined that the project will have an adverse effect on the North Wildwood Lifesaving Station.

Hereford Inlet Lighthouse, North Wildwood

The Hereford Inlet Lighthouse, constructed in 1874 and listed in the NRHP in 1977, is located at 113 North Central Avenue on the north end of North Wildwood. The lighthouse sits on the northeast corner of the intersection of North Central Avenue and East First Avenue. The lighthouse originally marked the Hereford Inlet between North Wildwood and Stone Harbor, an important waterway for local commerce. The lighthouse consists of one- and two-story sections surrounding a central four-story tower. The lighthouse's original setting was approximately 150 ft west of its present-day location. It was relocated in the early twentieth century due to erosion, weathering, and damage to the foundation (Elias 2018). Its NRHP nomination indicates that the lighthouse is no longer adjacent to the shoreline due to infill, which includes the construction of a contemporary police station to its north. The U.S. Coast Guard automated the lighthouse in 1964 and eventually converted it into a museum. The lighthouse is significant under Criterion A for Commerce and Criterion C for Architecture. The project is approximately 23.4 mi from the Hereford Inlet Lighthouse. BOEM has determined that the project will have an adverse effect on the Hereford Inlet Lighthouse.

Brigantine Hotel, Brigantine City

The Brigantine Hotel, at 1400 Ocean Avenue, is an 11-story rectangular plan, Art Deco-inspired hotel built in 1926–1927. The Brigantine Hotel was surveyed for OW1 in January 2021 and was recommended eligible for NRHP listing under Criterion A for Ethnic Heritage: Black, due to its associations with prominent African American figures and its role in integrating the Jersey Shore. The hotel is on Brigantine Beach at a distance of approximately 16 mi from the project.

The Brigantine Hotel is sited directly on the beach and has unobstructed sea views from most of the building. The hotel is recommended significant under Criterion A for Ethnic Heritage due to its association with black history on the Jersey Shore. As a hotel, the building represents a recreational property type associated with tourist activity in New Jersey, which heightens the importance of its setting, in particular those of sea views within the setting. As possibly the first hotel to welcome black guests and integrate New Jersey's beaches, the Brigantine Hotel reflects the challenges black Americans faced to gain equal access to recreational opportunities. Because the focus of recreational activity in this location is the beach and access to the sea, this aspect of the setting supports the hotel's significance under Criterion A. Conspicuous views of the WFA from the both the beach and guest rooms in the hotel will alter the character-defining setting of the building. As a result, the project will have an adverse effect on the Brigantine Hotel.

Absecon Lighthouse, Atlantic City

The Absecon Lighthouse, constructed in 1856, is an NRHP-listed property on the north end of Atlantic City. The lighthouse originally marked the inlet between Absecon and Brigantine Islands, although that channel has shifted northward since the lighthouse's construction. The 171-ft-tall light tower is constructed of iron and brick, and has a diameter of 27 ft at its base and 13 ft-7.5 in at the lens chamber. Lightkeepers had a

view of the Absecon Inlet from "A catwalk at a storage level just below the lens" (Wilson 1970). The Absecon Lighthouse was decommissioned in 1933. Its original setting was the undeveloped north end of Absecon Island, and the light station site included a keeper's house, assistant keeper's house, and oil house (all nonextant, although the keeper's house has been reconstructed). The 1970 NRHP nomination states the lighthouse is significant for navigational history (Criterion A) and architecture (Criterion C). The project is approximately 15.3 mi southeast of the Absecon Lighthouse. BOEM has determined that the project will have an adverse effect on the Absecon Lighthouse.

Atlantic City Boardwalk, Atlantic City

Origins of the Atlantic City Boardwalk date to 1870, when the first seasonal structure was constructed between South Massachusetts Avenue and what is now Columbia Place (between South Mississippi and Missouri Avenues). Four boardwalks soon followed in succession prior to 1900: widened for increased usage, but still seasonal (1880); permanent with electric lighting (1884); replacement due to hurricane (1890); and steel-braced (1898). Several piers were added in the 1890s, including Playground Pier, Central Pier, and Steel Pier. Large-scale hotels attracting tourists and businesspeople lined the west side of the Boardwalk beginning in the late 1890s and into the first decades of the twentieth century. Only a few of the hotels remain, largely due to the 1976 state legislation that required hotels to have at least 400 rooms, 325 square ft each, in order to operate a casino on the premises. This precluded many of the existing hotels from taking advantage of the new gambling legislation without extensive renovations. Many of the grand hotels on the Boardwalk were razed in the 1970s and 1980s to make room for new construction (*The Daily News* 1978:13). The Atlantic City Boardwalk was identified as a potential historic property in 1978, with NJHPO data indicating a boundary extending from the Atlantic City Convention Hall (South Georgia Avenue) to just northeast of South New Jersey Avenue. NJHPO data indicates the property's potential significance is associated with the commercial and recreation-related growth of Atlantic City (Criterion A). The WFA is approximately 15.3 mi southeast of Atlantic City Boardwalk. The Boardwalk is being treated as eligible for NRHP listing for the purposes of Section 106 compliance for the Project.

The Atlantic City Boardwalk is integral to the history of commercial development and recreation on the Jersey Shore. While the physical infrastructure of the Boardwalk has changed through the years, due to expansion, general improvements, and storm-related replacement and repairs, its role as a conduit along the shoreline has remained constant. The Atlantic City Boardwalk is home to resources from the early twentieth century through the twenty-first century, offering visitors accommodations, entertainment, and food, and, since the late 1970s, gambling opportunities. While large-scale towers built since the 1970s, including Caesar's Atlantic City (1979), Atlantic Palace (1986), Showboat Atlantic City (1987), Bally's Tower (1989), Hard Rock Hotel and Casino (1990), Ocean Casino (2012), have impacted the overall setting and feeling of the Boardwalk, as have the upgrades and improvements made to many of the one- and two-story buildings that line the Boardwalk, visitors walking along the Boardwalk in 2022 are still offered unobstructed sea views in some locations. Dunes and vegetation obstruct views of the horizon in other locations. Yet the Boardwalk has offered commercial and recreational opportunities along the seashore since its inception, and it has been subject to ongoing investment and economic development along its route, which in fact attests to its ongoing vitality and viability. To the extent that the WFA would be visible along the horizon

approximately 15.3 mi from the Boardwalk, BOEM has determined that the impact to setting rises to the level of adverse effect.

Atlantic City Convention Hall, Atlantic City

The Atlantic City Convention Hall, constructed 1929, is a National Historic Landmark-designated property on the Boardwalk in Atlantic City. The Convention Hall's 1985 NRHP nomination notes its eligibility under Criterion A for Recreation and Criterion C for Engineering. The Convention Hall's relationship to the Boardwalk, and by extension to the ocean, is defined by a curved limestone exedra (arcade) across the Boardwalk and in front of the hall's oceanside entrance. The exedra is "appropriately ocean-oriented, with decoration, like that of contemporary Atlantic City hotels, using forms of ocean flora and fauna" (Charleton 1985:2). The Convention Hall's views to the ocean from the building's interior are limited to ground floor entrances, where direct views of the ocean are screened partially by the exedra, and a ballroom on the second floor. The WFA is approximately 15.5 mi from the Atlantic City Convention Hall.

The Atlantic City Boardwalk was the center of social activity on the Jersey Shore in the early twentieth century, and the Convention Hall epitomized the Boardwalk's social and entertainment appeal. The Convention Hall's significance as a recreational venue (Criterion A) is tied to its large auditorium that hosted concerts, pageants, and sporting and political events. While the auditorium has no views to the exterior, an event space on the second story above the main Boardwalk entrance features a loggia of arched windows designed to provide sea views. This space was historically utilized as a ballroom but currently serves as a multi-function space for gatherings and smaller events (a reversible change).

The Project will have a visual effect on the Atlantic City Convention Hall, largely borne by the exedra walkway, a contributing structure of the site, located across the Boardwalk from the Convention Hall. While the Project would not alter any characteristics or physical features within the Convention Hall that contribute to its historic significance, BOEM determined that the Project would diminish its integrity of setting, an aspect of its historic integrity that relates to its significance. The Atlantic City Convention Hall is significant under Criterion A for Recreation and Criterion C for Engineering. The building's location on Atlantic City's Boardwalk is paramount to its history and associated significance. To the extent that the WFA would be visible along the horizon approximately 15.5 mi from the historic property, BOEM has determined that the impact to setting rises to the level of adverse effect.

Ritz-Carlton Hotel, Atlantic City

The Ritz-Carlton Hotel (constructed 1921, now The Ritz Condominiums) is an NRHP-eligible property at 2715 Boardwalk in Atlantic City. It was designed by Philadelphia's Horace Trumbauer in association with New York-based Warren and Wetmore. The hotel has a five-story block fronting the Atlantic City Boardwalk and a 15-story block that extends north creating an L footprint. The hotel was determined eligible for the NRHP in 2011. NJHPO data indicates the property's significance is associated with its construction at the height of Atlantic City's "urban hotel by the sea" period. The Boardwalk wing capitalizes on the Boardwalk's commercial activity while the orientation of the main block of hotel rooms maximized rooms with northeast and southwest sea views. It was determined to be significant under Criterion A for Commerce and Criterion C for Architecture. The WFA is approximately 15.3 mi southeast of this property.

The Ritz-Carlton Hotel is on the Atlantic City Boardwalk with the main hotel block extending north-northwest from the shoreline. The hotel block rising behind the commercial Boardwalk block is oriented to maximize the number of rooms on its narrow, deep lot. The ocean-facing elevation of this block is three bays wide, with a central-bay Juliet balcony on each floor. In addition to southeast elevation windows on both the main hotel block and the five-story Boardwalk block, most windows on the southwest elevation will have a view of the WFA. The building's siting and orientation are important to its Criterion A significance for Commerce. While architectural elements oriented toward the WFA have been subject to modification, most notably at the mezzanine level on the exterior, where a redesign with replacement materials creates a solid screen in front of double-height arched windows, conspicuous views of the WFA from guest rooms in the hotel will alter the character-defining setting of the building. As a result, the project will have an Adverse Effect to the Ritz-Carlton Hotel.

Riviera Apartments, Atlantic City

The Riviera Apartments at 116 South Raleigh Avenue in Atlantic City is a nine-story apartment building dating to 1930. It was surveyed for OW1 in January 2021 and was recommended eligible under Criterion C for its Spanish-influenced Art Deco style of architecture. NJHPO records attribute the design to Philadelphia architect Harry Sternfeld, and describe the building as "the queen of Atlantic City's larger apartment houses—its concrete and tile decoration are exuberant and original, rare outside of New York" (NJHPO 1980). The building appears to have undergone very few changes over the years, maintaining its original form, massing, and Art Deco design details. The building is adjacent to the Atlantic City Boardwalk. Its primary façade (northeast elevation) does not face the ocean. Both the northeast and southeast elevations include bands of windows, some of which are bay windows to optimize sea views. The building also includes rooftop balconies with sea views. It is approximately 15.6 mi from the WFA.

The Riviera Apartments building sits directly on the Atlantic City Boardwalk. This area was developed by the time the Riviera Apartments were constructed; however, aerial imagery shows that the surrounding buildings were primarily modest single-family detached homes in the 1930s, likely two to three stories tall. The apartment building was the tallest building in the area and would have had clear ocean views. The building's design focused on both the northeast and southeast elevations, with the southwest elevation having the appearance of a wall that would typically be found facing an alley. The two elevations with design emphasis have numerous windows, including bay windows, that maximize light and views in the apartments. Under the apartment building's significance for Criterion C, the property's historic integrity of location, design, materials and workmanship are critical, and those will not be altered by the proposed Project. Integrity of setting, feeling, and association have the potential to be affected by the project. Both ground-level views and views from inside the nine-story building may be affected by the introduction of the WFA on the horizon. The seascape was an important consideration in the selection of the location for this building, reflected in its design and siting. The project will be conspicuously visible in the viewshed, and it will affect views to the sea, a character-defining feature of the property. Therefore, the project will have an adverse effect on the Riviera Apartments.

Vassar Square Condominiums, Ventnor City

The Vassar Square Condominiums building at 4800 Boardwalk in Ventnor City is a high-rise building dating to 1969. The 21-story building is 218 ft (66.45 m) tall (CTUBH 2021) and was surveyed for OW1 in January 2021. The building was surveyed for OW1 in January 2021 and was recommended eligible for the NRHP under Criterion C for Architecture, as a good example of mid-century high-rise design with Formalist architectural details (reinterpretations of classical building components). The building's units each have a cantilevered balcony with glass railings. Corner balconies have views in multiple directions. This is especially important for units at the rear of the building (northwest), which, despite their location, have sea views due to the balcony design. Balconies on the northeast and southwest elevations angle outward to create an interesting dimensional effect across the wall plane. The angle also affords additional space on the balcony and increases the field of view from each unit. The building's upper levels are primarily glass and brick, while the ground level features stuccoed arches infilled with glass or metal grate. The building is approximately 16 mi from the WFA.

The Vassar Square Condominiums building sits directly on the Atlantic City Boardwalk. It sits on a deep lot with its longest elevations facing to the northeast and southwest. Although these elevations are perpendicular to the coastline, due to the building's height, extended balconies allow for sea views along these longer elevations. When the building was originally constructed, the Vassar Square area primarily included single-family detached houses two to three stories tall. However, multistory and multi-unit buildings were becoming more common south of the Atlantic City core. Although there are several similarly sized buildings in the vicinity as of 2021, Vassar Square Condominiums offer sea views from nearly all units. The building's design maximized sea views for its residents. Each unit has a glass-railed balcony, and even those that are farthest from the beachfront have corner balcony designs that allow for at least partial water views. Under the property's significance for Criterion C, its historic integrity of location, design, materials and workmanship are critical, and those will not be altered by the proposed project. Integrity of setting, feeling, and association have the potential to be affected by the project. Both ground-level views along the Boardwalk and views from inside the building may be affected by the introduction of the WFA on the horizon. Because the seascape was an important consideration in the selection of the location for this building and the building's design maximized expansive sea views, the project will impact a characteristic of the property that supports its eligibility for listing in the NRHP. Therefore, the project will have an adverse effect on the Vassar Square Condominiums building.

114 South Harvard Avenue, Ventnor City

The house at 114 South Harvard Avenue in Ventnor City is a two-and-a-half-story French Eclectic style building dating to 1925. The building was surveyed for OW1 in January 2021 and was recommended NRHP-eligible under Criterion C for Architecture as a good example of early twentieth-century beachfront housing in Ventnor City. The building appears to retain its original form and massing, and includes French Eclectic features such as textured stucco walls, a steeply pitched roof, flared eaves and multiple eave heights, and an asymmetrical plan with a tower. The house is immediately adjacent to the beach and Boardwalk, and has open views toward the Atlantic Ocean. The building faces northeast toward South Harvard Avenue, with its southeast elevation facing the Boardwalk. The southeast elevation includes an enclosed ground-level sun

room with arched windows facing the ocean. Above the sun room is a second-story porch with unobstructed sea views. The WFA is approximately 15.7 miles southeast of the property.

With limited visual obstructions, the project is expected to be visible on the horizon from this location. The building does not directly face the water, but sea views appear to have been an important consideration in the building's design, as it includes a sea-facing sun room and a second-story deck on its southeast elevation. Under significance for Criterion C for Architecture, the property's historic integrity of location, design, materials and workmanship are critical, and those will not be altered by the proposed project. Integrity of setting, feeling, and association may be impacted by the project. Both ground-level views and views from inside the building may be affected by the introduction of the WFA on the horizon. The seascape was an important consideration in the building's design, and the proposed project will alter a characteristic of the property that qualifies it for NRHP eligibility. Therefore, the project will have an adverse effect on the house at 114 South Harvard Avenue in Ventnor City.

Lucy the Margate Elephant, Margate City

Lucy the Margate Elephant, originally known as Elephant Bazaar, was NRHP-listed in 1971 and designated as a National Historic Landmark in 1976. The building is listed under Criterion C for Invention, Sculpture, and Other: "architectural folly" (Pitts 1971). Lucy the Margate Elephant is a six-story, elephant-shaped architectural folly located in Margate City. Lucy was built in 1881 by inventor James V. Lafferty, who had received a U.S. patent with exclusive rights to construct buildings in the shape of animals beginning in 1881. Lafferty was a land speculator who owned undeveloped land in the area that is now Margate City. Lucy was originally constructed in this barren location by Lafferty as a means of attracting potential buyers and visitors to the area (Lucy the Elephant 2011a). Lafferty sold Lucy to Anton Gertzen in 1887, and members of the Gertzen family continued to own the building until 1970 (Lucy the Elephant 2011a, 2011d). During the Gertzen family ownership, the building was used temporarily as both a house and tavern, but primarily as a piece of novelty architecture. The family capitalized on it by offering tours for an admission fee (Lucy the Elephant 2011b, 2011c).

Modifications to Lucy include the partitioning of the domed interior space in 1902 and replacement of the original howdah (canopied seat) after it was destroyed in a storm in 1928. The building went without a howdah (or with a very deteriorated howdah) for several years. When the building was nominated as an NHL in 1976, the nomination stated, "she will have a new howdah when funds permit." The howdah was eventually replaced with a less ornate version with a different roof type (Pitts 1971). In 1968, the Gertzen family sold the parcel on which Lucy was located and donated the building to the City. It was moved to its current parcel in 1970. Lucy's original location was near the intersection of present-day Atlantic Avenue and South Cedar Grove Avenue, two blocks north-northeast of its present location (NETR 1963, 1970). The building is currently located approximately one half-block farther inland than its original location. It continues to operate as a tourist attraction, with guided tours offered for a fee. The immediate surroundings include a single-story beachfront grill, several two- and three-story condominium buildings, a restaurant, and a 19-story condominium building (located on Lucy's original site). The building is approximately 15.3 mi west-northwest of the WFA. From its upper levels, views to the Atlantic Ocean are unobstructed.

Lucy the Margate Elephant is integral to the history of commercial development and recreation on the Jersey Shore. Originating as an architectural folly, it stands as one of the most recognizable symbols of the Jersey Shore experience. Part commercial, part recreational, part functional, part folly, Lucy is a tourist attraction that represents the vision a late nineteenth-century entrepreneur had for seaside development that continued through the twentieth century, a vision reflected in Margate's growth all around the building. While some original materials have changed through the years, and its setting has been subject to infill, impacting ground-level views of the sea, Lucy provides similar unobstructed sea views from its upper level as it did when it was first built. The uniqueness of the resource and its property type merited additional consideration during effects assessment.

The building's seaside location, while not original, generally replicates the sea views and setting of its original location a few blocks away. The building has windows on all sides, albeit small. The 18-in windows facing the ocean are inserted as the elephant's porthole eyes. The howdah (canopied seat) at the top of the building also has unobstructed ocean sea views; it was reportedly used by Lafferty as a viewing platform for potential investors to see advantageous views of the surrounding real estate (NJ South 2019).

At a distance of 15.3 mi, characterized in the VIA as apparent, the WFA will be visible on the horizon, altering the property's setting and potentially, the experience of visitors to the site. Lucy's significance as an architectural folly and sculpture, while not specified in its NRHP nomination, likely falls under Criteria A and C. Sea views are a key component of the building's property type and contribute to its significance. Therefore, a finding of Adverse Effect is recommended for Lucy the Margate Elephant.

Great Egg Coast Guard Station, Longport

The Great Egg Coast Guard Station is located at 2301 Atlantic Avenue in Longport. It was listed in the NRHP in October 2005 under Criterion C for Architecture as an example of the 1934 Roosevelt Design for Coast Guard stations (Berkey 2005; Koski-Karell et al. 2013). The station is located in an area of Longport that is approximately two blocks deep between Great Egg Harbor and the Atlantic Ocean. The station was constructed in 1938 as a U.S. Coast Guard station, and was abandoned in 1947 by the U.S. Treasury Department, which oversaw the Coast Guard until 1967. The City of Longport purchased the building and used it as a municipal hall (Berkey 2005). In 1994, it was leased to the Longport Historical Society and Museum. The primary building is two-and-a-half stories with a central three-story tower set within the roof ridgeline. The station replaced an 1888 lifesaving station at this same site (Berkey 2005). The 1934 Roosevelt Design was transitional, incorporating design cues from previous lifesaving station designs with evolving missions and administrative duties after consolidation of predecessor services under the U.S. Coast Guard. Located approximately 0.14 mi (740 ft) from the shore, the building is one-and-a-half blocks removed from the ocean front. It is approximately 15.2 mi from the project. BOEM has determined that the project will have an adverse effect on the Great Egg Coast Guard Station.

Little Egg Harbor U.S. Lifesaving Station #23 (U.S. Coast Guard Station #119, Little Egg Harbor)

The original Little Egg Harbor U.S. Lifesaving Station #23 was built in 1869 on Tucker Island and moved several times due to beach erosion. It succumbed to the ocean in the early 1930s, while Tucker Island itself disappeared by the early 1950s. In 1937, the U.S. Coast Guard constructed the current station, a two-and-

one-half-story building, just west of Tucker Island on the southern point of Little Egg Harbor's salt marsh peninsula on Great Bay. The station used the federal government's 1934 Roosevelt Design that incorporated Colonial Revival elements into a two-story, rectangular plan with a central cupola. The station and associated boathouses are on elevated piers to accommodate the tides (Koski-Karell et al. 2013). The station is accessed from Great Bay Road by a long pedestrian boardwalk. The Coast Guard operated the station into the 1960s. It was then left vacant until purchased in 1972 by Rutgers University for use as a marine field station, and it continues to operate as Rutgers Tuckerton Marine Field Station.

The station was determined individually eligible for NRHP listing by NJHPO in 2014. NJHPO's online records do not include information on the building's NRHP significance; however, it appears to be significant under Criterion A for Maritime History and under Criterion C for Architecture as an example of the 1934 Roosevelt Design, based on application of the eligibility requirements in the U.S. Government Lifesaving Stations, Houses of Refuge, and pre-1950 U.S. Coast Guard Lifeboat Stations Multiple Property Documentation Form (MPDF) (Koski-Karell et al. 2013). The 1934 Roosevelt Design was transitional, incorporating design cues from previous lifesaving station designs with evolving missions and administrative duties after consolidation of predecessor services under the U.S. Coast Guard. Key to the station's significance is its intact representation of the 1934 standardized Roosevelt Design. Its period of significance, 1937–1960s, reflects its use as a Coast Guard station. The project is approximately 21.25 mi south of the station. BOEM has determined that the project will have an adverse effect on U.S. Coast Guard Station #119.

Historic Context

North Wildwood, Cape May County

The city of North Wildwood is on Five Mile Island, where the Lenni-Lenape tribe often visited to fish and collect shells they used as currency. Farmers used the Wildwood area to graze their livestock, and fishermen and whalers established temporary camps on Five Mile Island between the early seventeenth and the mid-nineteenth centuries. Fishermen established the first settlement on Five Mile Beach—Anglesea—ca. 1859. Development increased following construction of a railroad and bridge in 1884. Anglesea incorporated as the North Wildwood Borough in 1885. The borough became the City of North Wildwood City in 1917. The city experienced a post-World War II boom following the growing popularity of personal automobiles and resultant tourism (VisitNJShore.com 2021a). New hotels featured futuristic forms and neon signage, a distinctive style later called Wildwood's "Doo Wop." North Wildwood was heavily damaged by the Ash Wednesday Storm of 1962, which flooded and destroyed beachfront properties and roads and caused major coastline loss (NPS 2019). Tourism declined in the 1970s and 1980s, but rebounded in the late 1990s with the establishment of the Doo Wop Preservation League, charged with restoring and promoting appreciation of the Wildwood area hotels and their history (VisitNJShore.com 2021a).

Ocean City, Cape May County

A barrier island, Ocean City (first known as Peck's Beach) was regularly used as a whaling camp by 1700. Later in the eighteenth century, John Townsend acquired much of the seven-mile-long island that featured several freshwater ponds, making it beneficial for grazing cattle (Miller 2003). It had its first permanent residence by 1850. In the post-Civil War period, Peck's Beach evolved into a tourist destination. Atlantic City,

which featured a famous boardwalk and hotels in the 1870s, served as a model for Peck's Beach, albeit with exceptions. In 1879, a group of Methodists leaders—including Rev. Ezra B. Lake, Rev. James B. Lake, Rev. S. Wesley Lake, and Rev. William H. Burrell—founded Ocean City. The founders were intent of developing a Christian-influenced resort that, unlike Atlantic City, boasted no gambling or drinking (Esposito and Esposito 1996). One of the main attractions was a boardwalk completed in 1883. Development of transportation was key to the city's success as a tourist destination, as early twentieth-century options included a steamboat service, bridges, and a trolley (VisitNJShore.com 2021b). The national prosperity of the post-World War I period was reflected in the development of beachfront hotels. A fire destroyed much of Ocean City in 1927, including the city's beachside boardwalk (Ocean City, New Jersey 2021). The boardwalk was rebuilt in 1928–1929. The Great Depression severely impacted the local New Jersey Shore economy (Bzdak 2001), but bolstered by a post-World War II economic recovery, Ocean City was the largest town in Cape May County by 1960 (VisitNJShore.com 2021b).

Brigantine City, Atlantic County

The Lenni-Lenape tribe first traveled to Brigantine Island from the mainland to fish and collect shells they used as currency. Brigantine Improvement Company purchased the island by the late nineteenth century. Railroad and light rail transportation facilitated early development during the period, but growth was limited by bad weather and difficult financial times. Brigantine invested in infrastructure development in the 1920s, including the construction of roads and sewage lines, only to have its growth stymied again by numerous storms and the Great Depression (SouthJersey.com 2015). Development continued post-World War II. Brigantine was heavily damaged by the Ash Wednesday Storm of 1962, which flooded and destroyed beachfront properties and roads, causing major coastline loss (NPS 2019). Due to its proximity and access to Atlantic City, development was consistent in the second half of the twentieth century, with older neighborhoods and commercial development interspersed with newer single-family and multi-family housing (Gatza 1991).

Atlantic City, Atlantic County

Atlantic City is located on Absecon Island, where the Lenni-Lenape tribe often visited to fish and collect shells they used as currency. Jeremiah Leeds built the first structure on the island in 1785, and his descendant had built seven permanent dwellings by 1850 (Town Square Publications 2010). The city incorporated in 1854 and rail development soon followed. The city grew quickly in the late nineteenth century as a resort town located near New York and Philadelphia. Unlike primarily residential communities on the New Jersey Shore, Atlantic City development included businesses, recreational spaces, and tourist attractions like theaters and the Boardwalk. Half of the Boardwalk was destroyed in the Great Atlantic Hurricane of 1944. The city's popularity continued through the mid-twentieth century. but diminished in the 1950s when air travel allowed vacationers more options (ACFPL 2021). Atlantic City was heavily damaged by the Ash Wednesday Storm of 1962, which flooded and destroyed beachfront properties and roads and caused major coastline loss (NPS 2019). Another wave of large-scale development followed the city's gambling legalization in 1976 (ACFPL 2021).

Ventnor City, Atlantic County

Ventnor City is located immediately south of Atlantic City on Absecon Island. The name Ventnor City was chosen in 1889 in honor of Ventnor, England. The arrival of railroad service catalyzed development in the late nineteenth and early twentieth centuries. The city incorporated in 1903, and between 1910 and 1917, the number of buildings in Ventnor City increased from approximately 100 to nearly 1,300. New York-based architects John M. Carrère and Thomas Hastings created a downtown plan for Ventnor City ca. 1907–1908 using City Beautiful planning principles. Architect Frank Seeburger designed homes in what is now the John Stafford NRHP-listed historic district (Thomas 1986). The city's popularity continued through the first half of the twentieth century given its proximity to Atlantic City. Films advertising Ventnor City were shown in Reading Terminal in Philadelphia, highlighting the city's beaches, boardwalk, public buildings, and homes (Smith 1963). Ventnor City was heavily damaged by the Ash Wednesday Storm of 1962, which flooded and destroyed beachfront properties and roads and caused major coastline loss (NPS 2019). By the mid-1960s, Ventnor City was the second-largest municipality on Absecon Island, a primarily residential resort that catered to seasonal rentals (Smith 1963).

Margate City, Atlantic County

Margate City is located five miles south of Atlantic City on Absecon Island, where the Lenni-Lenape tribe often visited to fish and collect shells they used as currency. Early settlers moved to modern Margate City in the early nineteenth century, and by the mid-nineteenth century, fishing, trade, and salt industries attracted increasing numbers of workers (VisitNJShore.com 2021c). Completion of a rail line from Philadelphia also opened Margate to seasonal residents, and Margate City neighborhoods like Marven Gardens attracted affluent vacationers interested in buying second homes (Ralph 1989). In 1882, James V. Lafferty built Lucy the Elephant, an elephant-shaped hotel and restaurant, to attract land buyers and commercial development. The city incorporated as South Atlantic City in 1897, and changed its name to Margate City in 1909. Development continued in the late nineteenth and early twentieth centuries following the arrival of railroad service (VisitNJShore.com 2021c). The Ash Wednesday Storm of 1962 heavily damaged Margate City, including washing away what remained of the city's boardwalk that had initially been washed out in the Great Atlantic Hurricane of 1944 (Galloway 2019).

Longport, Atlantic County

Longport is located on Absecon Island, where the Lenni-Lenape tribe often visited to fish and collect shells they used as currency. The borough is named for James Long, who owned the area including modern Longport from 1857 to 1882. Long sold the parcel to M. Simpson McCollough, who planned to develop a resort community. Development in the late nineteenth and early twentieth centuries was largely commercial, while development in the mid-twentieth century was primarily residential. Longport was heavily damaged by the Ash Wednesday Storm of 1962 (NPS 2019). Two early twentieth-century buildings—the Longport Cabin Inn and the Gospel Hall Home for the Aged—were demolished in the early twenty-first century in favor of residential development. Several historic buildings have been remodeled and repurposed, however, including the Betty Bacharach Home for Afflicted Children, which has served as Borough Hall since 1987 (Borough of Longport 2021).

MITIGATION MEASURES

This section details the proposed mitigation measures to resolve adverse effects to historic properties stipulated in the MOA, and describes the purpose and intended outcome, scope of work, methodology, standards, deliverables and funds and accounting for each measure. The content of this section was developed on behalf of OW1 by individuals who meet Secretary of the Interior (SOI) Qualifications Standards for History, Architectural History and/or Architecture (62 FR 33708) and is consistent with fulfilling the mitigation measures such that they fully address the nature, scope, size, and magnitude of the visual adverse effect. Fulfillment of the mitigation measures will be led by individuals who meet SOI Qualifications Standards for History, Architectural History and/or Architecture. This document identifies which mitigation measures are likely to trigger need for compliance with the identified state/local level legislation.

Historic Context Mitigation Measures

Purpose and Intended Outcome

Based on input from Participating Parties during consultation, historic contexts consistent with agreed upon themes will be developed to disseminate significance of specific property types to Jersey Shore history. Consistent with MOA stipulations III.B.1.i.a-c, historic context themes will include:

- Historic Context addressing early 20th century New Jersey Shore Hotels
- Historic Context addressing Mid-century High-rise residential buildings at the New Jersey shore
- Historic Context addressing Boardwalks of the New Jersey Shore, and Survey and Evaluation of Atlantic City Boardwalk, Ocean City Boardwalk, and Wildwood Boardwalk.

Historic context content would draw largely on additional research to expand on existing documentation. Each context will also provide registration requirements to assist in future NRHP eligibility evaluations. Survey and evaluation will only be conducted for Atlantic City Boardwalk, Ocean City Boardwalk, and Wildwood Boardwalk.

Scope of Work

The scope of work for each historic context will consist of the following:

- Historic Context addressing New Jersey Shore early 20th century Hotels (MOA Stipulation III.B.1.i.a)
    - Compile research for historic context;
    - Deliver Draft historic context for review by OW1, BOEM, and Participating Parties; and
    - Deliver Final historic context NJHPO.
- Historic Context addressing Mid-century High-rise residential buildings at the New Jersey shore (MOA Stipulation III.B.1.i.b)
    - Compile research for historic context;
    - Deliver Draft historic context for review by OW1, BOEM, and Participating Parties; and
    - Deliver Final historic context NJHPO.
- Historic Context addressing Boardwalks of the New Jersey Shore, and Survey and Evaluation of Atlantic City Boardwalk, Ocean City Boardwalk, and Wildwood Boardwalk (MOA Stipulation III.B.1.i.c)
    - Compile research for historic context;

- Deliver Draft historic context for review by OW1, BOEM, and Participating Parties; and
- Deliver Final historic context to NJHPO.
- Conduct field survey of Atlantic City Boardwalk, Ocean City Boardwalk, and Wildwood Boardwalk.
- Deliver draft Survey and Evaluation Report for review by OW1, BOEM, and Participating Parties, and
- Deliver Final Survey and Evaluation Report to NJHPO.

Methodology

OW1 will release an RFP for consultant services and select a consultant to perform the Scope of Work listed for Historic Context Mitigation Measures, for each context, or as part of a larger consultancy RFP for additional or all mitigation measures listed herein. The chosen consultant should have staff that meet SOI Professional Qualifications for Architecture, Architectural History, or History. A draft of the documents will be provided to the Participating Parties for review and comment. The final documents will be developed incorporating comments from the Participating Parties and will be submitted to NJHPO by OW1 in an NJHPO-approved format.

Standards

The project will comply with following standards and guidelines:

- NPS White Paper: The Components of a Historic Context, Barbara Wyatt (2009);
- NPS Bulletin 15: How to Apply the National Register Criteria for Evaluation (revised 1995);
- New Jersey Historic Preservation Office Guidelines for Architectural Survey; and
- New Jersey Historic Comprehensive Statewide Historic Preservation Plan 2023–2028 (2022).

Deliverables

The following documentation is to be provided for review by the Participating Parties and ultimately, submitted to the NJHPO:

- Historic Context addressing New Jersey Shore Hotels
  - Draft Historic Context
  - Final Historic Context
- Historic Context addressing Mid-century High-rise residential buildings at the New Jersey shore
  - Draft Historic Context
  - Final Historic Context
- Historic Context addressing Boardwalks of the New Jersey Shore, and Survey and Evaluation of Atlantic City Boardwalk, Ocean City Boardwalk, and Wildwood Boardwalk.
  - Draft Historic Context
  - Final Historic Context
  - Draft Survey and Evaluation Report
  - Final Survey and Evaluation Report

Schedule

The following is a preliminary schedule for execution of historic contexts based on the current BOEM timeline for completing the OW1 NEPA and NHPA Section 106 reviews. A more detailed schedule will be requested in the solicitation/request for proposal used to identify and select a consultant to perform the scope of work described in the HPTP. Once the consultant is identified and under contract, the consultant, OW1, and the Participating Parties will develop and agree upon a final delivery schedule.

Fall 2023	Solicitation/Request for Proposal for consultant and contracting consultant to perform tasks.
Winter 2023-2024	Preliminary documentation submitted for 30-day review first by OW1 and then by BOEM. Consultant revisions completed.
Spring 2024	Draft deliverables for 30-day review by Participating Parties followed by submission of final deliverables.

Funds and Accounting

OW1 will be responsible for funding and implementation of this mitigation measure.

Funding for Visitor Experience and Public Access

Purpose and Intended Outcome

Based on input from Participating Parties during consultation, funding will be provided to facilitate access and support the visitor experience at historic properties with public visitation applicable to but not limited to Lucy the Margate Elephant, Absecon Lighthouse (Atlantic city), and the Atlantic City Boardwalk (Atlantic City). Examples for use of these funds may include: directional signage, parking, improvements to site circulation (including ADA accessibility), public access, safety and security, and funding for maintenance and improvement to areas heavily used or damaged due to public visitation. When applicable, physical improvements to the properties should adhere to applicable preservation standards, including but not limited to the Secretary of the Interior Standards for the Treatment of Historic Properties. The intent of this funding is to support and improve public access at these historic properties to foster an appreciation of the sites and their contribution to the historic character of the Jersey Shore. This funding should ensure that improvements are made with careful consideration of the historic character of the property and sympathetic to the existing physical structure.

Scope of Work

The scope of work for each historic property, as appropriate, will consist of the following:

- Determine priority projects in collaboration with Participating Parties and property owners.
- Develop plans appropriate to the identified project, and submit plans for review by OW1, BOEM, and Participating Parties.;
- Identify qualified contractors to execute plans.

- Complete planned work and acquire final approval from OW1, BOEM, and Participating Parties, or a designated representative for the three entities.

Methodology

OW1 will provide funds to the property owner for an approved Scope of Work. In consultation with OW1, the property owner will solicit bids for consultant services and select a consultant to perform the approved Scopes of Work. The chosen consultant should have staff that meet SOI Professional Qualifications for Architecture or Architectural History. Draft project plans developed by the consultant will be provided to OW1, the Participating Parties and the property owner, as appropriate, for review and comment. Work will be monitored as needed, and a final walkthrough and approval of work is required. Work must be approved by OW1, Participating Parties, and the property owner, or a designee of all three.

Standards

The project will comply with following standards:

- Local preservation standards as applicable.
- The Secretary of the Interior Standards for Rehabilitation (for applicable projects).

Deliverables

The following documentation is to be provided for review by the Participating Parties:

- Project plans.
- Photos of completed work.

Schedule

The following is a preliminary schedule for execution of visitor experience and public access improvements based on the current BOEM timeline for completing the OW1 NEPA and NHPA Section 106 reviews. A more detailed schedule will be requested in the solicitation/request for proposal used to identify and select a consultant to perform the scope of work described in the HPTP. Once the consultant is identified and under contract, the consultant, OW1, and the Participating Parties will develop and agree upon a final delivery schedule.

Fall 2023	Determination of priority projects at each historic property.
Winter 2023-2024	Solicitation/Request for Proposal for consultant and contracting to perform tasks.
Spring 2024	Execution of projects followed by submission of complete project photos and approval of work. .

Funds and Accounting

OW1 will be responsible for funding and implementation of this mitigation measure.

IMPLEMENTATION

Timeline

Within one year of the MOA being executed, these mitigation measures must be initiated. Tasks associated with the Historic Context Mitigation Measures can occur during and/or after construction. Mitigation measures within this HPTP are to be completed within four years of its initiation, unless a different timeline is agreed upon by Participating Parties and accepted by BOEM and may be completed simultaneously, as applicable.

Reporting

Following the execution of the MOA until it expires or is terminated, OW1 shall prepare and, following BOEM review and approval, provide all signatories, invited signatories, and consulting parties to the MOA a summary report detailing work undertaken pursuant to the MOA consistent with MOA Stipulation XV (Monitoring and Reporting), including the mitigation measures outlined in the final HPTP. This report will be prepared, reviewed, and distributed by January 31, and summarize the work undertaken during the previous year.

Organizational Responsibilities

BOEM

- Make all federal decisions and determine compliance with Section 106;
- Ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA, and in consultation with the Participating Parties;
- Consult with OW1, NJHPO, ACHP, and other consulting parties with demonstrated interest in the affected historic properties; and
- Review and approve the annual summary report prepared and distributed to the consulting parties by OW1.

Ocean Wind LLC

- Fund and implement the mitigation measures Stipulated in III.B of the MOA and described in the Mitigation Measures section of this HPTP;
- Prepare Annual Reporting, submit reporting to BOEM for review and approval, and distribute to Consulting Parties per the Mitigation Measures section of this HPTP;
- Submit information for Participating Party review per the Mitigation Measures section of this HPTP;
- Creation and distribution of RFPs to solicit consultant support for mitigation measure fulfillment;
- Proposal review and selection of a consultant who meets the qualifications specified in the SOI Qualifications Standards for History, Architectural History and/or Architecture (62 FR 33708);
- Initial review of Documentation for compliance with the Scope of Work, Methodology and Standards;

- Distribution of Documentation to Participating Parties for their review; and
- Review and comment on deliverables.

New Jersey SHPO

- Consult, when necessary, on implementation of this HPTP.

Advisory Council on Historic Preservation

- Consult, when necessary, on implementation of this HPTP.

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https://www.boem.gov/ocean-wind
https://www.boem.gov/ocean-wind-1-construction-and-operations-plan
[Ocean Wind1 FEIS]
[Ocean Wind1 ROD]

General Information on Section 106

https://www.achp.gov/protecting-historic-properties/section-106-process/introduction-section-106

https://www.achp.gov/digital-library-section-106-landing/section-106-consultation-involving-national-historic-landmarks

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ATTACHMENT 5 – TERRESTRIAL ARCHAEOLOGICAL MONITORING PLAN

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Monitoring Plan

Monitoring Plan for the Treatment of Cultural Resources Encountered During Construction of Onshore Facilities associated with the Ocean Wind Offshore Wind Farm (Lease Area OCS-A 0498)

Cape May and Ocean Counties, New Jersey

1 Introduction

Ocean Wind LLC (Ocean Wind) has proposed construction of the Ocean Wind 1 Offshore Wind Project (Project), consisting of the Wind Farm located in federal water on the Atlantic Outer Continental Shelf (OCS) within the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0498 (Lease Area) as well as the export cable routes from offshore to onshore, nearshore and onshore horizontal directional drilling (HDD) locations and open-trench cuts, and substation interconnections (Figure 1).

This plan describes the protocols to be followed in the event that cultural resources and/or human remains are inadvertently exposed during onshore construction activities performed in the Area of Potential Effects (APE) and as documented in the Terrestrial Archaeological Resources Assessment (TARA) and nearshore/onshore portions documented in the Marine Archaeological Resources Assessment (MARA).

1.1 Regulatory Framework

The Outer Continental Shelf Lands Act, 1953 (as amended) (43 U.S.C 1337), grants the lead enforcement of laws and regulations governing offshore leasing on Federal offshore lands to BOEM (CFR Title 30, Chapter V, Subpart B-Offshore). The issuance of Lease Area OCS-A 0498 to Ocean Wind under the "Commercial Lease of Submerged Lands for Renewable Energy Development of the Outer Continental Shelf, Number OCS-A 0498") constitutes a federal undertaking subject to Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 300101 et seq.). The Section 106 implementing regulations (36 CFR Part 800) define an undertaking as a:

> project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; and those requiring a federal permit, license or approval (36 CFR 800.16[y]).

The Section 106 process "requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings" (36 CFR 800.1[a]). In December 2020, BOEM made the decision to substitute the National Environmental Policy Act (NEPA) review process to comply with Section 106 procedures, under 36 CFR 800.8(c). Procedures and documents required for the preparation of the Project's environmental impact statement (EIS) and record of decision (ROD) replaced the standard Section 106 review process.

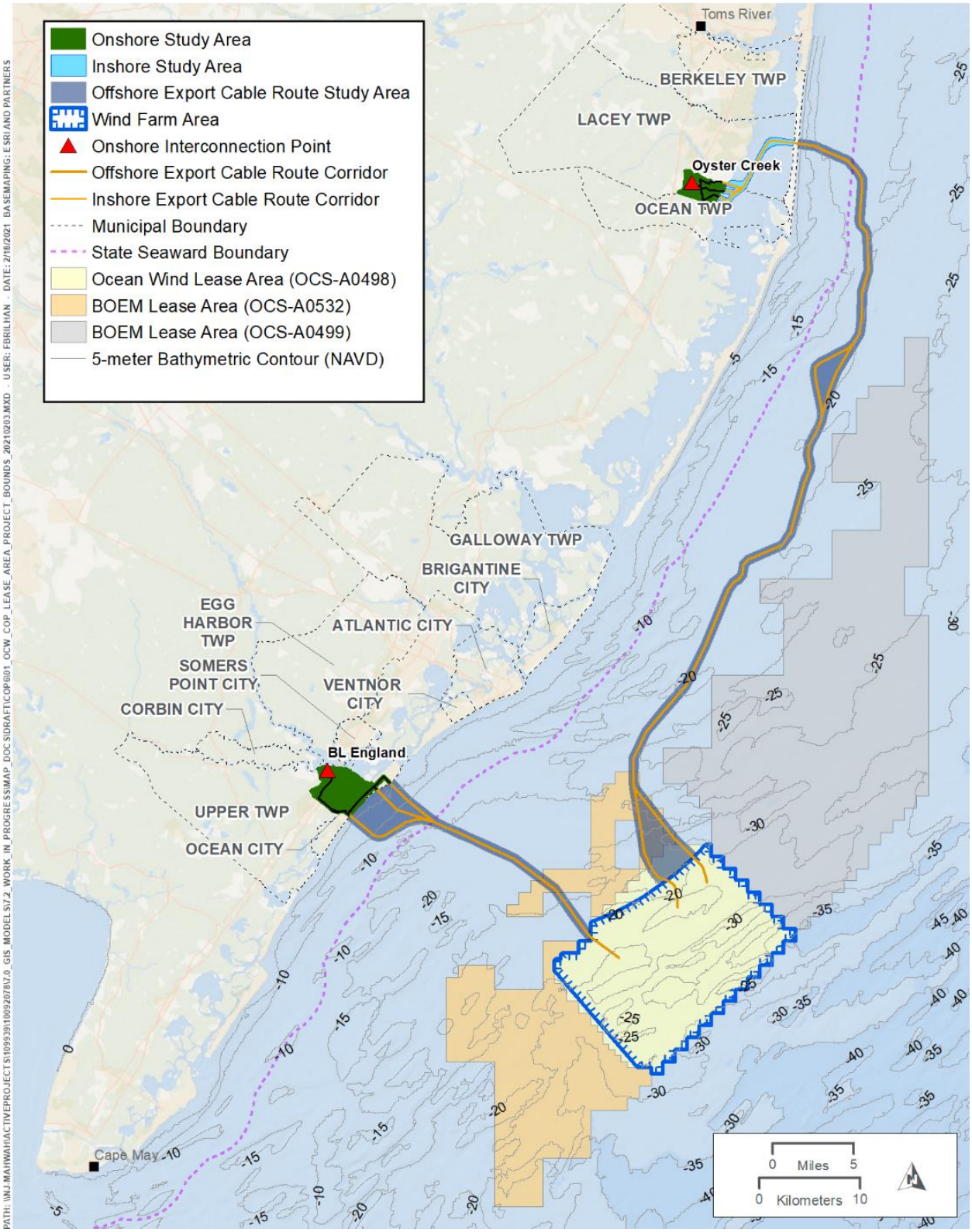


Figure 1. General Location of the Project.

1.2 Purpose

Between 2018 and 2022, Ocean Wind conducted Phase I archaeological investigations of the onshore portions of the Project, including the export cable routes from offshore to onshore, nearshore and onshore HDD locations and open-trench cuts, and substation interconnections. These surveys were completed in accordance with NJ HPO's *Guidelines for Phase I Archaeological Investigations: Identification of Archaeological Resources*, and its *Guidelines for Preparing Cultural Resources Management Archaeological Reports Submitted to the Historic Preservation Office*. The surveys identified six archaeological sites; two are expansions of previously reported sites, three are newly reported, and one is a previously reported site adjacent to the APE. Avoidance, protective measures, and monitoring were recommended during construction for this Project.

The purpose of this monitoring plan is to prevent or address unintended adverse effects to historic properties that may occur during the construction of the Project. This plan was prepared in accordance with the TARA recommendations found in Section 8.5.3 and conveyed within subsequent Section 106 consultation meetings.

Prior to beginning any construction activities related to the onshore cable routes at both Oyster Creek and BL England, Ocean Wind will share this construction monitoring plan that addresses the following:

- Training procedures to familiarize construction personnel with the identification and appropriate treatment of historic properties;
- Monitoring of construction activities by a qualified archaeologist meeting, at a minimum, the *Secretary of the Interior's (SOI) Professional Qualifications Standards for Archaeologists* (48 Federal Register 44738-44739);
- Provisions for monitoring and coordination with Tribal Monitors;
- Provisions for temporary avoidance measures;
- Process for determining the relevance of monitoring a construction activity;
- Reporting including regular updates to the Section 106 consulting parties (e.g. BOEM, New Jersey Historic Preservation Office [NJ HPO] serving as the State Historic Preservation Office [SHPO]), and Tribal representatives and/or Tribal Historic Preservation Officers (THPOs) during construction and the completion of a monitoring report following the completion of construction activities;

The ensuing archaeological monitoring will be conducted in compliance with the above referenced provisions.

1.3 Definition of Ground-Disturbing Activities Requiring Archaeological Monitoring

Archaeological monitoring is generally defined as the observation of ground-disturbing construction activities by a qualified archaeologist in order to identify, document, protect, and/or recover information on the cultural resources to avoid adverse effects.

Ground disturbance is defined as activities that compacts or disturbs the ground. Ground-disturbing activities that will require monitoring for this Project include mechanical tree removal and grubbing, scraping, grading, excavating, drilling, trenching, augering and coring.

2 Project Personnel Roles

Qualified Archaeologist (or archaeologist) – A professional archaeologist meeting, at a minimum, the *Secretary of the Interior's (SOI) Professional Qualifications Standards for Archaeologists* (48 Federal Register 44738-44739);

Cultural Resource Compliance Manager – Ocean Wind's defined point-of-contact for construction activities;

Cultural Resources Manager – Archaeological monitor manager, meeting, at a minimum, the *Secretary of the Interior's (SOI) Professional Qualifications Standards for Archaeologists* (48 Federal Register 44738-44739). This person may not be in the field but will manage archaeological monitoring aspects; and

Construction Contractor – Construction team manager or supervisor. There may be more than one Construction Contractor, dependent on the construction activity.

Archaeological Monitor(s) – field archaeologist with education and training in archaeology, supervised by SOI qualified archaeologist.

Tribal Monitor(s) – a Native American with affiliation with affected Tribes and specialized training in cultural resources and monitoring.

3 Training Procedures

A qualified archaeologist will provide on-site archaeological orientation and training in advance of the start of construction to applicable construction workers, including managers and supervisors, Archaeological Monitors and Tribal Monitors. Training will be provided as-needed for new workers as construction continues. The training, which will last no longer than 30 minutes, will outline the steps to be taken in the event of an unanticipated discovery. During the training the qualified archaeologist will:

- Give information and examples of the types of cultural resources that may be encountered in the area, including how to identify stone tools, bone, ceramics, glass, and various wood and metal objects;
- Outline the laws that protect cultural resources;
- Outline applicable penalties for damaging sites; and
- Provide contact information for the qualified archaeologist, the Archaeological Principal Investigator (PI), and any backup.

Individuals attending a training session will sign a sheet indicating the date and time of their attendance, which will be maintained by the qualified archaeologist.

Archaeological monitors and Tribal Monitors must participate in safety training prior to entering construction areas. That training will be provided at regular intervals before and during construction and updated in daily safety meetings. The Construction Contractor will provide a list of personal protective equipment that will be required for archaeological monitors.

4 Monitoring Procedures

The following procedures will be adhered to during archaeological monitoring of the ground-disturbing activities taking place during construction.

Work under the terms of the monitoring plan is to be carried out under the direct supervision of a qualified archaeologist meeting, at a minimum, the *Secretary of the Interior's Professional Qualifications Standards for Archaeologists* (48 Federal Register 44738-44739).

4.1 Coordination with Tribal Monitors

Tribal representatives and/or Tribal Historic Preservation Offices (THPOs) will be notified of construction activities minimally two-weeks in advance to participate in monitoring activities, if desired. Once monitoring has begun, the qualified archaeologist will notify Tribal representatives and/or THPOs who have expressed an intent to have a monitor present each day prior of the starting location for the next day.

4.2 Locations Requiring Monitoring

Six archaeological sites and nine archaeologically sensitive areas were identified during the TARA, completed between 2018 and 2022 (Tables 1 through 3). Additional areas of monitoring may be identified during construction, and is at the discretion of the Cultural and Tribal monitors and contacts.

Table 1: List of Archaeological Sites Identified during the Terrestrial Archaeological Resources Assessment.

Site Name	Number	Date	Size	Project Impacts
B.L. England (Locus 1) (Expansion)	28-Cm-032	Precontact: Late Archaic to Transitional, Middle to Late Woodland	2,695 m² (29,012 ft²)	Site previously determined eligible for the National Register. Site to be avoided and protected, area to be monitored.
GEHB Site 1 (Expansion)	28-Cm-064	Precontact and Historic: Woodland, Late 17th to early 20th century	53 m² (173 ft²)	Site to be avoided and protected, area to be monitored.
Cedar Hollow Historic Site	28-Cm-091	Historic: 18th to 19th century	104 m^2 (1125 $ft^{2)}$	Site to be avoided and protected, area to be monitored.
Oyster Creek Paleoindian Spot Find	28-Oc-249	Precontact: Paleoindian	17 m² (55 ft²)	Site considered eligible for the National Register. Site to be avoided and protected, area to be monitored.
Chamberlain Historic Midden	28-Oc-250	Historic: 18th to 20th century	550 m² (1,800 ft²)	Site to be avoided and protected, area to be monitored.
Unnamed Site	28-Oc-055	Possible precontact shell midden (appears to be mislocated in site forms).	Unknown	Adjacent to PAPE, area to be monitored.

Table 2. Summary of Pre-Contact and Historical Archaeological Sensitivity of the Oyster Creek Area of Potential Effects.

Landfall/Route	Pre-Contact Sensitivity	Historical Sensitivity	NJ CRGIS LUCY – Archaeology Grid Designation
Oyster Creek Substation	Moderate	Low	Not Evaluated

Landfall/Route	Pre-Contact Sensitivity	Historical Sensitivity	NJ CRGIS LUCY – Archaeology Grid Designation
Farm Property	Moderate	Moderate	Identified
US Route 9	Low	Moderate	Identified
Bay Parkway	Moderate	Moderate	Identified
Old Main Street	Moderate	High	Identified
Lighthouse Drive	Low	Low	Identified
Nautilus Road	Low	Low	Identified
Holiday Harbor Marina	Low	Moderate	Identified

Table 3. Summary of Pre-Contact and Historical Archaeological Sensitivity of the B.L. England Area of Potential Effects.

Landfall/Route	Precontact Sensitivity	Historic Sensitivity	NJ CRGIS LUCY – Archaeology Grid Designation
B.L. England Substation	High	Low	Eligible
US Route 9 (North Shore Road)	Moderate	High	Identified
Roosevelt Boulevard	Low	Low	Not Evaluated
West Ave – Ocean City	Moderate	Moderate	Not Evaluated and Eligible

The Project proposes to avoid impacts to known sites; however, archaeological monitoring was determined necessary during construction near known archaeological sites, as well as along the proposed cable routes and within roadways deemed to be highly sensitive, based on the sensitivity maps presented in the TARA.

4.3 Temporary Avoidance Measures

This section outlines the proposed avoidance measures to undertake at each of the archaeological sites, where applicable.

4.3.1 Site 28-Cm-032 (B.L. England)- Expanded Boundaries

Site number	28-Cm-032 (B.L. England)
Date	Late Archaic to Transitional and Middle to Late Woodland Periods
Type	Toolmaking/shellfish and mammal processing site; Late Archaic to Transitional and Middle to Late Woodland Periods
Size	2,695 m^2 (29,012 ft^2)
Depth	.5 m (1.5 ft)
Within/Adjacent PAPE	The site, although expanded, is no longer included as part of the PAPE, but is immediately adjacent to the north and west of the PAPE.
Proposed Impacts	Adjacent to the APE. No direct effects.
Protection/Avoidance Measures	Site protection measures and monitoring will occur.

The qualified archaeologist will install snow fencing and signage around the external limits of the site boundary within a 10-foot buffer of the APE and as mapped in the TARA no more than one week prior to construction. The signage will be demarcated with “Restricted Area” printed on corrugated plastic materials. The sign will be double- sided to ensure visibility. The signage will not denote the area as archaeological in nature. The signage and snow fencing will remain in place during construction activities, with the qualified archaeologist removing it within one week of completion of all construction activities within a 1-mile radius for the Project. The Construction Contractor will be responsible for ensuring the fencing remains in place, and should it fall or be removed, the Construction Contractor

will notify the qualified archaeologist within 24-hours. Please note, placement of snow fencing and signage is dependent upon approval from the landowner.

The qualified archaeologist will monitor ground-disturbing construction activities within the immediate vicinity, defined necessary by the qualified archaeologist, of the archaeological site.

4.3.2 Site 28-Cm-064 (GEHB Site 1), Expanded Boundaries

Site number	28-Cm-064 (expansion)
Date	Woodland Period and Late 17th – Early 20th century
Type	Precontact camp, tool production, and food processing site; historic house midden.
Size	53 m^2 (173 ft^2)
Depth	.5 m (1.5 ft)
Within/Adjacent PAPE	Within the defined PAPE, but between edge of pavement and edge of ROW
Proposed Impacts	The cable may be placed in the road near the site area if this alternate is selected. No direct effects.
Protection/Avoidance Measures	Site protection measures and monitoring will occur.

The qualified archaeologist will install snow fencing and signage around the external limits of the site boundary within a 10-foot buffer of the APE and as mapped in the TARA no more than one week prior to construction. The signage will be demarcated with “Restricted Area” printed on corrugated plastic materials. The sign will be double- sided to ensure visibility. The signage will not denote the area as archaeological in nature. The signage and snow fencing will remain in place during construction activities, with the qualified archaeologist removing it within one week of completion of all construction activities within a 1-mile radius for the Project. The Construction Contractor will be responsible for ensuring the fencing remains in place, and should it fall or be removed, the Construction Contractor will notify the qualified archaeologist within 24-hours. Please note, placement of snow fencing and signage is dependent upon approval from the landowner.

The qualified archaeologist will monitor ground-disturbing construction activities within the immediate vicinity, defined necessary by the qualified archaeologist, of the archaeological site.

4.3.3 Site 28-Cm-091 (Cedar Hollow Historic Site), Newly Identified Site

Site number	28-Cm-091
Date	18th – 19th century
Type	House midden
Size	105 m^2 (1125 ft^2)
Depth	0.35-0.55 m (1-1.5 ft)
Within/Adjacent PAPE	Within the defined PAPE, but between edge of pavement and edge of ROW.
Proposed Impacts	The cable may be placed in the road near the site area if this alternate is selected. No direct effects.
Protection/Avoidance Measures	Site protection measures and monitoring will occur.

The qualified archaeologist will install snow fencing and signage around the external limits of the site boundary within a 10-foot buffer of the APE and as mapped in the TARA no more than one week prior to construction. The signage will be demarcated with “Restricted Area” printed on corrugated plastic materials. The sign will be double- sided to ensure visibility. The signage will not denote the area as

archaeological in nature. The signage and snow fencing will remain in place during construction activities, with the qualified archaeologist removing it within one week of completion of all construction activities within a 1-mile radius for the Project. The Construction Contractor will be responsible for ensuring the fencing remains in place, and should it fall or be removed, the Construction Contractor will notify the qualified archaeologist within 24-hours. Please note, placement of snow fencing and signage is dependent upon approval from the landowner.

The qualified archaeologist will monitor ground-disturbing construction activities within the immediate vicinity, defined necessary by the qualified archaeologist, of the archaeological site.

4.3.4 Site 28-Oc-055, Unnamed Site

Site number	28-Oc-055
Date	Possible Pre-Contact
Type	Shell midden
Size	Approximately 40 m^2 (430 ft^2)
Depth	Unknown
Within/Adjacent PAPE	Possibly mapped the defined PAPE. Site was not relocated during survey
Proposed Impacts	The cable may be placed in the road and near the site area if this alternate is selected. No direct effects.
Protection/Avoidance Measures	Monitoring will occur.

The qualified archaeologist will monitor ground-disturbing construction activities within the immediate vicinity, defined necessary by the qualified archaeologist, of the archaeological site.

4.3.5 Site 28-Oc-249, Oyster Creek Paleoindian Spot Find

Site number	Site 28-Oc-249,
Date	Paleoindian, c. 12,500 B.P.
Type	Spot find
Size	706 m^2 (7,854 ft^2)
Depth	0-40 cm (1.3 ft)
Within/Adjacent PAPE	Within the PAPE, just outside of the proposed limits of disturbance (LOD), as the cable will be buried in this location via HDD. Entry/exit pit approximately 50 feet east of find.
Proposed Impacts	The site will be avoided. No direct effects.
Protection/Avoidance Measures	Site protection measures and monitoring will occur.

The qualified archaeologist will install snow fencing and signage around the external limits of the site boundary as mapped in the TARA no more than one week prior to construction. The signage will be demarcated with “Restricted Area” printed on corrugated plastic materials. The sign will be double-sided to ensure visibility. The signage will not denote the area as archaeological in nature. The signage and snow fencing will remain in place during construction activities, with the qualified archaeologist removing it within one week of completion of all construction activities within a 1-mile radius for the Project. The Construction Contractor will be responsible for ensuring the fencing remains in place, and should it fall or be removed, the Construction Contractor will notify the qualified archaeologist within 24-hours.

The qualified archaeologist will monitor ground-disturbing construction activities within the immediate vicinity, defined necessary by the qualified archaeologist, of the archaeological site.

4.3.6 Site 28-Oc-250, Chamberlain Historic Midden Site

Site number	Site 28-Oc-250,
Date	Historic, c. late 18th-20th centuries
Type	House midden
Size	550 m² (1,800 ft²)
Depth	15-40 cm (0.5-1.3 ft)
Within/Adjacent PAPE	Within the defined PAPE, but between edge of pavement and edge of ROW.
Proposed Impacts	The cable may be placed in the road if this alternate is selected.
Protection/Avoidance Measures	Site protection measures and monitoring will occur.

The qualified archaeologist will install snow fencing and signage around the external limits of the site boundary within a 10-foot buffer of the APE and as mapped in the TARA no more than one week prior to construction. The signage will be demarcated with “Restricted Area” printed on corrugated plastic materials. The sign will be double- sided to ensure visibility. The signage will not denote the area as archaeological in nature. The signage and snow fencing will remain in place during construction activities, with the qualified archaeologist removing it within one week of completion of all construction activities within a 1-mile radius for the Project. The Construction Contractor will be responsible for ensuring the fencing remains in place, and should it fall or be removed, the Construction Contractor will notify the qualified archaeologist within 24-hours.

The qualified archaeologist will monitor ground-disturbing construction activities within the immediate vicinity, defined necessary by the qualified archaeologist, of the archaeological site.

4.3.7 Archaeological Monitoring Along the Export Cable Routes, Including Open Cut Trench Landings and HDD Locations

The qualified archaeologist will monitor ground-disturbing construction activities within archaeologically sensitive areas along the export cable routes. This includes all areas of the export cable routes except areas along Lighthouse Drive, Nautilus Road, and Roosevelt Boulevard.

4.4 Process for Determining if Monitoring a Construction Activity is Necessary

Ground-disturbing construction activities should assume to be monitored; however, consultation with the qualified archaeologist should occur should there be a question whether monitoring is necessary. Questions regarding whether monitoring is necessary must go through the request for information process before proceeding.

4.5 Responsibilities During Construction

The qualified archaeologist will be responsible for confirming that the proper steps are followed to assess and protect cultural resources. The qualified archaeologist has the authority and responsibility to stop work if any previously unidentified cultural resources are encountered. The Cultural Resource Manager will be responsible for coordinating for coordinating logistics for Archaeological Monitors and Tribal Monitors.

The qualified archaeologist will be present where monitoring is required and will be responsible for the recordation of unanticipated discoveries. The qualified archaeologist will be equipped with:

- A digital camera;
- Global Positioning System (GPS) unit capable of submeter accuracy;
- Monitor's daily logs;
- Relevant Project contact information;
- Safety evacuation information.

Other equipment will be determined by the Project design and needs.

To minimize the hazards associated with the archaeological monitoring of construction, there will be close coordination between the archaeological monitors and construction personnel. The qualified archaeologist will be responsible for the following tasks:

- Be present during mechanical tree removal, scraping, grading, excavating, trenching, and other ground-disturbing activities in all required monitoring areas in the Project APE.
- Inspect the newly exposed surface as sediment is moved by heavy equipment.
- Identify cultural materials and ascertain whether the material is archaeological.
- Determine the significance of unanticipated discoveries.
- Consult and coordinate with the BOEM, NJ HPO, and Tribal representatives and/or THPOs in order to mitigate unanticipated discoveries.
- Coordinate with relevant construction personnel when unanticipated discoveries are made.

If cultural remains, or possible human remains are noted, construction activities will be halted within the immediate vicinity of the discovery, in an area defined sufficient by the qualified archaeologist. Construction may proceed in other areas of the Project APE.

Archaeological monitoring will not be required once all surface and subsurface ground-disturbing activity in a construction area is completed. Equipment or vehicles traveling over previously disturbed surfaces will not require monitoring. Routine travel on existing or disturbed areas will not be monitored for cultural resources.

Blading, scraping, grading, trenching, or excavating at a depth beyond the previously disturbed area will be monitored for cultural resources, even within previously graded or bladed areas, where the potential exists for impacting intact subsurface deposits.

4.6 Responsibilities for Reporting

Qualified archaeologists will maintain monitoring records, photographs, and digital data, and will maintain daily logs of Project-related monitoring activities comprising the following:

- Date, time of work, and amount of time spent at a construction monitoring location;
- Area of work;
- Type of work, equipment present, and name of construction crew being monitored;

- Documentation of successful resource avoidance, including a map showing locations of excavations, surface structures, topography, and identified archaeological deposits within the APE;
- Activities for which there are circumstances that limit or prevent visual examination of Project excavations (including delimiting those areas on a Project area map), cultural resource problems, non-compliances, or other concerns;
- Identification of an unanticipated discovery, steps taken to protect the discovery, and documentation of notifications (name, agency, time, and notes); and
- Color digital photographs taken (as appropriate) to document construction and monitoring activities and submitted as attachments to the daily log.

Qualified archaeologists will prepare and provide their monitoring logs daily to the Cultural Resources Manager, who will prepare and provide bi-weekly summary reports on the progress or status of cultural resources-related activities during active construction.

- The bi-weekly reports will summarize construction progress, monitoring (including monitor name, dates worked, finds, issues, etc.), and status of cultural resources-related issues.
- Bi-weekly reports will include photographs of the activities as well as a look-ahead schedule of upcoming activities.
- These reports will also include the appropriate state archaeological isolate or site forms for finds identified under the monitoring program.
- Site forms for any newly discovered properties will include recommendations for National Register of Historic Places (NRHP) eligibility and Project effect.

The Cultural Resources Manager will submit bi-weekly reports to Ocean Wind, BOEM, NJ HPO, and Tribal representatives and/or THPOs via email. BOEM will be notified of all unanticipated finds within 24-hours of discovery via email.

4.7 Detailed Procedures

This section includes detailed information regarding the construction and post-construction tasks to be performed by the qualified archaeologist and other parties, as well as the procedure for documenting and reporting unanticipated discoveries made during construction.

4.7.1 Construction Tasks

While construction activities are ongoing, the qualified archaeologist will observe ground-disturbing activities. If an unanticipated discovery is made and that find is determined significant by the qualified archaeologist, construction work within the site boundary will halt temporarily.

In the event of an unanticipated discovery, the Terrestrial Archaeology Post-Review Discovery Plan will be followed. If the discovery is recommended eligible for the NRHP, the qualified archaeologist will consult with the appropriate agency archaeologist. No construction work will occur at the discovery location until agency concurrence is made and the relevant data recovery is completed.

4.7.2 Post-Construction Tasks

Once the qualified archaeologist has reviewed the condition of the site and documented damage (if any), site-defining, snow fencing and signage will be removed.

5 Artifact Collection and Curation

If artifacts are collected, they will be prepared for curation at the state designated curatorial facility, or as otherwise directed by the NJ HPO and in consultation with BOEM and the Tribal representatives and/or THPOs.

6 Reporting

6.1 Daily Monitoring Logs

All qualified archaeologists will keep daily logs. These logs will capture the Project name and number, which GPS system unit was used, the camera used and associated photograph numbers, the monitor's and any visiting personnel's names, the company whose work is being monitored, the location of the area(s) monitored, the actions monitored (excavation, drilling, etc.), the number of sites (if any) that were monitored and their Smithsonian trinomial, any sites or cultural material discovered while monitoring that day, any safety incidents, and a narrative for the daily activities. In-field recordation will be made digitally for reporting purposes.

6.2 Bi-Weekly Progress Reports

The Cultural Resources Manager will complete a bi-weekly progress report, sent via email, BOEM, NJ HPO, and Tribal representatives and/or THPOs. This progress report will summarize the past two weeks' daily logs and will give a brief outlook for the following two weeks' archaeological monitoring activities. Unexpected discoveries should be noted in the progress report but should not be the primary form of communication for an unexpected discovery (see the Terrestrial Archaeology Post Review Discovery Plan for additional notification procedures).

6.3 Technical Reports

When construction activities have ceased and there is no longer a need for archaeological monitoring, a technical report will be prepared. This report will synthesize all monitoring activities, including photographs of sites before, during, and after construction. For any unanticipated discoveries, the report will cover the treatment activity completed (including excavation summaries if applicable) and any necessary site updates or new site forms created due to ground-disturbing activities.

Technical reports will abide by relevant agency guidelines, and a draft will be submitted within 30 days of archaeological monitoring completion.

7 Federal, State, Tribal, and Project Contacts

7.1 Federal Contacts

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Lead Historian and Section 106 Team Lead
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Sarah.Stokely@boem.gov

7.2 New Jersey State Historic Preservation Office

Katherine J. Marcopul
Deputy State Historic Preservation Officer
501 East State Street
P.O. Box 420, Mail Code 501-04B
Trenton, New Jersey 08609
609-940-4312

7.3 New Jersey State Police and County Medical Examiner Offices

New Jersey State Police
Office of Forensic Sciences
Forensic Anthropology Unit
NJ Forensic Technology Center
1200 Negron Drive - Horizon Center
Hamilton, New Jersey 08691
Phone: (609) 584-5054 x5656

Cape May County Medical Examiner Office
Dr. Eric Duval and Dr. Charles Siebert Jr.
County Medical Examiner
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Phone: (609) 861-3355

Ocean County Medical Examiner Office
County Medical Examiner
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Toms River, New Jersey 08754-2191
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7.4 Tribal Contacts

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Stockbridge-Munsee Community Band of Mohican Indians
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Tribal Historic Preservation Officer

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7.5 Project Contacts

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Cultural Resources Compliance Manager

HDR
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Cultural Resources Lead
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ATTACHMENT 6 – POST-REVIEW DISCOVERY PLAN FOR SUBMERGED CULTURAL RESOURCES FOR THE OCEAN WIND 1 OFFSHORE WIND FARM FOR LEASE OCS A-0498 CONSTRUCTION AND OPERATIONS PLAN

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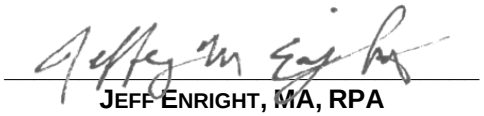
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Post-Review Discovery Plan for Submerged Cultural Resources for the Ocean Wind 1 Offshore Wind Farm for Lease Area OCS A-0498 Construction and Operations Plan

Ocean Wind 1 Offshore Wind Farm

AUTHORED BY

JOSEPH GRINNAN, MA, RPA, BENJAMIN C. WELLS, MA, RPA, AND JEFFREY M. ENRIGHT, MA, RPA



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NOVEMBER 2022

1. Introduction

Ocean Wind LLC (Ocean Wind) proposes to construct and operate the Ocean Wind 1 Offshore Wind Farm (Project) within the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS A-0498 (Lease Area). The Project consists of the Ocean Wind 1 Offshore Wind Farm and two unique offshore export cable route (ECR) corridors, which traverse federal and state waters. The BL England ECR Corridor has a proposed landfall near Ocean City, New Jersey, while the two Oyster Creek ECR corridors have a proposed landfall near Lacey Township, New Jersey. Ocean Wind has submitted a Construction and Operations Plan (COP) for the Project to BOEM to support the development, operation, and eventual decommissioning of Project infrastructure, including offshore wind turbines, offshore substations, array cables, substation interconnector cables, and offshore export cables. SEARCH provided technical expertise to Ocean Wind's environmental consultant, HDR Engineering, Inc. (HDR), by providing a Qualified Marine Archaeologist (QMA) in accordance with Lease Agreement Stipulation Addendum C Section 2.1.1.2.

SEARCH developed this Post-Review Discovery Plan (PRDP) to assist Ocean Wind and its contractors to preserve and protect potential cultural resources from adverse impacts caused by Project construction, operation and maintenance, and decommissioning activities. The PRDP sets forth guidelines and procedures to be used in the event potential submerged cultural resource are encountered during bottom disturbing activities and assists Ocean Wind in its compliance with Section 106 of the National Historic Preservation Act (NHPA) (Title 54 U.S.C. § 306108), Native American Graves Protection and Repatriation Act (Title 25 U.S.C. § 3001 et seg.), Lease OCS A-0498 Lease Stipulations, and other relevant state and local laws as applicable. This PRDP is subject to revisions based on consultations with interested parties pursuant to Section 106 of the National Historic Preservation Act or the Act's implementing regulations at 36 CFR Part 800.

2. Roles and Responsibilities

Implementation of the provisions and procedures in the PRDP will require the coordinated efforts of Ocean Wind and their contractors during all construction, operations and maintenance, and decommissioning activities with the potential to impact the seafloor. The following sections identify key participants in the PRDP and outlines their roles and responsibilities.

2.1 Ocean Wind

Implementation of the provisions and procedures outlined in this plan is ultimately the responsibility of Ocean Wind or its designee, who will be responsible for the following:

- Ensuring procedures and policies outlined in the PRDP and PRDP training materials are implemented;
- Identifying a responsible party within Ocean Wind tasked with overseeing implementation of the PRDP during all project and contractor activities;
- Developing cultural resource and PRDP awareness training programs for all project staff and contractors;
- Requiring all project and contractor staff complete cultural resource and PRDP awareness training;
- Coordinating and facilitating communication between the QMA, project staff, and contractors if a potential cultural resource is encountered during project activities; and
- Participating in and/or facilitating consultations with state and federal agencies (BOEM, New Jersey Historic Preservation Office [NJ HPO], etc…), federally recognized Tribes'/Tribal Nations' Tribal Historic Preservation Offices (THPOs), and other consulting parties, as appropriate.

2.2 Qualified Marine Archaeologist

Ocean Wind's QMA to provide cultural resource advisory services during implementation of the PRDP. The QMA will be responsible for the following:

- Assist Ocean Wind with the development and implementation of the procedures outlined in the PRDP;
- Assist Ocean Wind in developing a cultural resource and PRDP awareness training program and informational graphic;
- Review and document potential submerged cultural resources identified by the project and/or contractor staff;
- Assist Ocean Wind with the Section 106 consultation process that may arise as a result of an unanticipated submerged cultural resource; and
- Conduct archaeological investigation of unanticipated submerged cultural resources following coordination with appropriate consulting parties.

3. Training and Orientation

Ocean Wind will develop a training and orientation program for Project and contractor staff on cultural resources and PRDP awareness prior to the start of bottom disturbing activities. The training will be sufficient to allow Project and contractor staff to identify common types of marine cultural resources and implement the PRDP procedures. The training will be delivered as a standalone training and/or combined with the Project's or contractors' general health and safety (H&S) or environment, health, and safety (EHS) induction training. The training program may include, but not be limited to, the following elements:

- A review of applicable state and federal cultural resource laws and regulations;
- Characteristics of common types of submerged cultural resources found on the Atlantic Outer Continental Shelf (e.g. wooden shipwrecks, metal shipwrecks, downed aircraft, post-Contact artifacts, pre-Contact artifacts, bone and faunal remains, etc.);
- How to identify potential submerged cultural resources during bottom disturbing activities; and
- Procedures to follow and parties to notify if potential submerged cultural resources/materials are encountered during project activities.

The QMA will develop draft cultural resources and PRDP awareness training in coordination with Ocean Wind. The training program will be provided to BOEM, and the NJ HPO for review and comment before the training program is finalized. In additional to the training program, the QMA will generate an informational graphic summarizing the PRDP and the materials discussed in the cultural resources and PRDP awareness training program. The informational graphic will include:

- Images of common types of submerged cultural resources and materials;
- A flow chart depicting the PRDP reporting process;
- A notice to all employees of their stop work authority if potential cultural resources are encountered; and
- Contact information for the Ocean Wind staff responsible for overseeing implementation of the PRDP and the QMA.

The informational graphic will be placed in a conspicuous location on each project and contractor vessel where workers can see it and copies will be made available to project and/or contractor staff upon request.

4. Procedures for when Cultural Material are Observed

To support BOEM's efforts to identify historic properties within the Project's Area of Potential Effects (APE), Ocean Wind conducted an extensive marine archaeological resources assessment (MARA) of the APE. The MARA identified 19 potential submerged cultural resources (Targets 01-19) and 16 ancient submerged landform features (ASLFs) (Targets 20-35) within the APE. Ocean Wind anticipates avoidance of Targets 01-12, 14, and 16-19 and the associated recommended avoidance buffers. Ocean Wind anticipates avoidance of Targets 21-26, 28-31, and 33-35 is not possible. Ocean Wind anticipates construction activities may extend into the avoidance buffers for Targets 13 and 15, but would avoid the actual targets. Additionally, as the final design is not known, the degree of adverse effects to Targets 21-26, 28-31, and 33-35 is currently unknown. Ocean Wind is developing a Mitigation Framework to aid in avoiding, minimizing, and/or mitigating adverse effects upon historic properties.

Even with the extensive preconstruction marine archaeological surveys, it is impossible to ensure that all cultural resources have been identified within the APE. Even at sites that have been previously identified and assessed, there is a potential for the discovery of previously unidentified archaeological components, features, or human remains that may require investigation and assessment. Furthermore, identified historic properties may sustain effects that were not originally anticipated. Therefore, a procedure has been developed for the treatment of unanticipated discoveries that may occur during site development.

The implementation of the final PRDP will be overseen by Ocean Wind and a QMA who meets or exceeds the Secretary of the Interior's Professional Qualifications Standards for Archaeology [48 FR 44738-44739] and has experience in conducting HRG surveys and processing and interpreting data for archaeological potential [BOEM 2020]. See Figure 1 for a flow chart of the communications and notification plan for unanticipated discoveries.

If unanticipated submerged cultural resources are discovered, the following steps should be taken:

1. Per Lease Stipulation 4.2.7.1, all bottom-disturbing activities in the immediate area of the discovery shall cease and every effort will be made to avoid or minimize impacts to the potential submerged cultural resource(s).
2. The project or contractor staff will immediately notify Ocean Wind of the discovery.
3. Ocean Wind will notify the QMA and provide them with sufficient information/documentation on the potential find to allow the QMA to evaluate the discovery and determine if the find is a cultural resource. If necessary, the QMA may request to visit the find site or the vessel that recovered the cultural material to inspect the find. If the find is a cultural resource, the QMA will provide a preliminary assessment as to its potential to be a historic property as defined in 36 CFR Part 800.
4. Per Lease Stipulation 4.2.7.1, BOEM shall be notified of the potential submerged cultural resource within 24 hours of the discovery. Ocean Wind shall also notify the State Historic Preservation Officer (SHPO) of New Jersey, the State Archaeologist, and the Tribal Historic Preservation Officers (THPOs) or other designated representatives of the consulting tribal governments.
5. Within 72 hours of being notified of the discovery, Ocean Wind shall issue a report in writing to BOEM providing available information concerning the nature and condition of the potential submerged cultural resource and observed attributes relevant to the resource's potential eligibility for listing in the National Register of Historic Places (NRHP).
6. Ocean Wind shall consult with BOEM, as feasible, to obtain technical advice and guidance for the evaluation of the discovered cultural resource.
7. If the impacted resource is determined by BOEM to be NRHP eligible, a mitigation plan shall be prepared by Ocean Wind for the discovered cultural resource. This plan must be reviewed by BOEM prior to submission to the NJ HPO and representatives from consulting federally recognized

Tribes/Tribal Nations for their review and comment. The NJ HPO and Tribes/Tribal Nations will review the plan and provide comments and recommendations within a one week, with final comments to follow as quickly as possible.

8. Per Lease Stipulation 4.2.6, Ocean Wind may not impact a known archaeological resource in federal waters without prior approval from BOEM. No development activities in the vicinity of the cultural resource will resume until either a mitigation plan is executed or, if BOEM determines a mitigation plan is not warranted, BOEM provides written approval to Ocean Wind to resume bottom disturbing activities. For discoveries in state waters, Ocean Wind will not impact a known archaeological resource with prior approval from BOEM, and the NJ HPO. If suspected human remains are encountered, the below procedures, which comply with the Advisory Council on Historic Preservation's (ACHP) *Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects*, should be followed.

1. All work in the near vicinity of the human remains shall cease and reasonable efforts should be made to avoid and protect the remains from additional impact. Encountered potential material shall be protected, which may include keeping the remains submerged in an onboard tank of sea water or other appropriate material.
2. The Onboard Representative shall immediately notify the County Medical Examiner, State Archaeologist, the Forensic Anthropology Unit of the New Jersey State Police, and Ocean Wind as to the findings.
3. Ocean Wind will notify the QMA and provide them with sufficient information/documentation on the potential find to allow the QMA to evaluate the discovery and determine if the find is a cultural resource. If necessary, the QMA may request to visit the vessel to inspect the potential human remains. If the find is a cultural resource, the QMA will provide a preliminary assessment. The QMA will document and inventory the remains and any associated artifacts, and assist in coordinating with federal, state, and local officials.
4. A plan for the avoidance of any further impact to the human remains and/or mitigative excavation, reinternment, or a combination of these treatments will be developed in consultation with the State Archaeologist, the NJ HPOBOEM, and appropriate Indian tribes or closest lineal descendants. All parties will be expected to respond with advice and guidance in an efficient time frame. Once the plan is agreed to by all parties, the plan will be implemented.

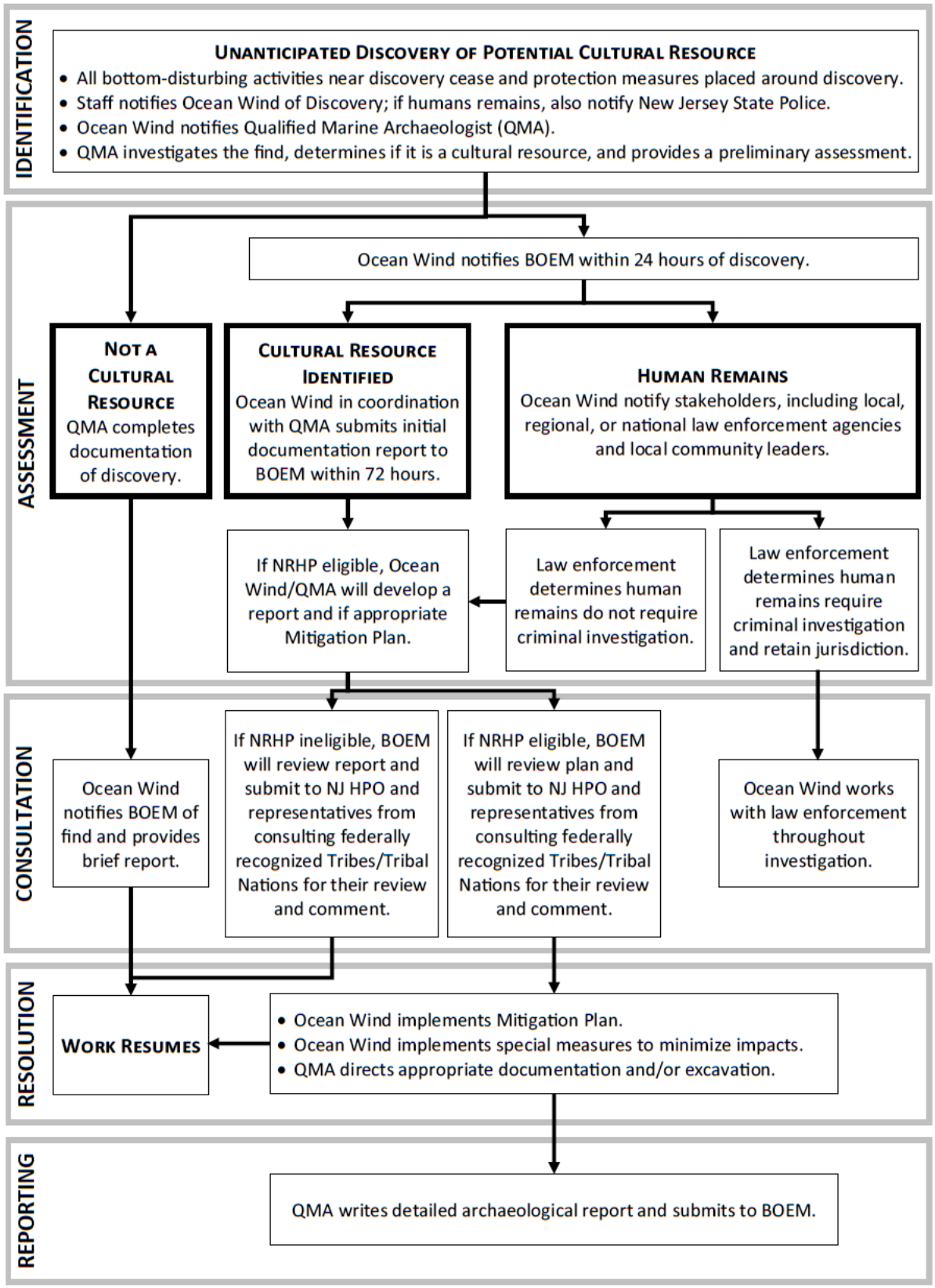


Figure 1. Communications and notification plan for unanticipated discoveries.

5. Archaeological Investigation of a Submerged Unanticipated Discovery

Archaeological investigation of a submerged unanticipated discovery may be necessary in order to evaluate the find, determine its eligibility for listing in the NRHP, and/or assess any construction impacts that may have occurred. The following is a recommended procedure for complying with the PRDP and providing the BOEM, and NJ HPO with the necessary information to make informed decisions to approve continuation of bottom disturbing activities. After each step, consultation among the appropriate parties will occur.

1. Initial assessment of unanticipated discovery via a refined HRG survey and/or ROV investigation (Phase Ia reconnaissance survey).
    a. May result in no further recommended action (i.e., target is not a historic property) or additional investigation.
2. Develop an avoidance zone based upon Step 1.
    a. Minimally, construction activity will remain outside of the avoidance zone for a period of time necessary to allow archaeological investigation, if required.
    b. Determine whether construction activity can remain outside of the avoidance zone permanently.
3. Identify the source, delineate the site boundary, and assess potential impacts that led to the unanticipated discovery (Phase Ib identification).
    a. Accomplished utilizing archaeological/scientific diving and/or ROV investigation.
    b. May result in no further recommended action (i.e., target is not a historic property) or additional investigation.
4. Determine eligibility for listing in the NRHP (Phase II NRHP evaluation).
    a. Accomplished utilizing archaeological/scientific diving.
    b. May require extensive excavation.
    c. May require archival research.
5. Develop a strategy to resolve adverse effects to the historic property that occurred as a result of the unanticipated discovery and to minimize or mitigate potential future adverse effects as construction proceeds.
6. On-site monitoring of bottom disturbing activities at the location.

Not all of these steps may be necessary, and the appropriate course of action will be determined at the time of discovery and in consultation with BOEM, and if applicable, NJ HPO.

6. Notification List

Contacts and a communication plan will be updated and provided during training.

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Eastern Shawnee Tribe of Oklahoma Mr. Brett Barnes Cultural Preservation Director 70500 East 128 Road, Wyandotte, OK 74370 Phone: (918) 238-5151	The Delaware Nation Ms. Carissa Speck Historic Preservation Director P.O. Box 825 Anadarko, OK 73005 Phone: (405).247-2448 Ext. 1403 cspeck@delawarenation-nsn.gov	Lenape Tribe of Delaware 4164 N. Dupont Hwy., Suite 6 Dover, DE 19901-1573 302-730-4601
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Shawnee Tribe Ms. Tonya Tipton Tribal Historic Preservation Officer P.O. Box 189 29 S Hwy 69A Miami, OK 74355 Phone: (918).542-4030 x124 tonya@shawnee-tribe.com	Nanticoke Indian Association, Inc. Natasha Carmine 27073 John J Williams Highway Millsboro, DE 19966 info@nanticokeindians.org 302.945.3400	Nanticoke Lenni-Lenape Tribal Nation Mark Gould Principal Chief/Chariman 18 E Commerce Street Bridgeton, NJ 08302 tribalcouncil@nlltribe.com 856.455.6910

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New Jersey State Police Office of Forensic Sciences Forensic Anthropology Unit NJ Forensic Technology Center 1200 Negron Drive - Horizon Center Hamilton, NJ 08691 Phone: (609) 584-5054 x5656	Cape May County Medical Examiner Office Dr. Eric Duval and Dr. Charles Siebert Jr. County Medical Examiner 1175 DeHirsch Avenue Woodbine, NJ 08270 Phone: (609) 861-3355	Ocean County Medical Examiner Office County Medical Examiner P.O. Box 2191, Sunset Avenue Toms River, NJ 08754-2191 Phone: (732) 341-3424

7. References Cited

Advisory Council on Historic Preservation's (ACHP)

2007 *Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects*. https://www.achp.gov/sites/default/files/policies/2018-06/ACHPPolicyStatementRegardingTreatmentofBurialSitesHumanRemainsandFuneraryObjects0207.pdf, Digital article accessed December 9, 2021.

Bureau of Ocean Energy Management (BOEM)

2020 *Guidelines for Providing Archaeological and Historical Property Information Pursuant to 30 CFR Part 585.* United States Department of the Interior, Office of Renewable Energy Programs.

ATTACHMENT 7 – POST-REVIEW DISCOVERY PLAN FOR TERRESTRIAL RESOURCES FOR THE OCEAN WIND 1 OFFSHORE WIND FARM FOR LEASE AREA OCS A-0498 CONSTRUCTION AND OPERATIONS PLAN

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Post-Review Discovery Plan for Terrestrial Resources for the Ocean Wind 1 Offshore Wind Farm for Lease Area OCS A-0498 Construction and Operations Plan

Ocean Wind 1 Offshore Wind Farm

AUTHORED BY

HDR

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1. Introduction

Ocean Wind LLC (Ocean Wind), an affiliate of Ocean Wind Power North America LLC (Ocean Wind) is developing the Ocean Wind 1 Offshore Wind Farm Project (Project) pursuant to the Bureau of Ocean Energy Management (BOEM) requirements for the commercial lease of submerged lands for renewable energy development on the outer continental shelf (Lease Area OCS-A 0498).

The purpose of the Project is to develop an offshore wind generation project within the BOEM Lease Area, to deliver competitively priced renewable energy and additional capacity to meet State and regional renewable energy demands and goals.

The Project includes up to 98 wind turbine generators (WTGs), up to three offshore alternating current substations, array cables linking the individual turbines to the offshore substations, substation interconnector cables linking the substations to each other, offshore export cables, an onshore export cable system, two onshore substations, and connections to the existing electrical grid in New Jersey (underground cables or overhead transmission lines would be required to connect each onshore substation to the existing grid). The WTGs and offshore substations, array cables, and substation interconnector cables will be located in Federal waters approximately 13 nautical miles (nm, 15 statute miles) southeast of Atlantic City. The offshore export cables will be buried below the seabed surface within Federal and State waters. The onshore export cables, substations, and grid connections are intended to be located in Ocean, and Cape May Counties, New Jersey. The Project location is depicted in Figure 1-1. The Project will be installed beginning in 2023 and operational in 2024.

Section 106 of the National Historic Preservation Act (Section 106, 54 USC 306108) requires federal agencies to take into account the effects of an undertaking on historic properties listed in or eligible for the National Register of Historic Places (NRHP). As the lead federal agency for this undertaking, BOEM has the responsibility for compliance with the NHPA and other federal statutes, regulations, and guidance relating to the protection of historic properties. Similarly, the State of New Jersey has promulgated regulations and guidance related to the protection of historic properties, including the properties listed in the State Register of Historic Places (SRHP). Ocean Wind is committed to the protection of historic properties in accordance with federal and state statues, regulations, and appropriate guidance.

To support BOEM's efforts to identify historic properties within the Project's Area of Potential Effects (APE), Ocean Wind has undertaken cultural resources studies to identify historic properties that may be affected by construction and operation of the Project. No archaeological properties listed in, eligible for, or recommended as eligible for inclusion in the NRHP or SRHP have been identified within the APE for terrestrial archaeological resources, and a majority of the APE has been previously disturbed by prior anthropogenic activity. Notwithstanding these conditions, Ocean Wind recognizes that it is possible that significant and unanticipated archaeological resources and/or human remains may be discovered during construction of onshore facilities, primarily during excavation. Ocean Wind also recognizes the importance of complying with federal, state, and municipal laws and regulations regarding the treatment of human remains, if any are discovered.

This Terrestrial Post-Review Discovery Plan (PRDP) outlines the protocol/steps for dealing with potential unanticipated discoveries of cultural resources, including human remains, during the construction of the proposed Project.

The Protocol:

1. Presents to regulatory and review agencies the protocol the Lessee and its contractors and consultants will follow to prepare for and potentially respond to unanticipated cultural resource (i.e., terrestrial archaeological) discoveries; and

2. Provides guidance and instruction to Ocean Wind personnel and its contractors and consultants as to the proper procedures to be followed in the event of an unanticipated cultural resource (i.e., terrestrial archaeological) discovery.

The following terms are used throughout the Protocol:

- The Facility: The Facility collectively refers to all components of the onshore portions of the Project.

- Unanticipated Discovery/Unanticipated Cultural Resource Discovery: Any indications of the presence of archaeological materials including historic-period or pre-contact Native American artifacts, stone features, animal bone, and/or human remains. Common historic-period artifacts encountered may include bottles/glass, pottery/ceramics, stone foundations, hand-dug wells, brick, nails, miscellaneous metal fragments, or charcoal or ash-stained soils. Common pre-contact Native American artifacts encountered may include arrowheads/spearheads, stone (chert or "flint") chips or flakes, charcoal or ash-stained soils, rough gray, black, or brown pottery, and other stone tools/artifacts of obvious human origin.

- Potential Human Remains: Any indications of potential human remains, such as bones or bone fragments, that cannot definitely be determined to be non-human.

- Preliminary Area of Potential Effect (PAPE): All areas of potential soil disturbance associated with the construction and operation of the proposed Facility.

- Cultural Resources Compliance Manager (CRCM): The Lessee's designated on-site staff person responsible for monitoring compliance with permitting conditions and commitments during construction.

- Archaeologist: The Lessee's Secretary of the Interior (SOI) qualified cultural resources consultant. Review of any potential unanticipated discoveries will be conducted under the supervision of a Registered Professional Archaeologist (RPA).

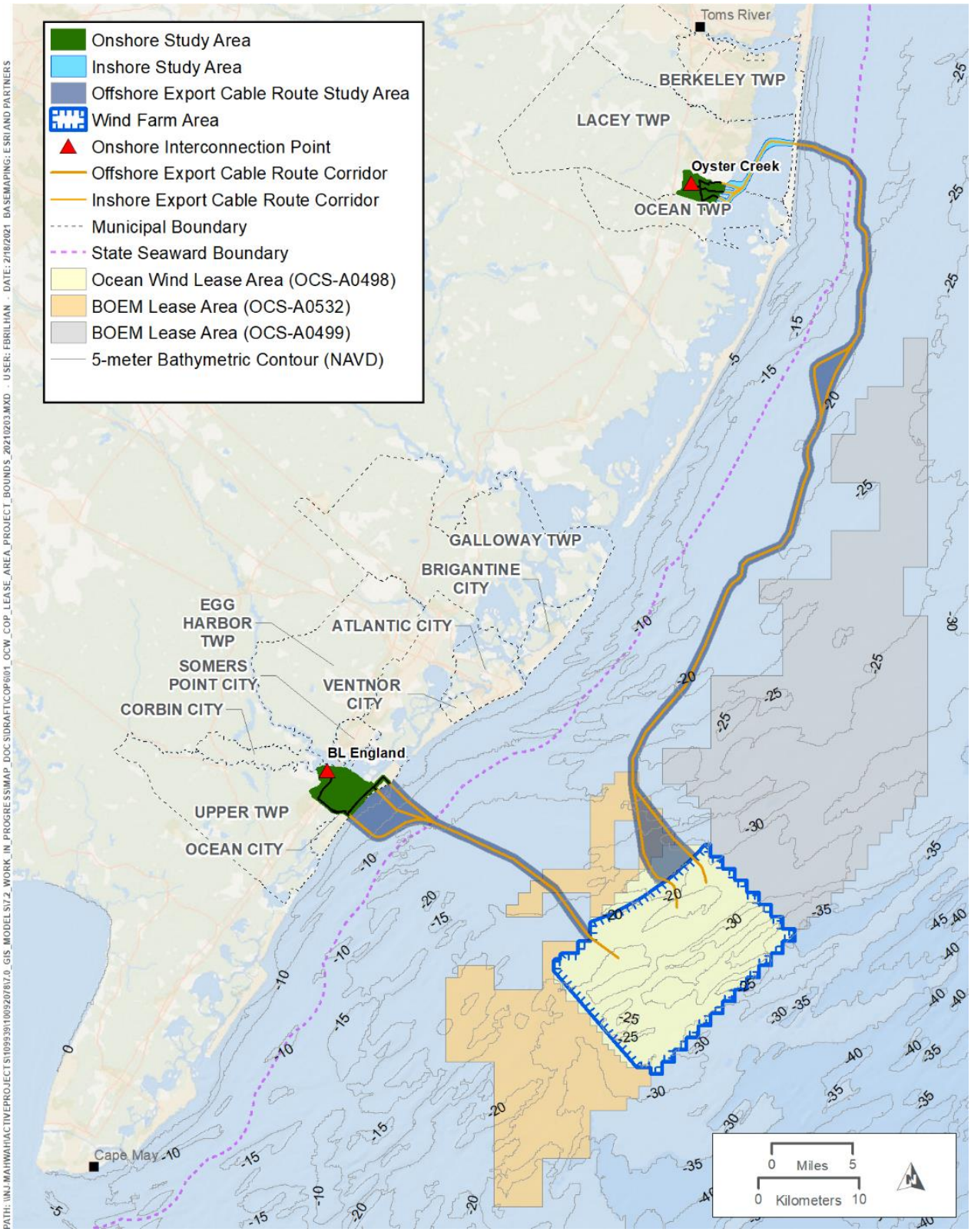


Figure 1-1. Lease Area and Project boundaries

2. Laws, Regulations, Standards, and Guidelines Relating to Unanticipated Discoveries of Archaeological Resources and/or Human Remains

- Section 106 of the National Historic Preservation Act of 1966, as amended (54 USC 300101) and Advisory Council on Historic Preservation (ACHP) implementing regulations (36 CFR 800);
- Secretary of the Interior's Standards for Archeology and Historic Preservation (48 CFR 44716-42);
- ACHP Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects (2007);
- Native American Graves Protection and Repatriation Act (NAGPRA)(25 USC 3001 et seq.);1 and
- New Jersey Register of Historic Places Act (New Jersey Administrative Code, Section 7:4).

3. Training and Orientation

The identification of archaeological resources, human remains, and burial sites is facilitated by training and orientation. All Project inspectors, resident engineers, and construction supervisors working on the Project's onshore excavation activities will be given basic training to facilitate their identification of archaeological sites, artifacts, features, and human remains prior to the start of Project-related excavation or construction activities. The training will be given by a SOI qualified archaeologist[2]. Additional training will be conducted on an as-needed basis (e.g., for new construction supervisors) during Project construction.

The purpose of this training will be to review Ocean Wind's to provide an overview of the general cultural history of the Project area, so that both Ocean Wind employees and contractors will be aware of the types of archaeological resources that may be encountered in the field. In addition, the training program will emphasize the protocols to be followed, as outlined in this PRDP, regarding actions to be taken and notification required in the event of an unanticipated discovery of archaeological resources and/or human remains.

4. Cultural Resources Compliance Manager

Prior to the start of excavation or other ground-disturbing activities, Ocean Wind will designate a Cultural Resources Compliance Manager (CRCM) to coordinate compliance activities described in the PRDP including:

- Maintaining records related to unanticipated discoveries of archaeological resources and/or human remains, including records relating to the notification of appropriate parties, consultation, archaeological investigations, work stoppages, avoidance areas, and treatment or disposition of unanticipated discoveries; and
- Coordinating training in accordance with Section 3 of the PRDP, including maintaining records of the qualifications of the archaeologist conducting the training, the names of employees or contractors that have completed the training, and the date the training was completed.

The CRCM will serve as the point-of-contact for all activities conducted in accordance with the PRDP and will have authority to stop work as needed to comply with the PRDP.

[1] Pursuant to 43 CFR Part 10, NAGPRA applies to human remains, sacred objects, and items of cultural patrimony (described as "cultural items" in the statute) located on federal or tribal lands or in the possession and control of federal agencies or certain museums. The Project's onshore infrastructure will not occupy federal or tribal lands. Notwithstanding the limits of NAGPRA's applicability, the principles described in NAGPRA and its implementing regulations will serve as guidance should remains or associated artifacts be identified as Native American, and to the extent such principles and procedures are consistent with any other applicable laws, guidelines, statutes, and requirements.

[2] As used in this PRDP, an "archaeologist" is an archaeologist who meets the Secretary of the Interior's Professional Qualification Standards for Archaeology (48 FR 44738 – 44739, September 1983).

5. Unanticipated Discovery Procedures

Although unlikely, there is the potential that undocumented archaeological resources may be inadvertently discovered during the course of Project construction activities. The procedures described in this section provide protocols for the inadvertent discovery of archaeological resources and the treatment of human remains during onshore construction. Ocean Wind will consult BOEM and other parties as necessary to determine if oversight of ground clearing activities by a SOI Qualified Archaeologist is warranted and the specific project locations where oversight is necessary based on the potential sensitivity for an unanticipated archaeological discovery.

5.1 Procedures for Unanticipated Archaeological Discoveries

1. SOI qualified professional archaeologist will initially monitor all construction activities that could potentially impact archaeological deposits. Monitoring will be discontinued as soon as the archaeologist is satisfied that final construction will not disturb important deposits.
2. In the event that suspected archaeological resources are discovered during a construction activity, that activity shall immediately be halted until it can be determined whether the archaeological resources may represent a potentially significant site.
3. The employee(s) and/or contractor(s) will immediately notify the CRCM of the suspected unanticipated discovery.
4. The CRCM will direct ground-disturbing activities to be halted in an appropriate vicinity of the discovery. The area of work stoppage will be adequate to provide for the security, protection, and integrity of the potential resource. Vehicles, equipment, and unauthorized personnel will not be permitted to access the discovery site. At minimum, the immediate area of any terrestrial archaeological discovery will be protected by a temporary barrier and the location will be marked on Project maps as a restricted area.
5. The CRCM will notify an archaeologist who will in turn be responsible for determining whether a site visit is required. That determination may be made by viewing photographs of any object or soil discolorations sent to the archaeologist in combination with a verbal description from the CRCM.
6. If the archaeologist determines a site visit is not required as the reported discovery of archaeological resources is determined by the archaeologist to not be a potentially significant archaeological resource, the archaeologist will notify the CRCM who will then notify the employee(s) and/or contractor(s) to resume work.
7. If the archaeologist determines that a site visit is necessary, the site visit will be conducted within 48 hours of notification by the CRCM.
8. If a site visit is necessary, the archaeologist will conduct limited investigations to make a preliminary identification and assessment of the find. This may include photos, measurements, and limited hand excavation. The archaeologist will provide a summary report and initial recommendations within 72 hours of completing the site visit.
9. The CRCM will provide the qualified archaeologist's summary report and initial recommendations to the New Jersey State Historic Preservation Office (NJSHPO), and (as appropriate)[3] the Absentee-Shawnee Tribe of Indians of Oklahoma, The Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Shawnee Tribe, Stockbridge-Munsee Community Band of Mohican Indians, Narragansett Indian Tribe, Shinnecock Indian Nation, Lenape Tribe of Delaware , Nanticoke Indian Association, Inc., Nanticoke Lenni-Lenape Tribal Nation, Powhatan Renape Nation, Ramapough Lenape Indian Nation, and Ramapough Mountain Indians.

[3] Notification of and consultation with the Indian Tribes is appropriate when archaeological resources may be related to Native American use or occupation of the area.

10. Ocean Wind will consult with appropriate Parties to determine the treatment of the site. As necessary, and in consultation with the appropriate Parties, Ocean Wind may direct the archaeologist to conduct additional archaeological investigations and/or evaluate the site's eligibility for inclusion in the NRHP and SRHP.
11. Work in the vicinity of the resource will proceed once a Treatment Plan has been approved by the NJSHPO or the site is determined to be ineligible for the NRHP or SRHP.

Duration of any work stoppages will be contingent upon the significance of the identified archaeological resource(s) and consultation with appropriate Parties to determine the appropriate measures to avoid, minimize, or mitigate any adverse effects to the site.

5.2 Procedures for the Unanticipated Discovery of Human Remains

Treatment and disposition of any human remains that may be discovered will be managed in a manner consistent with NAGPRA (see footnote 1) and the ACHP's 2007 *Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects*. At all times, human remains will be treated with the utmost dignity and respect.

1. In the event that suspected human remains or a burial site are discovered during a construction activity, that activity shall immediately be halted.
2. The employee(s) and/or contractor(s) will immediately notify the CRCM of the suspected unanticipated discovery of human remains.
3. The CRCM will immediately direct any ground-disturbing activities to be halted within a minimum of 100 feet of the discovery. The immediate area of any human remains or suspected human remains will be protected by a temporary barrier and the location will be marked on Project maps as a restricted area.
4. The CRCM will notify the New Jersey State Police and the Medical Examiner with jurisdiction in the county and will arrange for inspection of the site.
5. The Medical Examiner and law enforcement will make an official determination on the nature of the remains, being either forensic or archaeological.
6. If the remains are determined to be forensic in nature, the Medical Examiner and law enforcement will notify Ocean Wind when work in the area may resume.
7. If human remains are determined to be archaeological and Native American, the CRCM will contact the Parties, and the remains will be left in place and protected from further disturbance until a plan for their avoidance or removal can be developed in coordination with the landowner and Parties. Results of this consultation will be documented in writing. Avoidance is the preferred option and remains will only be removed following written concurrence from the NJSHPO.
8. If human remains are determined to be archaeological and non-Native American, the CRCM will contact the NJSHPO, and the remains will be left in place and protected from further disturbance until a plan for their avoidance or removal can be developed in coordination with the landowner and NJSHPO. Results of this consultation will be documented in writing. Avoidance is the preferred option and remains will only be removed following written concurrence from the NJSHPO Avoidance is the preferred choice.
9. In all cases, due care will be taken in the excavation and subsequent transport and storage of the remains to ensure their security and respectful treatment.

6. Notification List

Contacts and a communication plan will be updated and provided during training.

Ocean Wind Katharine Perry Environmental Manager 917-524-4633	Bureau of Ocean Energy Sarah Stokely Lead Historian and Section 106 Team Lead Bureau of Ocean Energy Management Office of Renewable Energy Programs 45600 Woodland Road, VAM-OREP Sterling, Virginia 20166	New Jersey State Historic Preservation Office 501 E. State Street Trenton, NJ 08609 609-984-0176
Ocean Wind Compliance Manager TBD	The Shinnecock Indian Nation Ms. Shavonne Smith Director, Shinnecock Environmental Department PO Box 5006 Southampton NY 11969 Phone: (631) 283-6143 ShavonneSmith@shinnecock.org Jeremy Dennis, Junior THPO P.O. Box 2338 Southampton NY 11968 jeremynative@gmail.com (631) 566-0486	The Narragansett Indian Tribe Mr. John Brown Tribal Historic Preservation Officer P.O. Box 268 Charlestown, RI 02813 Phone: (401).364-1100 tashtesook@aol.com
Eastern Shawnee Tribe of Oklahoma Mr. Brett Barnes Cultural Preservation Director 70500 East 128 Road, Wyandotte, OK 74370 Phone: (918) 238-5151	The Delaware Nation Ms. Carissa Speck Historic Preservation Director P.O. Box 825 Anadarko, OK 73005 Phone: (405).247-2448 Ext. 1403 cspeck@delawarenation-nsn.gov	Lenape Tribe of Delaware 4164 N. Dupont Hwy., Suite 6 Dover, DE 19901-1573 302-730-4601

Delaware Tribe of Indians Ms. Susan Bachor Historic Preservation Representative Delaware Tribe Historic Preservation Office 126 University Circle Stroud Hall, Rm. 437 East Stroudsburg PA 18301 610.761.7452 sbachor@delawaretribe.org	Absentee-Shawnee Tribe of Indians of Oklahoma Mr. Devon Frazier Tribal Historic Preservation Officer 2025 South Gordon Cooper Drive Shawnee, OK 74801 405.275.4030 x6243 dfrazier@astribe.com	Stockbridge-Munsee Community Band of Mohican Indians Mr. Nathan Allison Tribal Historic Preservation Officer Stockbridge-Munsee Mohican Tribal Historic Preservation Extension Office 86 Spring Street Williamstown, MA 01267 Phone: (413).884-6029 nathan.allison@mohican-nsn.gov
Shawnee Tribe Ms. Tonya Tipton Tribal Historic Preservation Officer P.O. Box 189 29 S Hwy 69A Miami, OK 74355 Phone: (918).542-4030 x124 tonya@shawnee-tribe.com	Nanticoke Indian Association, Inc. Natasha Carmine 27073 John J Williams Highway Millsboro, DE 19966 info@nanticokeindians.org 302.945.3400	Nanticoke Lenni-Lenape Tribal Nation Mark Gould Principal Chief/Chairman 18 E Commerce Street Bridgeton, NJ 08302 tribalcouncil@nlltribe.com 856.455.6910
Powhatan Renape Nation Barabara Jefferson New Jersey Commission on American Indian Affairs, Commission Member, Representing Powhatan Renape Tribe NJ Commission on Indian Affairs, PO Box 300 Trenton, NJ 08625 609.633.9627	Ramapough Lenape Indian Nation Steven Burton89 New Jersey Commission on American Indian Affairs, Commission Member, Representing Ramapough Lenape Indian Nation NJ Commission on Indian Affairs, PO Box 300 Trenton, NJ 08625 609.633.9627	Ramapough Mountain Indians Dwaine Perry Chief 189 Stag Hill Road Mahwah, NJ 07430
New Jersey State Police Office of Forensic Sciences Forensic Anthropology Unit NJ Forensic Technology Center 1200 Negron Drive - Horizon Center Hamilton, NJ 08691 Phone: (609) 584-5054 x5656	Cape May County Medical Examiner Office Dr. Eric Duval and Dr. Charles Siebert Jr. County Medical Examiner 1175 DeHirsch Avenue Woodbine, NJ 08270 Phone: (609) 861-3355	Ocean County Medical Examiner Office County Medical Examiner P.O. Box 2191, Sunset Avenue Toms River, NJ 08754-2191 Phone: (732) 341-3424

ATTACHMENT 8 – MITIGATION FUNDING AMOUNTS PROPOSED BY SIGNATORIES AND CONSULTING PARTIES

The mitigation measures proposed in Stipulation III have been developed by individuals who meet the qualifications specified in the SOI's Qualifications Standards for Archaeology, History, Architectural History, and/or Architecture (36 CFR 61). The proposed mitigation measures consider the nature, scope, and magnitude of adverse effects caused by the Project, the qualifying characteristics of each historic property that would be affected. The following funding amounts were considered by signatories, invited signatories, and consulting parties for historic properties mitigation measures based on budgets proposed by lessee for each mitigation effort. These budgets are good faith estimates, based on the experience of these qualified consultants with similar activities and comparable historic properties. The proposed level of funding is appropriate to accomplish the identified preservation goals and result in meaningful benefits to the affected properties, resolving adverse effects.

- Marine APE
    - $2,217,238 for mitigation to resolve adverse effects at the 13 ASLFs (Targets 21–26, 28–31, and 33–35), including Pre-construction Geoarchaeology ($1,875,758), Open Source GIS and Story Maps ($150,000), ASLF Post-Construction Seafloor Inspection ($1,540,000), and Ethnographic Study ($191,480).

The mitigation measures outlined in the MOA for Absecon Lighthouse, Atlantic City Boardwalk (Atlantic City), and Lucy the Margate Elephant (NHL) as well as for multi-property mitigation have been developed by individuals who meet the qualifications specified in the SOI's Qualifications Standards for Archeology, History, Architectural History, and/or Architecture (36 CFR 61) in consultation with the consulting parties.

- $55,000 for mitigation of adverse effects at the Absecon Lighthouse through:
    - Contribution to support planned, preservation-related rehabilitation activities at the lighthouse.
- $140,000 for mitigation of adverse effects at the Atlantic City Boardwalk through:
    - Contribution to support planned, preservation-related improvements to the boardwalk.
- $170,000 for mitigation of adverse effects at Lucy the Margate Elephant (NHL) through:
    - Contribution to support planned, preservation-related visitor center upgrades and site improvements.
- $175,000 to draft the following multi-property and multi-county mitigation measures:
    - Historic context addressing early 20th century New Jersey Shore Hotels to resolve adverse effects to Brigantine Hotel, Atlantic County, Ritz-Carlton Hotel, Atlantic County, and Flanders Hotel, Cape May County.
    - Historic context addressing mid-20th century New Jersey High-Rises to resolve adverse effects to Riviera Apartments, Atlantic City and Vassar Square Condominiums, Atlantic County.
    - Historic context addressing Boardwalks of the New Jersey Shore, with Surveys and Evaluations of Atlantic City Boardwalk, Ocean City Boardwalk, and Wildwood Boardwalk to resolve adverse effects to the Atlantic City Boardwalk and Ocean City Boardwalk.

These mitigation measures for the Ocean City Boardwalk, Ocean City Music Pier, Atlantic City Convention Hall (NHL), Flanders Hotel, U.S. Lifesaving Station #35, North Wildwood Lifesaving Station, Hereford Inlet Lighthouse, Brigantine Hotel, Ritz-Carlton Hotel, Riviera Apartments, Vassar Square Condominiums, 114 S Harvard Avenue, Great Egg Coast Guard Station, and U.S. Coast Guard

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Station #119, were proposed by lessee and circulated by BOEM in HPTPs to consulting parties. These mitigation measures have been developed by individuals who meet the qualifications specified in the SOI's Qualifications Standards for Archeology, History, Architectural History, and/or Architecture (36 CFR 61).

- $140,000 for mitigation of adverse effects at the Ocean City Boardwalk.
- $145,000 for mitigation of adverse effects at the Ocean City Music Pier.
- $170,000 for mitigation of adverse effects at the Atlantic City Convention Hall (NHL).
- $50,000 for mitigation of adverse effects at the Flanders Hotel.
- $55,000 for mitigation of adverse effects at U.S. Lifesaving Station #35.
- $55,000 for mitigation of adverse effects at the North Wildwood Lifesaving Station.
- $50,000 for mitigation of adverse effects at the Hereford Inlet Lighthouse.
- $65,000 for mitigation of adverse effects at the Brigantine Hotel.
- $65,000 for mitigation of adverse effects at the Ritz-Carlton Hotel.
- $70,000 for mitigation of adverse effects at the Riviera Apartments.
- $70,000 for mitigation of adverse effects at the Vassar Square Condominiums.
- $55,000 for mitigation of adverse effects at 114 S Harvard Avenue.
- $45,000 for mitigation of adverse effects at the Great Egg Coast Guard Station.
- $45,000 for mitigation of adverse effects at U.S. Coast Guard Station #119.

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ATTACHMENT B
FIGURES

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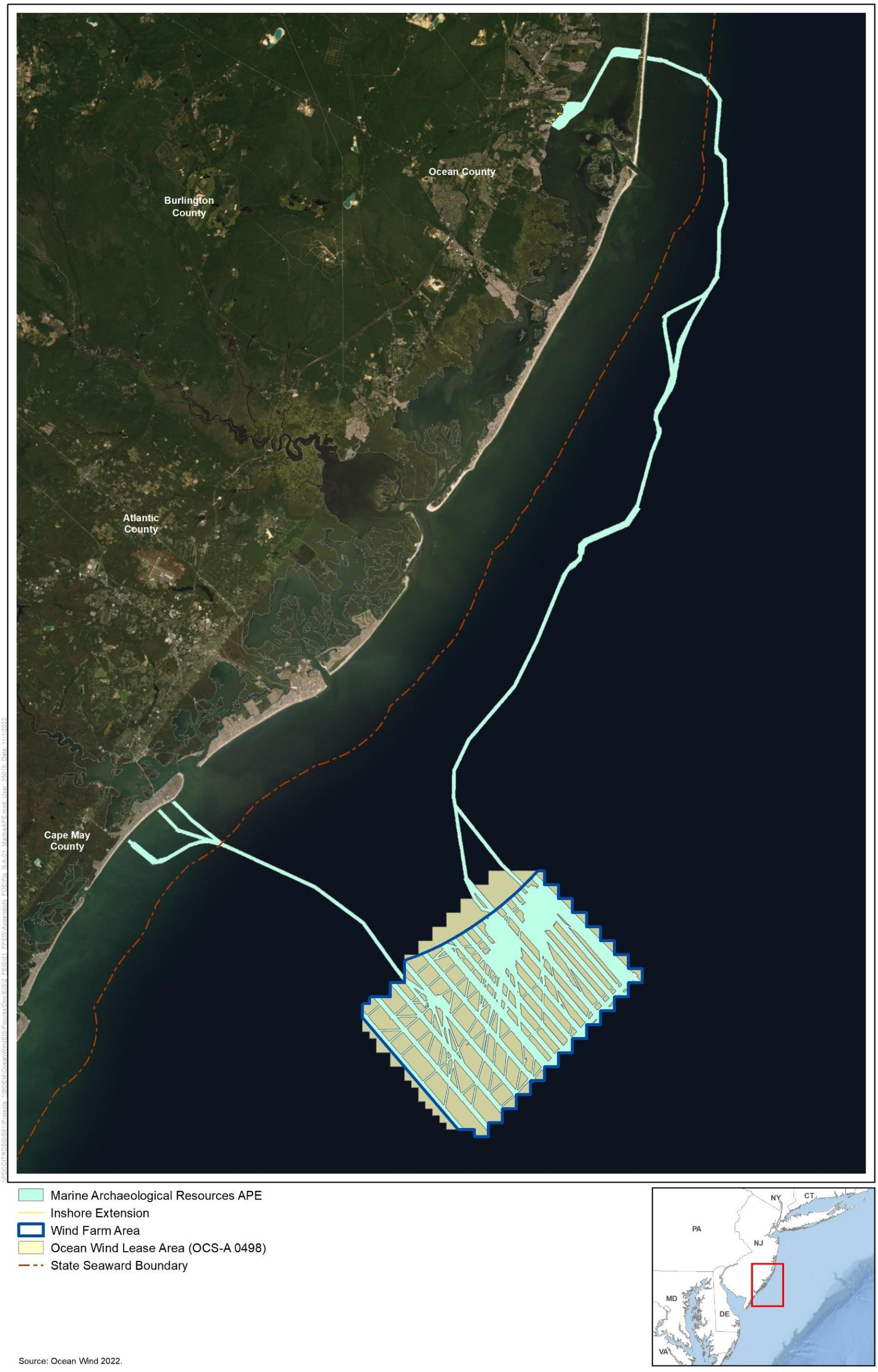


Figure 1 Marine Archaeological Resources APE for Activities within the Lease Area



Figure 2 Marine Archaeological Resources APE for Activities within the Oyster Creek Export Cable Route Corridor



Figure 3 Marine Archaeological Resources APE for Activities within the BL England Export Cable Route Corridor

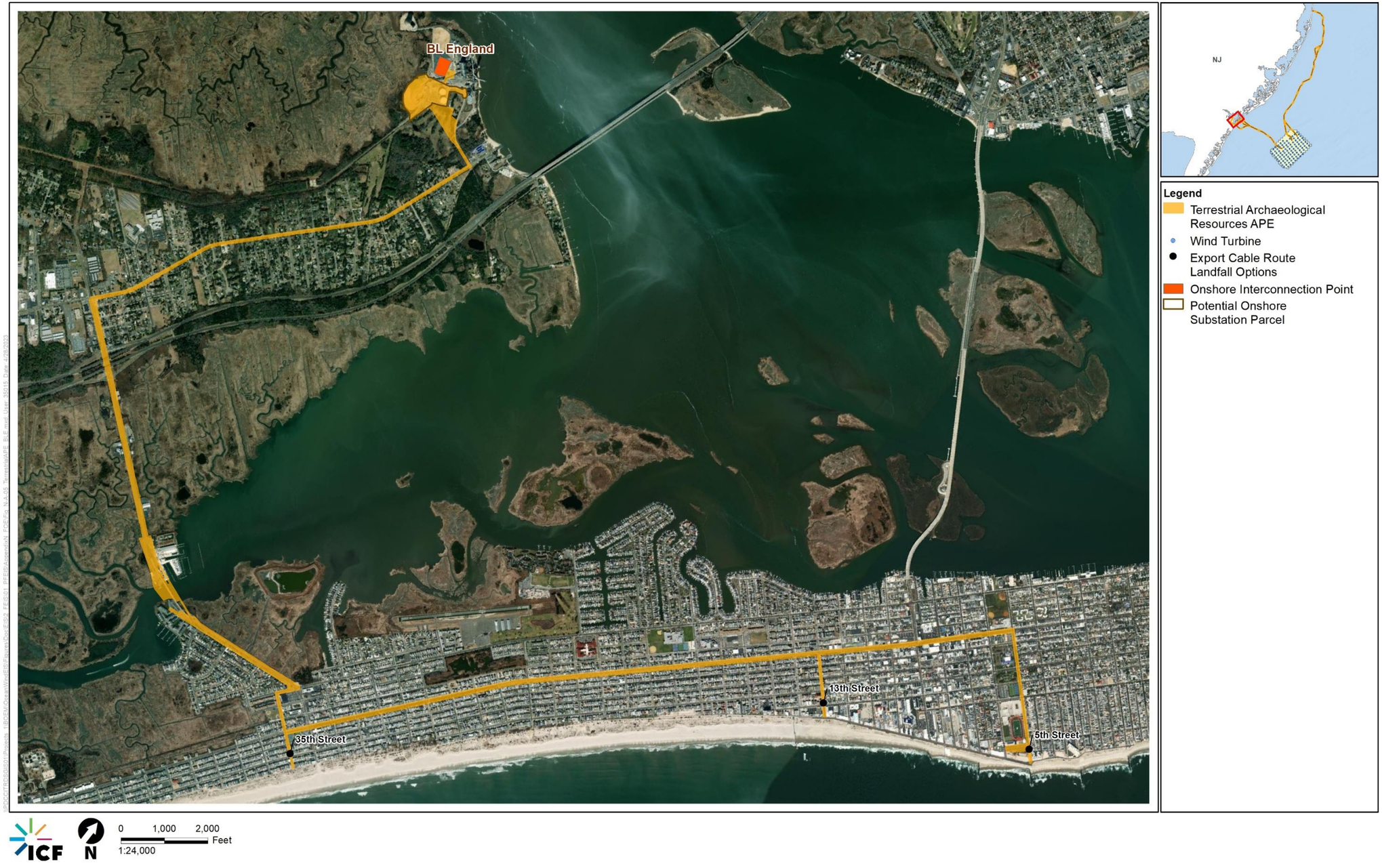


Figure 4 Terrestrial Archaeological Resources APE with Onshore Cable and Landfall Site Alternatives for BL England



Figure 5 Terrestrial Archaeological Resources APE with Onshore Cable and Landfall Site Alternatives for Oyster Creek

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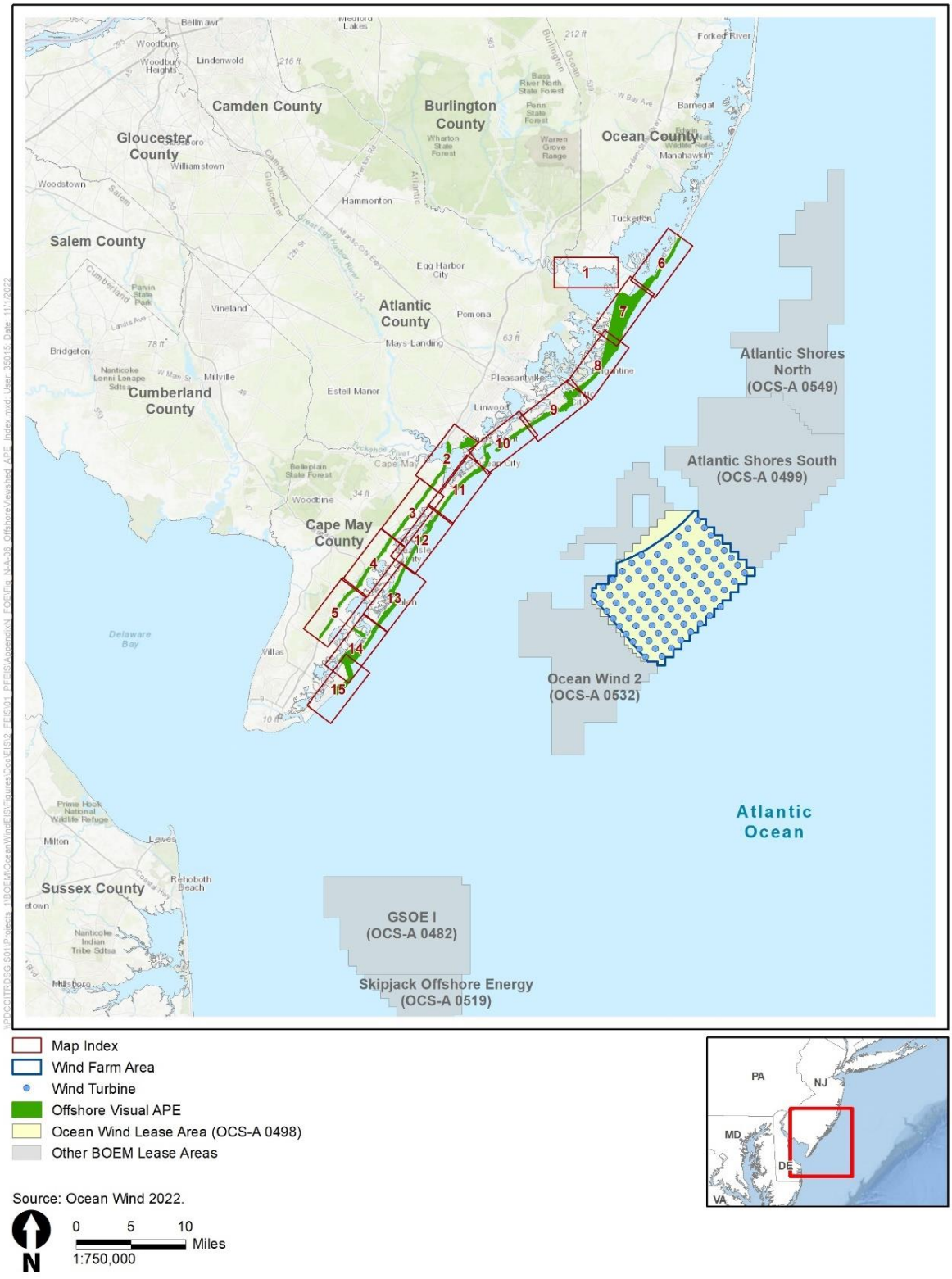


Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Index

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Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 1

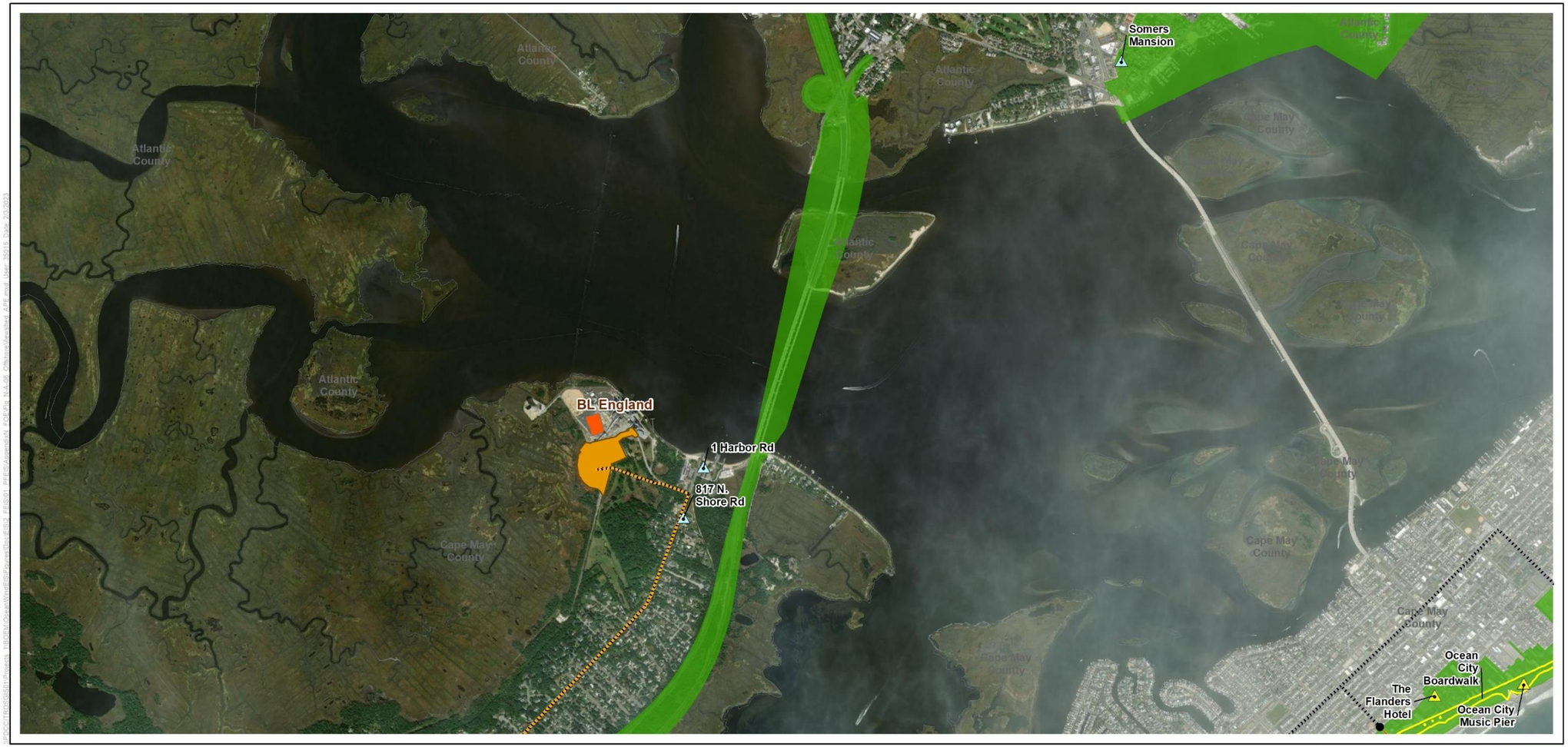


Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 2**

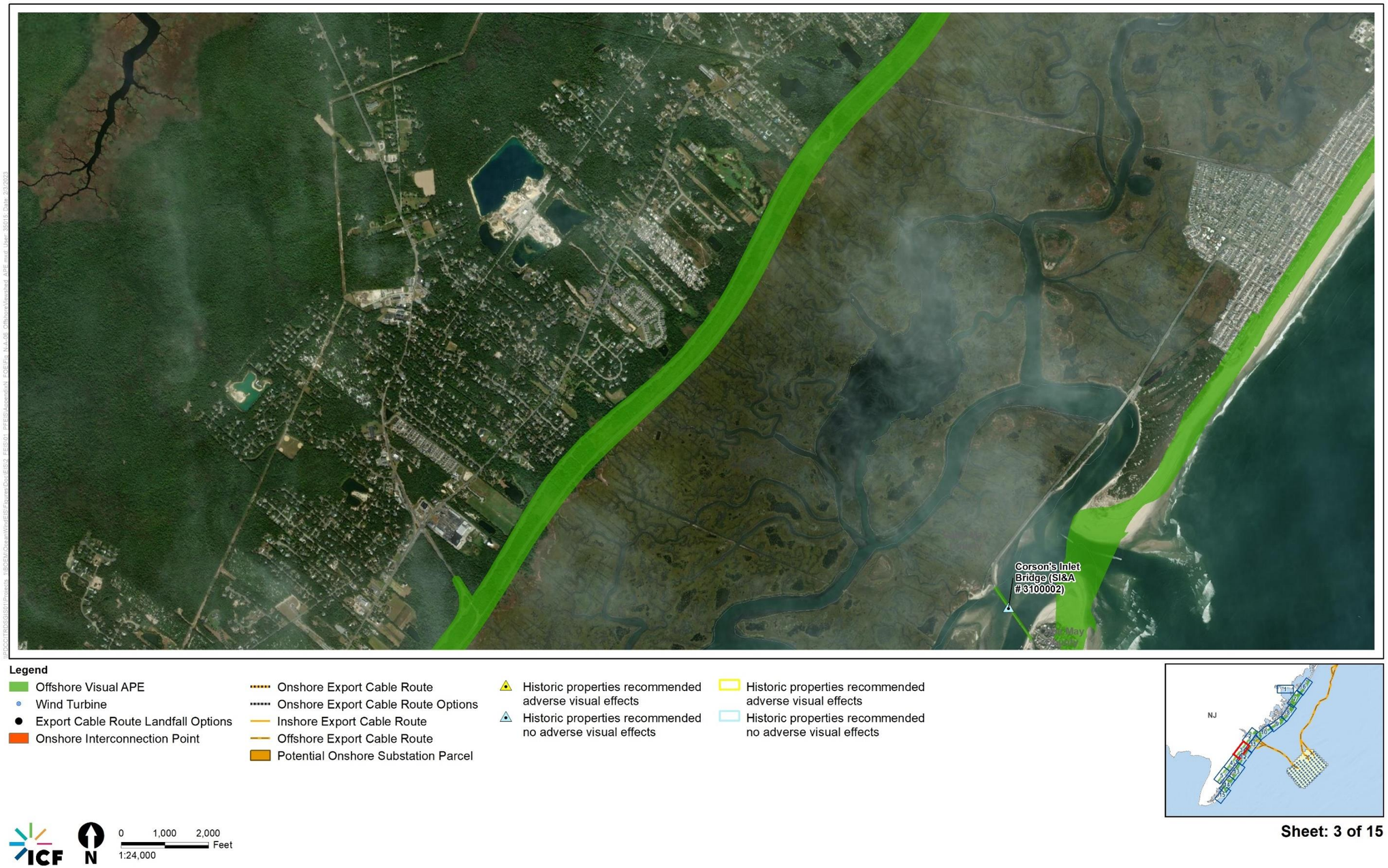
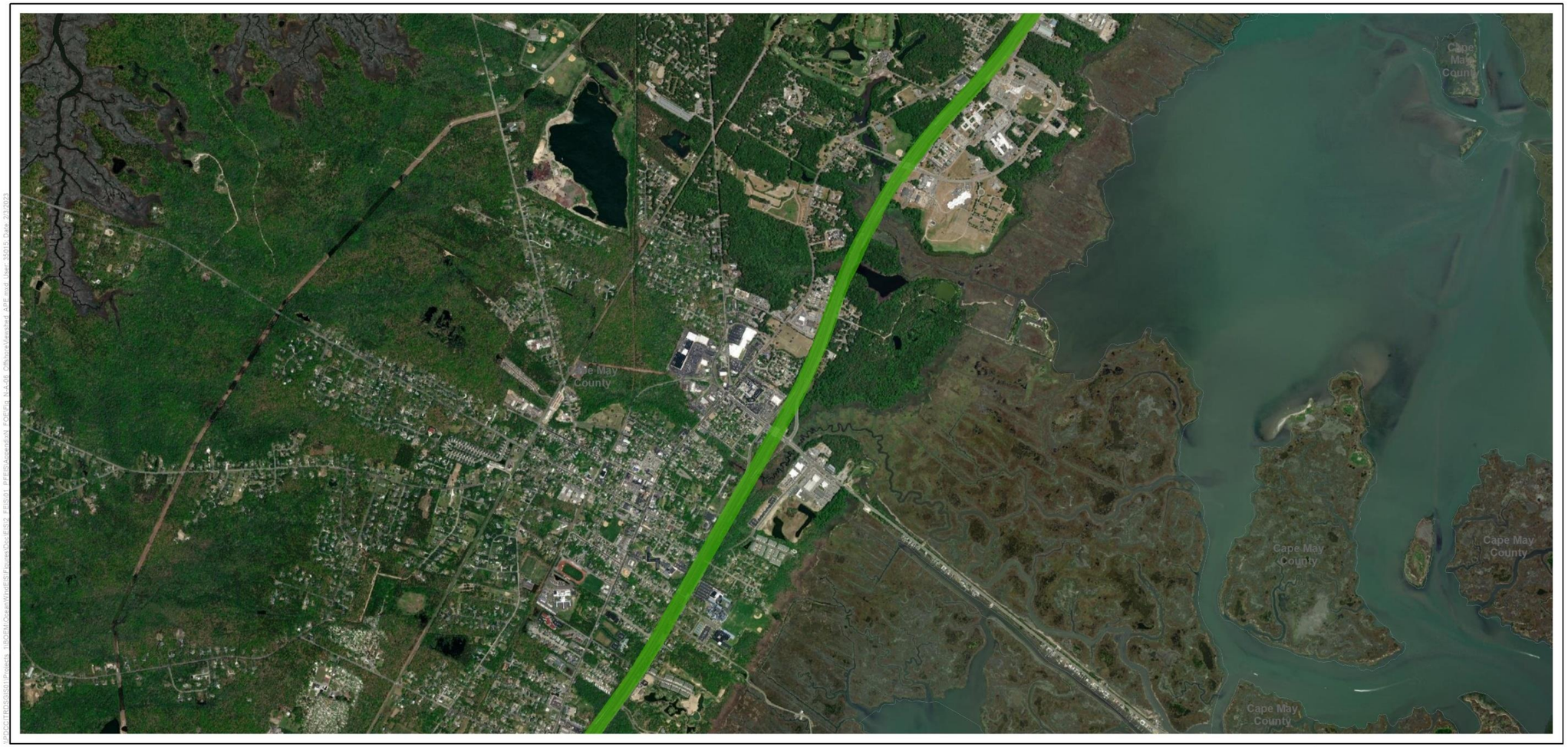


Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 3**

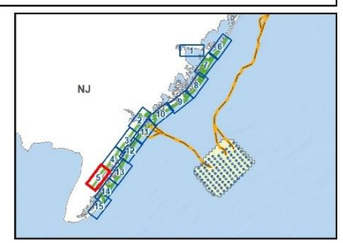


Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 4



Legend

- Offshore Visual APE
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



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Sheet: 5 of 15

Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 5

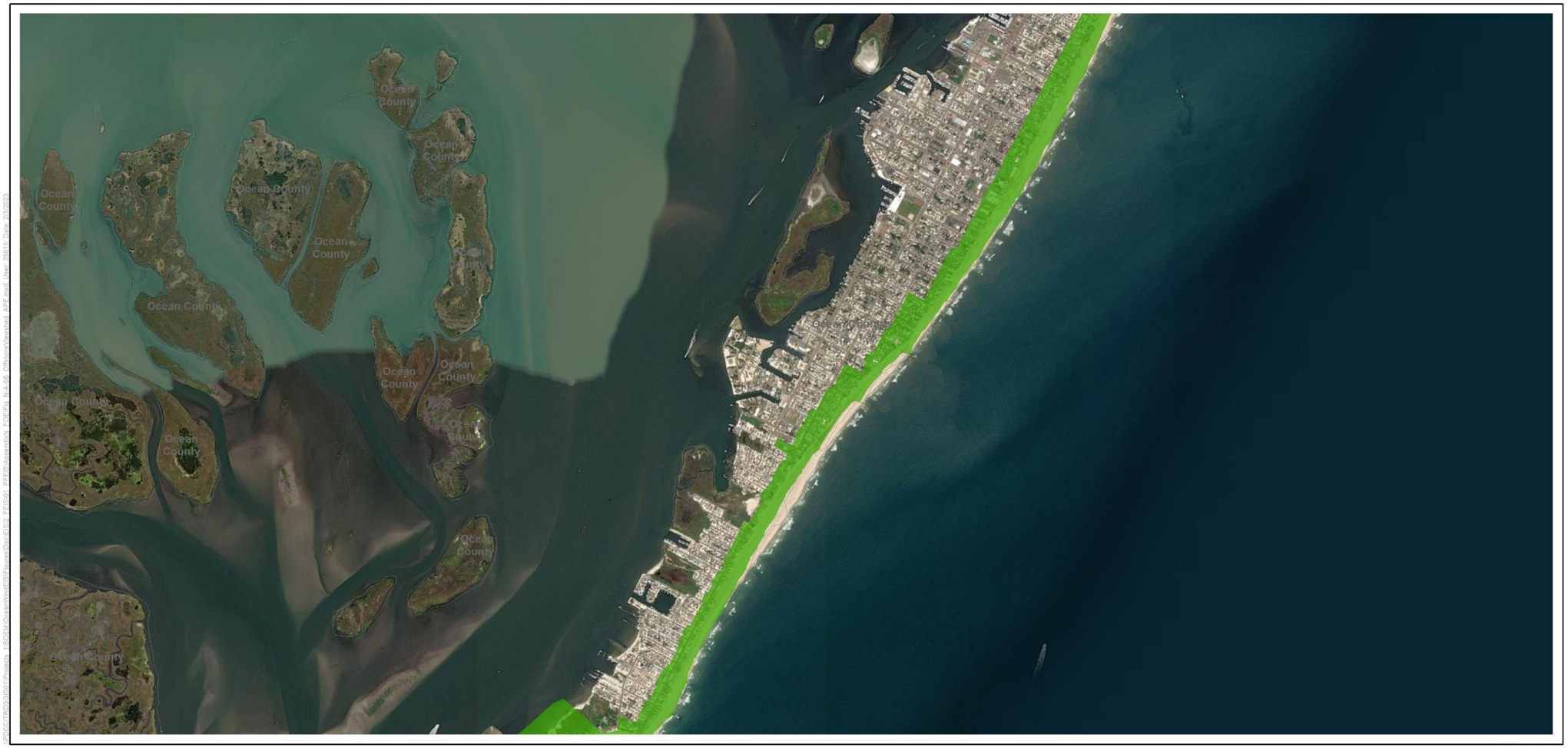


Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 6**



Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 7**



Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 8**

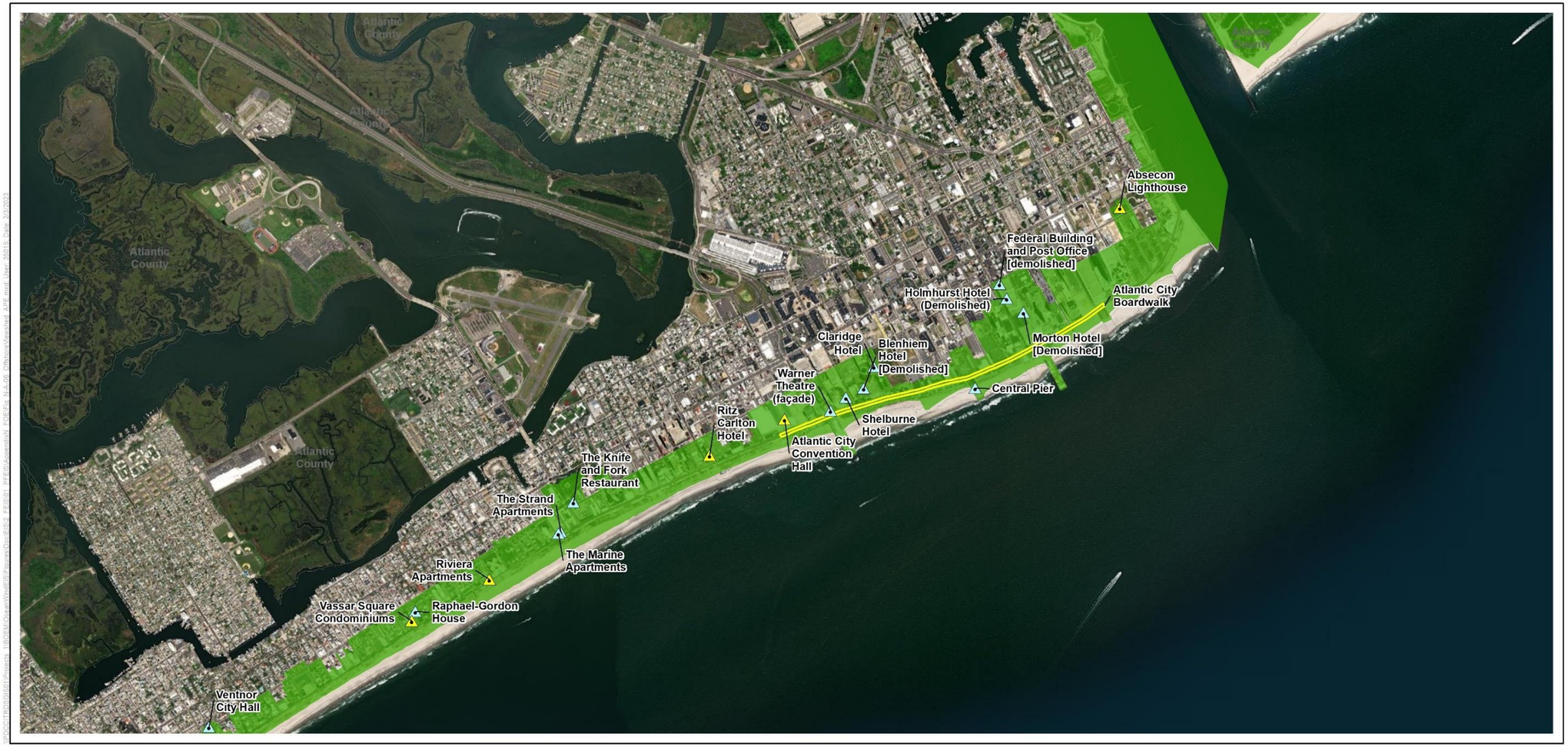
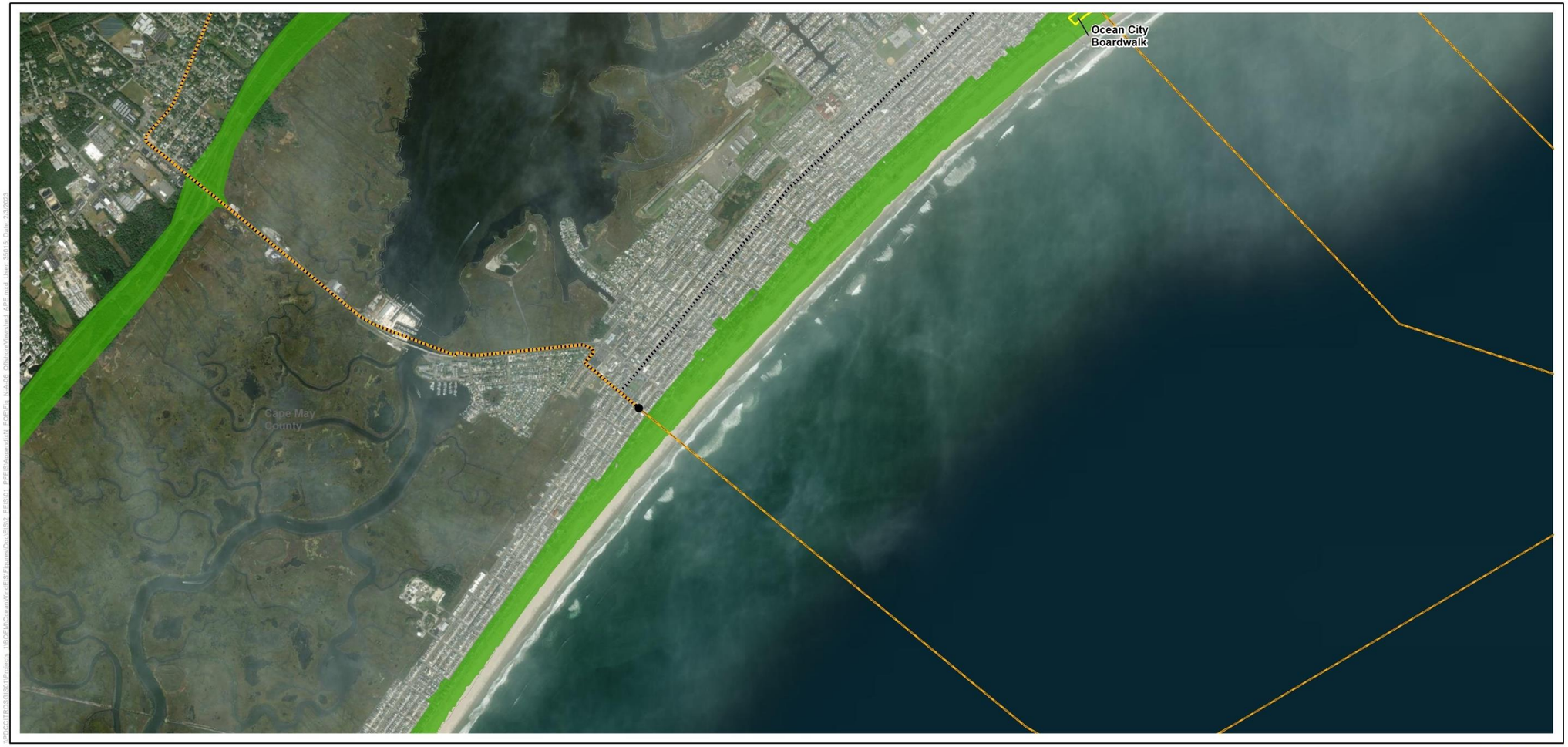


Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 9



Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 10



Legend

- Offshore Visual APE
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



Sheet: 11 of 15

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Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 11

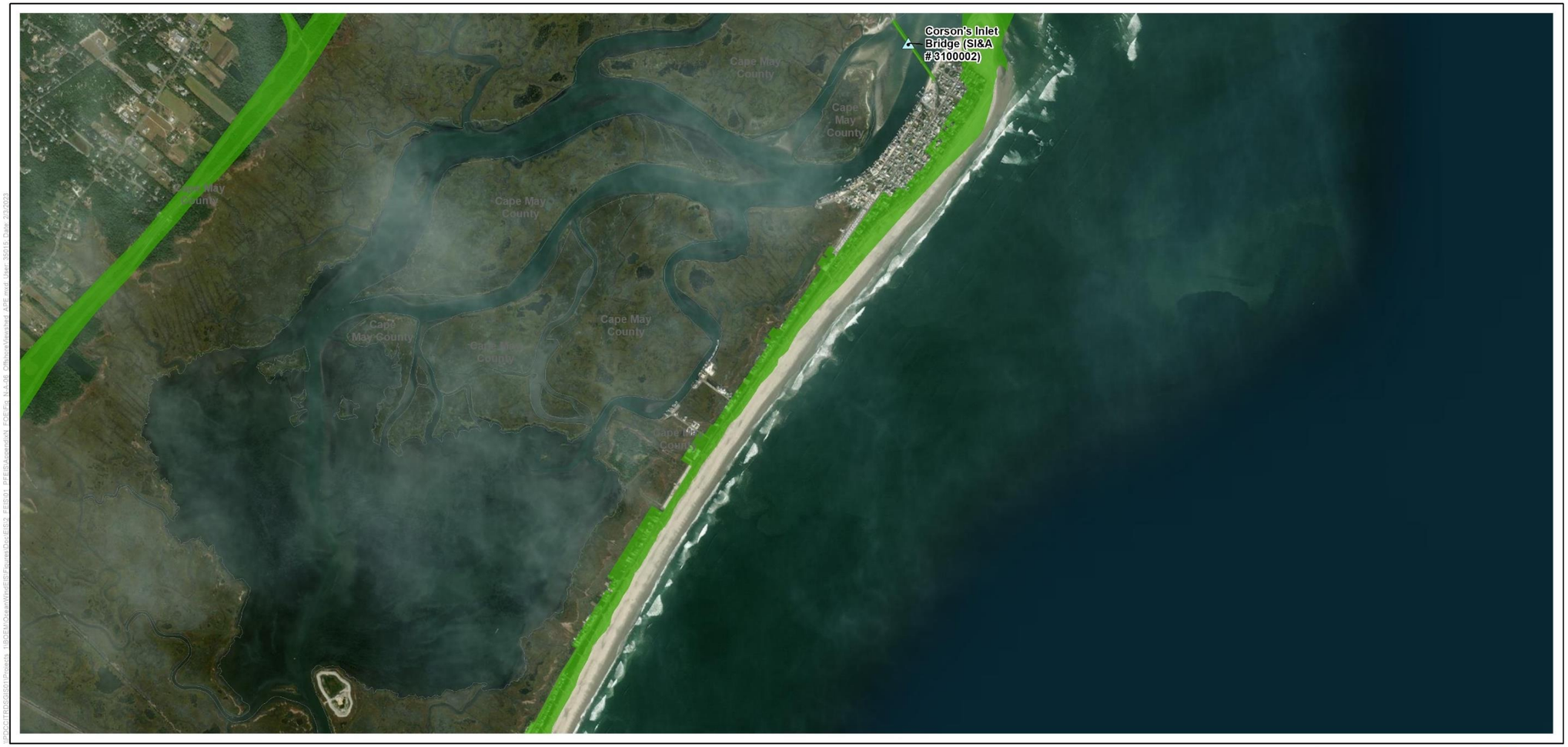


Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 12**

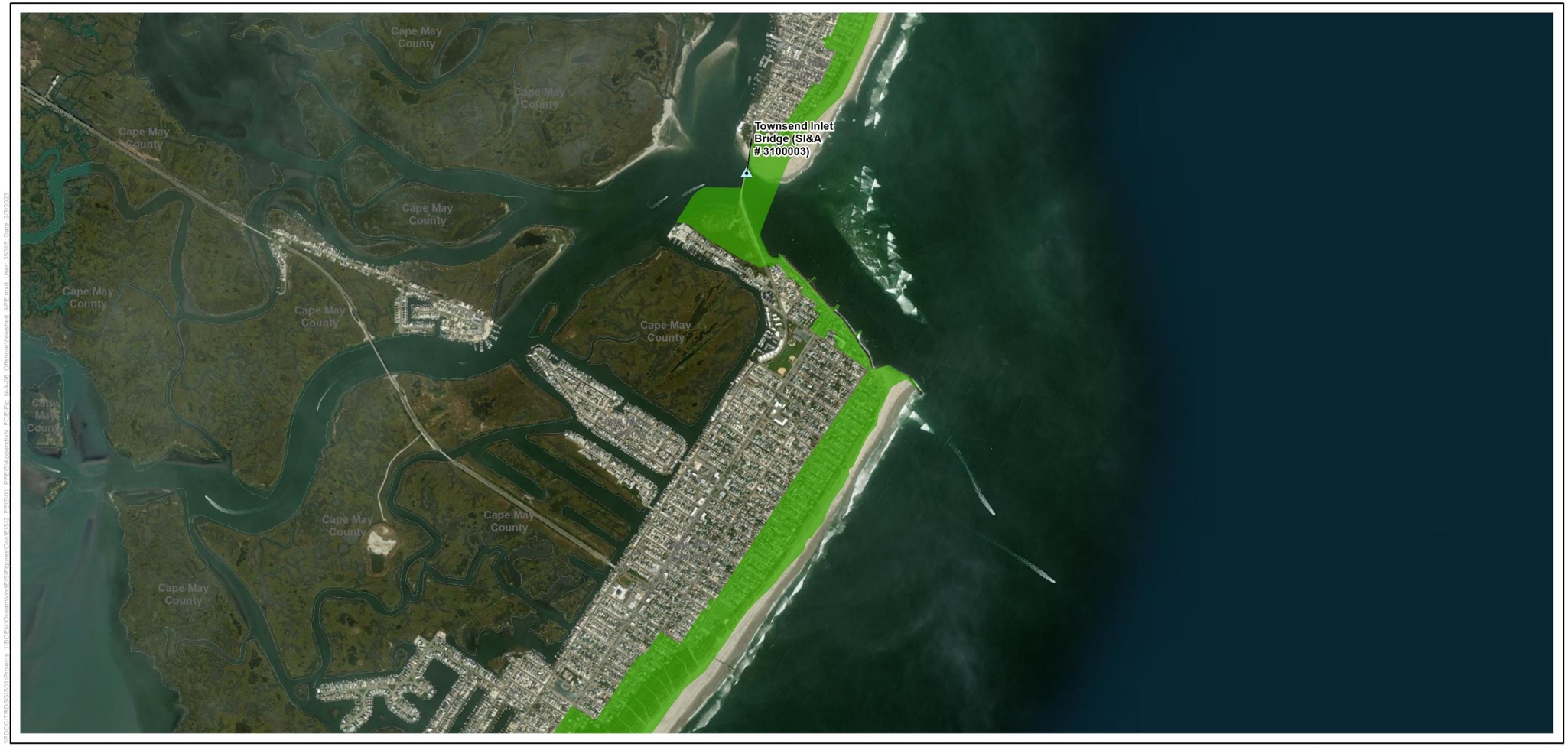


Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 13



Figure 6 Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 14

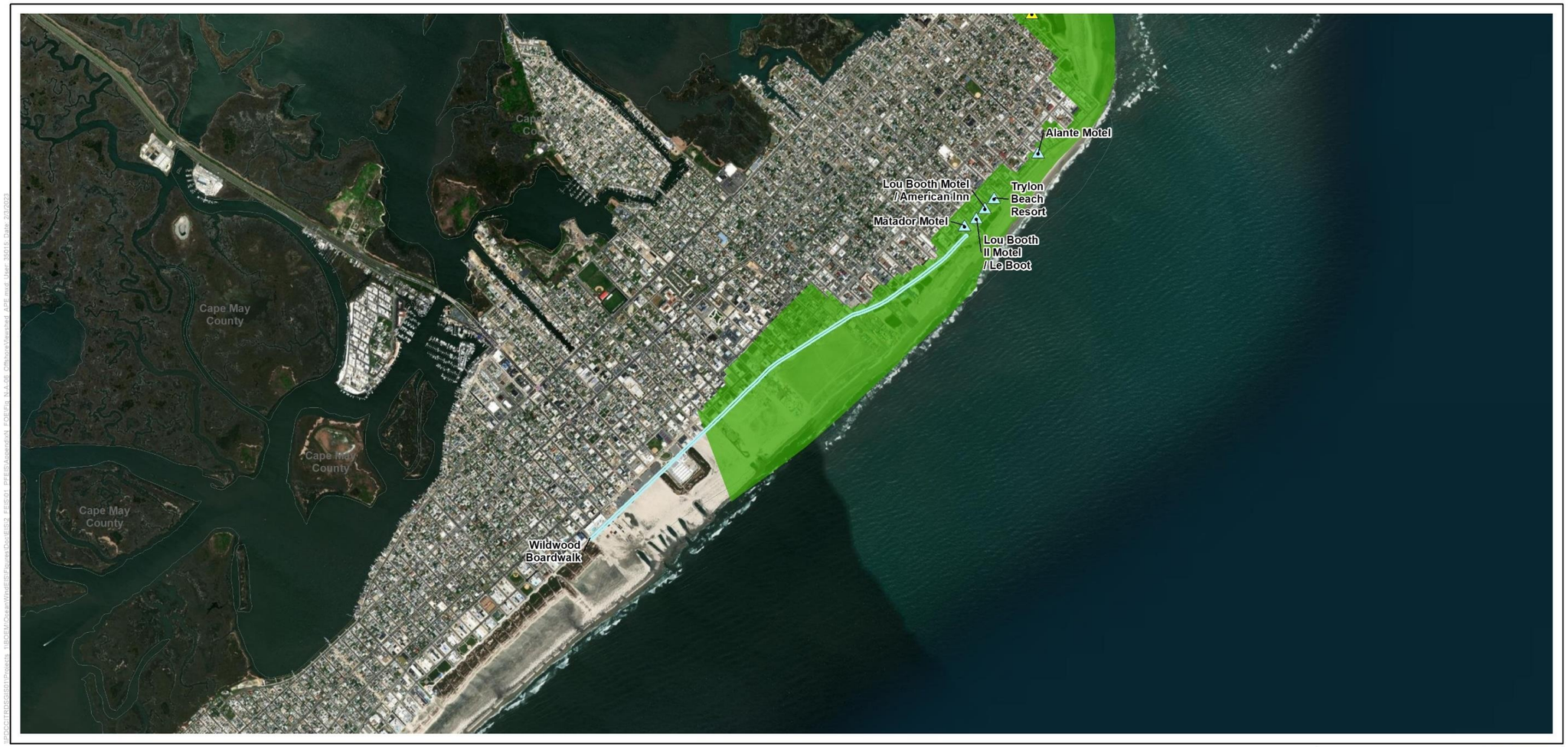


Figure 6 **Offshore Visual APE with Historic Properties Adversely Affected and Foreseeable Future Project Areas—Sheet 15**

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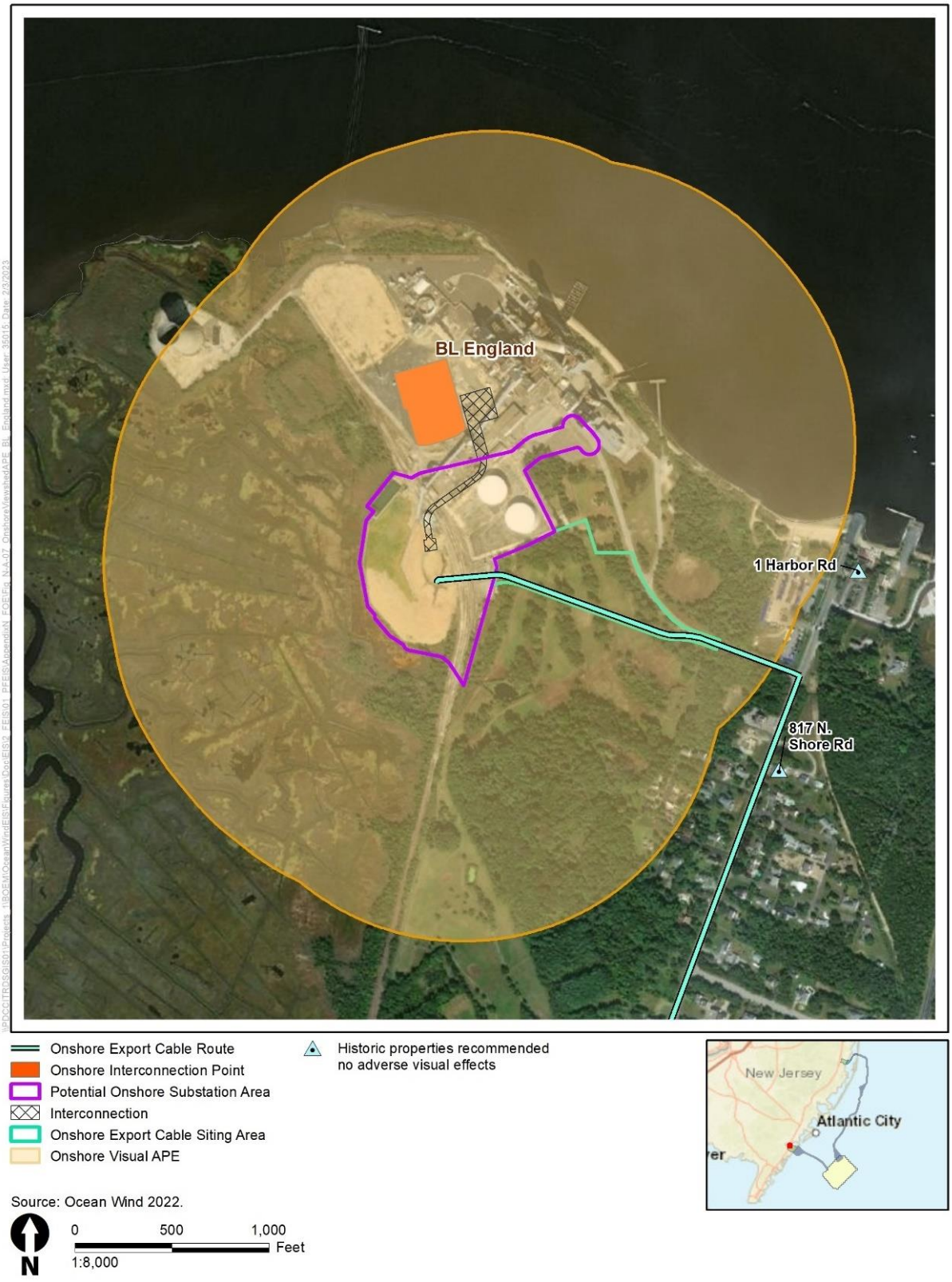


Figure 7 Onshore Visual APE for BL England Substation

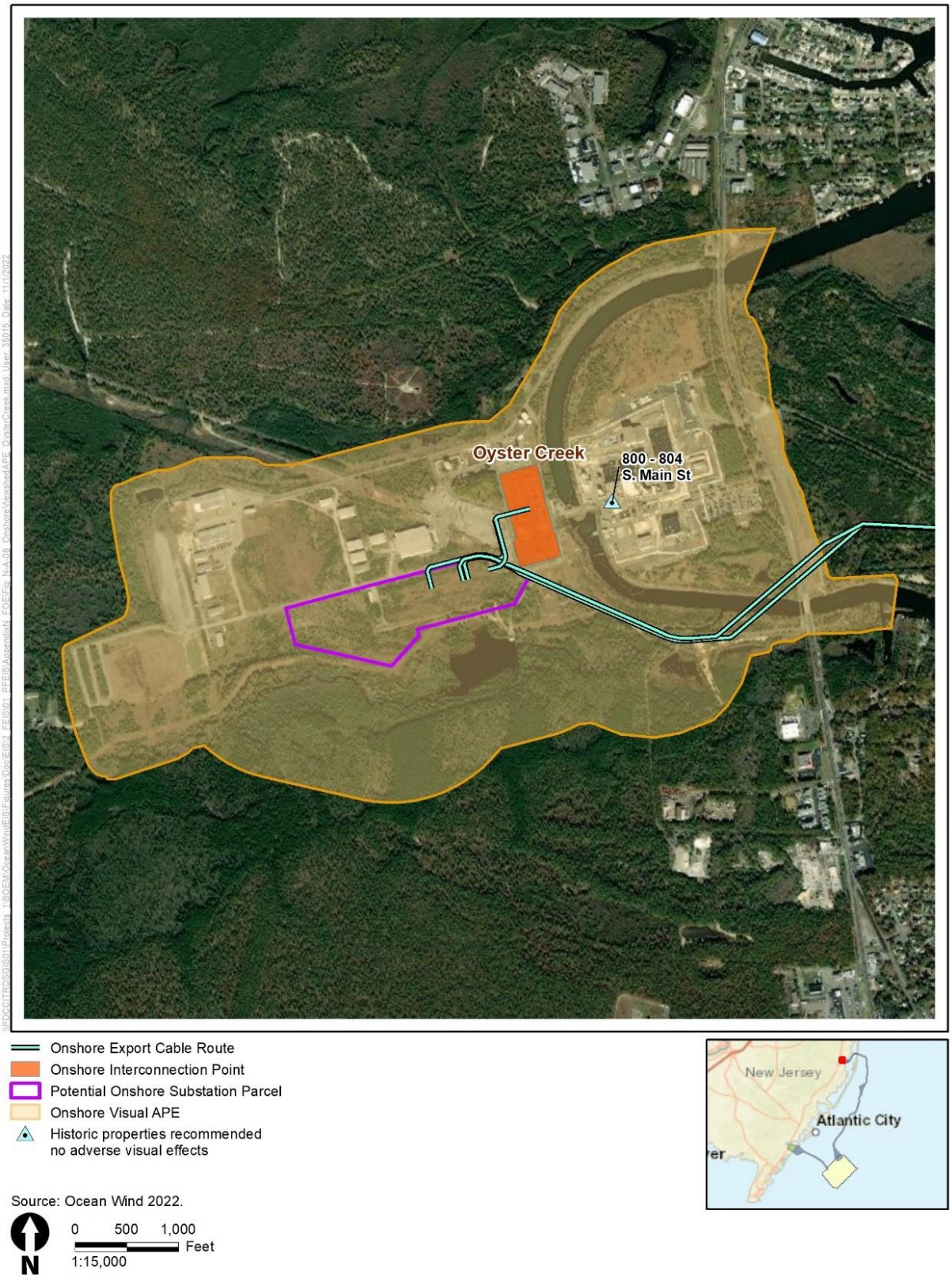


Figure 8 Onshore Visual APE for Oyster Creek Substation

ATTACHMENT C
ENTITIES INVITED TO BE CONSULTING PARTIES

The following is a list of governments and organizations that BOEM contacted and invited to be a consulting party to the NHPA Section 106 review of the Ocean Wind Project. During the consultations, additional parties were made known to BOEM and were added as they were identified.

Participants in the Section 106 Process	Invited Consulting Parties
SHPOs and State Agencies	NJDEP, Historic Preservation Office
	NJDEP, Office of Historic Sites & Parks
	NJDLPS, Marine Service Bureau
	New Jersey Casino Reinvestment Development Authority
	New Jersey Historic Trust
Federal Agencies	ACHP
	NOAA
	USCG
	USEPA
	USFWS
	National Park Service
	National Park Service, Region 1
Federally Recognized Tribes	Absentee-Shawnee Tribe of Indians of Oklahoma
	Delaware Tribe of Indians
	Eastern Shawnee Tribe of Oklahoma
	Shawnee Tribe
	The Delaware Nation
	The Narragansett Indian Tribe
	The Rappahannock Tribe
	The Shinnecock Indian Nation
	Wampanoag Tribe of Gay Head (Aquinnah)
Non-Federally Recognized Tribes	Lenape Indian Tribe of Delaware
	Nanticoke Indian Association, Inc.
	Nanticoke Lenni-Lenape Tribal Nation
	Nanticoke Lenni-Lenape Tribe
	Powhatan Renape Nation
	Ramapough Lenape Indian Nation
	Ramapough Mountain Indians
Local Governments	Absecon City
	Atlantic City
	Atlantic County
	Atlantic County, Department of Regional Planning and Development
	Avalon Borough

Participants in the Section 106 Process	Invited Consulting Parties
	Barnegat Light Borough
	Barnegat Township
	Beach Haven Borough
	Brigantine Beach City
	Cape May City
	Cape May County
	Cape May Point Borough
	Dennis Township
	Eagleswood Township
	Egg Harbor City
	Egg Harbor Township
	Galloway Township
	Hamilton Township
	Hammonton Town
	Harvey Cedars Borough
	Linwood City
	Little Egg Harbor Township
	Long Beach Township
	Longport Borough
	Lower Township
	Margate City
	Middle Township
	North Wildwood City
	Ocean City
	Ocean County
	Pleasantville City
	Sea Isle City
	Ship Bottom Borough
	Somers Point City
	Stafford Township
	Stone Harbor Borough
	Surf City Borough
	Tuckerton Borough
	Upper Township
	Ventnor City
	West Cape May Borough
	West Wildwood Borough
	Wildwood City
	Wildwood Crest Borough
	Woodbine Borough

Participants in the Section 106 Process	Invited Consulting Parties
Nongovernmental Organizations or Groups	Absecon Historical Society
	Absecon Lighthouse
	Atlantic City Convention Center
	Atlantic County
	Atlantic County Historical Society
	Avalon History Center
	Barnegat Light Museum
	Barnegat Lighthouse State Park
	Brigantine Beach Historical Museum
	Cape May Lighthouse
	Caribbean Motel
	Converse Cottage
	Donald & June Feith
	Dr. Edward H. Williams House
	Eagleswood Historical Society
	Emlen Physick Estate
	Flanders Condominium Association
	Friends of Barnegat Lighthouse
	Friends of the Cape May Lighthouse
	Friends of the World War II Tower
	Greater Cape May Historic Society
	Greater Egg Harbor Township Historical Society
	Hereford Inlet Lighthouse
	Historic Cold Spring Village
	Legacy Vacation Resorts
	Linwood Historical Society
	Long Beach Island Historical Association
	Long Beach Island Historical Association
	Longport Historical Society
	Madison Hotel
	Max Gurwicz Enterprises
	Museum of Cape May County
	New Jersey Lighthouse Society
	New Jersey Maritime Museum
	Ocean City Historical Museum
	Ocean City Music Pier
	Ocean County Historical Society
	Patriots for the Somers Mansion
	Preservation New Jersey
	Raphael-Gordon House

Participants in the Section 106 Process	Invited Consulting Parties
	Ritz Condominium Association
	Rutgers University, Department of Marine and Coastal Sciences, School of Environmental and Biological Sciences
	Save Lucy Committee, Inc.
	Stone Harbor Museum
	The Museum of Cape May County
	The Noyes Museum of Art
	Tuckerton Historical Society
	Vassar Square Condominium Association
	Wildwood Crest Historical Society
	Wildwood Historical Society

ATTACHMENT D
CONSULTING PARTIES TO THE OCEAN WIND PROJECT

The following is a current list of consulting parties to the NHPA Section 106 review of the Ocean Wind Project, as of May 9, 2023.

Government or Organization	Participating Consulting Parties	Contact
SHPOs and State Agencies	NJDEP, Historic Preservation Office	Katherine Marcopul, Administrator and Deputy Historic Preservation Officer
	NJDEP, Office of Historic Sites & Parks	Mark Texel, Administrator
	New Jersey Historic Trust	Dorothy Guzzo, Executive Director
Federal Agencies	ACHP	Christopher Daniel, Federal Property Management Section, Program Analyst Chris Koeppel, Federal Property Management Section, Assistant Director
	USACE	Naomi Handell, Regulatory Program Manager, USACE North Atlantic Division Brian Anthony, Biologist, Regulatory Branch, USACE Philadelphia District Ann Marie Dilorenzo, Division Section 408 Coordinator, USACE North Atlantic Division Juan Carlos Corona, Philadelphia District Section 408 Coordinator
	USCG	Matt Creelman, District 5 Agency Point of Contact Jerry Barnes, District 5 Waterways Stephen West, Headquarters George Detweiler, Headquarters Jen Doherty, Sector Delaware Bay Jordan Marshall, Sector Delaware Bay
	USEPA	Abbey States, Human Health Risk Assessor Mark Austin, Team Leader, Environmental Reviews
	National Park Service	Mary Krueger, Energy Specialist for the Northeast Region Kathy Schlegel, Historical Landscape Architect
	U.S. Naval History and Heritage Command	Dr. Alexis Catsambis, Underwater Archaeology Branch
Federally Recognized Tribes	Delaware Nation	Debora Dotson, President of Executive Committee Carissa Speck, Historic Preservation Director
	Delaware Tribe of Indians	Susan Bachor, Archaeologist, Delaware Tribe Historic Preservation Office Representative
	Stockbridge-Munsee Community Band of Mohican Indians	Jeff Bendremer, PhD, Tribal Historic Preservation Officer Graig Kroening, Jr., Vice President

Government or Organization	Participating Consulting Parties	Contact
	The Shinnecock Indian Nation	Bryan Polite, Chairman Shavonne Smith, Director, Shinnecock Environmental Department Jeremy Dennis, Junior Tribal Historic Preservation Officer Kelly Dennis, Council of Trustees Peter Running Deer Silva Rebecca Genia Tela Troge
	Wampanoag Tribe of Gay Head (Aquinnah)	Cheryl Andrews-Maltais, Chairwoman Bettina Washington, Tribal Historic Preservation Officer Lael Echo-Hawk, General Counsel Al Clark, Vice-Chair Kevin Devine, Tribal Council Person
Local Governments	Atlantic County	Gerald DelRosso, County Administrator Frances Brown, Senior Planner
	Cape May City	Warren Coupland, Historic Preservation Commission Chairperson
	Cape May County	William Cook, Special Council, Cultural Heritage Partners Jessica Krauss, Special Council, Cultural Heritage Partners
	Harvey Cedars Borough	Daina Dale, Municipal Clerk Jonathan Oldham, Mayor Paul Rice, Commissioner
	Linwood City	Mary Cole, Deputy Municipal Clerk Leigh Ann, Napoli Municipal Clerk, Registrar of Vital Statistics
	Margate City	Roger McLarnon, Planner, Zoning Officer James M. Rutala, Rutala Associates, LLC
	North Wildwood City	Michael J. Donohue, Blaney Donohue & Weinberg, P.C. Nicholas Long, City Administrator
	Ocean City	George Savastano, Business Administrator Doug Bergen, Public Information Officer Dottie McCrosson, City Solicitor
	Sea Isle City	George Savastano, Business Administrator Shannon Romano, Municipal Clerk
	Somers Point City	Jason Frost, City Administrator
	Stafford Township	Mathew von der Hayden, Township Administrator Rachel Giolitto, Confidential Assistant to the Mayor
Nongovernmental Organizations or Groups	Absecon Lighthouse	Jean Muchanic, Executive Director
	Flanders Condominium Association	Peter Voudouris, President

Government or Organization	Participating Consulting Parties	Contact
	Garden State Seafood Association	Scot Mackey, Trenton Representative
	Long Beach Island Historical Association	Ronald Marr, President
	House at 114 South Harvard Avenue, Ventnor City, New Jersey	Donald & June Feith, Property Owner
	Ritz Condominium Association	Gordon Pherribo, President of the Board
	Rutgers University, School of Environmental and Biological Sciences	Oscar Schofield, Chair, Rutgers Department of Marine and Coastal Sciences
	Save Lucy Committee, Inc.	Richard Helfant, Executive Director James Rutala, Rutala Associates
	The Noyes Museum of Art	Michael Cagno, Executive Director
	Vassar Square Condominiums	Paul Snyderman, President, Board of Trustees

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ATTACHMENT E
ADDENDUM TO THE FINDING OF ADVERSE EFFECT FOR HADDON HALL/RESORTS CASINO HOTEL

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Ocean Wind 1 Offshore Wind Farm

Addendum to the Finding of Adverse Effect for Haddon Hall/Resorts Casino Hotel, 1121 Boardwalk, Atlantic City, New Jersey

May 2023

U.S. Department of the Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

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Appendix A: Offshore Visual Area of Potential Effect Focused On Resorts Casino Hotel

Appendix B: Inventory Form for Haddon Hall/Resorts Casino Hotel

1.1. Summary

The Bureau of Ocean Energy Management (BOEM) prepared this summary in response to additional information received from a consulting party in April 2023 and to augment the Finding of Adverse Effect Report associated with the identification and evaluation of effects to historic properties for the Ocean Wind 1 project (Project) pursuant to Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations, "Protection of Historic Properties" (36 CFR Part 800). In April 2023, a consulting party requested information from BOEM regarding the property identified as the Resorts Casino Hotel located at 1121 Boardwalk in Atlantic City, New Jersey. The consulting party asked BOEM if this property could be a potential historic property in the Project's visual area of potential effects (APE) for offshore project components and, if yes, whether it could be visually adversely affected. In consideration of comments received from this consulting party, BOEM confirmed this property is in the offshore visual APE (Appendix A). BOEM, then requested confirmation from the Lessee, Ocean Wind LLC (Ocean Wind), regarding whether this property was surveyed during the Ocean Wind's previous intensive above-ground property surveys, which had been completed as a requirement for their Construction and Operations Plan (COP) submittal. BOEM also requested additional information on the property's historic significance and its eligibility for listing in the National Register of Historic Places (NRHP) if it was not previously surveyed.

Ocean Wind clarified that this property was not previously surveyed due to several factors. The current hotel, now operating as Resorts Casino Hotel, was previously called Haddon Hall. The New Jersey Historic Preservation Office (NJHPO), in its online GIS system called LUCY Cultural Resources GIS, identified this property as demolished and a previously contributing element within the NJHPO-identified Atlantic City Boardwalk District. Subsequent field verification by Ocean Wind in April 2023 determined that Haddon Hall is extant, having only been modified but not demolished as part of the opening of the current Resorts Casino Hotel in 1976. Haddon Hall is now the current Oceans Tower associated with the Resorts Casino Hotel.

Based on this additional information and as summarized in this Addendum, BOEM has determined that it will consider this property, Resorts Casino Hotel, as potentially eligible for listing in the NRHP and that it will be visually adversely affected. BOEM, with the assistance of Ocean Wind , believes it is appropriate to resolve the adverse effect to this property with measures analogous to similarly situated properties (i.e., the Ritz-Carlton), namely through the development of an historic context study that analyzes early 20th century hotels located in the visual APE, to include the Resorts Casino Hotel, and by providing funding in the amount of $65,000 to a project-specific mitigation fund established to resolve visual adverse effects attributed to this Project.

BOEM summarizes here within this Addendum to the *Finding of Adverse Effect for the Ocean Wind 1 Construction and Operations Plan* (FOE) the following information associated with the Resorts Casino Hotel:

- a description of the historic property;
- a statement of significance for this property (pursuant to 36 CFR 800.4(c));
- an evaluation of this property for NRHP eligibility (pursuant to 36 CR 800.4(c)(2));
- a description of BOEM's finding of adverse effect to this property; and
- a description of resolution measures to resolve the adverse effect to this property.

The following reports previously documented the historic properties within the visual Area of Potential Effect (APE) for the Project: the Historic Resources Visual Effects Assessment (HRVEA); the Cumulative Historic Resources Visual Effects Assessment (CHRVEA); the Finding of Adverse Effects (FOE); and the Environmental Impact Statement (EIS) for the Project (COP Volume III, Appendix F-3; Ocean Wind 2023a; BOEM 2023a, 2023b, 2023c). BOEM has determined amendments to the HRVEA and CHRVEA are not necessary as this Addendum addresses the additional information related to Resorts Casino Hotel including its NRHP-eligibility and the potential adverse effects.

1.2. Project Background

BOEM is the lead federal agency responsible for the decision on whether to approve, approve with modifications, or disapprove the Project's construction and operations plan (COP) pursuant to 43 United States Code 1332(3). To further inform that decision, ICF serves a third-party contractor to assist BOEM in its compliance with NHPA Section 106. On August 15, 2019, BOEM received a COP from Ocean Wind proposing an offshore wind energy project within Lease Area OCS-A 0498 offshore New Jersey. In addition, Ocean Wind submitted updates to the COP on March 13, 2020, September 24, 2020, March 24, 2021, November 16, 2021/December 10, 2021, October 14, 2022, and April 24, 2023. In its COP, Ocean Wind is proposing the construction, operation, and eventual decommissioning of a minimum 1,100-MW wind energy project consisting of offshore wind turbine generators (WTGs) and their foundations, offshore substations (OSS) and their foundations, scour protection for foundations, inter-array cables linking the individual turbines to the OSS, substation interconnector cables linking the substations to each other, offshore export cables and an onshore export cable system, onshore substations, and connections to the existing electrical grid in New Jersey. At their nearest points, WTG and OSS components of the Project would be approximately 13 nautical miles (15 statute miles) southeast of Atlantic City, New Jersey. Offshore Project elements would be on the Outer Continental Shelf, with the exception of a portion of the offshore export cables within state waters. Ocean Wind is utilizing a project design envelope (PDE) in its COP, which represents a reasonable range of design parameters that may be used for the Project. In reviewing the PDE, BOEM is analyzing the maximum-case scenario that could occur from any combination of the contemplated parameters. This includes alternatives that may require phased identification of historic properties in the marine APE. BOEM's analysis and review of the PDE may result in the approval of a project that is constructed within that range or a subset of design parameters within the proposed range.

1.3. Visual Area of Potential Effect (APE)

The APE for visual effects analysis (hereafter visual APE) includes the viewshed from which renewable energy structures—whether offshore or onshore—would be visible. Offshore, the visual APE includes a boundary of 40 miles radial distance from the Wind Farm Area, which is the approximate maximum theoretical distance—a distance that does not factor in certain environmental factors such as weather or environmental conditions—at which the WTGs could be visible (COP Volume III, Appendix F-3, page 23; Ocean Wind 2023). However, subsequent desktop analysis, visualizations, and field verification determined that the actual visibility of Wind Farm Area infrastructure beyond 25 miles is unlikely (COP Volume III, Appendix F-3, page 23; Ocean Wind 2023). See Finding of Effect (FOE) Attachment B, Figure 6, Sheets 1–16.

Geographic information system analysis and subsequent field investigation delineated the visual APE methodically through a series of steps, beginning with the maximum theoretical distance WTGs could be

visible. This was determined by first considering the visibility of a WTG from the water level to the tip of an upright rotor blade at a height of 906 feet. The analysis then accounted for how distance and environmental conditions impede visibility as the distance increases between the viewer and WTGs (i.e., by a 40-mile distance, even blade tips would be below the sea level horizon line). The mapping effort then removed all areas with obstructed views toward WTGs, such as those views impeded by intervening topography, vegetation, and structures. Areas with unobstructed views of offshore Project elements then constituted the APE. FOE Attachment B, Figure 6 Map Index, also depicts reasonably foreseeable future project areas for consideration of cumulative effects within the APE.

Onshore, the visual APE includes a 0.25-mile boundary around the BL England substation location (see FOE Attachment B, Figure 7) and a minimum 0.25-mile boundary around the Oyster Creek substation location (see FOE Attachment B, Figure 8). Any overhead lines would fall within these boundaries (COP Volume III, Appendix F-3, page 19; Ocean Wind 2023a). All other elements would be underground and would not be visible.

BOEM confirmed Resorts Casino Hotel is in the offshore visual APE (see Appendix A).

1.4. Description of the Historic Property – Haddon Hall; Currently Operating as Part of the Resorts Casino Hotel

Haddon Hall, 1121 Boardwalk, Atlantic City

Haddon Hall at 1121 Boardwalk in Atlantic City, New Jersey, is located in this Project's visual APE. It is an E-plan hotel completed in phases from 1920 to1929 and executed in the Beaux Arts style. The main tower block is 15 stories with a central 3-story penthouse level; it was completed in 1929. Two flanking projecting blocks, 12 stories tall, were built in 1921–1922 as additions to an earlier iteration of the hotel, a frame building constructed in 1896. While some of the building's exterior is covered in a smooth stucco in 2023, contemporary photography and newspaper descriptions indicate the concrete and steel building originally had a red brick, Indiana limestone, and granite exterior with terra cotta details. Some of these original exterior materials are still visible, albeit painted. Typical of Philadelphia-based architecture firm of Rankin and Kellogg, who designed the 1920s building components, Haddon Hall's Beaux Arts design includes exterior walls featuring inset decorative detailing, quoins, pilasters, string courses, dentil molding at cornice levels, and roof-line balustrades (Ocean Wind 2023b).

1.5. Historic Context and Significance

As described in the survey form produced by Ocean Wind (Appendix B), extant components of Haddon Hall are now part of the Resorts Casino Hotel, the first casino-hotel in Atlantic City and the first legal casino outside of the state of Nevada. The oldest extant portions of the hotel date to 1920-1921 and include the two-story arcade along the Boardwalk, extending between South North Carolina and Mansion Avenues. The hotel expanded following its merger with the neighboring Chalfonte Hotel (no longer extant) immediately southwest of Haddon Hall and across South North Carolina Avenue. Construction on the "Boardwalk wing," a 12-story addition built by the George A. Fuller Company of New York began in 1921 and had been completed by the summer of 1922. An addition was erected on the Mansion Avenue side of the hotel between 1924-1925, which included a corridor entrance connecting Haddon Hall to the Chalfonte. The original central frame section of Haddon Hall (1896) was demolished in 1928 to allow for the construction of the current central block, designed by Philadelphia architects Rankin & Kellogg. New

York-based Turner Construction won the building contract and broke ground in October 1928. The new Haddon Hall was completed in 1929.

During World War II, the owners of what was then known as Chalfonte-Haddon Hall leased the buildings to the Army between 1943-1946, as was typical among beachfront hotels. Haddon Hall was retrofitted to serve as a medical facility and along with the Chalfonte, Traymore, and other Atlantic City hotels, was part of the Thomas England General Hospital. Nicknamed "Camp Boardwalk," Haddon Hall served as the Thomas England General Hospital's main building and could house approximately 2,000 patients. By 1945, the hospital was the largest in the United States specializing in amputations and neurosurgery.

Upon its return to the Leeds & Lippincott Company, Chalfonte-Haddon Hall was re-opened to the public. With talk of gaming legalization in Atlantic City, Resorts International (formed in 1968), purchased Leeds & Lippincott Company and its hotels, renovating Haddon Hall in preparation for the passage of the 1976 gaming referendum. Haddon Hall, known from that point as the Resorts Casino Hotel, re-opened in 1978 as a hotel/casino. The Chalfonte Hotel, unable to meet the minimum room requirement to be converted into a gaming hotel, was demolished in 1980. The site was redeveloped as parking for the Resorts Casino Hotel. In 2002, the Rendezvous Tower was constructed, replacing a Ramada Inn on the site. The new tower opened in 2004.

Several components of local and regional history are associated with the Haddon Hall, including its association with pre-World War II, pre-gambling-era development in Atlantic City, its Beaux-Art architectural style, and its use as a World War II hospital. Recorded use of the property began with a Quaker rooming house in 1869, followed by construction of a 400-person capacity hotel in 1896, and then the development of Haddon Hall by Leeds & Lippincott Company in the 1920s in response to the growing popularity of Atlantic City as a resort area. Haddon Hall is an example of a Beaux Arts-style high-rise hotel designed by Philadelphia-based architects Rankin & Kellogg. Rankin & Kellogg's portfolio includes 72 buildings, primarily residential and commercial types executed in the Beaux Arts style. Finally, as the main building within the Thomas England General Hospital established in World War II, Haddon Hall was associated with advanced amputation and neurosurgery operations and rehabilitation, which bears additional research.

1.6. National Register of Historic Places Eligibility

The extant 1920s components of Haddon Hall were designed by the Philadelphia-based architecture firm of Rankin and Kellogg; the firm was responsible for the central tower block, its two flanking wings, and two-story arcade building. The building is associated with both the development of Atlantic City as a seaside resort and the use of Atlantic City hotels for the Thomas England General Hospital during World War II. Thus, Haddon Hall is significant under Criterion A for Commerce and, potentially, with additional research, Health/Medicine. The hotel is not known to be associated with historically important persons; therefore, it is not significant under Criterion B. The hotel is associated with Philadelphia-based architects Rankin & Kellogg, who designed several local landmarks, including the Camden County Courthouse and Jail, and United States Post Office and Custom House in Camden, New Jersey. Haddon Hall is an example of the firm's Beaux Arts designs; the building holds significance under Criterion C for Architecture. The hotel is not likely to yield information important to prehistory or history; thus, it is not significant under Criterion D. (Ocean Wind 2023b). While Haddon Hall has been subject to modifications through the years, including the addition of a porte cochere entrance on its primary elevation and modifications to the two-story arcade building, main tower block, and flanking projecting wings, which impact its integrity of design, materials, and workmanship, enough of the hotel design and materials are

extant to be able to convey the building's significance under Criterion A and C. It is therefore recommended Eligible for inclusion in the NRHP at the local level, with significant periods including 1921–1929, reflecting its construction period, and 1943–1946, reflecting its use as a hospital during World War II. (Ocean Wind 2023b).

The HRVEA identified historic properties in the visual APEs consistent with the *Programmatic Agreement Among The U.S. Department of the Interior, Bureau of Ocean Energy Management, The State Historic Preservation Officers of New Jersey and New York, The Shinnecock Indian Nation, and The Advisory Council on Historic Preservation Regarding Review of Outer Continental Shelf Renewable Energy Activities Offshore New Jersey and New York Under Section 106 of the National Historic Preservation Act* (Programmatic Agreement) which was executed on June 3, 2016. This Addendum specifically applies Stipulation I.D. of the Programmatic Agreement, treating the Resorts Casino Hotel as potentially eligible for inclusion in the NRHP unless BOEM determines, and the SHPOs agree, that the property is ineligible (Ocean Wind 2023b). This NRHP eligibility in this Addendum addresses Haddon Hall only and further analysis will be needed to determine the NRHP-eligibility for Resorts Casino Hotel. The proposed mitigation measures for this property including the historic context for early 20th century hotels will provide additional information needed to determine if it is eligible for listing in the NRHP.

1.7. Project Effects

BOEM finds that Resorts Casino Hotel will be visually adversely affected by the project and will require resolution of these effects.

Haddon Hall, now part of the Resorts Casino Hotel, is on the Atlantic City Boardwalk with the main hotel block extending north-northwest from the shoreline. The hotel block rising behind the commercial Boardwalk block is oriented to maximize the number of rooms on its narrow, deep lot. The ocean-facing elevation of this block is nine bays wide. In addition to southeast elevation windows, most windows on the southwest elevation of the projecting wings and the central tower block will have a view of the Wind Farm Area (WFA). The building's siting and orientation are important to its Criterion A significance for Commerce. While architectural elements oriented toward the WFA have been subject to modification, most notably at the two-story arcade building, conspicuous views southeast toward the WFA from guest rooms in the hotel will alter the character-defining setting of the building. (Ocean Wind 2023b).

Because of Resorts Casino Hotel's close proximity to the Ritz-Carlton Hotel, BOEM believes that the cumulative impacts on each of the two properties would be very similar. Therefore, BOEM has determined that the Resorts Casino Hotel will be cumulatively visually adversely affected by the Project. Cumulative impacts on the Ritz-Carlton Hotel are discussed in section N.3.1.3.5 of the FOE.

1.8. Resolution Measures

BOEM believes that it is appropriate to resolve the adverse effect to the Resorts Casino Hotel through analogous measures for similarly-situated properties, namely, the development of an historic context study that analyzes early 20th century hotels located in the visual APE, including the Resorts Casino Hotel, and a requirement for Ocean Wind to fund in the amount of $65,000 to a project-specific mitigation fund established specifically for visual adverse effects attributed to this Project.

1.9. References Cited

Bureau of Ocean Energy Management (BOEM). 2023a. *Ocean Wind 1 Offshore Wind Farm Final Environmental Impact Statement*. May. OCS EIS/EA BOEM 2023-020. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Washington, D.C.

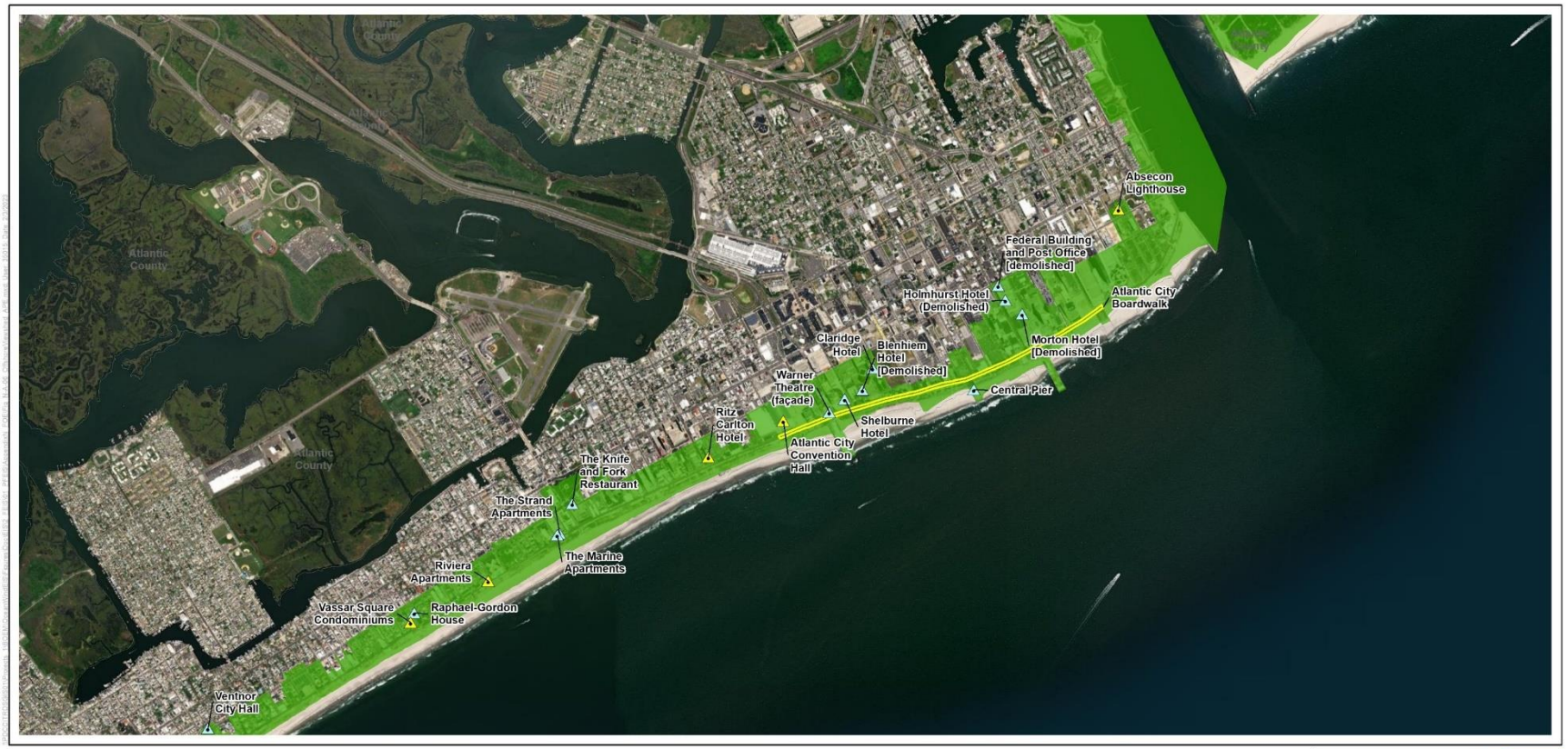
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Ocean Wind LLC (Ocean Wind). 2023a. *Construction and Operations Plan, Ocean Wind Offshore Wind Farm*. Volumes I–III. May. Available: https://www.boem.gov/ocean-wind-construction-and-operations-plan/.

Ocean Wind LLC (Ocean Wind). 2023b. *Ocean Wind Intensive-Level Architectural Survey of Haddon Hall, 1121 Boardwalk, Atlantic City, New Jersey*. May. Prepared for Bureau of Ocean Energy Management, Washington, D.C.

APPENDIX A
OFFSHORE VISUAL AREA OF POTENTIAL EFFECT FOCUSED ON RESORTS CASINO HOTEL



Legend

- Offshore Visual APE
- Wind Turbine
- Export Cable Route Landfall Options
- Onshore Interconnection Point
- Onshore Export Cable Route
- Onshore Export Cable Route Options
- Inshore Export Cable Route
- Offshore Export Cable Route
- Potential Onshore Substation Parcel
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects
- Historic properties recommended adverse visual effects
- Historic properties recommended no adverse visual effects



Sheet: 9 of 15

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APPENDIX B
INVENTORY FORM FOR HADDON HALL/RESORTS CASINO HOTEL

Ocean Wind 1
An Ørsted & PSEG project

May 3, 2023

Sarah Stokely
Lead Historian and Section 106 Team Lead
Renewable Energy Program
Bureau of Ocean Energy Management
1849 C Street, NW
Washington, DC 20240

Dear Sarah:

Ocean Wind LLC (Ocean Wind), a subsidiary of Ørsted Wind Power North America LLC, proposes to construct and operate the Ocean Wind Offshore Wind Farm Project (Project) off the coast of New Jersey. Ocean Wind is developing the Project pursuant to the Bureau of Ocean Energy Management (BOEM) requirements for the commercial lease of submerged lands for renewable energy development on the outer continental shelf (Lease Area OCS-A 0498). Ørsted has contracted HDR Engineering, Inc. (HDR) to provide environmental support for the project. HDR has subcontracted SEARCH, Inc. (SEARCH) to support cultural resources assessments.

BOEM is currently undergoing environmental review of Ocean Wind's Construction and Operations Plan (COP) under the National Environmental Policy Act and is consulting on this undertaking pursuant to the National Historic Preservation Act. Appendix F of the COP is the *Ocean Wind Visual Effects on Historic Properties Report*, also known as the *Historic Resources Visual Effects Assessment* (HRVEA), completed by the SEARCH/HDR team in March 2021, with revisions completed through January 2023. This document includes visual effects evaluations for historic properties that are either listed in or eligible for the National Register of Historic Places (NRHP). In coordination with the New Jersey Historic Preservation Office (NJHPO), BOEM established a preliminary area of potential effects (PAPE) for the Project, and SEARCH/HDR conducted a thorough review of the PAPE to identify historic properties requiring evaluation in the HRVEA. Historic properties were identified through review of NJHPO files, and through a historic resources survey conducted for the project. Historic resources survey results are presented in the *Architectural Intensive Level Survey, Ocean Wind Offshore Windfarm, New Jersey Report* completed by SEARCH/HDR in September 2021, with revisions completed in October 2022.

During the course of Section 106 consulting party meetings, a consulting party informed the SEARCH/HDR team of a historic-age resource that SEARCH/HDR then determined was inadvertently omitted from the 2021 survey and 2022 updates. SEARCH/HDR did not include this property in the survey because the property was indicated in the NJHPO's online GIS system called LUCY Cultural Resources GIS[1] as a demolished resource within the NJHPO-identified Atlantic City Boardwalk Historic District. The resource was recorded on April 20, 2023. SEARCH/HDR conducted research, completed an NJHPO Inventory Form, and made an NRHP eligibility recommendation for the resource.

[1] https://www.arcgis.com/home/item.html?id=44ce3eb3c53349639040fe205d69bb79.

The resource recorded is Haddon Hall, currently operating as part of the Resorts Casino Hotel at 1121 Boardwalk in Atlantic City, Atlantic County.

Following is a brief summary and NRHP recommendation for Haddon Hall. Its inventory form with detailed information is appended to this letter.

Haddon Hall, 1121 Boardwalk, Atlantic City

Haddon Hall at 1121 Boardwalk is an E-plan hotel completed in 1922–1929 and executed in the Beaux Arts style. The main tower block is 15 stories with a central 3-story penthouse level; it was completed in 1929. Two flanking projecting blocks, 12 stories tall, were built in 1921–1922 as additions to an earlier iteration of the hotel, a frame building constructed in 1896. While some of the building's exterior is covered in a smooth stucco in 2023, contemporary photography and newspaper descriptions indicate the concrete and steel building originally had a red brick, Indiana limestone, and granite exterior with terra cotta details. Some of these original exterior materials are still visible, albeit painted. Typical of Philadelphia-based architecture firm of Rankin and Kellogg, who designed the 1920s building components, Haddon Hall's Beaux Arts design includes exterior walls featuring inset decorative detailing, quoins, pilasters, string courses, dentil molding at cornice levels, and roof-line balustrades.

The extant 1920s components of Haddon Hall were designed by the Philadelphia-based architecture firm of Rankin and Kellogg; the firm was responsible for the central tower block, its two flanking wings, and two-story arcade building. The building is associated with both the development of Atlantic City as a seaside resort and the use of Atlantic City hotels for the Thomas England General Hospital during World War II. Thus Haddon Hall is significant under Criterion A for Entertainment/Recreation and (potentially, with additional research) Health/Medicine. The hotel is not known to be associated with historically important persons; therefore, it is not significant under Criterion B. The hotel is associated with Philadelphia-based architects Rankin & Kellogg, who designed several local landmarks, including the Camden County Courthouse and Jail, and United States Post Office and Custom House in Camden, New Jersey. Haddon Hall is an example of the firm's Beaux Arts designs; the building holds significance under Criterion C for Architecture. The hotel is not likely to yield information important to prehistory or history; thus, it is not significant under Criterion D.

While Haddon Hall has been subject to modifications through the years, including its porte cochere entrance addition on its primary elevation and modifications to the two-story arcade building, which impact its integrity of design, materials, and workmanship, enough of the hotel design and materials are extant to be able to convey the building's significance under Criterion A and C. It is therefore recommended **Eligible** for inclusion in the NRHP at the local level, with significant periods including 1921–1929, reflecting its construction period, and 1943–1946, reflecting its use as a hospital during World War II.

Haddon Hall is on the Atlantic City Boardwalk with the main hotel block extending north-northwest from the shoreline. The hotel block rising behind the commercial Boardwalk block is oriented to maximize the number of rooms on its narrow, deep lot. The ocean-facing elevation of this block is nine bays wide. In addition to southeast elevation windows, most windows on the southwest elevation of the projecting wings and the central projecting tower block will have a view

of the Wind Farm Area (WFA). The building's siting and orientation are important to its Criterion A significance for Commerce. While architectural elements oriented toward the WFA have been subject to modification, most notably at the two-story arcade building, conspicuous views southeast toward the WFA from guest rooms in the hotel will alter the character-defining setting of the building. As a result, it is recommended that the Project will have an Adverse Effect on Haddon Hall.

If BOEM has any questions about the information presented here, please do not hesitate to contact myself, Katharine Perry at (917) 524-4633 or KAPER@orsted.com.

Finally, Ørsted requested that the SEARCH/HDR team conduct an additional analysis of the list of demolished resources in the NJHPO's LUCY Cultural Resources GIS to confirm whether all other resources on the demolished list were, in fact, no longer extant. As outlined in the attached memorandum, this analysis confirmed that no other extant properties on that list meet the criteria for intensive-level survey.

Sincerely,



Katharine Perry
Permitting Manager, Ocean Wind 1

BASE FORM

Historic Sites #:

Property Name: Haddon Hall

Street Address: *Street #:* 1121 (Low) _____ (High) *Apartment #:* _____ (Low) _____ (High)

Prefix: _____ *Street Name:* Boardwalk *Suffix:* _____ *Type:* _____

County(s): Atlantic **Zip Code:** 08401

Municipality(s): Atlantic City **Block(s):** 60

Local Place Name(s): _____ **Lot(s):** 14

Ownership: Private **USGS Quad(s)** Atlantic City

Description:
Please see Exterior Description on Building Attachment Form.

Registration and Status Dates:

National Historic Landmark: _____ SHPO Opinion: _____

National Register: _____ Local Designation: _____

New Jersey Register: _____ Other Designation: _____

Determination of Eligibility: _____ Other Designation Date: _____

Photograph:



Survey Name: **OCEAN WIND INTENSIVE-LEVEL ARCHITECTURAL SURVEY** Date: May 3, 2023

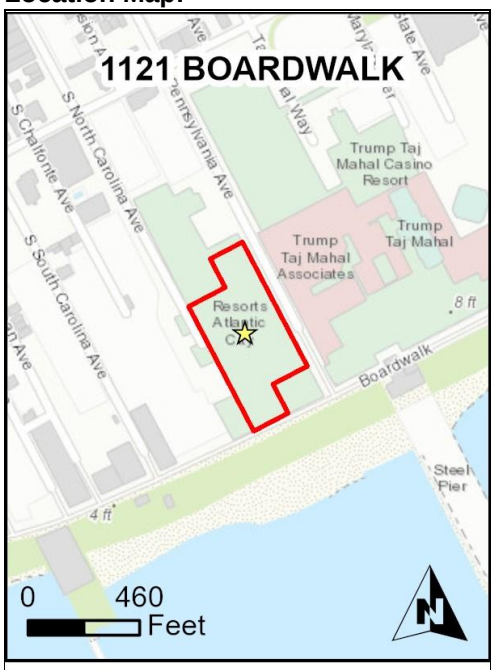
Surveyor: **Ann Keen (HDR), Liz Blackwell (SEARCH)**

Organization: **HDR and SEARCH**

BASE FORM

Historic Sites #:

Location Map:



Service Layer Credits: World Topographic Map: State of New Jersey, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA

Site Map:



Service Layer Credits: World Imagery: Maxar

Bibliography/Sources:

Atlantic City Gazette-Review
1920 “The Haddon Hall Arcade.” June 26, 1920:4.
1921a “Leeds & Lippincott and The Leeds Company.” Display ad. February 2, 1921:4.
1921b “May Span Street From Chalfonte to Haddon Hall.” December 2, 1921:1.
1924 “New Additions to Shore Hotel.” July 26, 1924:1.

Atlantic City Sunday Press the Sunday Gazette
1928a “Will Enlarge Haddon Hall.” April 1, 1928:13.
1928b “$5,500,000 Job To Start Soon.” September 16, 1928:13.

Atlantic Foto Service
1929 "Completion." [Photograph]. Philadelphia: Rankin & Kellogg/ Doe Collection, 33-P-038-008. July 4, 1929. Image courtesy Philadelphia Architects and Buildings. Available online at https://www.philadelphiabuildings.org/pab/app/im_display.cfm/504329?ProjectId=1B50E3AE-69BE-4232-B7494729A7A3F686, accessed April 2023.

IrishBrigade.com
n.d. Resorts Was Formerly WWII Military Hospital Thomas England General Hospital. Available online at https://www.irishbrigade.com/blogs/http-www-irishbrigade-com-blogs/resorts-was-formally-wwii-military-hospital-thomas-england-general-hospital, accessed April 2023.

BASE FORM

Historic Sites #:

Philadelphia Architects and Buildings
2023 “Rankin & Kellogg (fl. 1891-1903 and 1925-1943).” Available online at https://www.philadelphiabuildings.org/pab/app/ar_display.cfm?ArchitectId=A1137, accessed April 2023.

Press of Atlantic City
1921 “Twelve Story Addition For Haddon Hall.” October 4, 1921:1.
1925 “Hundreds of Thousands of Dollars Spend to Get Hotels Ready for Rush: Great Chalfonte-Haddon Hall Addition.” April 11, 1925:2.

Resorts Casino Hotel
2023 “Atlantic City’s First Casino – A Resorts AC History.” Available online at https://resortsac.com/history/#:%7E:text=Before%20becoming%20Resorts%20International%20in,opened%20its%20doors%20for%20business, accessed April 2023.

Additional Information:
Additional Information

More Research Needed? ☒Yes ☐No

INTENSIVE LEVEL USE ONLY

Attachments Included: ☒ Building ☐ Structure ☐ Object ☐ Bridge ☐ Landscape ☐ Industry

Within Historic District? ☐ Yes ☒ No

Status: ☐ Key-Contributing ☐ Contributing ☐ Non-Contributing

Associated Archaeological Site/Deposit? ☐ Yes
(Known or potential Sites – if yes, please describe briefly)

BUILDING ATTACHMENT

Historic Sites #:

Common Name:	Resorts Casino Hotel		
Historic Name:	Haddon Hall		
Present Use:	Residential Activity, Transient		
Historic Use:	Residential Activity, Transient		
Construction Date:	1920, 1921, 1924, 1928	**Source:**	Press of Atlantic City 1921, Atlantic City Gazette-Review 1924, Resorts Casino Hotel 2023
Alteration Date(s):	1976–1978	**Source:**	Resorts Casino Hotel 2023

Designer:	Rankin & Kellogg	**Physical Condition:**	Good
Builder:	George A. Fuller Company, Turner Construction	**Remaining Historic Fabric:**	Medium
Style:	Beaux Arts		
Form:	Other: High Rise	**Stories:**	15
Type:	Other	**Bays:**	21
Roof Finish Materials:	Unknown		
Exterior Finish Materials	Brick, stone, terra cotta, stucco		

Exterior Description:
Haddon Hall at 1121 Boardwalk is an E-plan hotel completed in 1922–1929 and executed in the Beaux Arts style. The main tower block is 15 stories with a central 3-story penthouse level; it was completed in 1929. Two flanking projecting blocks, 12 stories tall, were built in 1921–1922 as additions to an earlier iteration of the hotel, a frame building constructed in 1896. While some of the building's exterior is covered in a smooth stucco in 2023, contemporary photography and newspaper descriptions indicate the concrete and steel building originally had a red brick, Indiana limestone, and granite exterior with terra cotta details. Some of these original exterior materials are still visible, albeit painted. Typical of Beaux Arts design, exterior walls feature inset decorative detailing, quoins, pilasters, string courses, dentil molding at cornice levels, and roof-line balustrades. Residential-level windows are 1/1 sash. Windows in the lower levels are a mix of multi-light sash, horizontal sliders with rounded-arch mixed transoms; some windows have been infilled. The porte cochere on the southwest elevation is not original; it does not appear in contemporary photography from the 1920s.

A two-story commercial wing along the boardwalk was completed in 1921, also built as an addition to the 1896 iteration of Haddon Hall. Commercial space on the first level was arcaded, but many of the rounded-arch openings have been infilled. Rounded-arch windows on the second-story promenade are replacement. Limestone, brick, and terra cotta components visible on the exterior of this two-story building reflect how the exterior of the main hotel blocks used to appear.

Interior Description:
Not Applicable.

BUILDING ATTACHMENT

Historic Sites #:

Setting:
Haddon Hall is part of **Error! Reference source not found.**located on the north side of the Boardwalk, between South Pennsylvania Avenue and South North Carolina Avenue in Atlantic City, Atlantic County. Other buildings in the immediate area vary in scale and include restaurants, hotels, and casinos. Directly across South North Carolina from Haddon Hall is a paved parking lot where the Chalfonte Hotel was located until 1980, when it was demolished.

ELIGIBILTY WORKSHEET

Historic Sites #:

History:
Atlantic City is located on Absecon Island, where the Lenni-Lenape tribe often visited to fish and collect shells they used as currency. Jeremiah Leeds built the first structure on the island in 1785, and his descendant had built seven permanent dwellings by 1850 (Town Square Publications 2010). The city incorporated in 1854 and rail development soon followed. The city grew quickly in the late nineteenth century as a resort town located near New York and Philadelphia. Unlike primarily residential communities on the New Jersey Shore, Atlantic City development included businesses, recreational spaces, and tourist attractions like theaters and the Boardwalk. Half of the Boardwalk was destroyed in the Great Atlantic Hurricane of 1944. The city's popularity continued through the mid-twentieth century. but diminished in the 1950s when air travel allowed vacationers more options (ACFPL 2021). Atlantic City was heavily damaged by the Ash Wednesday Storm of 1962, which flooded and destroyed beachfront properties and roads and caused major coastline loss (NPS 2019). Another wave of large-scale development followed the city's gambling legalization in 1976 (ACFPL 2021).

The Resorts Casino Hotel was the first casino-hotel in Atlantic City, and the first legal casino outside of the state of Nevada. Originally named Haddon Hall, the extant components of the hotel were constructed in stages beginning in 1920–1921. The oldest extant component of Haddon Hall is the two-story arcade along the Boardwalk, between South North Carolina and Mansion Avenues (*Atlantic City Gazette-Review* 1920:4). The hotel complex expanded following its merger with the neighboring Chalfonte Hotel (no longer extant), immediately southwest of Haddon Hall across South North Carolina Avenue (*Atlantic City Gazette-Review* 1921a:2; *Atlantic City Gazette-Review* 1921b:1). Construction on the "Boardwalk wing," a 12-story addition built by the George A. Fuller Company of New York, began construction in 1921 and was completed in the summer of 1922 (*Press of Atlantic City* 1921:1). Similarly, the hotel constructed an addition on the Mansion Avenue side of the building between 1924–1925, including a corridor entrance connecting the Haddon Hall to the Chalfonte (*Atlantic City Gazette-Review* 1924:1; *Press of Atlantic City* 1925:2). The central frame section of Haddon Hall (built in 1896) was demolished in 1928 to allow for the construction of the current central block, which was designed by Philadelphia architects Rankin & Kellogg (*Atlantic City Sunday Press the Sunday Gazette* 1928a:13). The project was awarded to New York-based Turner Construction, and broke ground in October 1928 (*Atlantic City Sunday Press the Sunday Gazette* 1928b:13). It was completed in 1929.

Like many beachfront hotels, what was then known as Chalfonte-Haddon Hall leased its buildings to the Army between 1943 and 1946, where it was nicknamed "Camp Boardwalk." Haddon Hall was retrofitted to serve as a medical facility, and with the Chalfonte, Traymore, and other Atlantic City hotels, it was officially known as the Thomas England General Hospital. Haddon Hall was noted as the hospital's main building. The Haddon Hall section of the hospital had capacity for approximately 2,000 patients. By 1945, the hospital was the largest in the United States specializing in amputations and neurosurgery (IrishBrigade.com n.d.)

Upon its return to the Leeds & Lippincott Company, Chalfonte-Haddon Hall was re-opened to the public. With talk of gaming legalization in Atlantic City, Resorts International (formed in 1968), purchased Leeds & Lippincott Company and its hotels, renovating Haddon Hall in preparation for the passage of the 1976 gaming referendum. Haddon Hall, known from that point as the Resorts Casino Hotel, re-opened in 1978 as a hotel/casino. The Chalfonte Hotel, unable to meet the minimum room requirement to be converted into a gaming hotel, was demolished in 1980. The site was redeveloped into parking for the Resorts Casino Hotel. In 2002, the Rendezvous Tower was constructed, replacing a Ramada Inn on the site. The new tower opened in 2004 (Resorts Casino Hotel 2023; Olshan 2001:25).

ELIGIBILTY WORKSHEET

Historic Sites #:

Significance:
1121 Boardwalk is associated with pre-World War II, pre-gambling-era development Atlantic City. The location of a Quaker rooming house beginning in 1869. Expansion took place over the years, culminating in construction of a hotel with a 400-person capacity on the site in 1896. This iteration of Haddon Hall was expanded between 1920 and 1928 to include a two-story arcade and promenade along the Boardwalk and two 12-story wing additions. Haddon Hall was developed by Leeds & Lippincott Company, which expanded the hotel in response to the growing popularity of Atlantic City as a resort area, and commissioned the replacement of the 1896 central building with a 16-story concrete and steel structure capped by a 3-story penthouse structure. Extant components of Haddon Hall were designed by the Philadelphia-based architecture firm of Rankin & Kellogg.

The Resort Casino Hotel is an example of a Beaux Arts-style high-rise hotel designed by Philadelphia-based architects Rankin & Kellogg. Rankin & Kellogg's portfolio includes 72 buildings, primarily residential and commercial types executed in the Beaux Arts style.

As the main building associated with the Thomas England General Hospital during World War II, Haddon Hall was associated with advanced amputation and neurosurgery operations and rehabilitation, which bears additional research.

Eligibility for New Jersey and National Registers:	☒ Yes	☐ No	**National Register Criteria:**	☒ A	☐ B	☒ C	☐ D
Level of Significance	☒ Local	☐ State	☐ National				

Justification of Eligibility/Ineligibility:
The extant 1920s components of Haddon Hall were designed by the Philadelphia-based architecture firm of Rankin and Kellogg. The firm was responsible for the central tower block, its two flanking wings, and two-story arcade building. The building is associated with both the development of Atlantic City as a seaside resort and the use of Atlantic City hotels for the Thomas England General Hospital during World War II. Thus Haddon Hall is significant under Criterion A for Commerce and (potentially, with additional research) Health/Medicine. The hotel is not known to be associated with historically important persons; therefore, it is not significant under Criterion B. The hotel is associated with Philadelphia-based architects Rankin & Kellogg, who designed several local landmarks, including the Camden County Courthouse and Jail, and United States Post Office and Custom House in Camden, New Jersey. Haddon Hall is an example of the firm's Beaux Arts designs; the building holds significance under Criterion C for Architecture. The hotel is not likely to yield information important to prehistory or history; thus, it is not significant under Criterion D.

Haddon Hall has been subject to modifications through the years, including its porte cochere entrance addition on its primary elevation and modifications to the two-story arcade building, impacting its integrity of design, materials, and workmanship. However, enough of the hotel design and materials are extant to be able to convey the building's significance under Criterion A and C. It is therefore recommended Eligible for inclusion in the NRHP at the local level, with significant periods including 1921–1929, reflecting its construction period, and 1943–1946, reflecting its use as a hospital during World War II.

ELIGIBILTY WORKSHEET

Historic Sites #:

For Historic Districts Only:

Property Count: Key Contributing: _____ Contributing: _____ Non-Contributing: _____

For Individual Properties Only:

List the completed attachments related to the property's significance:

Narrative Boundary Description:
The survey boundary includes the entire legal parcel associated with the building at 1121 Boardwalk.

CONTINUATION SHEET

Historic Sites #:

ADDITIONAL PHOTOGRAPHS



Photo Description:
Resorts Casino Hotel, 1121 Boardwalk, view to the northeast. 2004 tower on left, Haddon Hall on right.



Photo Description:
Resorts Casino Hotel entrance at Haddon Hall, 1121 Boardwalk, view to the southeast.

Survey Name: **OCEAN WIND INTENSIVE-LEVEL ARCHITECTURAL SURVEY** Date: May 3, 2023
Surveyor: **Ann Keen (HDR), Liz Blackwell (SEARCH)**
Organization: **HDR and SEARCH**

CONTINUATION SHEET

Historic Sites #:

ADDITIONAL PHOTOGRAPHS



Photo Description:
Haddon Hall, 1121 Boardwalk, view to the northeast.



Photo Description:
Haddon Hall, 1121 Boardwalk, view to the southeast.

Survey Name: **OCEAN WIND INTENSIVE-LEVEL ARCHITECTURAL SURVEY** Date: May 3, 2023
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CONTINUATION SHEET

Historic Sites #:



Figure 1. Sketch rendering of the 12-story addition to Haddon Hall, 1921 (*Press of Atlantic City* 1921:1)

CONTINUATION SHEET

Historic Sites #:



Figure 2. Photograph commemorating the completion of Haddon Hall project, 1929 (Atlantic Foto Service 1929).