

APPENDIX

Analysis of Visual Effects to Historic Properties



Prepared for

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TETRA TECH

MARCH 2023

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ACRONYMS AND ABBREVIATIONS

ADLS	aircraft detection lighting system
APE	Area of Potential Effect
AVEHAP	Analysis of Visual Effects to Historic and Architectural Properties
BOEM	Bureau of Ocean Energy Management
COP	Construction and Operations Plan
CRIS	Cultural Resource Information System
Empire	Empire Offshore Wind LLC
EW	Empire Wind
EW 1	Empire Wind 1
EW 2	Empire Wind 2
FAA	Federal Aviation Administration
ft	foot
GIS	geographic information system
GPS	global positioning system
HRVEA	Historic Resources Visual Effects Assessment
km	kilometer
KOP	Key Observation Point
Lease Area	designated Renewable Energy Lease Area OCS-A 0512
m	meter
mi	mile
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NJ HPO	New Jersey Historic Preservation Office
nm	nautical mile
NPS	National Park Service
NRA	National Recreation Area
NRHP	National Register of Historic Places
NYSERDA	New York State Energy Research and Development Authority
NY SHPO	New York State Historic Preservation Office
OCS	Outer Continental Shelf
PAPE	Preliminary APE
POI	Point of Interconnection
Project	The offshore wind project for OCS A-0512 proposed by Empire Offshore Wind LLC consisting of Empire Wind 1 (EW 1) and Empire Wind 2 (EW 2).
Project Area	The area associated with the build out of the Lease Area, including the Lease Area, submarine export cable routes, and onshore project facility locations, including the onshore export and interconnection cables, onshore substations, and O&M Base
SBMT	South Brooklyn Marine Terminal
SHPO	State Historic Preservation Office

TCP	Traditional Cultural Properties
Tetra Tech	Tetra Tech, Inc.
Study Area	AVEHP Offshore Study Area
U.S.C.	United States Code
USCG	United States Coast Guard
VIA	Visual Impact Assessment
Wind Farm Development Area	Project Area to be developed for commercial operation including EW 1 and EW 2, comprising up to 147 wind turbines and 2 offshore substations, located in the Lease Area.

Z.1 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) was contracted by Empire Offshore Wind LLC¹ (Empire) to prepare an Analysis of Visual Effects to Historic and Architectural Properties (AVEHAP), also known as a Historic Resources Visual Effects Assessment (HRVEA), in support of the development of the Empire Offshore Wind: Empire Wind Project (EW 1 and EW 2) Project Construction and Operations Plan (COP). The Project consists of an offshore wind farm to be located in the designated U.S. Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area Outer Continental Shelf (OCS)-A 0512 (Lease Area), as well as submarine export cables and onshore ancillary facilities required to convey power produced by the wind farm to the regional electric transmission system. The Lease Area is approximately 14 statute miles (mi) (12 nautical miles [nm], 23 kilometers [km])² south of Long Island, New York and 19.5 mi (16.9 nm, 31.4 km) east of Long Branch, New Jersey (**Figure Z-1**). The purpose of this AVEHAP is to assess the potential visual effects of the construction and operations of the Project from above-ground historic properties (e.g., cultural properties, districts, buildings, structures, or objects, that are 50 years old or older and are listed in or eligible to the National Register of Historic Places [NRHP]) that will have views or partial views of Project components. For the purposes of this report, the historic properties of concern are of an architectural or landscape character and will be referred to herein as architectural properties. The Area of Potential Effect (APE) will be defined by BOEM through the Section 106 process; therefore, this COP describes the preliminary APE (PAPE), as identified by Tetra Tech.

Project components include wind turbines, offshore substations, foundations, submarine export cables, interarray cables, onshore export and interconnection cables, onshore substations, and an Operations and Maintenance (O&M) Base. The focus of this report is on the above water offshore and aboveground onshore Project components including the wind turbines, offshore substations, onshore substations, and O&M Base. Most of the resources affected by the Project relate to views of the offshore Project components. Onshore, three historic properties within the EW 1 Onshore AVEHAP PAPE, associated with the EW 1 onshore substation and O&M Base³, may have a view of an onshore Project component. One historic property within the EW 2 Onshore AVEHAP PAPE, associated with the EW 2 Onshore Substation C, may have a view of an onshore Project component, though assessed as not adversely affected. The submarine export cables and interarray cables, and the onshore export and interconnection cables will be entirely submerged under water and buried underground, except the cable bridge crossing; therefore, the export cable components will not be addressed further in this analysis. The cable bridge crossing is located within the EW 2 Onshore AVEHAP PAPE associated with the EW 2 Onshore Substation A. The historic properties with a view of the offshore Project components are greater in number and comprise the majority of this AVEHAP.

¹ Empire is a direct, wholly owned subsidiary of Empire Offshore Wind Holdings LLC (“Empire HoldCo”). Empire HoldCo is jointly owned by (1) an indirect, wholly owned subsidiary of Equinor ASA (collectively, “Equinor”); and (2) an indirect, wholly owned subsidiary of BP Wind Energy North America In. (“BP”). BP acquired ownership interest in Empire HoldCo in a transaction that closed on January 29, 2021.

² Distances throughout the AVEHAP are provided as statute miles (mi) or nautical miles (nm) as appropriate, with kilometers in parentheses. For reference, 1 mi equals approximately 0.87 nm or 1.6 km.

³ While the O&M Base will serve both EW 1 and EW 2, the base will be located at the South Brooklyn Marine Terminal (SBMT), adjacent to the EW 1 onshore substation, and will therefore be included within the EW 1 Onshore Study Area for the purposes of this analysis.

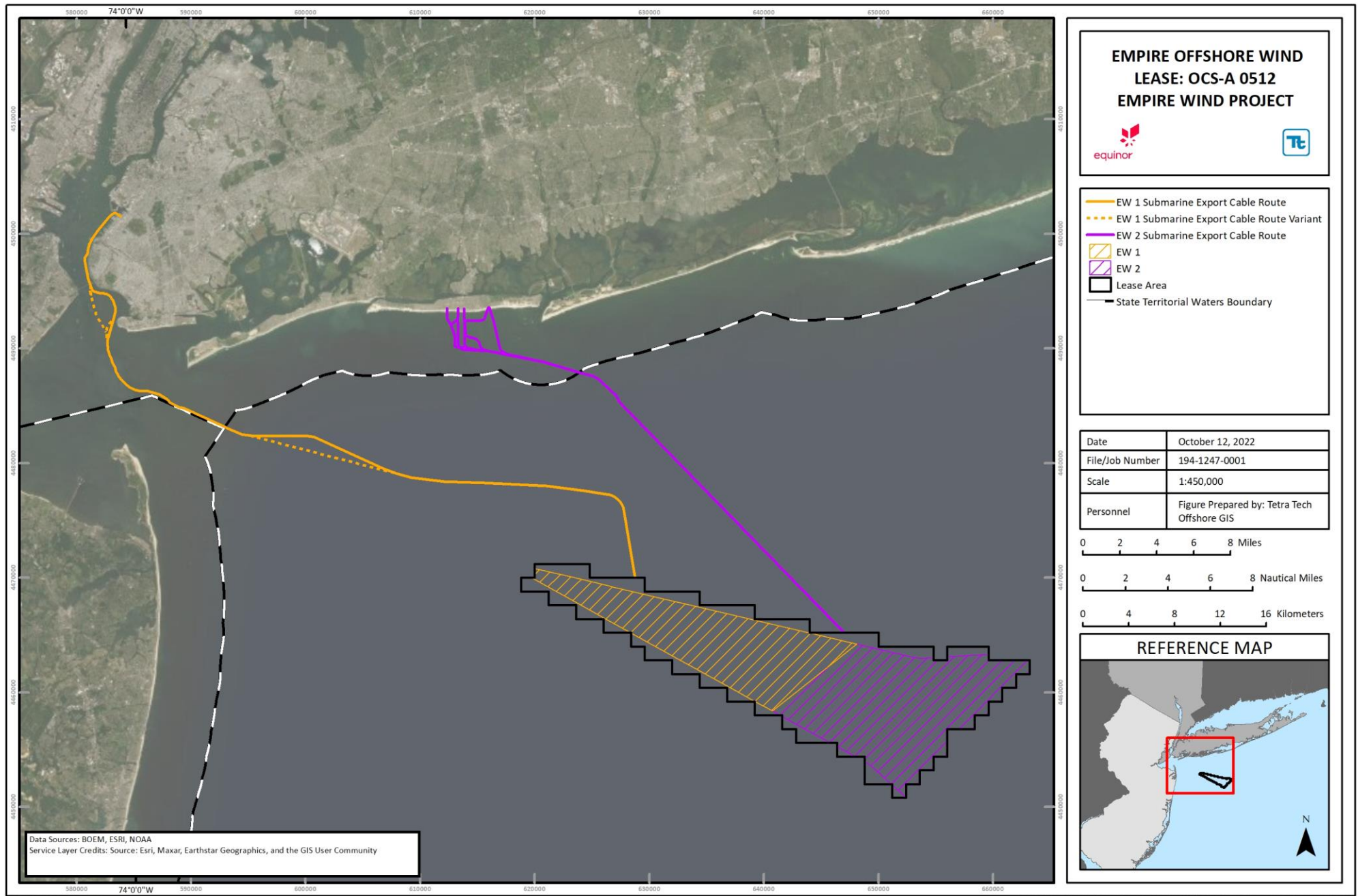


Figure Z-1 Project Area

This AVEHAP includes a detailed description of the Project components evaluated (Section Z.2 Project Description); a summary of the regulatory framework driving the analyses herein (Section Z.1.1 Regulatory Context); a detailed discussion of the methods used to identify the Study Areas and the PAPEs (i.e. locations of NRHP-listed and eligible resources potentially affected by the construction and operations of the Project, Section Z.4 Architectural Resource Survey Methodology); environmental and cultural contexts of the Project Area (Sections Z.3.1 and Z.3.2); descriptions of historic properties that may be impacted (Section Z.4 NRHP-Listed and -Eligible Architectural Resources within the PAPEs); an assessment of Project effects on NRHP-listed and -eligible historic properties (Section Z.4.3 Assessment of Effect); and recommendation of potential mitigation measures applicable to the Project (Section Z.5 Recommendations for Mitigation of Effects).

This analysis also relied upon assessments reported in a separate Visual Impact Assessment (VIA) developed for the Project and presented in a report detailing onshore and offshore visual effects (**Appendix AA Visual Impact Assessment**; Tetra Tech 2021).

Z.1.1 Regulatory Context

Several federal, state, and local agencies have regulatory authority over the Project based on the location of the different Project components. The wind turbines and offshore substations are to be located entirely within federal waters of the United States and the OCS and are under the jurisdiction of BOEM. Onshore facilities, including the onshore substations, will be located in Brooklyn, New York (EW 1) and the City of Long Beach and/or Town of Hempstead, New York (EW 2).

The Project is subject to regulation by BOEM under provisions of the Outer Continental Shelf Renewable Energy Program authorized by the Energy Policy Act of 2005 (42 United States Code [U.S.C.] §§13201 *et seq.*). Assessments of effects on historic architectural resources are required to support BOEM's National Environmental Policy Act (NEPA) review process and the review performed under Section 106 of the National Historic Preservation Act (NHPA; 54 U.S.C. § 306108). Under Section 110 of the NHPA (54 U.S.C. 306107), federal agencies assume responsibility for the preservation of historic properties or resources that fall under the agency's jurisdiction. Prior to approving any federal undertaking which may directly adversely affect National Historic Landmark (NHL), the responsible federal agency must minimize harm to the landmark and afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking. (NHPA; 54 U.S.C. 306107)

In the COP Guidelines, BOEM provides recommended approaches for assessing historic architectural resources during the permitting phase of offshore wind projects (BOEM 2017). BOEM directs that an AVEHAP should be conducted in a manner acceptable to the relevant State Historic Preservation Office (SHPO) for the state with the onshore viewshed. For the purposes of this Project, the affected areas fall within the states of New York and New Jersey.

In 2016, BOEM executed a Programmatic Agreement with the SHPOs of New York and New Jersey, the Shinnecock Indian Nation, and the Advisory Council on Historic Preservation to formalize agency jurisdiction and coordination for the review of offshore renewable energy development regarding cultural resources (BOEM 2016). The Programmatic Agreement recognized that issuing renewable energy leases on the OCS constituted an undertaking subject to Section 106 of the NHPA. BOEM, as the lead federal agency in this process, has authority to initiate consultations with the SHPOs, and to consult with interested Native American Tribes.

The scope and approach to this AVEHAP were supported through engagement with federal and state agencies. Empire met with BOEM and the National Park Service (NPS) on August 29, 2018 to discuss approaches to

the historic architectural survey and visual impact analysis. Empire initiated discussions with the New York State Historic Preservation Office (NY SHPO) and with the New Jersey Historic Preservation Office (NJ HPO) via letters dated December 13, 2018⁴. The NY SHPO concurred with the approach in a letter dated December 27, 2018, and NJ HPO concurred with the approach in a letter dated January 8, 2019. As the Project evolved, Empire provided NY SHPO with a Project Update letter on August 22, 2019 and met with NY SHPO on September 26, 2019 to describe the most recent preferred locations for the EW 1 and EW 2 onshore electrical systems. Empire provided NJ HPO with a Project update via videoconference on September 24, 2020. Empire also provided a Project-update letter to the NY SHPO, introducing the additional EW 2 onshore export and interconnection cable routes and EW 2 Onshore Substation A site in April 2021. NY SHPO confirmed receipt of the update and had no comments at the time. Empire provided a supplemental NY Project-update letter introducing an additional landfall site (Landfall E) and additional EW 2 onshore export and interconnection cable routes on May 10, 2022. Empire continues to engage with stakeholders with regards to potential impacts to architectural properties.

Z.2 PROJECT DESCRIPTION

A detailed description of offshore and onshore facilities is presented in the COP. A general description of the Project is provided in the following sections.

Z.2.1 Offshore Facilities

The Project includes the construction of up to 147 wind turbines (the total number across both EW 1 and EW 2) at up to 174 locations, two offshore substations, and foundations for the wind turbines and offshore substations within the Lease Area. The wind turbines will be connected via interarray cables to the offshore substations. The offshore substations will collect the power generated by the wind turbines and transport it to the Project's onshore substations via submarine export cables. The onshore substations will transmit the energy generated for connection to the Points of Interconnection (POIs) in New York⁵. An overview of the offshore Project facility locations is provided in **Figure Z-1**. The interarray cables and submarine export cables will be located subsea; therefore these will not be visible components of the Project and will not be evaluated as part of this assessment.

Empire proposes to develop the Lease Area in two wind farms. EW 1 and EW 2 will be electrically isolated and independent from each other. For the purposes of the COP, this assessment includes both EW 1 and EW 2 as required by federal regulations (see Section Z.4).

Z.2.1.1 Wind Turbines

The wind turbines installed for the Project will be three-bladed, horizontal-axis machines. The rotor will be attached to a nacelle containing the electrical generator and other equipment. The nacelle will sit on top of a tubular support tower. Wind energy causes the blades on a wind turbine to rotate, which turns a generator to transform the kinetic energy of the air into electricity.

Table Z-1 provides a summary of the parameters for the proposed representative wind turbine. **Figure Z-2** shows the representative wind turbine and associated layout.

⁴ The area encompassed by the EW 2 Onshore Substation C site was included in this original submission to NY SHPO as part of the onshore export cable route.

⁵ The Project Design Envelope proposes the construction and installation of two onshore substations to support the Project. The onshore substations will be used to connect the export cables to the POIs in New York.

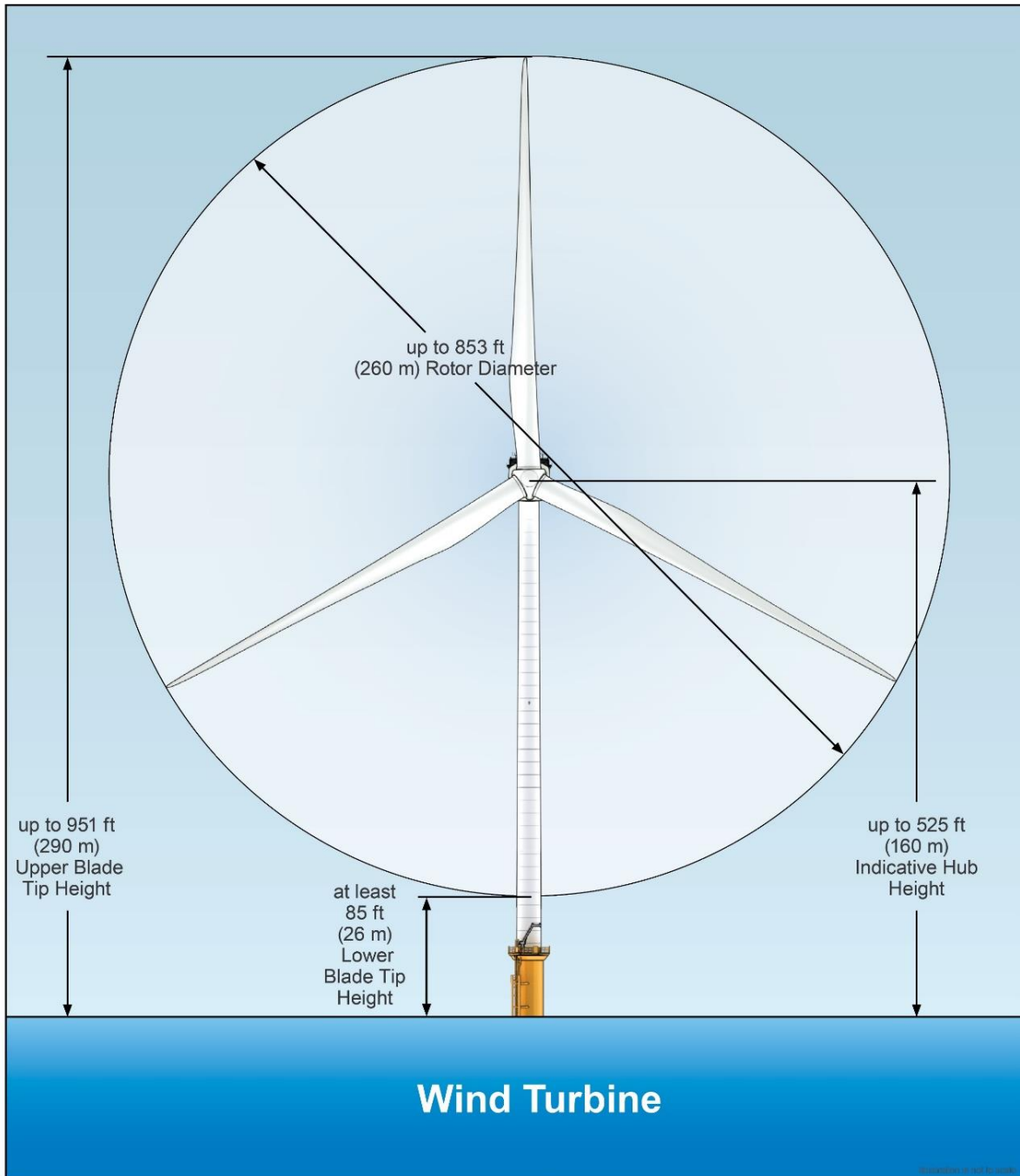


Figure Z-2 Representative Wind Turbine

Table Z-1 Summary of the Parameters for the Representative Wind Turbine

Parameter	Representative Wind Turbine
Total Number	147
Hub Height above Highest Astronomical Tide (HAT)	525 ft (160 m)
Upper Blade Tip above HAT	951 ft (290 m)
Lower Blade Tip above HAT	85 ft (26 m) a/
Rotor Diameter	853 ft (260 m)

a/ For this parameter, the minimum value represents the maximum Project Design Envelope value.

Z.2.1.2 Offshore Substations

To support the Project's design capacity, Empire will require the installation of two offshore substations. Each offshore substation will consist of a platform containing the electrical components necessary to collect the electricity generated by the wind turbines (via interarray cables) for delivery transmission and transport to the Project's onshore electricity infrastructure (via export cables). The offshore substations will have a maximum width of 230 ft (70 m) and length of 230 ft (70 m). The height of the offshore substation topsides will be 92 ft (28 m), with a maximum height of 295 ft (90 m) measured to the top of the lightning protection and ancillary structures. The offshore substation topside will be situated 72 ft (22 m) above mean sea level. The offshore substation will be lit and marked in accordance with United States Coast Guard (USCG) and Federal Aviation Administration (FAA) requirements, as applicable, and include lights around the perimeter of each deck level for safety.

Z.2.2 Onshore Facilities

Z.2.2.1 Onshore Substations

EW 1

The EW 1 onshore substation would be developed within an approximately 4.8-acre (ac, 1.9-hectare [ha]) parcel of land in Brooklyn, New York, with a maximum main building height of 49 ft (15 m). The layout includes three buildings (**Figure Z-3**). Outside electrical equipment will be situated in the central portion of the site. The onshore substation is 0.1 mi (0.2-km) from the Gowanus POI, owned by ConEd.

EW 2

The EW 2 Onshore Substation A and EW 2 Onshore Substation C sites are located on Long Island in the Town of Hempstead, New York, with EW 2 Onshore Substation A located in the unincorporated hamlet of Oceanside and EW 2 Onshore Substation C in the incorporated Village of Island Park (**Figure Z-4**). The onshore substation will connect into the Oceanside POI owned by National Grid and operated by PSEG Long Island.

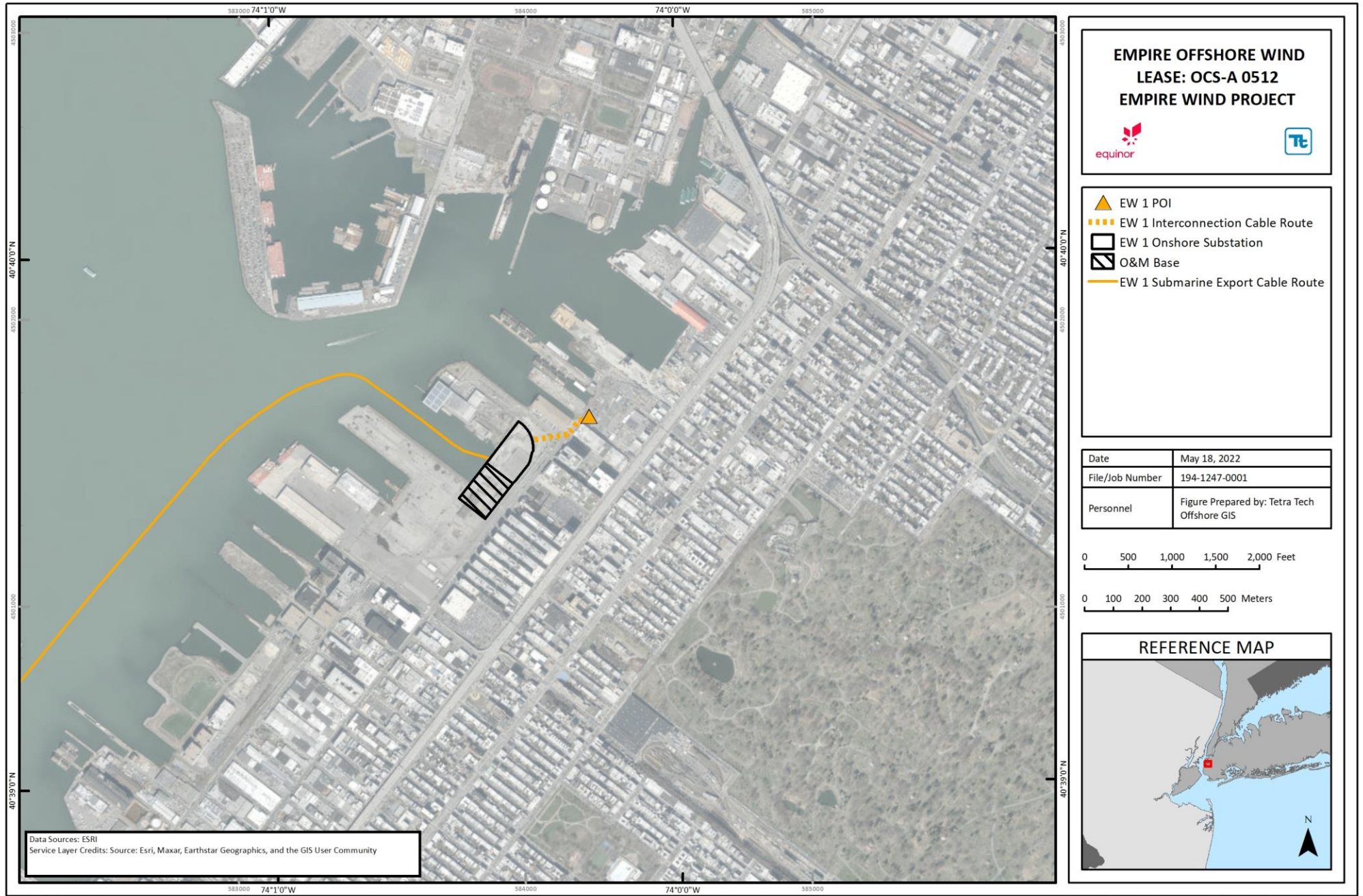


Figure Z-3 EW 1 Onshore Substation Site, Interconnection Cable Route, and O&M Base

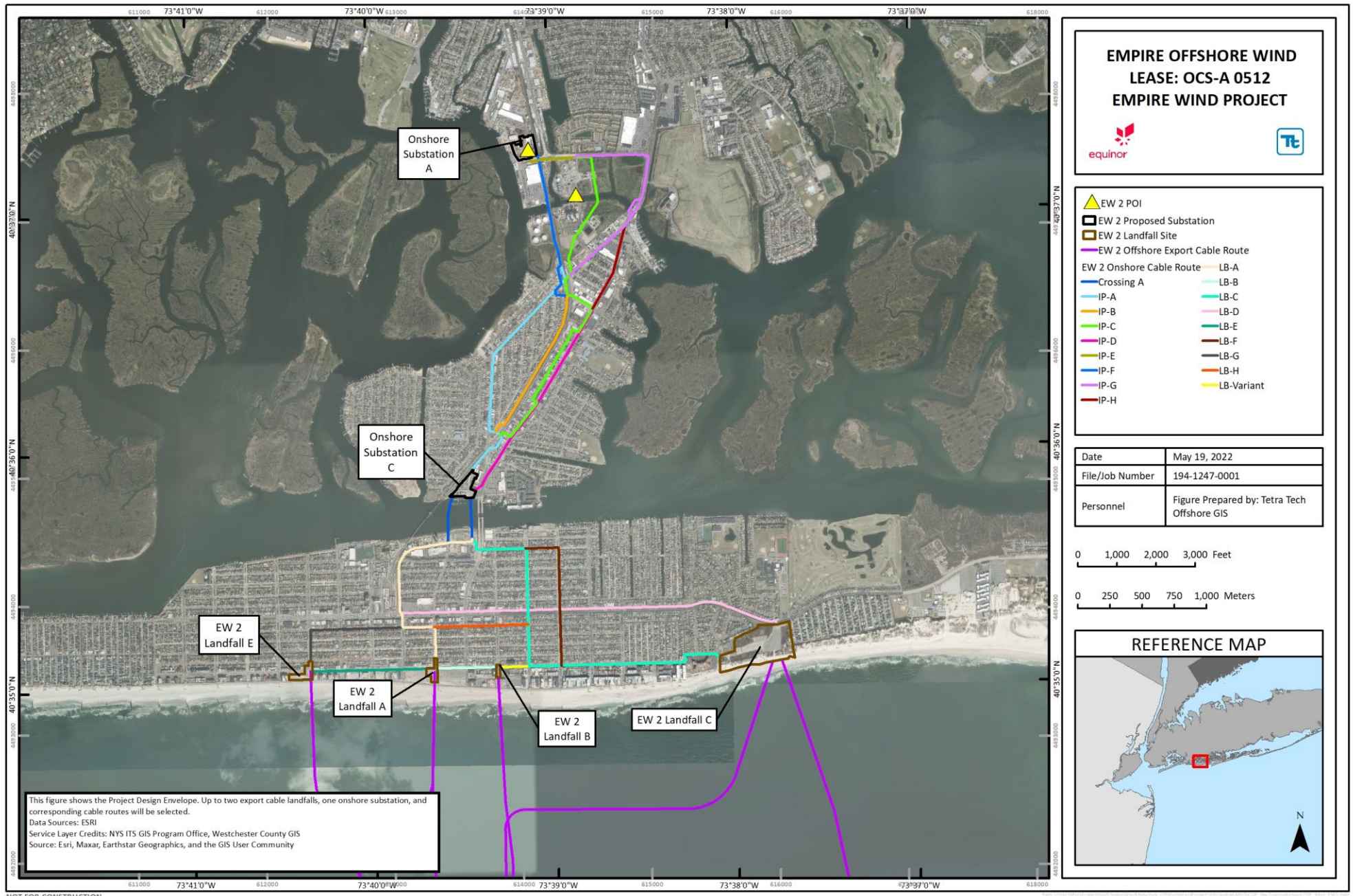


Figure Z-4 EW 2 Onshore Substation Sites and Onshore Export and Interconnection Cable Routes

EW 2 Onshore Substation A:

The onshore substation will be located on a property at the corner of Daly Boulevard and Hampton Road, in Oceanside, New York. The parcel is privately owned. The onshore substation will be constructed within an approximately 6.4-ac (2.6-ha) portion of the property, with a maximum main building height of 60 ft (18 m)⁶. The parcel currently supports industrial uses and contains minor temporary infrastructure that would need to be removed for the construction of the onshore substation. Engagement with the POI operator has indicated a potential expansion of the Oceanside POI into this parcel; this location may therefore contain the POI and associated equipment to which the Project will connect into the grid. Electrical equipment to support the Oceanside POI, if constructed, will be similar to what is proposed to be used for the onshore substation and will be installed in an orientation consistent with the conceptual layout analyzed in this document. If plans develop for the Oceanside POI to expand onto this parcel, the co-location of the EW 2 onshore substation would not be possible due to space constraints.

EW 2 Onshore Substation C:

The onshore substation will be located on a property adjacent to Railroad Place in Island Park, New York. The site is bordered by the Long Island Rail Road to the west, Reynolds Channel to the south, and Long Beach Road to the east. The parcel is privately owned and contains existing commercial uses. The site would require the demolition and removal of existing structures for the construction of the onshore substation. Each structure proposed to be demolished on this parcel is listed as Not Eligible according to the New York State Cultural Resource Information System (CRIS). Included among these structures are Pop's Seafood Shack and Grill (CRIS No. 05936.000229 and 05936.000230) and a boat marina (05936.000231). The onshore substation will be constructed within an approximately 5.2-ac (2.1-ha) portion of the onshore substation site, with a maximum main building/equipment height of 60 ft (18 m).

Z.2.2.2 O&M Base

The O&M Base would be developed within an approximately 4.5 ac (1.8 ha) parcel of land in Brooklyn, New York, with a maximum main building height of 49 ft (15 m). The conceptual layout includes up to two enclosed buildings to support O&M operations (**Figure Z-3**).

Z.2.2.3 Cable Bridge Crossing

An above-water cable bridge may be utilized to support an inland waterway crossing between Island Park and Oceanside, New York, along EW 2 Route IP-F or EW 2 Route IP-G. The crossing will be located adjacent to the existing LIRR railway bridge or adjacent to the existing Long Beach Road bridge. This crossing will use up to two support columns located within the waterway to support the truss system which will hold the cables above the water.

These supports will include up to six 1.5-ft (0.5-m) diameter steel pipe piles per pile cap, for a total of twelve steel pipe piles within the waterway. The cable bridge will be constructed from a prefabricated steel truss system assembled offsite and set in place, and the structure will measure up to 25 ft (7.6 m) wide and 8 ft (2.4 m) tall and span a length of approximately 300 ft (91 m). The structure is anticipated to have a total height of up to 15 ft (4.6 m) above MSL, with a maximum total height of 30 ft (9.1 m) above MSL.

Z.2.3 Decommissioning

At the end of the Project's operational life, it will be decommissioned in accordance with a detailed Project decommissioning plan that will be developed in compliance with applicable laws and regulations at that time. Impacts during decommissioning are expected to be similar or less than those experienced during construction,

as described in Section Z.6. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and potential impacts will be re-evaluated at that time. It is anticipated that decommissioning activities would occur over a shorter period of time than initial construction. Once above-water offshore Project components are removed, the Lease Area would be returned to pre-construction conditions with regard to visual resource impacts.

Z.3 DEFINITION OF PRELIMINARY AREA OF POTENTIAL EFFECT (PAPE)

Z.3.1 Offshore PAPE

As defined by 36 Code of Federal Regulations § 800.16(d), the APE is “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist”. The APE will be defined by BOEM through the Section 106 process, therefore, this COP describes the PAPE, as identified by Tetra Tech.

Z.3.1.1 Description of offshore PAPE assessed in AVEHAP

Based on discussions with BOEM, the modeled AVEHAP Offshore viewshed can be delimited by a 40-mi (64-km) buffer, or Study Area, around the Lease Area perimeter. This AVEHAP Offshore Study Area consists of western Long Island including all of Kings, Queens, Bronx, Richmond, and Nassau counties and the western half of Suffolk County, and the southern portion of Westchester County. In New Jersey, the Study Area encompasses all of Hudson County, most of Monmouth County, northeastern Ocean County, and portions of Bergen, Passaic, Essex, Union, and Middlesex counties. This AVEHAP focuses on historic properties and architectural properties within the Offshore and Onshore PAPEs that may be affected by the construction and operations of the Project. The AVEHAP PAPE is defined as areas where views of the Project are present (**Figure Z-8**). Maps at 1:24,000 scale depict the offshore PAPE in detail for the entire Project Study Area (Attachments Z-13 and Z-14). Overall, the offshore PAPE includes: 1) the littoral zone of the Atlantic Ocean shoreline, the Lower New York Bay shoreline, and the barrier islands on the south shore of Long Island from the Rockaway peninsula eastward to Fire Island; 2) generally level terrain that extends approximately 0.5 mi to 3 mi (0.8 to 4.8 km) landward from the shorelines; 3) elevated terrain including the Atlantic Highlands in Monmouth County, New Jersey, the Ronkonkoma and Harbor Hill terminal moraines in Kings, Nassau, and Suffolk counties, New York, and the bedrock-cored uplands in northern Manhattan and adjacent parts of the Bronx; and, 4) elevated buildings clustered in lower and midtown Manhattan and occurring in lower density across the PAPE.

Z.3.1.2 Description of offshore PAPE using Phased Identification

Empire has developed a separate Phased Identification Plan to address additional needs for identifying historic properties. This plan includes additional examination of county parcel data from Monmouth, Ocean, and Middlesex counties, and additional field surveys. The definition of the offshore PAPE for phased identification is expected identical to that described in Section Z.3.1.1.

Z.3.2 Onshore PAPE

The Onshore AVEHAP PAPEs are those areas where views of the Project’s onshore components will be visible. The process of defining the PAPE involved establishing study areas and models of preliminary viewsheds. Under Section 106, BOEM will then determine the extent of and define the Onshore AVEHAP PAPEs for this Project.

The Project proposes to develop two onshore substations; the EW 1 onshore substation will be located in Brooklyn, New York and the EW 2 onshore substation will be at one of two proposed locations, either in the

unincorporated hamlet of Oceanside, Town of Hempstead, New York or in the incorporated village of Island Park, Town of Hempstead, New York. The transition from submarine export cables to onshore export cables will occur at the export cable landfall; however, there will be no permanent above-ground structures at the export cable landfall locations. The onshore export and interconnection cables will be located underground and will not be visible once installed, with the exception of a cable bridge crossing at Barnums Channel. The cable bridge crossing is located within the EW 2 Onshore AVEHAP PAPE associated with the EW 2 Onshore Substation A. Locations for the onshore facilities are shown on **Figure Z-3** and **Figure Z-4**.

Empire intends on constructing and maintaining a staffed Operations and Maintenance (O&M) Base. This O&M Base will monitor operations and include office, control room, warehouse, shop, and pier space. The final selection and design will be determined upon whether the facility will be able to accommodate Empire's workforce and equipment needs. The O&M Base will be sited at SBMT adjacent to the EW 1 onshore substation.

Z.4 METHODOLOGY

This section describes the methodology used to identify, define, and refine the PAPE. Discussion relevant to both the offshore and onshore PAPE methodology is presented.

Z.4.1 Methodology for PAPE

Z.4.1.1 Offshore PAPE

An initial analysis was conducted using ESRI ArcGIS Pro 2.2.0 software with the Spatial Analyst extension to process 10-meter Digital Elevation Models based on the National Elevation Dataset and height zones of visible components of the wind turbines (foundation, entire rotor swept area, hub, and maximum blade tip). The initial topographic viewshed assumed "bare earth" conditions and was developed from wind turbine locations looking out to determine areas with potential visibility. The initial viewshed accounted for both curvature of the earth and refraction, using the default values identified in the software. **Figure Z-5** is a scaled graphic, showing the wind turbines at varying distances based on a photograph from a coastal beach location. A 40-mi (64 km) AVEHAP Offshore Study Area around the Lease Area was used as a conservative estimate of minimal visibility as a starting point for identifying the Offshore AVEHAP PAPE. The location and extent of the AVEHAP Offshore Study Area is illustrated in **Figure Z-6**.

To supplement the initial topographic viewshed analysis, a viewshed accounting for building heights and vegetation was also developed to identify areas where potential screening may be provided by buildings and vegetation. This viewshed model helped to focus inventory and field visit efforts based on existing conditions within the landscape. The viewshed model accounting for building heights and vegetation was derived using a similar process as the initial topographic viewshed described above. However, for this viewshed model, building footprints for New York City, Suffolk County, and Nassau County in New York and Monmouth County in New Jersey were incorporated into the digital elevation model to represent surface elevations. The building footprint information obtained for New York City contained building heights. Other data sources obtained did not contain building height information. For data sets that did not contain building heights, an assumed height of 17 ft (5.2 m) was used to represent a conservative height of an approximately one-story building across the building footprints. The resulting viewshed model accounting for building heights was taken to approximate the Offshore AVEHAP PAPE (**Figure Z-8**).

Z.4.1.2 Onshore PAPE

The methodology for defining the onshore AVEHAP PAPE was largely the same as for the offshore PAPE. The area encompassed by a computer-generated viewshed indicated that the EW 1 onshore substation and O&M Base would have a maximum theoretical visibility up to 4 mi (6.4 km) away, including portions of Brooklyn, Manhattan, Staten Island, and New Jersey. This 4-mi (6.4-km) radius was designated as the EW 1 AVEHAP Onshore Study Area (see **Figure Z-13**).

The EW 1 AVEHAP Onshore Study Area contains 384 historic properties (NRHP listed and eligible), largely located in Brooklyn and Manhattan, with a small number in Staten Island and Jersey City. Each of the 384 historic properties in the EW 1 AVEHAP Onshore Study Area was subjected to a bare-earth viewshed analysis, resulting in 82 properties with potential views of the EW 1 onshore substation and/or O&M Base. Street-level and in-field analyses were performed to establish the presence of actual Project views, starting with properties in proximity to the onshore substation and proceeding outward with greater distance. In this manner, 30 historic properties were assessed at distances up to 2 mi (3.2 km) from the EW 1 onshore substation and O&M Base (**Attachment Z-5, Photo Documentation of Historic and Architectural Properties within EW 1 Onshore AVEHAP PAPE**), allowing an onshore PAPE to be defined. The analyses indicated that Project visibility became attenuated beyond the blocks immediately surrounding the onshore substation and O&M Base.

EW 1 Onshore AVEHAP PAPE

The EW 1 Onshore AVEHAP PAPE was defined as the zone within the EW 1 AVEHAP Onshore Study Area that was likely to contain views of the onshore substation and O&M Base, based on analysis of screening by building elevations, desktop street-level analysis, and a field visit on February 4, 2021. The EW 1 Onshore AVEHAP PAPE is an approximately 2-mi (3.2-km) radius around the EW 1 onshore substation and/or O&M Base. The EW 1 Onshore AVEHAP PAPE encompasses the elevated terrain of the Harbor Hill glacial moraine, the highest point in Brooklyn. Descriptions of the historic properties in the EW 1 Onshore AVEHAP PAPE are provided in Section Z.4.2.2. The EW 1 Onshore AVEHAP PAPE is shown in **Figure Z-13**.

EW 2 Onshore AVEHAP PAPE

The area encompassed by a computer-generated viewshed indicated that the EW 2 onshore substations would have a maximum theoretical visibility up to 4 mi (6.4 km) away, including portions of Long Beach Island, Barnum Island, and the Town of Hempstead, all within Nassau County, New York. The 4-mi (6.4-km) radius from each substation was designated as its EW 2 AVEHAP Onshore Study Area (see **Figure Z-14**).

Based on the near-sea level elevation of the onshore substation locations, a refined Study Area, of a 2-mi (3.2-km) radius was evaluated, which captures the realistic line-of-sight in the area adjacent to the onshore substations. This refined Study Area for EW 2 Onshore Substation A contains three historic properties and 565 unevaluated architectural properties. For the EW 2 Onshore Substation C, a 2-mi Study Area contains 128 historic properties (7 NRHP listed, 121 NRHP eligible) and 837 unevaluated architectural properties.

The EW 2 Onshore Substation A AVEHAP PAPE was defined as the zone within the EW 2 AVEHAP Onshore Study Area for EW2 Onshore Substation A that will contain views of the proposed onshore substation. Tetra Tech conducted a field visit in May 2021 to ground-truth zones of visibility within the EW 2 Onshore Substations A AVEHAP PAPE. The field team utilized the E.F. Barrett Power Station main building profile to replicate the proposed onshore substations. The E.F. Barrett Power Station main building is approximately 125 ft (38 m) in height and is located 0.4 mi (0.6 km) southeast of the EW 2 Onshore Substation A.

The cable bridge crossing is contained within the EW 2 Onshore Substation A PAPE, and was separately evaluated for its potential to be viewed by historic and architectural properties. Two locations are under consideration for the cable bridge. At the location adjacent to the LIRR railway bridge, the cable bridge, with a maximum height of approximately 30 ft (9 m) above MSL, is screened by the local built environment at distances ranging from approximately 280 ft (85 m) to 660 ft (200 m). To the north the view is screened by the Costco Wholesale building at 3705 Hampton Road, Oceanside, New York; to the east and northeast the view is screened by the E.F. Barrett Power Station and its substation; and, to the southwest, fuel storage tanks obstruct views of the proposed cable bridge. A narrow corridor of visibility to the west takes in undeveloped salt marsh. The other potential location is adjacent to the Long Beach Road bridge. Anticipated to have a maximum height of 30 ft (9 m) above MSL, the cable bridge is screened to the east by the Oceanside Landfill, which rises to approximately 160 ft (50 m) above MSL. Views of the cable bridge are attenuated northward and westward by distance and will not be apparent at Daly Boulevard or the E.F. Barrett Power Station, respectively. To the south, views of the bridge crossing may extend to the intersection of Long Beach Road and Austin Boulevard, a distance of approximately 500 ft (150 m), but are not expected to be significantly different from existing views of the built environment, which includes commercial, industrial, and infrastructural views.

The EW 2 Onshore Substation C AVEHAP PAPE was defined as the zone within the EW 2 AVEHAP Onshore Study Area for EW 2 Onshore Substation C that has theoretical views of the proposed substation (**Figure Z-14**). Viewshed analyses were conducted on all 130 NRHP-eligible and 8 NRHP-listed historic properties occurring on Long Beach Island, resulting in 85 properties with potential views of the onshore substation. The City of Long Beach elevated water tower (USN 05946.001723), located between Water Street and Park Place, reaches a height of approximately 160 ft (49 m), or more than twice the height of the proposed substation. Its position on the south shore of Reynolds Channel, opposite the site of the proposed onshore substation, makes the tower a useful visual reference point vis-à-vis historic properties across the PAPE. An assessment of street-level views toward the tower's midpoint, resulted in an onshore zone of visual impact extending not beyond approximately 0.25 mi (0.40 km) from the tower, encompassing an area around 125 acres (51 ha). Beyond approximately 0.25 mi (0.40 km) ground-level views of the tower are obscured by the built environment of the surrounding neighborhoods. EW 2 Onshore Substation C's location on the north shore of Reynolds Channel allows potential views largely limited to the channel shorelines.

Z.4.2 Methodology for Visual Effects Assessment

Coastal New York and New Jersey are areas with extensive historical value and a tradition of historical commemoration resulting in numerous cultural resources that are listed in and determined to be eligible for the NRHP (i.e., historic properties), some within the recommended Offshore and Onshore PAPEs. As defined by 36 Code of Federal Regulations § 800.16(d), the APE is “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist”. Under Section 106, BOEM will determine the extent of and define the Offshore and Onshore APEs for this Project. This AVEHAP focuses on historic properties and architectural properties within the Offshore and Onshore Preliminary APEs (PAPEs) that may be affected by the construction and operations of the Project. The PAPE is defined as the area in which there will be potential visibility of the Project, based on computer modeling. Historic properties are defined as properties listed on the NRHP or determined NRHP-eligible. Architectural property is the term used here to denote an above-ground building, structure or object, 50 years old or older, that has not been evaluated for NRHP eligibility.

The NPS maintains the NRHP and defines four criteria for evaluating a cultural resource to be eligible to the NRHP (NPS 1997). A cultural resource must meet at least one of the following criteria for NRHP-eligibility.

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- Criterion A: That are associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion B: That are associated with the lives of persons significant in our past;
- Criterion C: That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; and
- Criterion D: That have yielded, or may be likely to yield, information important in prehistory or history (NPS 1997:2).

In addition to meeting at least one of the criteria, properties must also retain sufficient integrity to convey its significance. Integrity is assessed on the following aspects: location, design, setting, materials, workmanship, feeling, and association (NPS 1997:44).

Properties 50 years old and older that had been identified within the PAPE were evaluated for NRHP eligibility under the criteria of significance, outlined above (**Attachment Z-3, Attachment Z-17**). Unless previously determined not eligible, the presumption is that if a property met the age threshold of 50 years it would be considered potentially eligible for listing in the NRHP. Desktop review of line-of-sight toward the Project, condition, and significant rehabilitation or rebuilding was undertaken on selected properties along the path of transects from the shoreline to landward. Intensive level surveys were not conducted. The methodology for record searches included data acquisition from publicly available sources including, NJ HPO LUCY, NY SHPO CRIS, the NRHP, and the Monmouth County tax assessor's databases.

In contrast to the VIA (**Appendix AA**), the AVEHAP is not an observer-based study. Project components, both offshore and onshore, occur in direct relationship to the built environment (of which historic properties are a subset) rather than mediated by a human observer. This difference is a subtle shift in perspective between these two related studies, in which the AVEHAP emphasizes the physical and historical contents of the landscape, while the VIA exposes a more abstract, visual character of the Project that relates specifically to human experience.

Z.4.2.1 Offshore Visual Effects Investigations

Historic Properties within the Offshore AVEHAP PAPE

Data were gathered from the National Park Service-National Register, New York SHPO's Cultural Resource Information System, and New Jersey Historic Preservation Office's LUCY databases. Within the Study Area, 16,515 historic and architectural properties were identified in New Jersey and 2,353 historic and architectural properties in New York. All 18,868 properties were subjected to viewshed analysis.

Data from the National Park Service-National Register, New York SHPO's Cultural Resource Information System (CRIS), and New Jersey Historic Preservation Office's LUCY databases were acquired to compile a list of historic properties occurring within the Offshore AVEHAP PAPE. In New Jersey, 2,005 NRHP-listed, eligible, contributing resources, and unevaluated properties were identified, and 825 historic properties were identified in New York within the Offshore AVEHAP PAPE (**Figure Z-9** and **Figure Z-10**). In general, historic districts were enumerated as an individual historic property without including individual contributing properties. Each historic property identified was subjected to viewshed analysis.

Unevaluated Architectural Properties within the Offshore AVEHAP PAPE

As per the Programmatic Agreement regarding renewable energy activities offshore New Jersey and New York (BOEM 2016), BOEM administratively treats all potentially eligible historic properties as eligible. In this AVEHAP, any unevaluated property within the Offshore AVEHAP PAPE is treated as if it is potentially NRHP eligible.

Typically, unevaluated architectural properties outnumber recorded historic properties by orders of magnitude. Assessing unevaluated properties for an AVEHAP in the New York metropolitan area with the presence of potentially thousands of architectural properties within the Offshore AVEHAP PAPE poses a challenge of scale. The methodological approach implemented for this AVEHAP was to first collect data regarding unevaluated architectural properties from available datasets. Then these data were reviewed in relation to the viewshed model, and a sample of unevaluated properties with modeled views were examined via street-level views.

The dataset of unevaluated architectural properties in the New York portion of the Offshore AVEHAP PAPE was obtained from the NY CRIS database, filtered for build dates of 1972 or earlier; properties with unknown build dates were also compiled. This dataset contained 100 architectural properties spread across Richmond, Kings, Queens, Nassau, and Suffolk counties, comprising Long Island's barrier islands, uplands on the Ronkonkoma terminal moraine, and coastal and upland portions of Staten Island.



Figure Z-5 Perspective Simulation

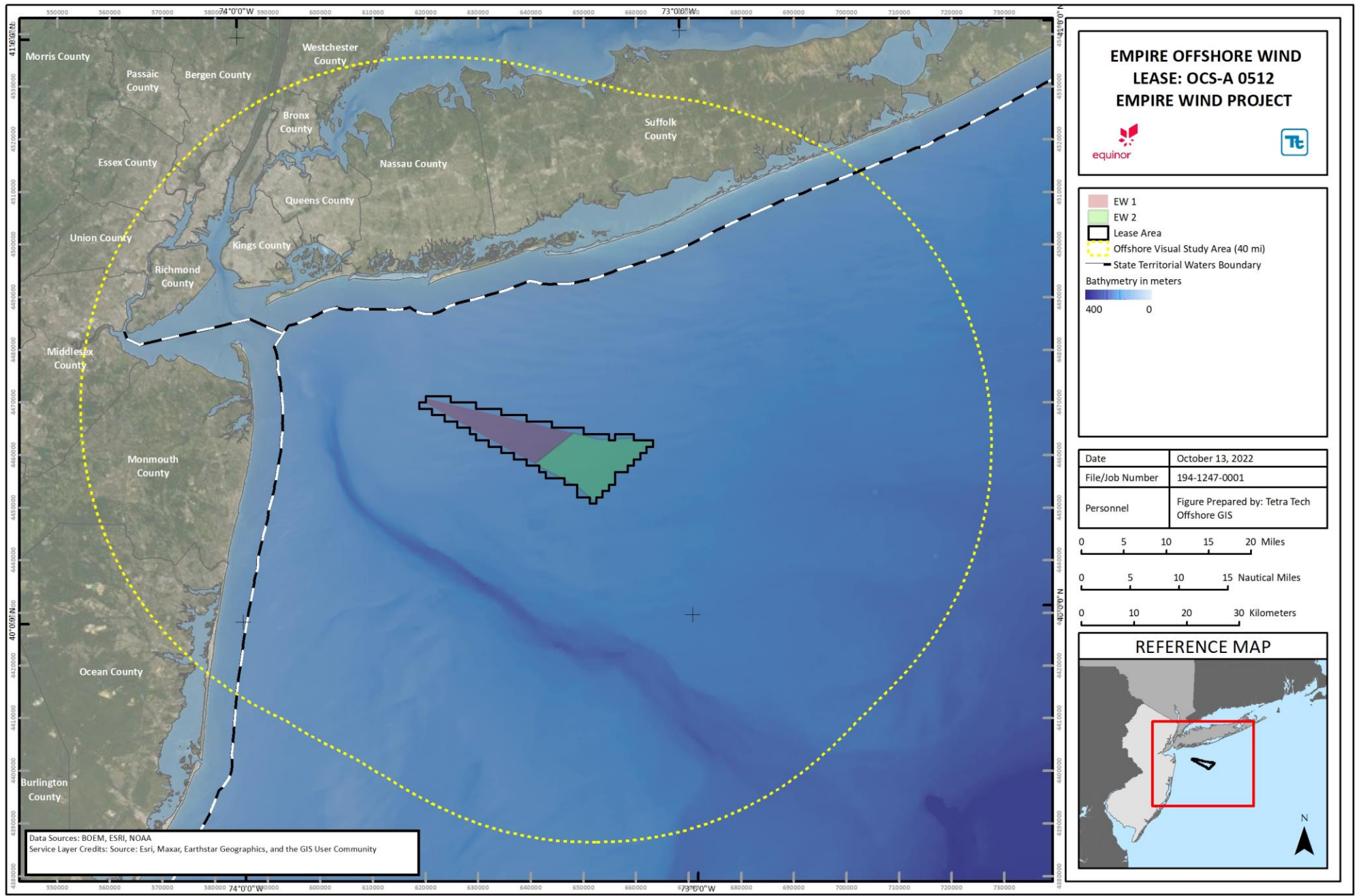


Figure Z-6 AVEHAP Offshore Study Area

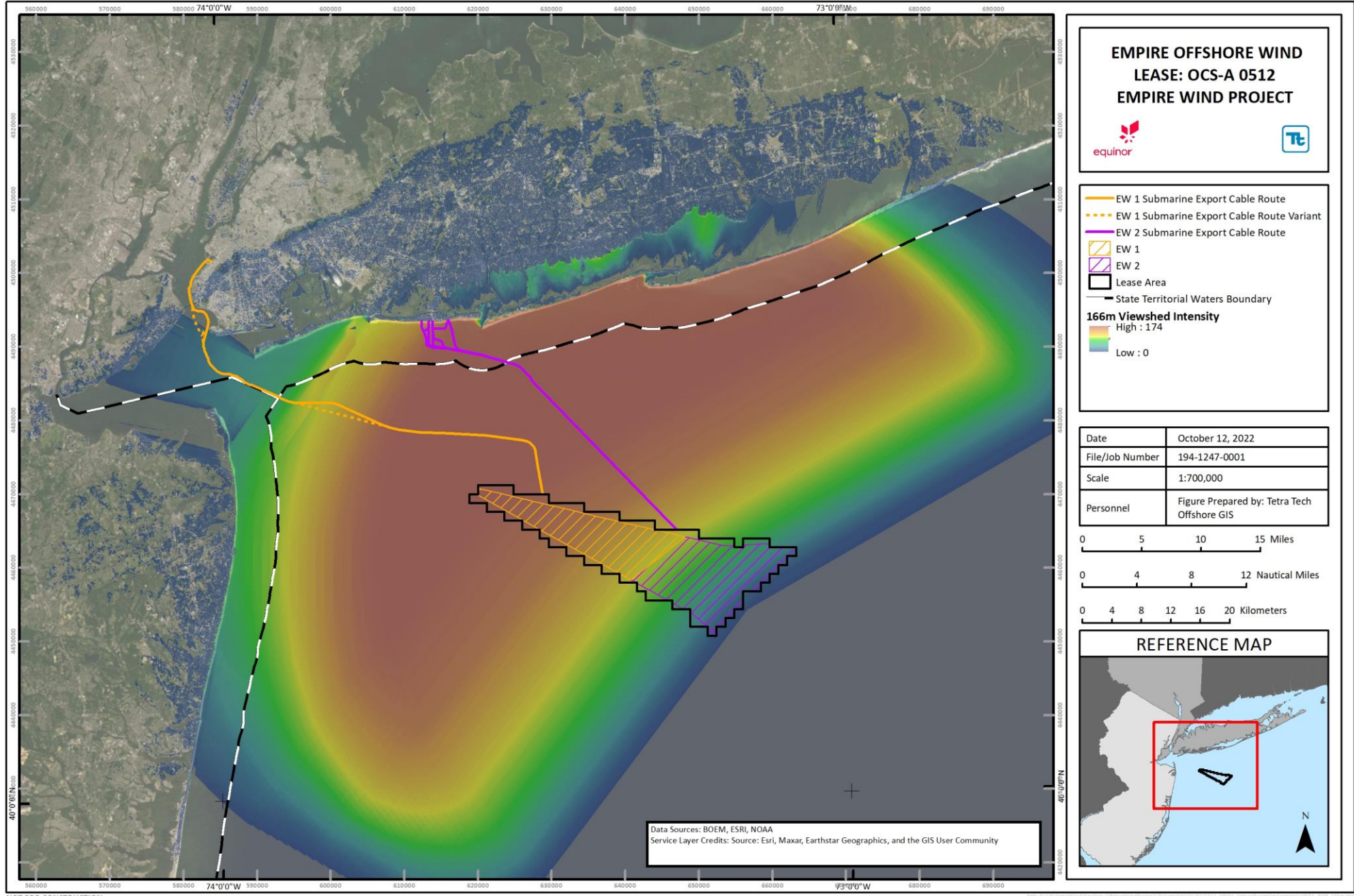


Figure Z-7 Viewshed Intensity (# of Turbines Visible) Based on a 166 m Height (Hub Height)

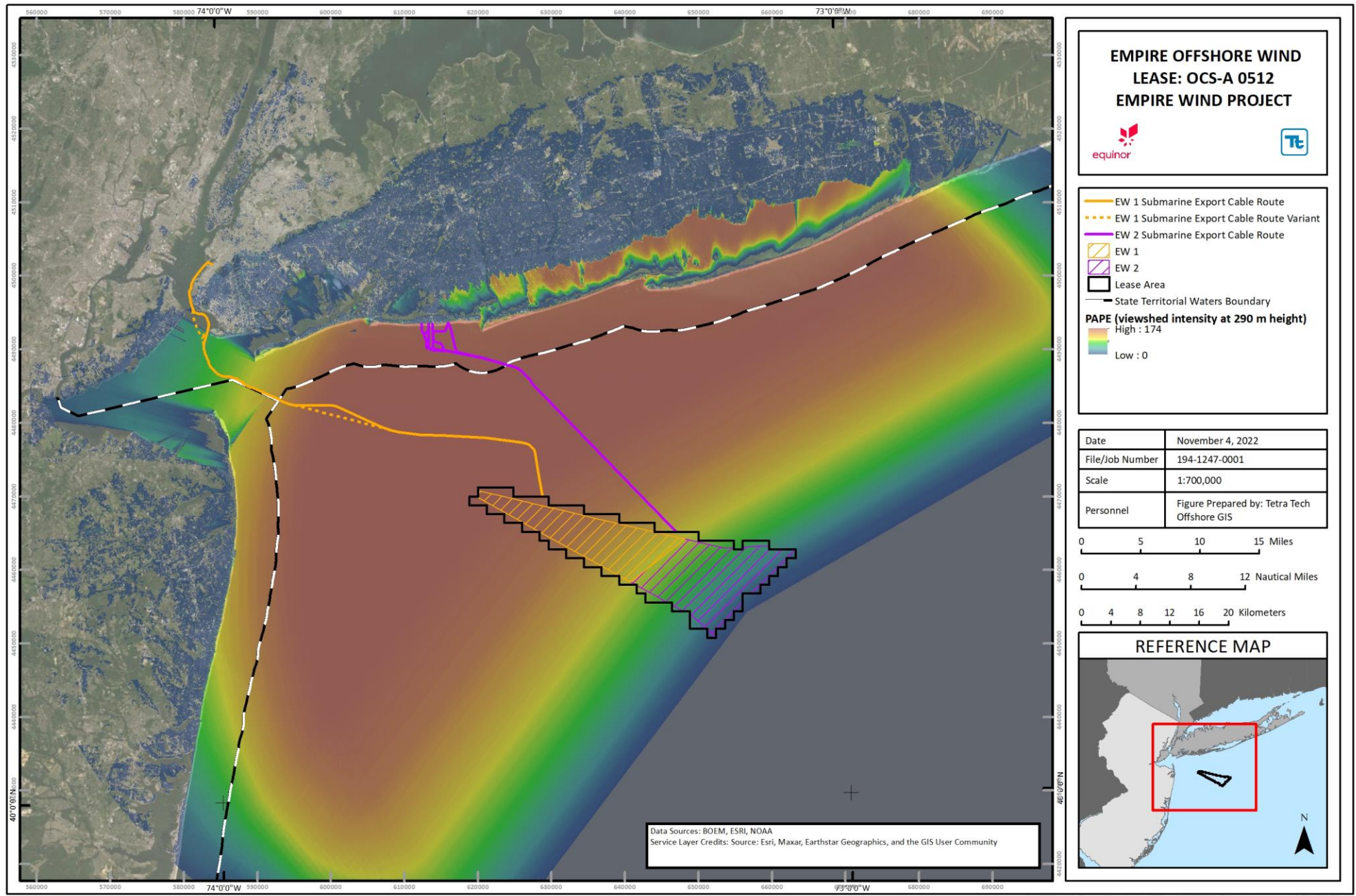


Figure Z-8 Geographic Definition of the Offshore AVEHAP PAPE Shown as Viewshed Intensity (# of Turbines Visible) Based on a 290 m Height (Blade Tip Height)

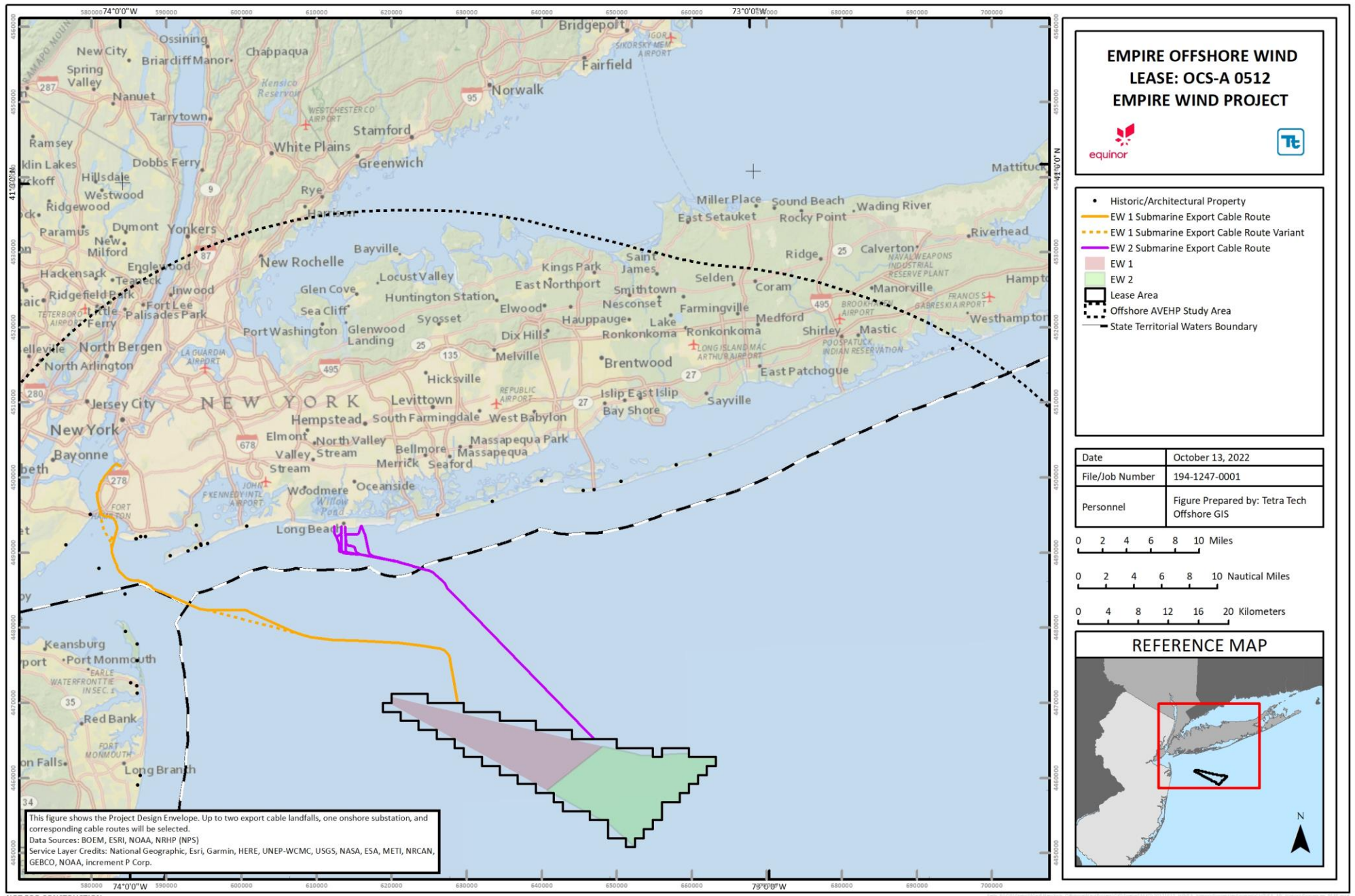


Figure Z-9 Historic and Architectural Properties Investigated within the Offshore AVEHAP PAPE in New York

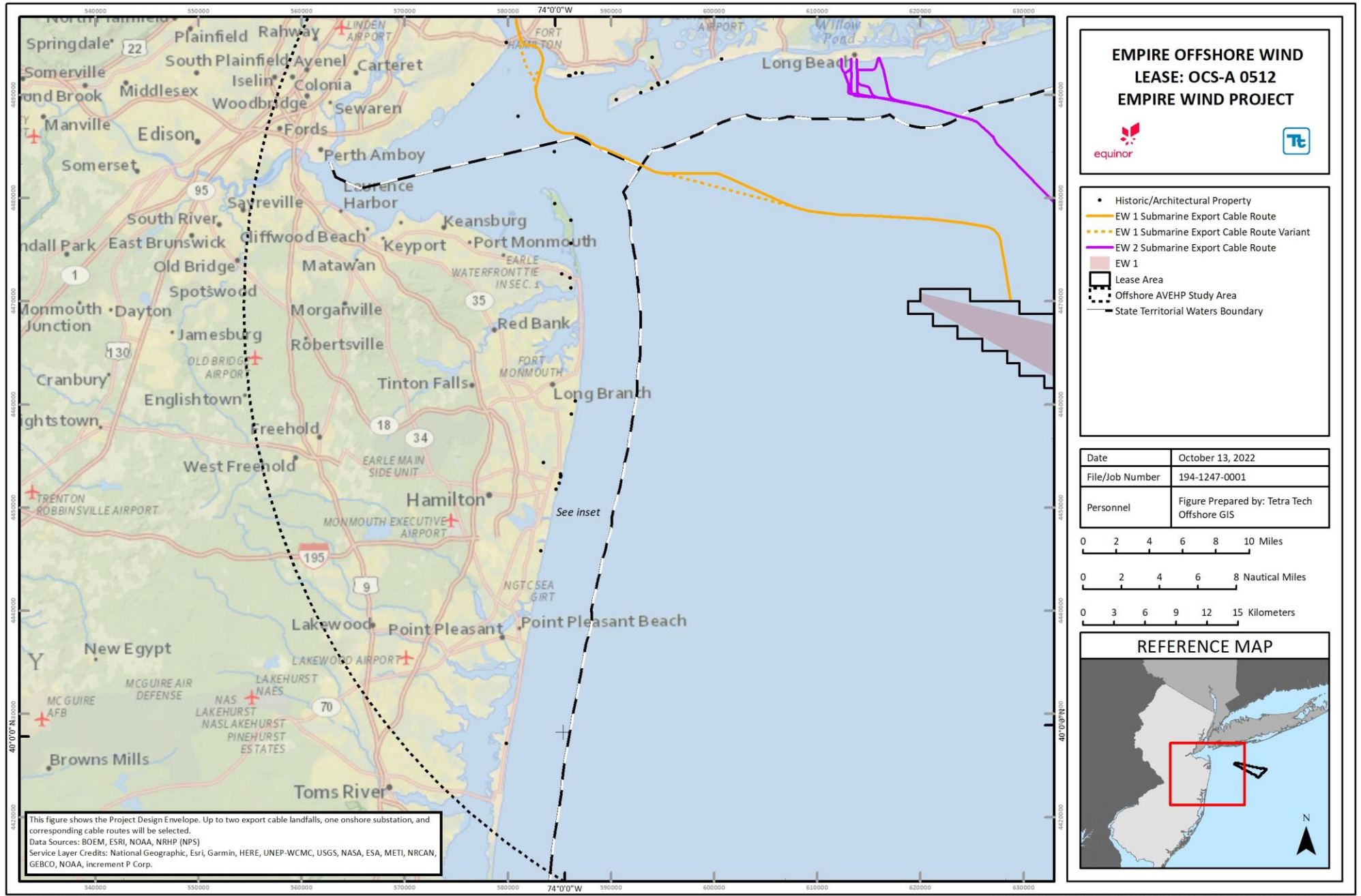


Figure Z-10 Historic and Architectural Properties Investigated within the Offshore AVEHAP PAPE in New Jersey

Previously Recorded Resources

Research in NY CRIS, NJ HPO, and the NPS National Register Information System identified 2,830 historic and architectural properties within the modeled viewshed and defined as the PAPE. **Table Z-2** presents a breakdown of these properties by state and NRHP status. The individual resources identified in New Jersey are listed in **Attachment Z-17**.

Table Z-2 Identified Historic and Architectural Properties within Offshore AVEHAP PAPE

NRHP Status	New York	New Jersey	TOTAL
National Historic Landmark	7	5	12
National Register Listed	325	45	370
National Register Eligible	117	77	194
Historic Districts	68	13	81
Contributing Resources	208	1,352	1,560
Unevaluated	100	513	613
TOTAL	825	2,005	2,830

Determining Which Resources Require Individual Assessment

As described above in Section Z.4.1.1, the computer-generated viewshed model accounting for building heights was taken to approximate the Offshore AVEHAP PAPE (**Figure Z-8**). Of the 2,830 identified properties within the Offshore AVEHAP PAPE (**Table Z-2**), the following process was used to determine which resources require individual assessment.

Contributing Resources

Contributing resources to historic districts were not individually assessed for adverse effects because contributing resources are not separately eligible for NRHP listing. This eliminates a total of 1,560 properties out of the total 2,830 in **Table Z-2**, leaving 1,270 remaining resources that may require individual assessment.

Desktop Analysis

The viewshed model represents a best management practices approach to delineating the PAPE. The computer-generated viewshed is a close approximation of zones of Project visibility and is considered to conservatively define the PAPE. However, the viewshed model inherently displays some misrepresentation of actual Project views due to an imperfect rendering of existing conditions on the ground. To better understand this gap between modeled views and actual views, and to delineate areas of the PAPE that would be most likely to contain historic properties vulnerable to visual adverse effects, the AVEHAP team conducted additional analysis. This additional analysis consisted of desktop Google Earth Street View examination of Project-facing views along regularly spaced transects. These transects followed streets, in New Jersey moving westward from the shoreline and in New York, generally moving northward from the shoreline. NRHP-listed, eligible and unevaluated properties were used as station points along each transect, with the objective of determining the most inland point along a transect that would have an ocean view, and thus a possible Project view.

Thirty-seven transects, arrayed around the PAPE were employed in this fashion, allowing an analytical process that would help to delineate a more realistic zone of visibility, and thus a more accurate representation of where visual effects might occur (**Table Z-3**). Other station points examined in addition to transects were at Fort Wadsworth Historic District, Floyd Bennett Field Historic District, Fort Tilden Historic District, Fire Island

Lighthouse Historic District, Fort Hancock and Sandy Hook Proving Ground Historic District, and Miller Army Air Field Historic District.

Table Z-3 Street Transects Examined for Ocean Views

New Jersey	New York
<i>Asbury Park</i> : 3rd Avenue, 7th Avenue, Ocean Avenue	<i>Coney Island</i> : Brighton Beach Avenue, Ocean Avenue
<i>Avon-on-the-Sea</i> : Garfield Avenue	<i>Long Beach</i> : Cleveland Avenue, Florida Street, Laurelton Boulevard, Lindell Boulevard, Wisconsin Street
<i>Belmar</i> : 9th Avenue	<i>Rockaway</i> : Rockaway Beach Boulevard, Beach 84th Street
<i>Bradley Beach</i> : Park Place, 2nd Avenue	<i>Staten Island</i> : Maple Terrace, Neutral Avenue, Seaview Avenue, Wiman Avenue
<i>Deal</i> : Roosevelt Avenue	
<i>Highlands</i> : Highland Avenue, Shore Drive, Navesink Avenue	
<i>Long Branch</i> : Atlantic Avenue, Avery Avenue, Chelsea Avenue, Park Avenue	
<i>Monmouth Beach</i> : Valentine Avenue	
<i>Rumson</i> : Rumson Avenue	
<i>Sea Girt</i> : Beacon Boulevard	
<i>Spring Lake</i> : Madison Avenue, Salem Avenue	

The modeled viewshed is an accurate, if somewhat imperfect, representation of actual Project visibility from every location within the Study Area. The LIDAR data that the model is based upon represents ground conditions at a single point in time, which may not capture new construction, tree growth, and certain intangibles of the computer-generated imagery that can lead to false positive or false-negative results. To gauge the degree of this occurrence, a sample of 157 properties along the transects listed in **Table Z-3** was selected for street-level desktop analysis to ground-truth the modeled viewshed. This sample included 104 properties in New Jersey and 53 properties in New York, comprising six National Historic Landmarks (NHLs), 26 NRHP-listed properties, 31 NRHP-eligible properties, 93 unevaluated properties, and 1 non-contributing property (**Attachments Z-1, Z-2, and Z-3 Historic Properties in Offshore AVEHAP PAPE**). In general, this exercise confirmed the overall accuracy of the model while indicating that some individual properties within the PAPE are likely to have only partial or rooftop views. As distance from the shoreline increases, the predominant Project view becomes those from rooftops or upper stories in tall buildings. Increased distance also lessens direct associations with maritime settings and introduces previously altered foreground viewsheds that represent only small, incremental change compared with existing conditions. The ground-truthing indicated that the portion of the PAPE with the clearest views of the ocean in the direction of the Project tends to extend from the shoreline inland a distance of approximately 0.3 to 0.5 mi (0.5 to 0.8 km), depending on location. Elevated terrain in New Jersey occurs in the Atlantic (Navesink) Highlands in New Jersey within a zone extending inland from approximately 0.45 mi (0.7 km) to 0.7 mi (1.1 km). Sections of the Ronkonkoma and Harbor Hill terminal moraines on Long Island, and the bedrock-cored hills of Washington Heights in Manhattan and High Bridge section in the Bronx, have been identified as containing historic and architectural properties with attenuated, or partial Project views.

Field Verification

Focused field visits to specific locations also occurred. An initial field visit was conducted between November 4 and November 13, 2018. An additional field visit was conducted between June 3 and June 6, 2019. The site visits and assessments were performed by a two-person team made up of a Secretary of the Interior-qualified architectural historian and a visual assessment specialist. Both team members had completed the Bureau of Land Management’s Visual Resource Management training.

Ground truthing the viewshed model resulted in two conclusions. The first confirmed that ocean views in the direction of the Project were unlikely when viewed further inland than approximately 0.5 mi (0.8 km) distance due to intervening vegetation and the built environment. One general exception identified during the process was that elevated viewing points allowed for more expansive views. For instance, visibility in New Jersey from the Atlantic (Navesink) Highlands is an example of an elevated, expansive view. The topography and landscape along this seaboard headland allow for some unimpeded views to the horizon, including from the Navesink Twin Lights and the Navesink Military Reservation Historic District. A second conclusion resulting from ground truthing was that the Project would be a less significant feature in the viewshed of the resources when barrier islands are located in the middleground between the viewer and the Project. The juxtaposition of the islands in the middleground makes the Project a less prominent feature in the viewshed or completely shields the Project, thereby diminishing or eliminating its impact.

Photographic simulations (simulations) were created to depict the Project components and their potential changes to the existing landscape. The simulations were used to determine the level of contrast between the existing landscape and the expected landscape after the Project is implemented. Four Key Observational Points (KOPs) were selected for development of simulations to demonstrate how the constructed Project will appear to future viewers; Sandy Hook–North Beach, Ocean Grove Beach, Jacob Riis Park, and Fire Island. A simulation was created for each selected KOP depicting the representative wind turbines. A nighttime simulation was also completed for the KOPs. Simulations are included in **Attachment Z-4 Visual Simulations**. Additional simulations from viewpoints on Fire Island are included in **Attachment Z-15 National Park Service Sites Visual Simulations**. Simulations depict actual weather conditions at the time photography was taken during the field visits. Simulations provide representative depictions of how the Project would appear from multiple ocean-front locations and can be considered representative of similar oceanfront viewing settings.

A digital single lens reflex (dSLR) camera was used to take the photographs used in the simulations. The camera is equipped with a “normal lens,” which means that it most closely approximates the field of vision of the human eye. In photographs taken using this lens, the size and scale of objects in the background and foreground are depicted proportionately and are not distorted. At each photo point, a panorama, or an overlapping series of photographs, was captured. A global positioning system (GPS) device is used to record the latitude, longitude, elevation, date and time of each photo point location.

The simulations were created using geographic information system (GIS) software, Autodesk 3D Studio Max®, and rendering software. To create the simulations, the location data captured by the GPS device were transferred to ArcMap, where it was combined with GIS data of the preliminary layouts of Project components and facilities. A map showing the data was exported at true scale and imported into 3D Studio Max®. Using this scaled map as a base, 3D models of the offshore and onshore Project Areas were created to scale. These 3D models of the Project features, previously modeled to scale in 3D Studio Max®, were added in their appropriate locations and elevations. The views from the existing digital photographs were then matched in the 3D model using virtual cameras with the same focal length and field of view as the dSLR camera setting. After date- and time-specific lighting was added to the 3D model, renderings from the virtual cameras were created.

These renderings were then blended into the existing conditions photographs in Adobe Photoshop software. Any necessary modifications to the existing landscape were completed in Adobe Photoshop as well. This process of creating a 3D model at true scale and rendering images using the same specifications used by the camera ensures that the spatial relationships of the landscape, Project features, and viewer perspective are accurate and match the existing site photographs. Each simulation was then scaled to be viewed at a specified distance to represent the actual size of the turbines.

Simulations for offshore Project components, and nighttime simulations are included in **Attachment Z-4**.

Relevance of Ocean or Project Views to Historical Significance

The combination of desktop analysis and field verification identified locales most likely to have substantially visible views of the Project. The locales that have views of the Project within the Study Area include those situated at or near sea level in proximity to the shoreline, as well as some located at a distance from the ocean shoreline and consisting of tall buildings or structures situated on elevated terrain. In some places and for some properties, a view of the ocean or the Project is likely to be not relevant to the historical significance of a property because the place or property lacks a maritime setting and/or unmediated views of the ocean. For example, the Study Area contains elevated terrain in several locales, including the Atlantic (Navesink) Highlands in Monmouth County, New Jersey, the Ronkonkoma and Harbor Hill moraines that form the east-west ridge of hills on Long Island, and bedrock formations in northern Manhattan. Historic and architectural properties with tall elevations or located on elevated terrain in these locales would possess somewhat strongly attenuated Project views where integrity of the foreground historic viewshed is already substantially altered such that addition of wind turbines in the background represents a small, incremental change relative to existing conditions. Of the 1,270 properties listed in **Table Z-2** that are not contributing resources, 1,229 resources are either not situated in proximity to the shoreline or lack a maritime setting or unmediated views of the ocean and were therefore excluded from individual analysis.

The remaining 41 properties proximal to the ocean, which may have unmediated views and maritime settings, would be most susceptible to any adverse effects caused by views of Project construction and operations, and therefore, such properties received the focus of attention in this AVEHAP. The number of properties excluded at each step in this process is shown in **Table Z-4**.

Table Z-4 Numbers of Properties Excluded in Each Step of the Process Used to Determine which Resources Require Individual Assessment

Category of Property	Total
Identified Historic and Architectural Properties within Offshore AVEHAP PAPE	2,830
Contributing Resources	1,560
Not situated in proximity to the shoreline, or lacking a maritime setting and unmediated views of the ocean	1,229
Remainder	41

Z.4.2.2 Onshore Visual Effects Investigations

EW 1

Historic properties with modeled Project views that were situated outside the EW 1 Onshore AVEHAP PAPE were determined by further desktop analysis to lack lines of sight to the Project and were not further evaluated.

Field and desktop analysis of the 30 historic properties located within the EW 1 Onshore AVEHAP PAPE resulted in the identification of three properties (Bush Terminal Historic District, U.S. Navy Storehouse #2,

and Green-Wood Cemetery) that possess true views of the EW 1 onshore substation and O&M Base. While only some perspectives from Bush Terminal Historic District and Green-Wood Cemetery contained unobstructed views of the onshore substation, the EW 1 Onshore AVEHAP PAPE was considered to encompass the entire extent of the district and the cemetery (**Figure Z-13**).

Descriptions of the historic properties in the EW 1 Onshore AVEHAP PAPE are provided below. Photo documentation of the EW 1 Onshore AVEHAP PAPE historic properties is presented in **Attachment Z-5**.

Bush Terminal Historic District (USN No. 04701019392)

Bush Terminal Historic District is NRHP eligible under criteria A and C located in Brooklyn, Kings County. The property is listed as “the first American example of the complete integration of the commercial and industrial functions of manufacturing and warehousing with both rail and water transportation in one terminal under a unified management.” Observations made by the Project team in 2019 indicate that Bush Terminal Historic District currently retains its significance and integrity (**Figure Z-13**).

Storehouse #2, U.S. Navy Fleet Supply Base (NR No. 13000026)

Storehouse #2, U.S. Navy Fleet Supply Base was listed in the NRHP in 2013 under Criteria A and C and is located in Brooklyn, Kings County. The property is listed both for its role in supplying the military and for its Classical Revival style design. Observations made by the Project team in 2019 indicate that Storehouse #2 currently retains its significance and integrity (**Figure Z-13**).

Green-Wood Cemetery (NR No. 97000228)

Green-Wood Cemetery was listed in the NRHP in 1997 under Criterion C and is located in Brooklyn, Kings County. The property was listed for the outstanding merits of the landscape design of David Bates Douglass, the cemetery architecture of Richard Upjohn & Sons, and the sculptural quality of the monuments. The cemetery was designated a National Historic Landmark in 2006. Elements of the cemetery have been NYC-landmarked, including: the 25th Street gates in 1966; the Weir Greenhouse in 1982; the Fort Hamilton Parkway Gate in 2016; and the Green-Wood Cemetery Chapel in 2016. Green-Wood Cemetery is one of the earliest and most elaborate examples of landscaped rural, or “garden” cemeteries that gained popularity in the United States and elsewhere in the mid-nineteenth century. The 478-ac (193.4-ha) cemetery contains more than 600,000 burials including telegraphy inventor Samuel F.B. Morse, former New York Governor DeWitt Clinton, composer Leonard Bernstein, and painter Jean-Michel Basquiat. Observations made by the Project team in 2019 indicate that Green-Wood Cemetery currently retains its significance and integrity (**Figure Z-13**).

The computer model indicates that the three historic resources located within the EW 1 Onshore AVEHAP PAPE will be completely shielded by the hilly Harbor Hill glacial moraine from views of the offshore wind turbines; this assessment was confirmed by a site visit in February 2021. The effects of the proposed EW 1 onshore substation and O&M Base to NRHP-listed and -eligible resources are assessed below.

EW 2

For the EW 2 AVEHAP Onshore Study Area for EW 2 Onshore Substation A, CRIS identified 19 NRHP-listed properties, 469 NRHP-eligible properties, and 1,778 unevaluated properties within the EW 2 Onshore Study Area for EW 2 Onshore Substation A. The EW 2 Onshore Study Area for EW 2 Onshore Substation C overlaps part of the EW 2 Onshore Substation A Study Area, and contains 13 NRHP-listed properties, 523 NRHP-eligible properties, and 1,413 unevaluated architectural properties.

Based on the near-sea level elevation of the onshore substation locations, a refined Study Area, of a 2-mi (3.2-km) radius was evaluated, which captures the realistic line-of-sight in the area adjacent to the onshore

substations. This refined Study Area for EW 2 Onshore Substation A contains three historic properties and 565 unevaluated architectural properties. For the EW 2 Onshore Substation C, a 2-mi Study Area contains 128 historic properties (7 NRHP listed, 121 NRHP eligible) and 837 unevaluated architectural properties.

For the proposed cable bridge, a review of the NY SHPO CRIS database identified no historic properties or historic architectural properties with potential views of the proposed cable bridge at either location.

For the EW 2 Onshore Substation C, viewshed analyses were conducted on all 130 NRHP-eligible and 8 NRHP-listed historic properties occurring on Long Beach Island, resulting in 85 properties with potential views of the onshore substation. Barnum Island contains no NRHP-listed or eligible resources. Photo documentation of 31 selected historic properties within the EW 2 Onshore Substation C AVEHAP PAPE is presented in Attachment Z-6, Photo Documentation of Historic and Architectural Properties Within EW 2 Onshore Substation C AVEHAP PAPE. The 31 photo-documented historic properties in the vicinity of Substation C were selected based on proximity within approximately 0.8 mi (1.3 km) to the proposed substation.

Z.4.3 Methodology for Phased Identification Surveys

Unsurveyed historic and architectural properties in the PAPE will be documented and assessed for eligibility and effects during the first quarter of 2023. The methodology for the phased identification of these surveys will start with data acquisition for parcels within the Study Area that are 50 years old or older from the relevant county assessors' databases and that are undocumented in the SHPO records. This will be supplemented by data acquisition from LUCY, CRIS, and NRHP databases, and followed by cross-checks between the databases to eliminate duplicate entries. Each property (listed, eligible, unevaluated-recorded, and unevaluated-unrecorded) will be subjected to the viewshed analysis to identify those properties located within the PAPE. Field observations and recordation will be conducted on properties that have not previously been recorded or whose age of recordation exceeds 10 years. All evaluated properties will be recommended as either eligible or not eligible for the NRHP. All listed and eligible properties in the PAPE will be assessed for potential Project effects, and recommendations will be presented for properties exhibiting No Effect and Adverse Effect.

Z.5 ENVIRONMENTAL AND HISTORICAL CONTEXT

Z.5.1 Environmental Setting

The AVEHAP Offshore Study Area in New York encompasses much of New York City and includes all of Kings and Queens counties, nearly all of Richmond County, four-fifths of New York County, one-third of Bronx County, nearly all of Nassau County, plus large portions of Suffolk County; in New Jersey, the Study Area encompasses all of Hudson County, most of Monmouth County, northeastern Ocean County, and portions of Bergen, Passaic, Essex, Union, and Middlesex counties (see Section Z.4.1). The AVEHAP Offshore Study Area is situated at the northernmost extent of the Atlantic Coastal Plain physiographic province, a region of low relief and diverse ecological habitats. In general, the coarse-textured soils of the coastal plain are derived from Cretaceous period marine sediments and a mantle of Pleistocene period glacial till and outwash. The southern shore of Long Island and the New Jersey shoreline are characterized by barrier islands, bayside salt marsh lagoons, and sand beaches.

The principal features of the Long Island landscape are the east-west trending Harbor Hill and Ronkonkoma terminal moraines, the low relief outwash plain that descends from the moraines southward to the south-shore bays, and the barrier islands and salt marshes along the Atlantic shore. The moraines and outwash plain reflect Long Island's encounter with the arrival and retreat of the Laurentide ice sheet during the Wisconsin glacialiation. The moraines represent two phases of maximum glacial advance; the older Ronkonkoma moraine

dates from 40,000 to 70,000 years before present (BP) and the younger Harbor Hill moraine to the last glacial maximum about 21,000 BP (Moss 2013; Sirkin 1995).

The region's barrier islands resulted from the erosion and transport of unconsolidated sediments by waves and winds landward and by stream drainages moving seaward. Barrier islands are highly dynamic landforms that respond to onshore formations and processes (e.g., headland control, inlet drainage, and marsh fringes) and offshore processes (e.g., tidal deltas, wave inundation and breaching, and sediment supply and circulation) (Ritter 1978:546). Barrier islands, such as Long Beach Island, are backed by open bays and mid-Holocene lagoonal deposits supporting *Spartina* salt marsh. Changes to barrier island morphology include accretion, erosion, and migration. Human activities contribute to this dynamic and include channel dredging and shoreline armoring. Dredging tends to reduce available sediment for island building. Shoreline bulkheads minimize local erosion, while groins and jetties will encourage accretion of beach sediment on their updrift side but result in beach erosion downdrift (Psuty et al. 2010).

Early colonial descriptions of Long Island's native flora are rare and tend to be brief. Of his voyage into New York Harbor, Henry Hudson described the landscape as "...full of great tall oaks...with grass and flowers and goodly trees..." (Munsell 1882:20). Writing in the 1670s, Daniel Denton described Long Island as "...very full of timber, as oaks white and red, walnut trees, chestnut trees...also red maples, cedars, sassafras, beech, holly, hazel with many more..." (quoted in Svenson 1936:208-209).

The Monmouth County shorefront lies within the Atlantic Coastal Plain physiographic province, a region of low relief, coarse sandy soils, and numerous low-energy streams draining seaward. Topographic elevation in the Project vicinity ranges from sea level at the shoreline to approximately 225 ft (70 m) in the Atlantic Highlands. The New Jersey coastal plain is characterized by a drainage divide, or cuesta, running roughly southwest to northeast formed from indurated sands and marl. Geographers distinguish the Inner Coastal Plain, west of the cuesta, and the Outer Coastal Plain to the east, where the Project is located. The Outer Coastal Plain is a level, highly eroded surface that slopes gently to the east, draining into the Atlantic Ocean. Stream drainage tends to be sluggish due to the gentleness of the relief (Widmer 1964). A prominent feature of the shoreline in the Project vicinity is the presence of sandy beaches on the mainland, in contrast to the more common sandy barrier islands that fringe much of the New Jersey shoreline. At present, the transition from the near-inland landscape to the beach is smooth and exhibits little natural dune or scarp formation. Undeveloped portions of the New Jersey shoreline typically exhibit dune heights from 8 to 15 ft above the flat part of the beach and can sometimes support multiple rows of dune (Wootton et al. 2016).

Native flora at the period of European contact was diverse, reflecting the location of the Project Area at the intersection of the inland chestnut-oak forest community and the shorefront pine-oak forest community. Tidal and freshwater wetlands were present, complimenting the floristic assemblage. Upland tree species included American beech, scarlet oak, white oak, red oak, sweet gum, sumac, and black oak. Wetland forests supported willow, pin oak, black gum, and sycamore. Pitch pine dominated the shoreline littoral with *Spartina* salt marsh present at stream inlets. Understory vegetation in uplands included flowering dogwood, azalea, spicebush, and viburnum; wetlands understory included dogwood, pussy willow, wild rose, and viburnum (Avakian 2003).

Z.5.2 Cultural Context

The historical record of the 400-year European-American presence in the Project vicinity can be viewed as three eras of broad social transformations. These eras represent the *Colonial Period* (1600-1776), which entailed the arrival of Europeans and the demise of pre-contact Native American lifeways; *American Independence and Internal Development* (1776-1860), representing the transfer of sovereignty from George III to American rule as well as the rise of canals and railroads, and expansion of agricultural production; and, *Urban Expansion and Rural*

Decline (1860-1960), which designated New York City as the financial and manufacturing capital of the world and the transformation of its Long Island and New Jersey precincts from agrarian societies to an urban mass culture.

Z.5.2.1 The Colonial Period (1600-1776)

Dutch, Italian, and English mariners visited the Atlantic seaboard during the late sixteenth century lured by furs, fish, and other trade items. While employed by the Dutch East India Company to search for a northwest passage to Asia, the English mariner Henry Hudson sailed along the New Jersey-New York coastline in 1609 and wrote the first detailed descriptions of its people. Landfalls at Sandy Hook and New York Harbor brought Hudson and his men ashore and in direct contact with members of eastern Lenape bands. The Dutch established fortified trading posts on Manhattan Island in 1612 and at Fort Orange near Albany in 1614 but were slow to settle the lands west of the Hudson River. The slow pace of westward settlement, which was the result of Native American resistance and the hierarchical structure of Dutch governance, hindered Dutch control of their New Netherland holdings. The Dutch established settlements on western Long Island at Brooklyn in 1636, followed by Flatbush in 1651, New Utrecht in 1657, and Bushwick in 1660 (Munsell 1882, 23). Although the Dutch claimed sovereignty over all Long Island, they were unable to halt English settlement in central and eastern Long Island. English settlers established towns at Newtown in 1642, Flushing in 1643, and Hempstead in 1644, all located in what would become Queens County (Burrows and Wallace 1999, 40). The first permanent Dutch settlement in New Jersey was organized at Bergen (now part of Jersey City) in 1660 and played no noticeable role when the English seized the colony in 1664 (Ellis 1885; Taylor 2001).

Monmouth County, New Jersey was largely outside the sphere of Dutch settlement and control. The first permanent European settlers in Monmouth County arrived soon after the transfer of power from Holland to England, and by 1670, English settlers from Long Island and Rhode Island had established the towns of Shrewsbury and Middletown through the purchase of the Monmouth (Navesink) Patent, a tract incorporating much of present-day Monmouth County (Ellis 1885, 63; Hodges 1997, 3). Efforts to recruit Scottish settlers led, in the 1680s, to the establishment of Freehold, and was followed by the migration of New York Dutch to the county (Wacker 1982:199).

Seventeenth century settlements along the southern coast of Long Island tended to be small, isolated farmsteads or hamlets situated on the drainage headlands, or necks, that extend into the marshes and bays between the marine barrier islands and the coast. Early farming on Long Island was primarily subsistence based, with grains serving as the principal crops. Among the first grains cultivated on seventeenth century farms were corn, rye, and wheat. Later, oats, flax barley, buckwheat, and, in some places, potatoes and tobacco were grown (Moss 1993, 6). In addition to crops, livestock raising was important to the livelihood of many settlers. Salt hay, growing along the south shore and barrier island, was used as fodder for herds of cattle, sheep, and pigs. The Hempstead Plains, a large prairie environment, was utilized for livestock foraging. Fishing and shellfishing were important supplements to income and diet for farming families. In Monmouth County, the typical settlement pattern consisted of dispersed independent farms surrounding hamlets and villages containing a church, tavern, and mill. Farms in Monmouth County during the Colonial era ranged in size from around 50 to 400 ac (20 to 162 ha), and typically grew corn, oats, flax, buckwheat, and hay; butter, cheese and beef were also produced (Hodges 1997, 45; Wacker and Clemens 1995, 177).

The Dutch transported the first enslaved Africans to New Amsterdam shortly after its establishment in the 1620s, using them to clear land, build roads and structures, and work farms. By 1664, an estimated 25 percent of New Amsterdam's 1,500 residents were slaves. The English continued and greatly expanded the institution of slavery after their takeover of the colony, and by 1698 Long Island (the counties of Kings, Queens, and Suffolk) contained 1,053 enslaved Africans, or 12 percent of the population. A 1712 slave revolt in New York

City was violently suppressed, and rumors of a slave revolt in 1741 led to the execution of dozens of enslaved people in the city (Singer 2007, 165-167). Slaveholding in Monmouth County was a key factor in local farm and industrial economy from early Colonial settlement through the early nineteenth century. The 1738 provincial census enumerated 655 enslaved persons in the county accounting for 10.8 percent of the total population. Slaveholding was a vital economic engine in the region due to the Monmouth Patent's grant of additional land if patentees owned slaves, New Jersey's elimination of tariffs on slaves, and a propensity for slave ownership among the Dutch who settled in Monmouth County in sizeable numbers in the 1690s (Wacker 1975:251; Hodges 1997:15). Slavery continued to be economically important to the county through the 1820s (Wright 1989).

As the number of enslaved Africans in New York and New Jersey increased through the seventeenth and eighteenth centuries, Native American communities were also in decline. Harassed and exploited by European settlers, the Lenape found themselves exposed to foreign diseases, hemmed in by loss of traditional hunting lands, and overwhelmed by more powerful tribes to the north and west. After a brief period of intense fighting with Europeans in 1655 during the so-called Peach War, the Lenape's hold on western Long Island was broken and by the early 1670s they were largely dispersed from the region (Burrows and Wallace 1999, 68-69). In similar manner, Lenape bands in New Jersey began to move west of the Delaware River during this period, and in 1758 the Treaty of Easton formalized sale of all Munsee lands to the provincial governor (Kraft 1986, 230).

Z.5.2.2 American Independence and Internal Development (1776-1860)

On the eve of the American Revolution, western Long Island contained around 14,000 inhabitants in a largely rural setting of dispersed farms, hamlets, and a few small towns. As New York City grew from about 7,250 people in 1723 to almost 22,000 in 1771 (O'Callaghan 1849:693, 697), agricultural production in the agrarian periphery expanded to meet the food demands of urban dwellers and the province's increasing trade with the British West Indies. In addition to food staples, agricultural products of economic importance in the region were flax, wool, timber, and beeswax (O'Callaghan 1849:729, 761). Richmond County (Staten Island) and Monmouth County contained around 2,800 and 11,200 people, respectively, in 1771.

Loyalty to the British Crown ran high on Long Island and in Monmouth County. When British forces defeated the Americans at the Battle of Brooklyn in late August 1776, towns across Long Island defied the Continental Congress and supported English rule. It appears that a majority in Kings and Queens counties backed the loyalist cause with as many as 2,000 men joining royal militias (McNamara 1995, 184). Promised freedom for their allegiance and aid to the British, thousands of slaves from the metropolitan area ran away from their masters and sought protection under the crown (Burrows and Wallace 1999, 248). In Monmouth County, many residents joined the Royal Volunteers militia or provided British forces with aid. Skirmishes and raids on food stocks were common in the county especially around the towns of Shrewsbury and Middletown from the beginning of the war until 1780 (Ellis 1885, 200-207). Although the county was not of great strategic value overall, it did lie in the path of the British army after its evacuation of Philadelphia and march to New York City. On June 28, 1778, Washington's forces attacked the British rearguard at Monmouth Courthouse, in the present town of Manalapan Township. Considered a tactical draw as the British were able to disengage and withdraw to Sandy Hook, the Battle of Monmouth represented the most sustained action of the war and the last major battle in the north (Coakley and Conn 1975, 65-67; Munn 1976).

Before and after the Revolutionary War, slaveholding was commonplace in the economic life of New Yorkers and was, in large measure, a reflection of Dutch attitudes toward slavery. In the old Dutch strongholds of the Hudson Valley and western Long Island, more than one in three families owned slaves in 1790, proportionally more than in most of the South, though numbers were far fewer in these northern contexts (White 1995). In 1790, enslaved Africans accounted for 14.4 percent of a total population of 16,014 in Queens County,

31.9 percent of Kings County's 4,495 residents, and 7.1 percent of New York City's 33,131 inhabitants (U.S. Census Bureau 1908). The New York legislature acted to limit slavery in 1799 and abolished the practice in 1827. Still, the 1825 state census enumerated 3,849 enslaved persons in Kings and Queens counties, around 11 percent of the population. In contrast, New York City became a haven of sorts for African-Americans after the Revolution, reaching more than 10,000 in number by 1820, of whom 95 percent were freedmen. Monmouth County remained a slaveholding district after the Revolutionary period, with 1,596 enslaved persons accounting for 8.2 percent of the county population in the 1790 census. Though in decline by the early nineteenth century, the institution of slavery continued to be economically important to Monmouth County till the 1820s (Wright 1989).

Through the early nineteenth century Kings and Queens counties remained primarily rural districts. Aside from the Town of Brooklyn which contained 10,800 inhabitants in 1825, the other towns in Kings County were modest in size, ranging from about 400 to 1,000 persons, and many of those inhabitants lived on dispersed farmsteads. Queens County had no large towns on the order of Brooklyn and was characterized by a far lower population density than Kings County. The completion of the Erie Canal in 1825 placed New York City and environs at the crux of a vast trade network that linked the interior and Great Lakes with burgeoning transatlantic commerce. New York City had already, by 1810, surpassed Philadelphia as the largest city in the United States, and in the second quarter of the century superseded Mexico City as the largest metropolis in the Americas. The introduction of steamships and railroads in the 1830s and 1840s enhanced New York's position as the continent's pre-eminent port and manufacturing center. The lure of jobs in New York in concert with failed revolutions and failed crops in Europe stimulated massive immigration from Germany, Ireland, Scandinavia, and elsewhere. In 1825 New York contained 166,000 residents; by 1860 the New York metropolitan area was home to more than one million people (Burrows and Wallace 1999).

Key agricultural products for the region were cattle, wheat, rye, corn, oats, and butter. Grain processing facilities were some of the earliest and most important manufacturing sites in the region. In Kings County this activity took the form of liquor distilling, with nine distilleries producing more than 3.3 million gallons of liquor in 1840. In contrast, grain processing in Queens County involved 41 grist mills in 1840 (US. Census 1842, 138, 140). Neither the liquor nor flour produced in Kings and Queens counties was intended for local consumption alone; county populations simply were not large enough for the amounts produced. Canal and railroad construction from the 1820s to the 1850s connected new farming districts with the urban and overseas markets.

The Long Island Rail Road opened its line from Brooklyn to Hicksville in 1837, running through the towns of Hempstead and Oyster Bay, and completing a branch line to the village of Hempstead in 1839. By 1855 Hempstead was the most populous town in Queens County (NYSL 2019). Railroads were rather late in connecting to Monmouth County. The Jamesburg and Freehold Agricultural Railroad was built in 1853, making Freehold the rail terminus of the region and enhancing its importance as the county seat. The Raritan and Delaware Bay Railroad opened in 1860 and ran from Port Monmouth via Red Bank to Eatontown and Lakewood. In 1877, the Freehold and New York Railway opened a route to Keyport. The mining of marl, a calcium carbonate-rich mudstone used as fertilizer, became an important local industry during the mid-nineteenth century. The Squantum Railroad and Marl Company opened in 1861, connecting the marl beds at Farmingdale to the Freehold rail hub. Branch lines to the seaside town of Long Branch were completed by the New York and Long Branch Railroad in 1875 (Ellis 1885, 378-381).

Z.5.2.3 Urban Expansion and Rural Decline (1860-1960)

With access to inlands provided by canals and railroads, Long Island farmers by mid-nineteenth century were not able to compete with midwestern grain prices and turned to supplying New York City with market garden produce, including potatoes, beans, peas, and other vegetables (Burrows and Wallace 1999, 431). By 1880,

Kings and Queens counties led New York State in the value of market garden production. Nassau County (following its separation from Queens County in 1899) ranked eighth among U.S. counties in market garden acreage in 1900 (9,010 ac [3,646 ha]) and led the nation in cabbage acreage (U.S. Census Bureau 1902, 320-321). Queens County, with 7,148 ac (2,893 ha) of garden acreage, ranked 11th nationwide in 1900.

Contributing to the transformation of Long Island's economy was oystering along the South Shore. With the completion of the Southern Railroad in 1865, large quantities of oysters were shipped daily to New York City. The rail service also accelerated development of seaside resorts in Long Beach and Rockaway, bringing them within reach of urban dwellers (Munsell 1882, 150-151, 172). The Long Island Rail Road started to promote Long Island as a resort destination in the 1870s, offering excursion trains to Fire Island, Babylon, and Patchogue (Kass 2004/2005, 81). In 1929, New York State built the Wantagh Causeway to Jones Beach, along with bathhouses and parking, inaugurating public access and use of Jones Beach State Park. In its first year, Jones Beach drew 1.5 million visitors (Fasanella 1994, 107). From the early 1800s, wealthy Philadelphians traveled overland to the Jersey Shore for sea bathing and vacationing. With the introduction of rail service in the 1870s large numbers of urban dwellers from across the New York and Philadelphia regions could easily travel to seaside towns from Sandy Hook to Cape May. Long Branch in Monmouth County became one of the premier seaside resorts on the eastern seaboard, attracting the upper and middle classes to a diverse array of hotels, boarding houses, and eateries. By the late nineteenth century most of Monmouth County's Atlantic shoreline from Sea Bright to Manasquan had been developed as seaside resorts. In the early twentieth century, Asbury Park became a major tourist destination with theaters, arcades and its famous boardwalk along the beach. Much of the original infrastructure and buildings of its heyday have been demolished through redevelopment efforts beginning in the 1970s or by weather events such as the 2012 Hurricane Sandy (Mazzagetti 2018).

Long Island's essential character remained largely unchanged until 1910 when the East River rail tunnels and Pennsylvania Station were built, providing direct access from Long Island to Manhattan. City workers could now commute from new suburban developments across Long Island, beginning the transformation of the island from a rural enclave to a bedroom community. From 1905 to 1915 Nassau County's population nearly doubled, and from 1915 to 1925 nearly doubled again. A second, deeper expansion of suburban development occurred after World War II, when highway construction and widespread automobile ownership fostered the growth of new bedroom communities built on the flat agricultural lands across the region.

Though fragmented and dispersed by unfair treaties, Anglo-American hostility, and unequal access to state services, Native American groups and their lifeways have persisted on Long Island over the centuries. Historically known for their skill as sailors and whalers, two Indian Nation communities are present on the south shore and include the Shinnecock Indian Nation and the Unkechaug Indian Nation. The Shinnecock Nation, which received federal recognition in 2010, occupies a reservation of approximately 800 acres on a headland at the eastern margin of Shinnecock Bay in the Town of Southampton. Land of the Unkechaug Nation comprises around 55 acres of what was once a much larger treaty reservation, on the west bank of the Forge River in the Town of Mastic. The Unkechaug tribe has received state-level recognition.

Z.6 ASSESSMENT OF EFFECTS TO HISTORIC PROPERTIES WITHIN OFFSHORE AVEHAP PAPE

Z.6.1 Offshore PAPE

Environmental factors contribute to views of offshore projects. Meteorological conditions such as haze, fog, rain, snow or a combination thereof sometimes contribute to reduction of visibility. The New York State Energy Research and Development Authority (NYSERDA) developed a Visibility Threshold Study (NYSERDA study) in support of the New York State Offshore Wind Master Plan (NYSERDA 2017). The

NYSERDA study assessed the visibility of a hypothetical wind farm at various distances (13.2 and 30 mi [21.2 and 48.2 km]) from shore under different meteorological conditions within an Area of Analysis. The Area of Analysis identified in the NYSERDA study consisted of the Atlantic shoreline of Long Island, which also falls within the AVEHAP Offshore Study Area. Based on the NYSERDA study visibility during daytime hours was noted as less than 10 mi (16 km) only 17 percent of the time. The study also suggests that “the highest color contrast and most visible condition (morning, clear skies) has the potential to occur during approximately eight percent of the daylight hours in a given year and the least visible condition (overcast, morning) would occur during approximately 22 percent of the daylight hours in a given year” (NYSERDA 2017). The step-wise refinements that were performed in the viewshed modeling sought to present a conservative approach to the definition of visibility. As such, the environmental factors described above were not quantified or taken into account for this AVEHAP.

In contrast to the VIA (**Appendix AA**), the AVEHAP is not an observer-based study. Project components, both offshore and onshore, occur in direct relationship to the built environment (of which historic properties are a subset) rather than mediated by a human observer. This difference is a subtle shift in perspective between these two related studies, in which the AVEHAP emphasizes the physical and historical contents of the landscape, while the VIA exposes a more abstract, visual character of the Project that relates specifically to human experience.

The wind turbines and offshore substations will be lit and marked in accordance with FAA, BOEM, and USCG guidelines and requirements for aviation and navigation obstruction lighting. For the wind turbines, FAA lighting will include two FAA Type L-864 lights mounted on opposite rear sides of the nacelle on both the maximum and minimum representative wind turbines. The maximum representative wind turbines may also require three or more FAA Type L-810 lights spaced around the mast located midway between the nacelle and mean sea level. The L-810 lights will be configured to flash in sync with the L-864 lights. FAA-required lighting will be red. USCG lighting will be located on the foundation of each wind turbine. The proposed lighting for the offshore substations will include lights around the perimeter of each deck level for safety and FAA lights will be mounted to lightning protection rods. Potential impacts associated with nighttime lighting for offshore Project components is discussed in **Appendix AA**.

The historic and architectural properties that have views of the Project within the Study Area include those situated at or near sea level in proximity to the shoreline, as well as some located at a distance from the ocean shoreline and consisting of tall buildings or structures situated on elevated terrain. The Study Area contains elevated terrain in several locales, including the Atlantic (Navesink) Highlands in Monmouth County, New Jersey, the Ronkonkoma and Harbor Hill moraines that form the east-west ridge of hills on Long Island, and bedrock formations in northern Manhattan. Historic and architectural properties with tall elevations or located on elevated terrain would possess somewhat attenuated Project views where integrity of the foreground viewshed is already substantially altered such that addition of wind turbine in the background viewshed represents a small, incremental change relative to existing conditions. In contrast, properties proximal to the ocean would be likely to have views of the Project that are direct and unmediated by foreground or middleground vistas of the built-environment, vegetation or topography. Properties proximal to the ocean, which may have unmediated views and maritime settings, would be most susceptible to adverse effects caused by Project construction and therefore, such properties received the focus of attention in this assessment of effects. Those properties located in Manhattan, and elsewhere, with elevated views, will be assessed for their potential impacts through a separate Phased Identification Plan.

Among the properties with Project views in proximity to the shoreline are a number federally owned resources managed by the National Park Service (NPS), including Gateway National Recreation Area and the Fire Island

National Seashore. These are described below, with recommendations of assessment of effects for major units and key contributing resources, followed by an assessment of impacts to Gateway National Recreation Area (NRA) and the National Seashore as whole entities. Following these assessments of NPS properties are discussions of state, local, and private historic properties with Project views.

Z.6.1.1 Gateway National Recreation Area

The Gateway NRA was established in 1972 as an assemblage of federal, state, and local properties along Lower New York Bay, Jamaica Bay, and the Atlantic Ocean and administered by the National Park Service (NPS). Much of Gateway NRA consisted of former military preserves whose operations had been significantly curtailed or closed by the late 1960s, and their incorporation into a single park was timely in terms of the expansion of recreational, cultural, and historic sites for the greater New York and New Jersey metropolitan area. Gateway's various components share a common geographic and historic connection as the entrance to New York Bay, literally the "gateway" for millions of immigrants to the United States and for countless mariners making port in New York and associated anchorages. Gateway NRA comprises three units, Jamaica Bay, Staten Island, and Sandy Hook, with each unit containing one or more park entity. Historic properties within each of these three units are described below and assessed for potential Project impacts.

Z.6.1.2 Jamaica Bay Unit - Gateway NRA

The Jamaica Bay Unit of Gateway NRA lies within the New York City boroughs of Queens and Brooklyn and includes the historic properties of Floyd Bennet Field Historic District, Jacob Riis Park, Fort Tilden Historic District, and the Breezy Point Surf Club Historic District.

Floyd Bennett Field Historic District (NR No. 80000363)

Floyd Bennett Field opened in 1931 as New York City's first municipal airport and by the mid-1930s was the busiest airport east of the Mississippi River. Floyd Bennett Field incorporated many new innovations in airport design and operations, including those in navigational lighting, multiple runways, large hangars, and airplane turntables. Despite initial success, the field's distance from Manhattan placed it at a disadvantage to competing Newark Airport, and when LaGuardia Airport, with direct highway access to Manhattan, opened in 1939, passenger service at Floyd Bennett Field ended, although flight operations continued with U.S. Navy and U.S. Coast Guard stations there. Several pioneering pilots made flights from Floyd Bennett Field in the 1930s, including Wiley Post, Amelia Earhart, and Howard Hughes. On the eve of America's entry into the Second World War, the U.S. Navy took control of Floyd Bennett Field and commissioned it as Naval Air Station New York (NASNY). During the war, the airfield was expanded, many new buildings constructed, and runways lengthened to accommodate larger military craft. NASNY became a key air transport hub for the war effort, ferrying aircraft from the Grumman and Republic factories on Long Island to the west coast for action in the Pacific. With the end of the war, NASNY's role in military affairs diminished, marking the end point in the resource's period of significance from 1928 to 1945. From the end of the Korean War to the base decommissioning in 1971, NASNY served largely as a Naval Reserve training facility. In 1972, the property was transferred to the NPS as a component of Gateway NRA.

Floyd Bennett Field Historic District comprises the original and expanded airfield and contains 54 NRHP listed contributing resources, including hangars, runways, buildings, and ancillary structures (**Attachment Z-8**). The historic district is significant under Criterion A for its association with the early history of air travel, and airplane and airport development in the United States. It is also significant under Criterion C in the areas of architecture and engineering. Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The historic district retains integrity in the areas of location, design, setting, materials,

workmanship, and association. While the historic district and its associated contributing resources are modeled to have possible views of the Project, these views are likely to be attenuated by the intervening mass of the Rockaway Peninsula and its built environment. Whatever the extent of potential views, the Project will not introduce new vistas that would alter or diminish the character-defining elements that make Floyd Bennett Field Historic District eligible to the NRHP under Criterion A or C. In part, this is due to the district's geographic separation from the Atlantic shoreline, eliminating any powerful physical, cultural, or emotional attachment to the resource by an ocean setting. Floyd Bennett Field Historic District does not depend on an expansive, unobstructed ocean the vista for its significance, and thus will not experience a loss of integrity or diminishment of with the introduction of views of the Project, which is 21.5 mi (39.7 km) away. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Silver Gull Beach Club Historic District (CRIS No. 08101.012423)

Silver Gull Beach Club Historic District is a significant local example of a seaside beach club that served an urban population in the post-Second World War period. The beach club comprises adjoining rows of cabanas, a club house, pool, athletic facilities, and ocean beach located on the Rockaway Peninsula. Built in 1962 as a private club offering seaside recreational amenities, the period of significance is 1962–1963. The historic district lies within the Gateway National Recreation Area, which leases the club facilities to its operators. Though suffering storm damage from Hurricane Sandy in 2012, the beach club has remained largely unaltered in appearance from its origins. The property is NRHP eligible under Criterion A for its association with the development of seaside recreation and entertainment in the post-Second World War period, and under Criterion C as a nearly intact example of oceanfront recreational architecture. The property's existing configuration and appearance accurately reflects its character during the period of significance. The beach club offers its members and guests expansive views of the Atlantic Ocean in one of New York City's last undeveloped locations. The Project will be visible during daytime and nighttime periods. The introduction of the Project within sight of the beach and cabanas that comprise the historic district will likely diminish the sense of separation from the urbanized world that lies just beyond the district. It was assessed that views of the Project, which is 22.0 mi (35.4 km) away, will have an adverse effect on the significance of the Silver Gull Beach Club Historic District (**Figure Z-11: Historic Property No. 7**).

Breezy Point Surf Club Historic District (CRIS No. 08101.011499)

The Breezy Point Surf Club Historic District encompasses New York City's oldest and largest beach cabana club, located near the western tip of the Rockaway Peninsula in the Borough of Queens. Opened as a private club in 1937, it offered seaside recreation for middle-class urban clientele who had not the means to purchase summer homes elsewhere along the shore. The club consisted of small, rather spartan cabanas, pool and sports facilities, a restaurant, and ocean beach. The western margin of the Rockaway Peninsula accretes sand from longshore currents, and by the 1950s, the original cabanas had become distant from the beach, causing the club to construct a second set of cabanas and club facilities nearer the ocean. Presently, due to continual accreting processes, the second-generation cabanas find themselves about a quarter-mile from the beach. In its heyday in the post-Second World War period, the club had a largely Irish and Italian ethnic make-up, with as many as a few thousand people visiting on summer days. The success of the club was due in no small part to the increasing ownership by the middle-class of automobiles and by the construction of New York City's parkway system that allowed access to the otherwise isolated Breezy Point section of the Rockaways.

The Breezy Point Surf Club Historic District retains a large measure of integrity and original design content reflecting its period of significance from 1937 to 1963. The district is NRHP-eligible under Criterion A for its association with the development of seaside recreation in New York City during the Great Depression. It is

also eligible under Criterion C as an example of mid-twentieth century beach club cabana complex. The district offers its members an expansive view of the Atlantic Ocean from its beach, an isolated setting that is one of the last undeveloped tracts in the city. This characteristic, important to its eligibility in the area of recreation, would likely be altered or diminished by the introduction of an entirely new daytime and nighttime vista by the Project. The Project, which is 22.0 mi (35.4 km) away, will be visible during daytime and nighttime periods. It was assessed that views of the Project will have an adverse effect on the significance of the Breezy Point Surf Club Historic District.

Fort Tilden Historic District (NR No. 84002917)

Fort Tilden was an important coastal defense installation from the First World War through the Cuban Missile Crisis. Construction began in 1917 with the emplacement of six-inch gun batteries, however, all extant features of the historic district date to the Second World War. Surviving components include concrete casemates for shore batteries, ammunition magazines, and operations bunkers. Fort Tilden was organized as a subordinate post to Fort Hancock on Sandy Hook, along with Forts Hamilton and Wadsworth, which were all vital components of the harbor defense for New York. At Fort Tilden, Battery Harris comprised a casemated 16-inch gun, the largest type of artillery gun available to American forces. During the Cold War in the 1950s, the Department of Defense emplaced Nike missile silos and control facilities at Fort Tilden. These weapons were removed in the mid-1960s. The introduction of intercontinental ballistic missiles into the superpower arsenal rendered Nike missiles obsolete, and Fort Tilden's air defense silos and command and control facilities were deactivated in 1967. The period of significance is 1917-1967. The post was turned over to the National Park Service as part of Gateway National Recreation Area in 1972.

The Fort Tilden Historic District, which is 20.9 mi (33.6 km) from the Project, is NRHP-listed under Criterion A within the context of military history for the period 1916-1967. Although eroded by surf and storms, especially from Hurricane Sandy in 2012, it retains sufficient integrity to remain listed (**Figure Z-11: Historic Property No. 8**). The historic district contains 21 NRHP-listed and 45 -eligible buildings and structures that are contributing resources to the district, including the Administration Building (**Figure Z-11: Historic Property No. 9**), which is 20.9 mi (33.6 km) from the Project, and Commanding Officer Quarters (**Figure Z-11: Historic Property No. 10**), which is 20.8 mi (33.5 km) (**Attachment Z-9**). Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The property will have a view of the Project during daytime and nighttime periods. The district does not depend on its maritime proximity as an associative or locational quality for its eligibility to the NRHP and will not experience a loss of integrity through the introduction of Project views. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Just outside the boundaries of the Fort Tilden Historic District are three NRHP-unevaluated buildings associated with the former U.S. Coast Guard Station-Rockaway Point. Currently unused, the resources include an administration building (CRIS No. 08101.012270) and two garage/maintenance/storage structures (CRIS Nos. 08101.012269 and 08101.012321). The online tax map of the New York City Department of Buildings indicates ownership by NPS. The administration building, built circa 1900, is a three-story brick structure on a limestone foundation in Colonial Revival style. The side-gabled central block faces Rockaway Point Boulevard in a southeasterly direction, has four gable-end dormers, and a six-sided cupola on the roof ridgeline. Front-gable wings project from the main block at both ends. Cornices exhibit large dentil moldings that punctuate the roofline. Projecting brick quoins are present at each corner of the building. The support buildings are 1½-story, utilitarian in form and have large vehicular doors. The three buildings surround a small grassy courtyard with flagpole present. A pier and breakwaters extend from bulkheads into Rockaway Inlet. The U.S. Coast Guard Station-Rockaway Point retains its historic integrity and the buildings are in good condition. Tetra Tech

recommends that this resource is potentially NRHP-eligible. As it was sited on Rockaway Inlet, the station's focus was bayside and not southward toward the ocean. It was assessed that Project-related visual effects will not diminish the potential significance of the character-defining elements for this resource.

Jacob Riis Park Historic District (NR No. 81000081)

Jacob Riis Park Historic District comprises a 1-mi long section of the Rockaway peninsula in Queens County, New York, fronting the Atlantic Ocean and Rockaway Inlet. The park was created in 1932 under the direction of New York City Parks Commissioner, Robert Moses, who also oversaw the construction of Marine Parkway Bridge linking the peninsula to Brooklyn, New York. In addition to swimming and sunbathing, Jacob Riis Park provides a variety of recreational activities including, fishing, hiking, boating, and ball fields. Park buildings were rendered in the recreational architectural style popular in the 1930s, with the Art Deco main bathhouse a prime example. Park buildings have been largely unaltered since their construction in the 1930s and reflect the character of the property's period of significance, 1932-1937. The district includes six contributing resources (Attachment Z-10).

Jacob Riis Park Historic District was listed in the NRHP in 1981 under Criterion C as an example of the prevalent aesthetic design of the 1930s, much of it undertaken by the Works Progress Administration. Observations made by the Project team in 2019 indicate that Jacob Riis Park currently retains its significance and integrity. The Project, which is 20.7 mi (33.2 km) away, will be visible from most lines of site within the property. The primary focus of the park, both in terms of purpose and visual orientation, is the ocean. Whether in the water or on the beach, observers are drawn to the ocean by the sound of the surf, the kinetic motion of the waves, and the sensory effects of sand, salt, and water. The resource will have Project views during daytime and nighttime periods. It was assessed that views of the Project will have an adverse effect on the significance of the on the Jacob Riis Park Historic District (**Figure Z-11**: Historic Property No. 11)

Z.6.1.3 Staten Island Unit - Gateway NRA

The Staten Island Unit of Gateway NRA includes two historic properties, Fort Wadsworth Historic District and Miller Army Air Field Historic District.

Fort Wadsworth Historic District (NR No. 99000430)

Fort Wadsworth Historic District encompasses shoreline and upland locales at the Narrows of New York Harbor, where the U.S. War Department established a series of forts to defend New York City in the period from the late eighteenth century to the end of the Second World War. The district comprises fortifications, gun batteries, barracks, and support infrastructure in settings with broad views of the harbor, the borough of Brooklyn, lower Manhattan, and the ocean. The district contains 62 contributing resources on 117 acres and is bisected by the Interstate highway approach to the Verrazano Narrows Bridge (Attachment Z-11). Two integral fortifications, Battery Weed on the shoreline and Fort Tompkins atop steep upland, are individually listed in the NRHP. Built on the site of an earlier British fortification, artillery positions were constructed in 1794 as part of the First System of coastal fortifications. Tensions with the British led to defensive improvements in the early 1800s, culminating with the construction of Battery Weed between 1847 and 1864, and Fort Tompkins from 1859 to 1876. The fort was named in 1865 for Civil War General James Samuel Wadsworth.

Fort Wadsworth continued to serve as a harbor fortification through the first half of the twentieth century but with the advent of the Cold War, war planners realized that strategic defense would have to rely on planes and missiles, and in 1946 Fort Tompkins was decommissioned as a coastal defense facility. A wave of appropriations for a proposed U.S. Navy homeport facility in the mid-1980s resulted in the demolition of some support structures and the construction of new housing at Fort Wadsworth for the expected influx of military personnel

and families. Despite these changes, the district retains a high degree of integrity as an example of a fortified military landscape. The district is considered nationally significant under Criterion A for its association with military history and is nationally significant under Criterion C as an excellent example of military engineering as it evolved across the nineteenth and early twentieth centuries. Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The viewshed analysis indicates that Fort Wadsworth Historic District may have potential views of the Project, which is 29.6 mi (47.7 km) away, during daytime and nighttime periods. These views are understood to be somewhat attenuated by the district's perspective along the long axis of the Lease Area, with most turbines more than 40 mi (64 km) from the resource. The potential views are also somewhat screened by the built environment of Coney Island's west side and the bulk of the Verrazano Narrows Bridge and Interstate 278. Regarding assessment of effects, the Fort Wadsworth Historic District is an area where integrity of the foreground historic viewshed is already substantially altered such that the addition of wind turbines in the background viewshed represents a small incremental change in the existing conditions. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Miller Army Air Field Historic District (NR No. 80000362)

Miller Army Air Field Historic District comprises the landing field and seaplane hangar of Miller Field, a former U.S. Army Air Corps base located on the southeastern shoreline of Staten Island, New York City. Miller Field was built in 1919 in the aftermath of the First World War, and along with Floyd Bennett Field in Brooklyn, was an important early aviation testing and maintenance facility of the U.S. military. The period of significance is 1920-1939, when the last major addition to the seaplane hangar was completed. The seaplane hangar, one of the few extant buildings from the period of significance, has a gambrel roof supported by open steel trusses. The grass landing field was the last of its kind in New York City when the base was deactivated in 1969. Though by 1940 major aviation testing had shifted to other regional airfields, such as Bennett Field, Miller Field was an important base for coastal air defense during the Second World War and continued to support U.S. Army air units from the 1950s through 1960s. A light beacon, referred to as the Elm Tree Light, was constructed in 1939 to aid in aviation navigation and played a secondary role in maritime navigation. The light has been inactive since the 1960s. When operational, Elm Tree Light was an automated beacon, such that human presence within or atop the resource was limited to routine maintenance and repair.

Miller Field was listed in the NRHP in 1980 under Criterion A. The property is listed for its "direct association with early aviation history, the history of air coast defenses of New York, and the lighthouse service." Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. Observations made by the Project team in 2019 indicate that the landing strip is no longer recognizable due to the installation of ballfields and that the seaplane hangar and Elm Tree Light have suffered considerable deterioration. Nevertheless, Miller Army Air Field Historic District currently retains integrity of material, feeling, and setting associated with its period of significance (**Figure Z-11: Historic Property No. 1**). The Project, which is 31.0 mi (49.9 km) away, will be visible from the historic district during daytime and nighttime periods. The district does not depend on its maritime proximity as an associative or locational quality for its eligibility to the NRHP and will not experience a loss of integrity through the introduction of Project views. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Z.6.1.4 Sandy Hook Unit – Gateway NRA

The Sandy Hook Unit of Gateway NRA comprises the entirety of the Sandy Hook peninsula, including the Fort Hancock and Sandy Hook Proving Ground Historic District and the individually listed Sandy Hook Light and Fort Hancock Life Saving Station.

Sandy Hook Light (NR No. 6600468)

The Sandy Hook Light, built in 1764, is the oldest extant lighthouse in the United States. Standing 103 ft tall, the octagonal brick structure tapers upward from a base diameter of 29 ft to 15 ft at the top. The lantern and catwalk are accessible by a spiral, cast iron staircase. The property's period of significance is 1764-1799. The lighthouse largely has been unaltered in appearance and materials since its construction, and accurately reflects the character of the property during its period of significance. Areas of significance include commerce and transportation.

Sandy Hook Light was designated a National Historic Landmark in 1964 and was listed in the NRHP in 1966 under Criterion A for its association with the colonial program to promote maritime safety along the eastern seaboard. Observations made by the Project team in 2019 indicate that the Sandy Hook Light currently retains its significance and integrity (**Figure Z-11: Historic Property 23**). Although the NRHP nomination does not explicitly note the significance of the view to the ocean, the setting of this historic aid to navigation is important to understanding its significance. Criterion A is readily interpreted to mean that an expansive, unimpeded ocean view is integral to the light station's character, setting, feeling, and association. The resource will have views of the Project during daytime and nighttime periods. The introduction of the Project will likely change the sense of the ocean's expanse during periods of visibility, diminishing the apparent prominence of the light. It was assessed that views of the Project, which is 24.0 mi (38.6 km) away, will have an adverse effect on the significance of the Sandy Hook Light.

Fort Hancock and Sandy Hook Proving Ground Historic District (NR No. 80002505)

The Fort Hancock and Sandy Hook Proving Ground Historic District encompasses 380 acres on Sandy Hook that was utilized by the U.S. Army as a weapon testing area during the period 1874-1919. The proving ground included firing ranges, gun platforms, and instrument housings. Innovative testing undertaken at Fort Hancock included rifling smooth bore cannon, breech-loading guns, rapid fire guns, and armor-piercing shot. Between 1885 and 1907, large-scale enhancement of the nation's coastal defenses was recommended and implemented by the Endicott Board, a presidential-appointed military and civilian board headed by Secretary of War William Endicott. Fort Hancock was designated as the principal outpost for the defense of New York Harbor, and became superordinate to Forts Wadsworth, Hamilton, and Tilden. Fortifications at Fort Hancock were completed in 1895 and the first garrison of artillerists arrived there in 1898. The period of significance for the proving ground historic district is 1874-1919, when weapons testing ended at Fort Hancock and shifted to other military reservations. The district includes 89 contributing resources, including individually listed Sandy Hook Light and Fort Hancock U.S. Life-Saving Station (**Attachment Z-12**).

The property was listed in the NRHP in 1980 under Criterion A for its association as the key fortification guarding the approaches to America's most important harbor and its largest metropolis in the late nineteenth and early twentieth centuries, and for the key role in the development of the weapons employed by the U.S. Coast Artillery and U.S. Field Artillery during the years that the United States emerged as a world power. Observations made by the Project team in 2019 indicate that the Fort Hancock and Sandy Hook Proving Ground Historic District currently retains its significance and integrity (**Figure Z-11: Historic Property 24**). The property will have a view of the Project. However, the district does not depend on its maritime setting as an associative or locational quality for its eligibility to the NRHP. Listed under Criterion A in the area of military

history, the Fort Hancock and Sandy Hook Proving Ground Historic District acquires its significance on the basis of actions and events that occurred on land and does not require an unobstructed ocean vista to satisfy this recommendation. The district will have views of the Project, which is 22.4 mi (36.0 km) away, during daytime and nighttime periods. It was assessed that Project-related visual effects will diminish the significance of the character-defining elements for this resource.

Fort Hancock, U.S. Life Saving Station (NR No. 81000080)

The Fort Hancock U.S. Life Saving Station was established on Sandy Hook, New Jersey in 1894 and deactivated in 1949, bookending the period of significance between these dates. This station was one of six original U.S. Life Saving Service sites in New Jersey. The lifesaving station was built in the Shingle style, while railings and framing principals exhibit Craftsman influence. Since 1974, the building has served as a visitor center for Gateway National Recreation Area. Relatively unaltered since its construction, the property accurately reflects the character of the station during its period of significance.

The Fort Hancock Life Saving station was listed in the NRHP in 1981 under Criterion A for its association with the earliest federally sponsored efforts to save life and property from coastal shipwrecks, and under Criterion C as an example of late-nineteenth-century New Jersey coastal utilitarian architecture. Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. Observations made by the Project team in 2019 indicate that the Fort Hancock, U.S. Life Saving Station currently retains its significance and integrity (**Figure Z-11: Historic Property 25**). The property will have a view of the Project. Its historic viewshed during the period of significance would have been a broad vista of beach to north and south and unobstructed views of the ocean between them. The expansive character of this viewshed was intrinsic to the function of the life-saving station and construction of the Project will introduce new elements to this viewshed that are likely to alter the character of the resource's historic setting, diminishing the significance of the character-defining elements for which the property has been listed in the NRHP. The resource will have views of the Project, which is 22.6 mi (36.3 km) away, during daytime and nighttime periods. It was assessed that views of the Project will have an adverse effect on the significance of the Fort Hancock U.S. Life-Saving Station.

Z.6.1.5 Summary of Gateway – NRA

Gateway NRA includes historic properties that are modeled to have views of the Project in each of the three park units. Within the Jamaica Bay Unit, recommendations of adverse effects apply to Jacob Riis Park Historic District but not to Fort Tilden Historic District nor Floyd Bennett Field Historic District. Within the Sandy Hook Unit, adverse effects were found to be potentially experienced by Sandy Hook Light and Fort Hancock U.S. Life-Saving Station, individually listed properties, but not to the Fort Hancock and Sandy Hook Proving Ground Historic District itself. No adverse effects are recommended as applying to the Staten Island Unit historic properties. Overall, Tetra Tech concludes that adverse effects to military districts caused by the introduction of new elements in a viewshed are not likely to occur because of the character of their criterion of eligibility. Historic districts that are significant under Criterion A in the Area of Military History, but which were not the scene of battles and engagements, acquire their significance from the flow of day-to-day activities performed by common soldiers and officers, and by the advances made in military theory, practice, equipment, and construction that occurred at or were applied at a location over a broad sweep of time. This is in contrast to a battlefield site whose historic viewshed may have played a critical role in the outcome of that engagement, such as Devil's Den at Gettysburg or the bluffs at Little Big Horn, and which would be vulnerable to diminishment of significance with the introduction of new visual characters in the viewshed.

Z.6.1.6 Fire Island National Seashore

Fire Island National Seashore, established by Congress on September 11, 1964, protects a 26-mile section of the 30-mile-long Fire Island barrier island. The island is separated from Long Island by the Great South Bay and is part of Suffolk County, New York. Fire Island is comprised of 17 year-round and seasonal communities and contains federal, state, and county parks. The island supports distinct ecosystems alongside areas of economic, cultural, and historic value. The Fire Island National Seashore encompasses the NRHP-listed Fire Island Light Historic District, and the individually listed Fire Island Light and Carrington House, all managed by NPS.

Fire Island Lighthouse (NR No. 81000082) and Historic District (NR No. 09001288)

The Fire Island Lighthouse was built in 1858, rises 150 ft high, and became the most important maritime navigational aid on the eastern seaboard because it marked the first landfall for ships approaching New York Harbor on the trans-Atlantic routes. The present lighthouse replaced one built in 1826. The lighthouse's hollow central column of cast iron is clad in brick and covered with a cement wash. The original lamp, with its 1st order Fresnel lens, was visible for 21-23 nm and filled the gap between Montauk Point Light to the east and Sandy Hook Light to the west. Various lamp fuels were utilized, including, lard, whale oil, kerosene, and incandescent oil vapor, until electrification occurred in 1939. The historic district includes the lighthouse and the keeper's house, in addition to 14 other contributing buildings, sites, and structures. The district's period of significance is 1825-1960, encompassing the period of the first Fire Island lighthouse to the construction of the U.S. Coast Guard Garage, the last major structure added to the district.

The historic district was listed in the NRHP in 1981 under Criterion A for its association with the early federally sponsored program of maritime navigational aids along the eastern seaboard and is significant in the areas of maritime history, transportation, communication, commerce, and military. The district is listed under Criterion C as an outstanding example of mid-nineteenth century lighthouse engineering and architecture. The district is also listed under Criterion D for its potential to contain significant post-contact period archaeological deposits. Observations made by the Project team in 2019 indicate that the Fire Island Lighthouse Historic District currently retains its significance and integrity (**Figure Z-11: Historic Property No. 18**). The lighthouse and historic district are located on an undeveloped stretch of the barrier beach to the west of the communities of Fire Island. Although the NRHP nomination does not explicitly note the significance of the view to the ocean, the setting of this historic aid to navigation, specifically the unimpeded views of the Atlantic Ocean, is important to understanding its significance. The resource will have views of the Project during daytime and nighttime periods. Visual simulations for the lighthouse can be found in Appendix AA: Visual Impact Analysis. Supplemental visual simulations from the lighthouse deck can be seen in **Attachment Z-15**. The introduction of the Project will likely change the sense of ocean's expanse, diminishing the apparent prominence of the light when visible. It was assessed that views of the Project, which is 21.7 mi (35.0 km) away, will have an adverse effect on the significance of both the Fire Island Lighthouse and Historic District.

Carrington House (NR No. 13001057)

The Carrington House is an early twentieth century beach house on Fire Island, in the Town of Brookhaven, New York. Built circa 1912 and enlarged in the 1930s or 1940s, the house is an early, intact example of residential structures that characterized Fire Island as a resort community. The house is a wood shingle-clad bungalow with some Craftsman-style details, such as exposed rafter ends, and is set between two parallel beach dunes surrounded by short pines and scrub vegetation. About 60 feet to the east sits a small guest house composed of two sections of the former Lone Hill Lifesaving Station that were moved onsite in the early 1940s and cobbled together as a single unit. The main house was built by Frederick Marquet as a vacation home and was purchased in 1927 by Frank Carrington, a noted theater director. It is through Carrington that the property

acquired a reputation as a salon for gay artists, actors, and writers over the next few decades, one of several such residences in the Fire Island communities of Cherry Grove and the Pines.

The period of significance of the resource is from 1912 to 1969, when Carrington deeded the property to the NPS. The property is NRHP-listed under Criterion A in the area of recreation for its association with the development of Fire Island as a vacation community in the early twentieth century which focused on the immediacy of the ocean setting and the isolated landscape and was also eligible under Criterion A for the encouragement and growth of gay cultural life in the local community from the 1930s to the 1960s. As an intact example of beach bungalow architecture, the Carrington House is significant under Criterion C. The resource will have views of the Project during daytime and nighttime periods. The introduction of the Project into the views seen from the property may diminish the characteristics that endow it with significance. It was assessed that views of the Project, which is 24.9 mi (40.1) away, will have an adverse effect on the significance of the Carrington House.

Z.6.1.7 Summary of Fire Island National Historic Seashore

Fire Island's association with its ocean setting is its most prominent characteristic and plays important roles in the significance of historic properties there in the area of recreation where broad, unobstructed views of the ocean and beaches were reasons people visited Fire Island. Tetra Tech recommends that the Project will likely introduce adverse effects to individual historic properties and to the National Seashore as a whole.

Z.6.1.8 Other Resources—New York

West Bank Light Station (NR No. 06001230)

The West Bank Light Station is an important maritime navigational aid located in Lower New York Bay, approximately 3 nm (5.6 km) east of New Dorp Beach, Staten Island. Built in 1901 in water 21 feet deep, the light station was constructed of a cast iron caisson expanding in trumpet shape to form a gallery above which supports an iron conical tower surmounted by a black lantern. Hundreds of tons of riprap encircle the station and form a small anchorage for boats. When installed, the light station contained a 4th order Fresnel lens and was visible for approximately 12 nm (22 km). Automated in the 1980s, the light station's period of significance is 1901-1971.

The West Bank Light Station was listed in the NRHP in 2006 under Criterion A for its association with the federal program of coastal maritime safety, and Criterion C as an excellent example of maritime-related architecture. The property is listed as part of the Light Stations of the United States multiple property submission. Its existing configuration and appearance accurately reflect its character during the period of significance; however, the corrosive effects of its marine environment and storm damage have severely impacted the property's condition. The Project, which is 27.8 mi (44.7 km) away, will be visible from the light station, which is located near the entrance to New York Harbor with a relatively unobstructed view towards the Project between Sandy Hook and Rockaway Point. The setting of this historic aid to navigation is important to understanding its significance. The introduction of the Project will likely change the sense of the ocean's expanse during periods of visibility, diminishing the apparent prominence of the light station. Criteria A and C are readily interpreted to mean that an expansive and unimpeded ocean view is integral to the light station's character and setting. The resource will have views of the Project during daytime and nighttime periods. It was assessed that views of the Project will have an adverse effect on the significance of the West Bank Light Station (**Figure Z-11: Historic Property No. 2**).

Cyclone Roller Coaster (NR No. 91000907)

The Cyclone Roller Coaster is a rare surviving example of the mechanized amusement park rides that were once legion at Coney Island, Brooklyn, New York. Built in 1927 and featuring a 3000 ft track and a vertical drop of almost 100 ft, the wooden roller coaster was one of the best attended rides at Luna Park, one of three major amusement parks once present at Coney Island. This property was listed in the NRHP in 1991 under Criterion A for its association with the development of seaside recreation during the early twentieth century, and under Criterion C as an example of extreme engineering that pushed the envelope of safety to give riders a thrilling, even frightful, experience. Designated a National Historic Landmark, the period of significance is 1927-1941. Relatively unaltered since its opening, the property is an enduring, functioning snapshot of Coney Island's history as one of the premier seaside amusement locales on the U.S. East Coast. Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. Observations made by the Project team in 2019 indicate that the Cyclone currently retains its significance and integrity. The Project, which is 26.0 mi (41.8 km) away, will be visible from this property. The resource will have views of the Project only during daytime. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource. (**Figure Z-11: Historic Property No. 3**).

B&B Carousell (NR No. 16000035)

The B&B Carousell is an amusement ride comprising 50 hand-carved horses and mythical characters painted a variety of colors and ornamentations and incorporating loud, carnival-like music during its operation. Built between 1906-1909 in Coney Island by the firm of Mangels and Illions, it was located in Asbury Park, New Jersey and then Lake Hopatcong, New Jersey before being moved to Coney Island in 1934. The B&B Carousell is one of the last surviving carousel rides of its era in the United States. The property's period of significance is 1934-1949.

The carousel was listed in the NRHP in 2016 under Criterion A for its association with the development of seaside amusement parks for urban dwellers during the 1930s, and under Criterion C as an excellent example of the work of master craftsmen. Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. Observations made by the Project team in 2019 indicate that the carousel retains its significance and integrity. The Project, which is 26.1 mi (42.0 km) away, will be visible from the property during daytime and nighttime periods. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource. (**Figure Z-11: Historic Property No. 4**).

Parachute Jump (NR No. 80002645)

The Parachute Jump is a seaside amusement ride located in Coney Island, Brooklyn, New York. Built in 1941, the ride is an intricate structure of steel framing and bracing rising 250 ft above the ground. Radiating steel arms at the top comprise counterbalanced cantilevered trusses, supporting 12 parachute drops. The property's period of significance is 1941-1964, when Coney Island began to fade as an attraction and the ride ceased operating. Renovations to the structure and its lighting system have made the Parachute Jump a widely seen symbolic reminder of Coney Island's heyday as an amusement mecca.

The property was listed in the NRHP in 1980 under Criterion A for its association with the development of seaside amusement parks in an urban setting, and under Criterion C as an excellent example of extreme engineering in the service of revelry and entertainment. The property is listed as an extant example of the amusement attractions at Coney Island. Based on desktop research including the NRHP registration form,

examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. Observations made by the Project team in 2019 indicate that the Parachute Jump currently retains its significance and integrity. The Project, which is 26.2 mi (42.1 km) away, will be visible from the property during daytime and nighttime periods. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource. (**Figure Z-11: Historic Property No. 5**).

Saint Margaret Mary Roman Catholic Church, Coney Island, Brooklyn (CRIS No. 04701.023736)

Built around 1920, Saint Margaret Mary Roman Catholic Church combines elements of Arts & Crafts and English Tudor styles in a small suburban building. The design was unusual for the time, Gothic Revival being the most common style for religious buildings. However, the church building was rendered in the more contemporary style of its surroundings and blends in well with neighboring structures. The period of significance is 1920-1935. Saint Margaret Mary Roman Catholic Church retains all aspects of integrity and is NRHP eligible under Criterion C. Based on desktop research including the CRIS record, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The property will have a view of the Project, which is 24.7 mi (39.7 km) away, only during daytime. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource. (**Figure Z-11: Historic Property No. 6**).

Jones Beach State Park/Jones Beach State Park, Causeway and Parkway System (NR No. 05000358)

Jones Beach was envisioned in the early 1920s by Robert Moses as an expansive seaside recreational destination for middle class urban dwellers. Construction began in 1925 and continued through the mid-1950s, bookending its period of significance from 1925-1955. The park incorporated ocean and bay fronts, landscaped roads and paths, a boardwalk, and a large building complex housing bathhouses and service and recreational facilities. The bathhouses can accommodate up to 15,000 people. Moses created the park as an extensive naturalistic landscape and transportation network that included highways and bridges.

The Jones Beach State Park/Jones Beach State Park Causeway and Parkway System was listed in the NRHP as a historic district in 2005 under Criterion A for its association with the development of public oceanside recreational facilities on Long Island, and under Criterion C for both its Beaux Arts design with use of Art Deco motifs and its large-scale beach development created to allow public access to oceanside recreation in New York. Observations made by the Project team in 2019 indicate that Jones Beach State Park/Jones Beach State Park, Causeway and Parkway System retains its significance and integrity. The Project will be visible from many lines of site within the park. The primary focus of the park, both in terms of purpose and visual orientation, is the ocean. Whether in the water or on the beach, observers are drawn to the ocean by the sound of the surf, the kinetic motion of the waves, and the sensory effects of sand, salt, and water. The expansive, unimpeded views of the Atlantic Ocean are integral to the property's character and setting. The resource will have views of the Project, which is 12.8 mi (20.6 km) away, during daytime and nighttime periods. Visual impacts of the Project are likely to diminish the characteristics for which the property is listed in the NRHP. It was assessed that views of the Project will have an adverse effect on the significance of the Jones Beach State Park, Causeway and Parkway System (**Figure Z-11: Historic Property No. 13**).

Ocean Parkway (CRIS No. 10301.000062)

Ocean Parkway is a 15-mi road that links Jones Beach State Park to Gilgo and Captree state parks on Jones Beach Island. The parkway was built in stages between 1929 and 1934, its period of significance. Ocean Parkway was developed by Robert Moses, then chairman of the Long Island State Park Commission, as a component of the Long Island park and transportation network. The property is NRHP eligible and is a significant example

of the transportation network that was built during the inter-war period that enabled urban dwellers to easily access the beaches of Long Island's south shore. It is NRHP eligible under Criterion A for its association with the development of regional state parks and beach facilities and as an intact example of an early twentieth century parkway (**Figure Z-11: Historic Property No. 15**). Based on desktop research including the CRIS record, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The property will have a view of the Project, which is 18.6 mi (30.0 km) away, only during daytime. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Gilgo State Park (CRIS No. 10301.000084)

Gilgo State Park, located within the eastern half of Jones Beach Island, is a recorded and unevaluated property in CRIS. Established in 1926, the park contains oceanside beaches, a channel-side marina, and bath house facilities for the public. The period of significance is 1926-1935. Gilgo State Park is recommended NRHP-eligible under Criterion A for its association with the early twentieth century development of public-access recreation along Long Island's south shore.

The Project will be visible from the property, separated by 21.6 mi (34.8 km). The most striking characteristic of the park is its setting as an undeveloped beach with expansive and unobstructed views of the Atlantic Ocean. The introduction of the Project into the views seen from the park may diminish the characteristics that endow it with significance. It was assessed that the Project will have an adverse effect on Gilgo State Park (**Figure Z-11: Historic Property No. 40**).

Robert Moses State Park (CRIS No. 10305.001592)

Robert Moses State Park, located at the western end of Fire Island, was established in 1908 as Fire Island State Park, the first state park on Long Island. Prior to the construction of the Robert Moses Causeway from Long Island to Fire Island in 1964, the park was accessible only by ferry or private boat. The causeway greatly increased attendance at the park. In 1964 the park was renamed Robert Moses State Park to honor the chairman of the Long Island State Park Commission who oversaw much of the planning and development of the various state parks along Long Island's south shore, including Jacob Riis, Jones Beach, Gilgo, and Captree. The period of significance is 1908-1964, marking the completion of the causeway and construction of Field #2 Bathhouse. Robert Moses State Park is NRHP eligible as a Building District under Criterion A for its association with the development of Long Island's south shore as a recreational destination for urban and suburban dwellers, and under Criterion C for its recreation architecture (**Figure Z-11: Historic Property No. 16**). The Field #2 Bath House, which is 20.3 mi (32.6 km) from the Project, is also NRHP eligible for its mid-century modern architecture (**Figure Z-11: Historic Property No. 17**).

The Project will be visible from this property during daytime and nighttime periods. Unobstructed views of the Atlantic Ocean are integral to the character and setting of this park, and thus its NRHP eligibility. The introduction of the Project into the park's viewshed may diminish the qualities that make it NRHP eligible. It was assessed that views of the Project will have an adverse effect on the significance of the Robert Moses State Park.

Point O'Woods Historic District (CRIS No. 10302.003470)

Point O'Woods was established in 1894 by the Long Island Chautauqua Assembly Association as a Methodist community offering spiritual, recreational, and educational advancement. Located in the isolated central portion of Fire Island, Point O'Woods includes 133 residential buildings, plus community structures, and maintenance facilities, nearly all rendered in the Shingle style popular among shore communities dating from the late

nineteenth century. The period of significance is 1894 to circa 1962, when the Fire Island National Seashore was created. In contrast to other communities on Fire Island, Point O'Woods has avoided an over-reliance on a rectangular grid plan, making use of curved roads and paths.

The Point O'Woods Historic District on Fire Island is NRHP eligible under Criterion A for its association with the Chautauqua movement and development of private beach communities during the early twentieth century. It is also eligible under Criterion C for its comprehensive and innovative design as a beach community. The district is a gated community to which the Project team did not have access. Nonetheless, current imagery appears to confirm that the Point O'Woods Historic District retains the appearance and setting reflecting its period of significance (**Figure Z-11: Historic Property No. 19**). Point O'Woods sought to provide members with seaside recreation and unobstructed ocean views as a refuge from the city and as an avenue for spiritual cultivation. The district will have views of the Project during daytime and nighttime periods. The introduction of the Project into the views seen from the district may diminish the characteristics that endow it with significance. It was assessed that views of the Project, which is 24.0 mi (38.6 km) away, will have an adverse effect on the significance of the Point O'Woods Historic District.

Geller-Pearlroth House (CRIS No. 10375.000013)

The Geller-Pearlroth House is a private residence at 615 Dune Road in Westhampton Beach. Situated adjacent to the beach dunes on the narrow barrier island, the original house block was constructed in 1958 and consists of a pair of elongated box shapes rotated in tandem and perched on edge. The exterior is sheathed in copper. Referred to as the “Double Diamond,” the house was designed by noted architect Andrew Geller. The house is characteristic of the eclectic nature of modern design in the middle of the twentieth century. Front and side additions built in the 1970s were removed in 2006 prior to restoration of the core; the original double diamond section was moved streetward in 2013 to make room for a large rear addition. The period of significance is 1958 to 1973.

The Geller-Pearlroth House is NRHP-eligible under Criterion C as an excellent example of mid-century modern beach house architecture. Based on desktop research including the CRIS record, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The resource will have views of the Project, which is 39.7 mi (64 km) away, only during daytime. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource. (**Figure Z-11: Historic Property No. 20**).

Z.6.1.9 Other Resources—New Jersey

Romer Shoal Light Station (NR No. 06001304)

The Romer Shoal Light Station was built in 1898 by the federal government as an aid to maritime navigation at the entry to New York Harbor. The station, located 4 mi north of Sandy Hook, consists of a 30-ft diameter cast iron cylindrical caisson filled with rock and concrete that supports a 4-story cast iron tower. Above is a circular watch room surrounded by a gallery, surmounted by the lantern. The lantern originally contained a 4th order Fresnel lens, and has been automated since 1966. The period of significance covers the period 1898-1966. The light station remains in its original location, and its design, materials, and setting reflect the period of significance.

Romer Shoal Light Station was listed in the NRHP in 2006 under Criterion A for its association with the late nineteenth century federal program to provide an integrated system of navigational aids throughout the United States and to promote maritime safety in the vicinity of New York Harbor and under Criterion C as an intact example of maritime-related engineering and architecture that incorporated important innovations at the turn

of the twentieth century. Although suffering from deterioration caused by the salt-water environment and storms, reviews of aerial photographs and interviews with members of a friends of the lighthouse association, suggest that the Romer Shoal Light Station currently retains its significance and integrity (**Figure Z-12: Historic Property No. 22**). The Project will be visible from the Romer Shoal Light Station during daytime and nighttime periods. Although the NRHP nomination does not explicitly note the significance of the view to the ocean, the setting of this historic aid to navigation is important to understanding its significance. Criteria A and C are readily interpreted to mean that an expansive, unimpeded ocean view is integral to the light station's character, setting, feeling, and association. The introduction of the Project will likely change the sense of the ocean's expanse during periods of visibility, diminishing the apparent prominence of the light. It was assessed that views of the Project, which is 25.7 mi (41.3 km) away, will have an adverse effect on the significance of the Romer Shoal Light Station.

Navesink Light Station (Twin Lights) (NR No. 70000389)

The Navesink Light Station (Twin Lights) National Historic Landmark, located on the Atlantic Highlands in Monmouth County, New Jersey, were built in 1826-1827 as separate structures, and reconstructed and joined in 1862 amidst a fortress-like masonry structure. The twin towers stand 73 ft high and reach 254 ft above mean sea level. The north tower is octagonal, the south square to allow mariners clear indication of their relative positions. The current lights are the latest in a series of lighthouses present on the spot since 1746. The south tower housed the first Fresnel lens installed in the United States, and the first electric arc lamp in a lighthouse in the United States in 1898. In 1899, Guglielmo Marconi set up a wireless station at the lights to receive news of the America Cup races being held off the Jersey shore.

Navesink Light Station was listed in the NRHP in 1970 under Criterion C. The property is listed as a National Historic Landmark for its unusual twin light design. Observations made by the Project team in 2018 indicate that Navesink Light Station currently retains its significance and integrity (**Figure Z-12: Historic Property 26**). The property will have a view of the Project, which is 22.4 mi (36.1 km) away, during daytime and nighttime periods. Given this property's elevated position and unobstructed views from the maritime approaches to New York Bay, the Project will introduce new visual elements to the established viewshed of the light station. It was assessed that Project-related visual effects will diminish the significance of the character-defining elements for this resource and result in an adverse effect.

Navesink Military Reservation Historic District (NR No. 15000011)

Navesink Military Reservation Historic District encompasses some 224 acres of the Navesink highlands that the U.S. Army utilized during the Second World War for harbor defense. Created in 1942 as a subordinate post to Fort Hancock, the military reservation was a critical component of the defensive network that surrounded New York during the war due to its strategic elevation and proximity to the harbor entrance. The 16-inch casemated guns at Battery Lewis were designated the most important armament guarding New York Harbor, and important secondary armament included a series of 6-inch guns. The period of significance is 1942-1946, when the guns were removed. During the 1950s, the reservation was converted to a radar installation.

Navesink Military Reservation Historic District was listed in the NRHP in 2015 under Criterion A for its role as the primary fortification in the Harbor Defense of New York, and under Criterion C for the design and construction of its five tactical military structures that exemplify the culmination of more than 200 years of American coastal fortifications. Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. Observations made by the Project team in 2019 indicate that Navesink Military Reservation Historic District currently retains its significance and integrity (**Figure Z-12: Historic Property 27**). The property will have a view of the Project, which is 22.2 mi (34.4 km) away, during daytime and nighttime

periods. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

468 Ocean Avenue, Long Branch (NJ HPO No. 2009)

This 1907 Craftsman cottage is a fine example of this once ubiquitous house style. NJ HPO has determined it is NRHP eligible under Criterion C. (**Figure Z-12: Historic Property No. 28**). Based on desktop research, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The property will have a view of the Project, which is 22.1 mi (35.5 km) away, during daytime and nighttime periods. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Saint Michael's Roman Catholic Church, Long Branch (NJ HPO No. 4647)

Saint Michael's Roman Catholic Church, built in 1886, is a late example of the Gothic Revival style that was a popular choice for religious structures during the second half of the nineteenth century. Period of significance is 1886 to circa 1890, denoting the end point of the Gothic Revival style. It is NRHP eligible under Criterion C and retains significance and integrity (**Figure Z-12: Historic Property No. 29**). Based on desktop research, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The property will have a view of the Project, which is 23.1 mi (37.2 km) away, during daytime and nighttime periods. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Allenhurst Residential Historic District (NR No. 10000353)

The Allenhurst Residential Historic District comprises 290 residences, 202 outbuildings, a municipal building, a church, a restaurant, and the Allenhurst Beach Club complex. Most of the residences were built by the Coast Land Improvement Co., around the turn of the twentieth century, as a seaside residential community designed to attract upper middle-class professionals. A number of architectural styles were employed, including Tudor Revival, Gothic Revival, Queen Anne, Prairie, Mission, Shingle, and Craftsman. The period of significance is 1895-1930, when the trolley lines to the district ceased running and development in the area slowed.

The district is NRHP listed under Criterion C as an example of late nineteenth and early twentieth century community development that employed an assemblage of revival styles. Observations made by the Project team in 2019 indicate that the Allenhurst Residential Historic District retains its significance and integrity (**Figure Z-12: Historic Property No. 30**). The community was built to take advantage of the unobstructed ocean views. The district will have views of the Project, which is 24.3 mi (39.1 km) away, during daytime and nighttime periods. The introduction of the Project will likely change the relationship of sea and land that serves as a proscenium arch between the community and the Atlantic Ocean. It was assessed that views of the Project will have an adverse effect on the significance of the Allenhurst Residential Historic District.

Berkeley Carteret Hotel (NJ HPO No. 3673)

The Berkeley Carteret Hotel, built in 1925, was billed as a luxury hotel when Asbury Park was in its ascendancy as a seaside resort. The seven-story brick building, located a few hundred feet from the Asbury Park boardwalk, has two flaring wings connected at the center, with a short octagonal tower and cupola atop its apex. A series of five, large arched windows grace the façade of the lobby entry. Access to and views of the ocean were an integral part of this property's location and the guest experience. The hotel is NRHP eligible under Criterion A for its association with the early twentieth development of Asbury Park as a seaside resort. Observations made by the Project team in 2019 indicate that the Berkeley Carteret Hotel (presently named the Berkeley Oceanfront Hotel) retains its significance and integrity (**Figure Z-12: Historic Property No. 31**). The property will have

a view of the Project, which is 24.9 mi (40.1 km) away, during daytime and nighttime periods. It was assessed that views of the Project will have an adverse effect on the significance of the Berkeley Carteret Hotel.

Asbury Park Convention Hall (NR No. 79001512)

The Asbury Park Convention Hall was built in 1928 and consists of two principal parts: the hall and pier, and the Paramount Theater, which are joined by a 60 ft wide roofed enclosure of the Asbury Park boardwalk. The building is constructed of steel framing and masonry, with large steel roof trusses spanning the major spaces. The foundation comprises steel-jacketed reinforced concrete piers resting on timber piles. During the Second World War, the U.S. Army Signal Corps and U.S. Navy occupied the hall for training purposes. The hall was envisioned by its developer as a commercial venue to anchor the Asbury Park entertainment area adjacent to the beach. Thus, an ocean view could be considered a character-defining element of this resource. The hall's eclectic architectural design incorporated early Italian Renaissance and classical period French Renaissance styles. The façade along Ocean Avenue employs multiple limestone arches on the ground floor forming a pedestrian gallery, with elaborate limestone decorative elements on the upper stories. The period of significance is 1928-1940.

The Asbury Park Convention Hall was listed in the NRHP in 1979 under Criterion C for its design by architects Warren and Wetmore. Observations made by the Project team in 2018 indicate that the Asbury Park Convention Center currently retains its significance and integrity (**Figure Z-12: Historic Property 32**). The property will have a view of the Project, which is 24.9 mi (40.1 km) away, during daytime and nighttime periods. It was assessed that views of the Project will have an adverse effect on the significance of the Asbury Park Convention Hall.

Howard Johnson Pavilion (NJ HPO No. 4129)

The Howard Johnson Pavilion, on the Boardwalk in Asbury Park, is an interesting example of mid-twentieth century Modern Eclecticism and Space-Age aesthetic. Its crenellated roofline and expansive windows make the building appear to float above the ground. The “HoJo” Pavilion is NRHP eligible under Criterion C, as an excellent example of modern architectural expressionism. Based on desktop research, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. Observations made by the Project team in 2019 indicate that the Howard Johnson Pavilion retains its significance and integrity (**Figure Z-12: Historic Property No. 33**). The property will have a view of the Project, which is 24.9 mi (40.1 km) away, during daytime and nighttime periods. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Asbury Park Casino (NJ HPO No. 1951)

The Asbury Park Casino on the Boardwalk was a Beaux-Arts seaside amusement center built in 1920 at the height of Asbury Park's popularity. The Casino was designed by Warren and Wetmore, the team responsible for the neighboring Asbury Park Convention Hall. Thus, an ocean view could be considered a character-defining element of this resource. The period of significance is 1920-1930.

Observations by the Project team in 2019 indicate that the Asbury Park Casino has suffered some deterioration and the demolition of its southern section. Nonetheless, it retains sufficient integrity to remain NRHP eligible (**Figure Z-12: Historic Property No. 34**). The property will have a view of the Project, which is 24.9 mi (40.1 km) away, only during daytime. It was assessed that views of the Project will have an adverse effect on the significance of the Asbury Park Casino.

Ocean Grove Camp Meeting Association Historic District (NR No. 76001170)

The community of Ocean Grove, New Jersey was established by the Methodist Church in 1870 as a seaside resort, religious assembly, and spiritual haven for congregants. The Ocean Grove Camp Meeting Association owns all property in the community, letting long-term leases on residences, and formally functioning as the municipal authority. Comprising nearly one thousand buildings, nearly three-quarters are stick-style design. The period of significance is 1870-1894, when the Great Auditorium was completed.

The Ocean Grove Camp Meeting Association Historic District was listed in the NRHP in 1976 under Criterion A for its association with the religious camp meeting as a planned community, for its vernacular architecture, and for the nineteenth century acoustical science and ventilation system demonstrated by the Great Auditorium. Observations made by the Project team in 2019 indicate that the Ocean Grove Camp Meeting Association Historic District currently retains its significance and integrity (**Figure Z-12: Historic Property 35**). The Project, which is 25.4 mi (40.9 km) away, will be visible from the historic district only during daytime. The district's setting along the then-undeveloped Atlantic Ocean shoreline was chosen by the community founders to encourage spiritual renewal among parishioners. The introduction of the Project onto the views enjoyed by Ocean Grove will diminish the sense of expansive grandeur offered by the Atlantic Ocean views. It was assessed that the Project will have an adverse effect on the significance of the Ocean Grove Camp Meeting Association District.

Audenried Cottage (NR No. 91000117)

The Audenried Cottage, also known as the Normandy Inn, was built between 1885-1889 in Spring Lake, New Jersey. The building exhibits a hybrid of the Queen Anne and Italianate styles, with a circa 1909 Shingle style porch addition. The period of significance is 1889 to 1909.

The Audenried Cottage was listed in the NRHP in 1991 under Criterion A for its associative history in the development of Spring Lake as an upper-class beach resort during the turn of the twentieth century and under Criterion C as an example of a creative mixture of architectural styles. Based on desktop research including the NRHP registration form, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. Observations made by the Project team in 2019 indicate that the Audenried Cottage currently retains its significance and integrity (**Figure Z-12: Historic Property 36**). The property will have a view of the Project, which is 28.0 mi (45.1 km) away, during daytime and nighttime periods. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource.

Water Witch (Monmouth Hills) Historic District (NR No. 04000147)

The Water Witch (Monmouth Hills) Historic District was listed in the NRHP in 2004 under Criterion A for its association with the development of the Atlantic Highlands as a summer community for the professional class during the late-nineteenth and early-twentieth centuries; under Criterion B for its association with the life of Frederick P. Hill, a well-known architect who designed and resided in the community; and under Criterion C for its contribution to community planning, construction techniques, and architecture. It is significant as an example of a late nineteenth and early twentieth century romantically designed summer community arrayed along winding gravel roads, with vegetated lots and hills offering scenic views of the Atlantic Ocean, Raritan Bay, and Sandy Hook. Included in the district is the individually listed Water Witch Club Casino (NR No. 90001219). Observations made by the Project team in 2021 indicate that Water Witch (Monmouth Hills) Historic District currently retains its significance and integrity (**Figure Z-12: Historic Property 37**). The Project, which is 22.8 mi (36.6 km) away, will be visible from this property during daytime and nighttime periods. The district is cited for its picturesque siting of buildings and landscaping that offer excellent views of

the Atlantic Ocean. It is likely that Project views will diminish the characteristics for which the historic district has been listed in the NRHP. It was assessed that views of the Project will have an adverse effect on the significance of the Water Witch (Monmouth Hills) Historic District.

Ocean Beach Historic District-Units 1, 2, and 3 (NJ HPO No. 5023)

The Ocean Beach Historic District comprises three non-contiguous residential developments built on the Barnegat Peninsula in the Town of Lavellette, between circa 1946 and 1955. Consisting of several hundred small bungalows and cottages, on a gridded, narrow street pattern, these houses were built inexpensively and were marketed for blue-collar, working class, and lower-middle class urban dwellers seeking summer and vacation homes along the New Jersey shore. Most houses were constructed as one-story slab-on-grade forms, though second stories have been added to many dwellings in the past few decades. The structures are situated on small lots and the density of houses within the district is very high. The three units of the district encompass 62.5 acres, 33.1 acres, and 15.9 acres, respectively (Units 1 to 3, north to south), and have been determined NRHP-eligible under criterion A for its association with the development of the Jersey Shore post-Second World War as a second-home ocean recreation area. It is also NRHP-eligible under Criterion C as an example of architecturally simple, inexpensive houses on the ocean-front. Based on desktop research, examination of photographs, and virtual street views, an unobstructed ocean view does not appear to be a character-defining feature of this resource. The period of significance is 1946 to 1955.

The district will have views of the Project, which is 37.0 mi (59.6 km) away, only during daytime. It was assessed that Project-related visual effects will not diminish the significance of the character-defining elements for this resource. (**Figure Z-12: Historic Property 38**).

Consideration of Historical Range of Lighthouses/Light Stations and U.S. Life Saving Stations

A consideration on the range of lighthouse and light station beacons is provided here in response to BOEM feedback. The visible range of a light beacon seaward is the result of three principal factors: height of the beacon above sea level, candlepower of the beacon, and curvature of the earth. Light beacon range was so important to navigation that standard manuals provided tables of distances based on beacon heights (Anonymous 1910, 15). As advances in optics and electrification were adopted in the nineteenth century, light beacons increased their range up to the point where the curvature of the earth screened their view. Based on published data of lighthouse and light station height, the nominal range (presented in nautical miles) of the five lighthouses/light stations within the Offshore AVEHAP PAPE to a hypothetical ship deck 15 ft (5 m) above sea level, are presented in **Table Z-5**.

Table Z-5 Nominal Beacon Ranges for Lighthouses/Light Stations within the Offshore AVEHAP PAPE

Lighthouse/Light Station	Nominal Range of Beacon	Distance to Nearest Wind Turbine
West Bank Light Station	12.6 nm (23.2 km)	27.8 mi (24.2 nm)
Fire Island Light	18.5 nm (34.2 km)	21.7 mi (18.9 nm)
Romer Shoal Light Station	12.6 nm (23.2 km)	25.7 mi (22.3 nm)
Sandy Hook Light	15.9 nm (29.5 km)	24.0 mi (20.9 nm)
Navesink Light Station (Twin Lights)	22.6 nm (41.8 km)	22.4 mi (19.5 nm)

The nominal range of a light beacon for four of the lighthouses/light stations within the Offshore AVEHAP PAPE (West Bank, Fire Island, Romer Shoal, and Sandy Hook) is less than the distance to the nearest wind turbine and would not have been seen from a ship in the vicinity of the nearest wind turbine. Navesink Light

Station (Twin Lights) is situated on the Atlantic (Navesink) Highlands, at an elevation approximately 200 ft (61 m) above mean sea level, and with its 73-ft (22-m) towers, would have cast its beacons to a ship in the vicinity of the nearest wind turbine.

The Fort Hancock U.S. Life Saving Station at Sandy Hook included four-story tower with observation windows approximately 50 ft (15 m) above grade. The nominal range of sight from the tower windows to a ship at sea would have been around 8.2 nm (9.4 mi, 15.1 km), well short of the 18.7 nm (21.5 mi, 34.6 km) distance to the nearest wind turbine.

The nominal range of a light beacon for four of the lighthouses/light stations within the Offshore AVEHAP PAPE (West Bank, Fire Island, Romer Shoal, and Sandy Hook) is less than the distance to the nearest wind turbine and would not have been seen from a ship in the vicinity of the nearest wind turbine. Twin (Navesink) Lights is situated on the Atlantic (Navesink) Highlands, at an elevation approximately 200 ft (61 m) above mean sea level, and with its 73-ft (22-m) towers, would have cast its beacons to a ship in the vicinity of the nearest wind turbine.

The Fort Hancock U.S. Life Saving Station at Sandy Hook included four-story tower with observation windows approximately 50 ft (15 m) above grade. The nominal range of sight from the tower windows to a ship at sea would have been around 8.2 nm (9.4 mi, 15.1 km), well short of the 18.7 nm (21.5 mi, 34.6 km) distance to the nearest wind turbine but within the viewshed of the toward and blade.

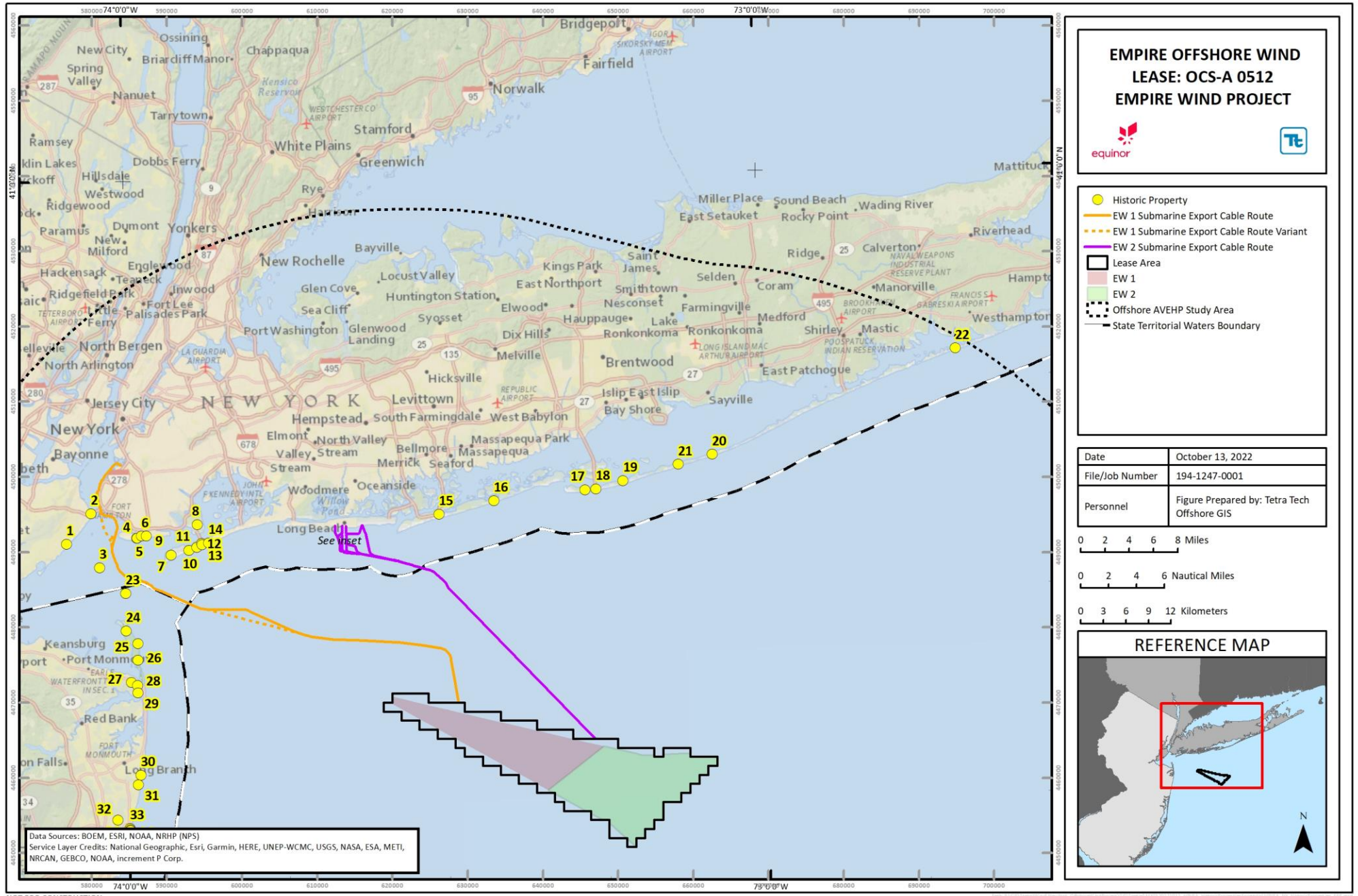


Figure Z-11 Identified Historic and Architectural Properties within the Offshore AVEHAP PAPE in New York

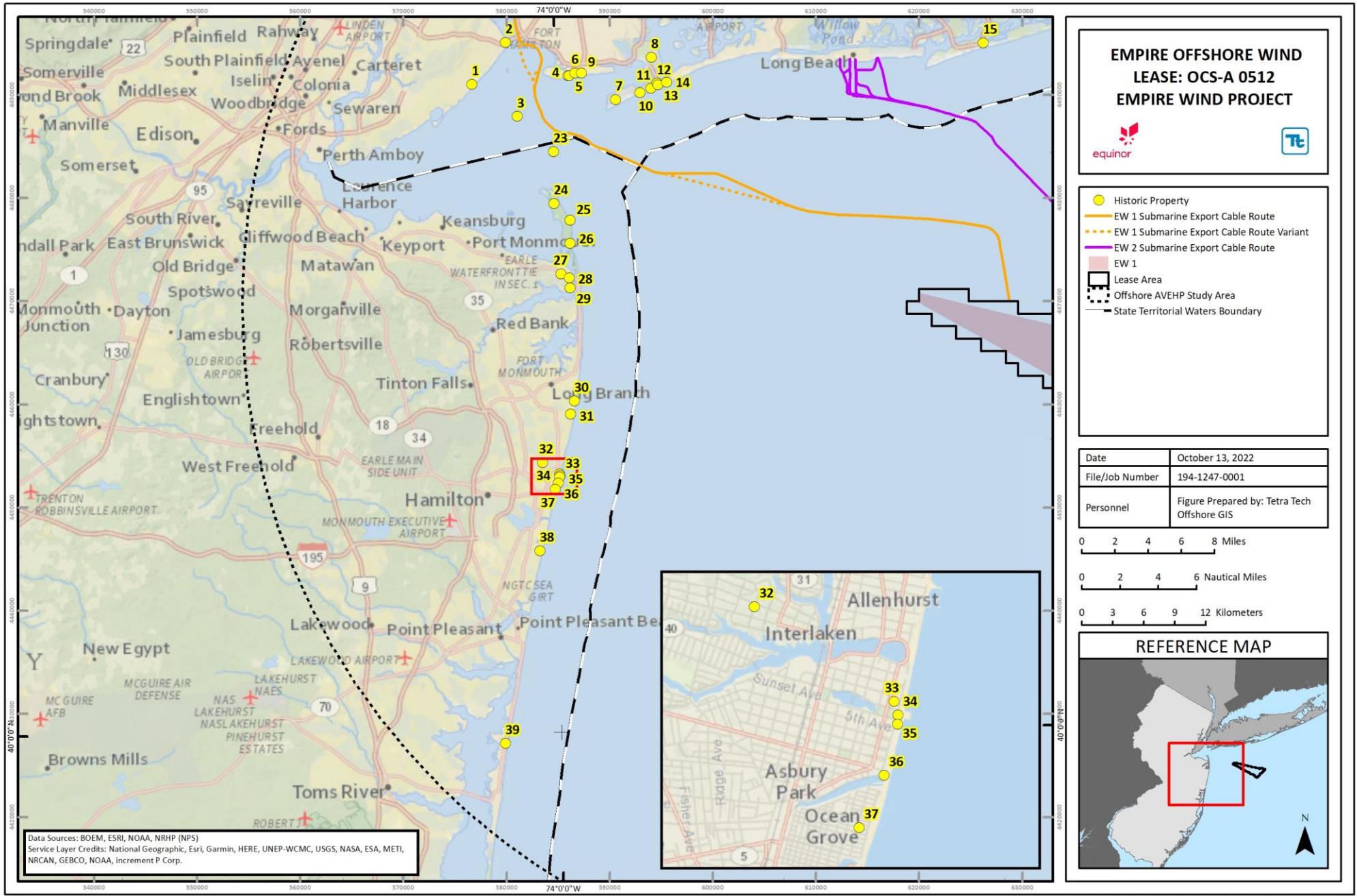


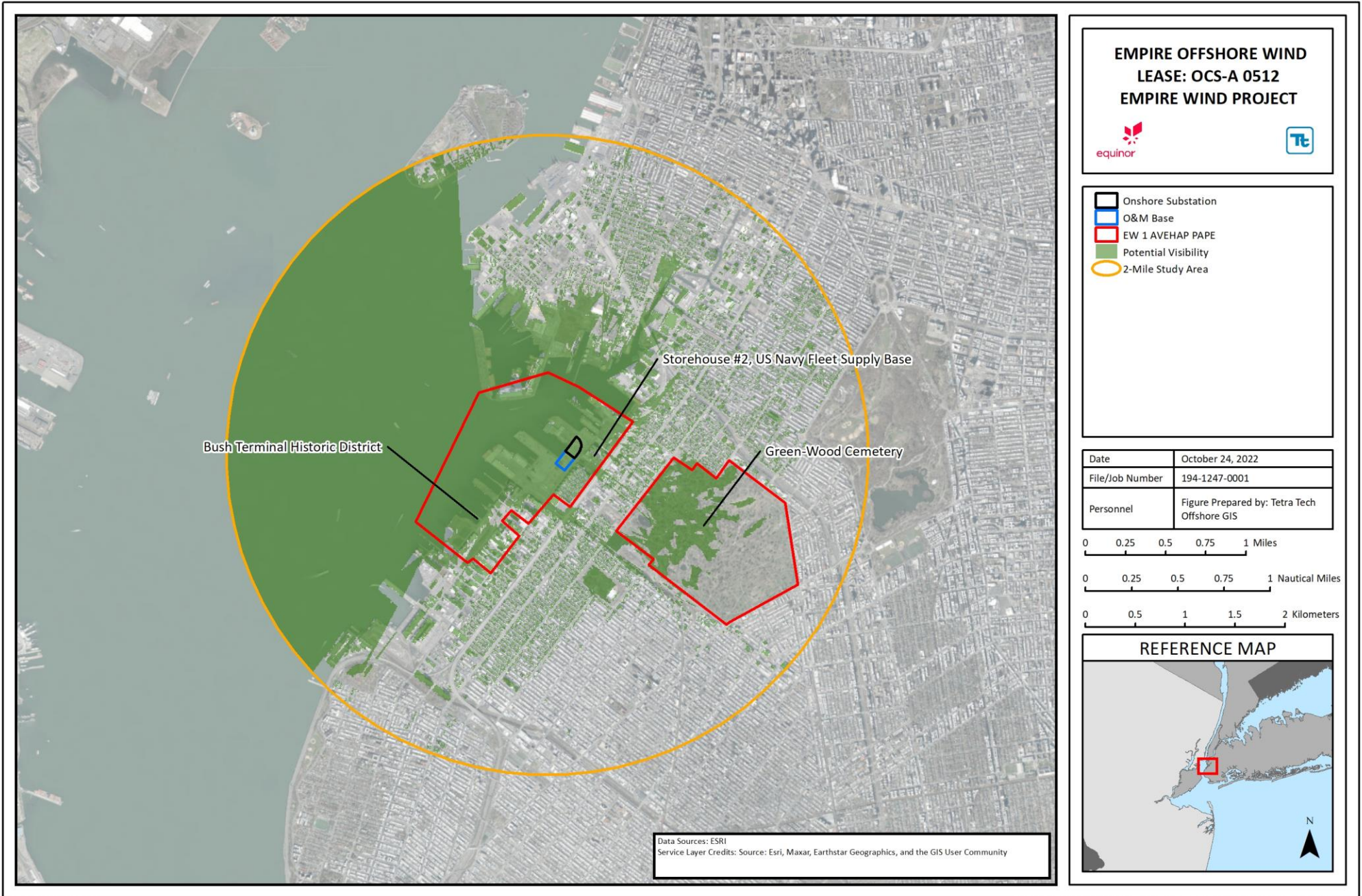
Figure Z-12 Identified Historic and Architectural Properties within the Offshore AVEHAP PAPE in New Jersey

Table Z-6 Assessment of Potential Effects on Selected Historic Properties and other Historic Resources within the Offshore AVEHAP PAPE

Resources	Figure Ref.	NRIS No. SHPO No.	Status	NR Criterion	Modeled View	Distance (mi)	Tetra Tech Assessment of Effect
Miller Army Air Field Historic District	Figure Z-11, 1	80000362	NR Listed	A	Hub up Visible	31.0 (49.9 km)	No adverse effect
Fort Wadsworth Historic District	Figure Z-11, 2	99000430	NR-Listed	A, C	Hub up Visible	29.6 (47.7 km)	No adverse effect
West Bank Light Station	Figure Z-11, 3	06001230	NR Listed	A, C (engineering)	Hub up Visible	27.8 (44.7 km)	Adverse effect
Parachute Jump	Figure Z-11, 4	80002645	NR Listed	A, C	Hub up Visible	26.2 (42.1 km)	No adverse effect
B&B Carousell	Figure Z-11, 5	16000035	NR Listed	A, C	Hub up Visible	26.1 (42.0 km)	No adverse effect
Cyclone Roller Coaster	Figure Z-11, 6	91000907	NR Listed	A	Max tip Visible	26.0 (41.8 km)	No adverse effect
Breezy Point Surf Club Historic District	Figure Z-11, 7	08101.011499	NR-Eligible	A, C	Hub-up Visible	22.0 (35.4 km)	Adverse effect
Floyd Bennett Field Historic District	Figure Z-11, 8	80000363	NR-Listed	A, C	Hub up Visible	21.5 (34.6)	No adverse effect
St. Margaret Mary Roman Catholic Church, Coney Island, Brooklyn	Figure Z-11, 9	04701.023736	NR Eligible	C	Max tip Visible	24.7 (39.7 km)	No adverse effect
Silver Gull Beach Club Historic District	Figure Z-11, 10	08101.012423	NR Eligible	A, C	Hub up Visible	22.0 (35.4 km)	Adverse effect
Fort Tilden Historic District	Figure Z-11, #11	84002917	NR Listed	A	Hub up Visible	20.9 (33.6 km)	No adverse effect
Administration Bldg, Fort Tilden	Figure Z-11, 12	08101.012280	NR Eligible	A	Hup up Visible	20.9 (33.6 km)	No adverse effect
CO Quarters, Fort Tilden	Figure Z-11, 13	08101.012281	NR Eligible	A	Hub up Visible	20.8 (33.5 km)	No adverse effect
Jacob Riis Park Historic District	Figure Z-11, 14	81000081	NR Listed	C	Hup up Visible	20.7 (33.2 km)	Adverse effect

Resources	Figure Ref.	NRIS No. SHPO No.	Status	NR Criterion	Modeled View	Distance (mi)	Tetra Tech Assessment of Effect
Jones Beach State Park, Parkway and Causeway System	Figure Z-11, 15	05000358	NR Listed	A, C	Hub up Visible	12.8 (20.6 km)	Adverse effect
Ocean Parkway, Suffolk County	Figure Z-11, 16	10301.000062	NR Eligible	A	Max tip Visible	18.6 (30.0 km)	No adverse effect
Gilgo State Park	Figure Z-11, 40	10301.000084	Recommended NR-Eligible	A	Not Visible	21.6 (34.8 km)	Adverse effect
Field #2 Bath House, Fire Island	Figure Z-11, 17	10301.000746	NR Eligible	C	Hub up Visible	20.3 (32.6 km)	No adverse effect
Robert Moses State Park	Figure Z-11, 18	10305.001592	NR Eligible	A, C	Hub up Visible	20.6 (33.1 km)	Adverse effect
Fire Island Lighthouse	Figure Z-11, 19	81000082	NR Listed	A, C	Hub up Visible	21.7 (35.0 km)	Adverse effect
Fire Island Lighthouse Historic District	Figure Z-11, 19	09001288	NR Listed	A, C, D	Hub up Visible	21.7 (35.0 km)	Adverse effect
Carrington House	Figure Z-11, 20	13001057	NR-Listed	A, C	Hub up Visible	24.9 (40.1)	Adverse effect
Point O'Woods Historic District	Figure Z-11, 21	10302.003470	NR Eligible	A, C	Hub up Visible	24.0 (38.6 km)	Adverse effect
Geller-Pearlroth House	Figure Z-11, 22	10375.000013	NR Eligible	C	Max tip Visible	39.7 (64 km)	No adverse effect
Romer Shoal Light Station	Figure Z-12, 23	06001304	NR Listed	A, C	Hub up Visible	25.7 (41.3 km)	Adverse effect
Sandy Hook Light	Figure Z-12, 24	66000468	NHL	A	Not Visible at base; Hub up Visible at Lantern	24.0 (38.6 km)	Adverse effect
Fort Hancock and Sandy Hook Proving Ground Historic District	Figure Z-12, 25	80002505	NHL	A	Hub up Visible	22.4 (36.0 km)	Adverse effect
Fort Hancock U.S. Life Saving Station	Figure Z-12, 26	81000080	NR Listed	A, C	Hub up Visible	22.6 (36.3 km)	Adverse effect
Water Witch (Monmouth Hills) Historic District	Figure Z-12, 27	04000147	NR Listed	A, B, C	Hub up Visible	22.8 (36.6 km)	Adverse effect
Navesink Light Station (Twin Lights)	Figure Z-12, 28	70000389	NHL	C	Hub up Visible	22.4 (36.1 km)	Adverse effect

Resources	Figure Ref.	NRIS No. SHPO No.	Status	NR Criterion	Modeled View	Distance (mi)	Tetra Tech Assessment of Effect
Navesink Military Reservation Historic District	Figure Z-12, 29	15000011	NR Listed	A, C	Hub up Visible	22.2 (34.4 km)	No adverse effect
468 Ocean Ave., Long Branch	Figure Z-12, 30	2009	NR Eligible	C	Hub up Visible	22.1 (35.5 km)	No adverse effect
St. Michael's Roman Catholic Church, Long Branch	Figure Z-12, 31	4647	NR Eligible	A, C	Hub up Visible	23.1 (37.2 km)	No adverse effect
Allenhurst Residential Historic District	Figure Z-12, 32	10000353	NR Listed	C	Hub up Visible	24.3 (39.1 km)	Adverse effect
Berkeley Carteret Hotel	Figure Z-12, 33	3673	NR Eligible	A	Hub up Visible	24.9 (40.1 km)	Adverse effect
Asbury Park Convention Hall	Figure Z-12, 34	79001512	NR Listed	C	Hub up Visible	24.9 (40.1 km)	Adverse effect
Howard Johnson Pavilion	Figure Z-12, 35	4129	NR Eligible	C	Hub up Visible	24.9 (40.1 km)	No adverse effect
Asbury Park Casino	Figure Z-12, 36	1951	NR Eligible	A, C	Max Tip Visible	24.9 (40.1 km)	Adverse effect
Ocean Grove Camp Meeting Association District	Figure Z-12, 37	76001170	NR Listed	A, C	Hub up Visible	25.4 (40.9 km)	Adverse effect
Audenried Cottage	Figure Z-12, 38	91000117	NR Listed	A, C	Hub up Visible	28.0 (45.1 km)	No adverse effect
Ocean Beach Historic District	Figure Z-12, 39	5023	NR-Eligible	A, C	Max tip Visible	37.0(59.6 km)	No adverse effect



NOT FOR CONSTRUCTION

Figure Z-13 EW 1 Onshore AVEHAP PAPE

Z.6.2 Onshore AVEHAP PAPE Assessment of Effects

Z.6.2.1 EW 1

Short-term visual effects to historic properties would occur during construction of the EW 1 and EW 2 onshore substations the O&M Base, and cable bridge resulting from construction activities and the presence of construction equipment and work crews. Construction activities associated with the construction and installation of the onshore substations and O&M Base will include surveying, clearing and grubbing the construction site, stockpiling topsoil, grading, forming and construction of substation equipment foundations, placement and erection of buildings and electrical equipment, placement of perimeter security fencing, and restoration and landscaping installation (if required). Construction activities associated with installation of the cable bridge will include surveying, clearing and grubbing the construction site if needed, installation of piled foundation supports, placement of a prefabricated steel truss system assembled offsite, and restoration and landscaping installation (if required). Section Z.4.3.1 gives an overview of potential ground surface impacts during construction.

It is anticipated that contrast would be introduced during Project construction of the onshore substations, O&M Base, and cable bridge primarily for viewers associated with residential areas in proximity to the onshore substations and O&M Base, and LIRR commuters and industrial workers for the cable bridge, where the presence of construction equipment, materials, and crews would be dominant in the foreground. However, these visual effects will be short-term because construction equipment and crews would be removed once construction is complete. Views of Project construction from areas not immediately adjacent to the onshore substation, O&M Base, and cable bridge site would be mostly screened by residential, commercial or industrial buildings, vegetation and/or topography. Visual effects to these viewers will be mostly limited to seeing construction traffic on local roads.

Other onshore Project components; namely export cable trenches, horizontal directional drilling pads, and laydown yards; will occur at-grade and will offer temporary views of construction equipment only to areas immediately adjacent to the construction.

It is anticipated that proposed lighting associated with the onshore Project components (i.e., onshore substations and O&M Base) will include emergency and exterior lighting. Emergency lighting would most likely include lighting installed on the static masts and/or buildings and would be directed downward toward outdoor electrical equipment. Emergency lights would only be turned on during emergency repairs. Exterior lighting would consist of security lighting at building entrances and access gates. The lights would be directed downward and will be motion sensor activated. Potential impacts associated with nighttime lighting for onshore Project components is discussed in **Appendix AA**.

Bush Terminal Historic District (USN No. 04701019392)

The EW 1 onshore substation and O&M Base will be visible from the Bush Terminal Historic District, approximately 135 ft (41 m) northwest of the district. The industrial character of the district and its environs are consistent with the massing and appearance of the proposed onshore substation and O&M Base. Tetra Tech's assessment is that the Project will have no adverse effect on the significance of Bush Terminal Historic District.

Table Z-7 Assessment of Effects of Historic Properties within the EW 1 Onshore AVEHAP PAPE

Resources	Figure Ref.	NRIS No./ CRIS No.	Status	NR Criteria	Tetra Tech Assessment of Effect
Bush Terminal Historic District	Z-13	047010.19392	NR Eligible	A, C	No Adverse Effect
Storehouse #2, US Navy Fleet Supply Base	Z-13	13000026	NR Listed	A, C	No Adverse Effect
Green-Wood Cemetery	Z-13	97000228	NHL	C	No Adverse Effect

Storehouse #2, US Navy Fleet Supply Base (NR No. 13000026)

Storehouse #2 will be located approximately 175 ft (53 m) east-southeast of the proposed EW 1 onshore substation and O&M Base and will have an unimpeded view of the onshore facilities.

The property is listed both for its role in supplying the military and for its Classical Revival style design. The industrial-entrepot character of the building and its environs are consistent with the massing and appearance of the proposed onshore substation and O&M Base. Tetra Tech's assessment is that the Project will have no adverse effect on the significance of Storehouse #2.

Green-Wood Cemetery (NR No. 97000228)

Green-Wood Cemetery is approximately 0.5 mi (0.8 km) east-southeast of the proposed EW 1 onshore substation and O&M Base.

The property is listed for the outstanding merits of the landscape design of David Bates Douglass, the cemetery architecture of Richard Upjohn & Sons, and the sculptural quality of the monuments. The proposed onshore substation and O&M Base would be partially visible from one of the highest topographic points of the cemetery but would be a minor middleground element in the built environment of the Gowanus Bay shoreline (**Attachment Z-5**). Tetra Tech's assessment is that the Project will have no adverse effect on Green-Wood Cemetery.

Z.6.2.2 EW 2**EW 2 Onshore Substation A AVEHAP PAPE**

The EW 2 Onshore Substation A AVEHAP PAPE was defined as the zone within the EW 2 AVEHAP Onshore Study Area for EW2 Onshore Substation A that will contain views of the proposed onshore substation. Tetra Tech conducted a field visit in May 2021 to ground-truth zones of visibility within the EW 2 Onshore Substations A AVEHAP PAPE. The field team utilized the E.F. Barrett Power Station main building profile to replicate the proposed onshore substations. The E.F. Barrett Power Station main building is approximately 125 ft (38 m) in height and is located 0.4 mi (0.6 km) southeast of the EW 2 Onshore Substation A. Views of the E.F. Barrett Power Station main building were not visible in a direct line-of-sight beyond approximately 0.5 mi (0.8 km) from Lawson Boulevard to the northwest and from Long Beach Road to the northeast of the power station, both located in Oceanside, New York. From locations lacking direct line-of-sight to the power station, views were blocked by the juxtaposition of buildings and vegetation. To the south, direct line-of-sight views of the power station main building became obscured beyond 0.4 mi (0.6 km) along Sherman Avenue in Island Park, New York. To the east, the Oceanside Landfill Gas Recovery Facility blocks views of the power plant beyond 0.5 mi (0.8 km); desktop observations indicate that the Oceanside Landfill Gas Recovery Facility would effectively obscure eastward views of the EW 2 Onshore Substation A beyond

0.6 mi (1 km). Uninhabited marsh islands occur west of the proposed onshore substations, with the eastern edge of the Village of Hewlett Neck 2.4 mi (3.9 km) away. From residences along the Hewlett Neck shoreline, the upper third of the E.F. Barrett Power Station main building is visible from a distance of 2.6 mi (4.2 km).

Desktop analysis indicates that the three historic properties (the Haviland-Davison Grist Mill, NRIS #98000352; the Denton Homestead, NRIS #14000913; and eligible dwelling CRIS #05901.000754) located within 2 mi (3.2 km) of the EW 2 Onshore Substation A site would have no views of the Project. CRIS contains records of 18 unevaluated architectural properties within the EW 2 Onshore Substation A AVEHAP PAPE. Assessment of these unevaluated architectural properties within the EW 2 Onshore Substation A AVEHAP PAPE indicates that none appear to satisfy the criteria of significance for NRHP eligibility, as shown in Attachment Z-7. Tetra Tech concludes that there are no adverse effects to historic properties within the EW 2 Onshore Substation A AVEHAP PAPE.

The cable bridge crossing is contained within the EW 2 Onshore Substation A PAPE and was separately evaluated for its potential to be viewed by historic and architectural properties. Two locations are under consideration for the cable bridge. At the location adjacent to the LIRR railway bridge, the cable bridge, with a maximum height of approximately 30 ft (9 m) above MSL, is screened by the local built environment at distances ranging from approximately 280 ft (85 m) to 660 ft (200 m). To the north the view is screened by the Costco Wholesale building at 3705 Hampton Road, Oceanside, New York; to the east and northeast the view is screened by the E.F. Barrett Power Station and its substation; and, to the southwest, fuel storage tanks obstruct views of the proposed cable bridge. A narrow corridor of visibility to the west takes in undeveloped salt marsh. The other potential location is adjacent to the Long Beach Road bridge. Anticipated to have a maximum height of 30 ft (9 m) above MSL, the cable bridge is screened to the east by the Oceanside Landfill, which rises to approximately 160 ft (50 m) above MSL. Views of the cable bridge are attenuated northward and westward by distance and will not be apparent at Daly Boulevard or the E.F. Barrett Power Station, respectively. To the south, views of the bridge crossing may extend to the intersection of Long Beach Road and Austin Boulevard, a distance of approximately 500 ft (150 m), but are not expected to be significantly different from existing views of the built environment, which includes commercial, industrial, and infrastructural views. A review of the NY SHPO CRIS database identified no historic properties or historic architectural properties with potential views of the proposed cable bridge at either location. In summary, it is concluded that the proposed cable bridge crossing between Island Park and Oceanside, New York, will not introduce new visual effects on NRHP historic properties or potentially eligible architectural properties.

EW 2 Onshore Substation C PAPE

The EW 2 Onshore Substation C AVEHAP PAPE was defined as the zone within the EW 2 AVEHAP Onshore Study Area for EW 2 Onshore Substation C that has theoretical views of the proposed substation (**Figure Z-14**). Viewshed analyses were conducted on all 130 NRHP-eligible and 8 NRHP-listed historic properties occurring on Long Beach Island, resulting in 85 properties with potential views of the onshore substation. Barnum Island contains no NRHP-listed or eligible resources. Photo documentation of 31 selected historic properties within the EW 2 Onshore Substation C AVEHAP PAPE is presented in **Attachment Z-6, Photo Documentation of Historic and Architectural Properties Within EW 2 Onshore Substation C AVEHAP PAPE**. The 31 photo-documented historic properties in the vicinity of Substation C were selected based on proximity within approximately 0.8 mi (1.3 km) to the proposed substation. The City of Long Beach elevated water tower (USN 05946.001723), located between Water Street and Park Place, reaches a height of approximately 160 ft (49 m), or more than twice the height of the proposed substation. Its position on the south shore of Reynolds Channel, opposite the site of the proposed onshore substation, makes the tower a useful visual reference point vis-à-vis historic properties across the PAPE. An assessment of street-level views toward the tower's midpoint, resulted in an onshore zone of visual impact extending not beyond approximately

0.25 mi (0.40 km) from the tower, encompassing an area around 125 acres (51 ha). Beyond approximately 0.25 mi (0.40 km) ground-level views of the tower are obscured by the built environment of the surrounding neighborhoods.

EW 2 Onshore Substation C's location on the north shore of Reynolds Channel allows potential views largely limited to the channel shorelines. The street-level analysis identified one historic resource with a potential view of the proposed EW 2 Onshore Substation C, the Cobble Villa house (NR No. 14001214) located at 657 Laurelton Boulevard on the south shore of Reynolds Channel.

Cobble Villa is a two-story house that is NRHP listed under Criterion A for its association with town planning and the development of Long Beach as a resort community during the early twentieth century, and under Criterion C for its Mediterranean Revival style. The “cobble” in its name refers to the use of cobble stone as a decorative element on the front façade. Observations made by the Project team in 2019 indicate that Cobble Villa currently retains its significance and integrity.

The assessment of effects to Cobble Villa is described in **Table Z-8**. The EW 2 Onshore Substation C will be visible from Cobble Villa, approximately 0.8 mi (1.3 km) northeast of the historic property. The industrial character of the Reynolds Channel shorelines and its environs are consistent with the massing and appearance of the proposed onshore substation. Cobble Villa's significance and NRHP listing is not associated with unobstructed vistas or pristine natural settings. Tetra Tech's assessment is that the Project will have no adverse effect on the significance of Cobble Villa.

Table Z-8 Assessment of Effects of Historic Properties within the EW 2 Onshore Substation C AVEHAP PAPE

Resources	Figure Ref.	NRIS No./ CRIS No.	Status	NR Criteria	Tetra Tech Assessment of Effect
Cobble Villa	Z-14	14001214	NR listed	A, C	No Adverse Effect

Z.7 CONCLUSION

Tetra Tech has researched the effects of the Project on historic and architectural resources. This work has identified 2,830 historic and architectural properties within the PAPE. Analysis of property locations and ground-truthing of the model indicate that Project visibility across the viewshed can be mediated by the degree of foreground views between a resource and the Project. Areas with clear Project views tend to be proximal to the shoreline, generally within approximately 0.5 mi (0.8 km) from the Atlantic Ocean, with views that are unmediated by vegetation, topography, and the built environment. In such areas, properties may be described as exhibiting correspondences with maritime and ocean settings, themes, locations, materials, associations, and feelings that may contribute to character-defining features that endow a resource with historic significance. Those historic properties with both Project views and a direct relationship to the ocean littoral, or maritime activities and events, are susceptible to visual adverse effects caused by Project construction and operations. Twenty of the 22 historic properties that have been recommended as sustaining adverse effects by the Project are located within the near-shore zone. Water Witch Historic District is located approximately 0.7 mi (1.1 km) from the Atlantic Ocean. For each of these 22 resources (11 in New York and 11 in New Jersey), their association with maritime settings are tied to the reasons for which they are significant. The introduction of the Project may modify their views of the ocean vista, resulting in possible effects that may be considered by the NY SHPO and the NJ HPO as adverse. **Table Z-9** presents historic properties that are recommended as adversely affected by the Project.

Table Z-9 Recommended Historic Properties with Adverse Effects

New York	New Jersey
West Bank Light Station (NR No. 06001230)	Romer Shoal Light Station (NR No. 06001304)
Breezy Point Surf Club Historic District – <i>Gateway National Recreation Area</i> (CRIS No. 08101.011499)	Sandy Hook Light – <i>Gateway National Recreation Area</i> (NR No. 66000468)
Silver Gull Beach Club Historic District – <i>Gateway National Recreation Area</i> (CRIS No. 08101.012423)	Fort Hancock U.S. Life-Saving Station – <i>Gateway National Recreation Area</i> (NR No. 81000080)
Jacob Riis Park Historic District – <i>Gateway National Recreation Area</i> (NR No. 81000081)	Allenhurst Residential Historic District (NR No. 10000353)
Jones Beach State Park, Parkway and Causeway System (NR No. 05000358)	Ocean Grove Camp Meeting Association Historic District (NR No. 76001170)
Gilgo State Park (CRIS No. 10301.000084)	Water Witch (Monmouth Hills) Historic District (NR No. 04000147)
Robert Moses State Park (CRIS No. 10305.001592)	Navesink Light Station (Twin Lights) (NR No. 70000389)
Fire Island Lighthouse - <i>Fire Island National Seashore</i> (NR No. 81000082)	Fort Hancock and Sandy Hook Proving Ground Historic District (NR No. 80002505)
Fire Island Lighthouse Historic District - <i>Fire Island National Seashore</i> (NR No. 09001288)	Berkeley Carteret Hotel (NR No. 3673)
Carrington House – <i>Fire Island National Seashore</i> (NR No. 13001057)	Asbury Park Convention Hall (NR No. 79001512)
Point O'Woods Historic District (CRIS No. 10302.003470)	Asbury Park Casino (NR No. 1951)

In contrast, the Project viewshed that occurs farther inland, often on elevated terrain or upon the rooftops and upper floors of tall buildings, rarely incorporates historic properties that would have cultural, historic, or geographic associations with maritime settings. Historic properties within this more-distant portion of the viewshed would tend to have attenuated views of the Project, where integrity of the foreground historic viewshed is already substantially altered such that the addition of wind turbines in the background viewshed represents only a small, incremental change compared with existing conditions, and would not result in an adverse effect to a resource within the PAPE. Elevated viewsheds, including those of tall building rooftops and upper stories, are concentrated in downtown and midtown Manhattan, and contain densely developed foreground viewsheds.

Assessments of effects to buildings in the Borough of Manhattan, New York City, will be conducted as an Addendum to this report. The *Phased Identification Plan*, issued with the DEIS, presents the methodology, scope, and schedule for this task.

The EW 1 Onshore AVEHAP PAPE encompasses three historic properties with Project views. The EW 1 Onshore AVEHAP PAPE extends from approximately 0.1 mi (0.2 km) in the vicinity of the U.S. Navy Storehouse #2 to approximately 1.6 mi (2.5 km) to encompass the full extent of Green-Wood Cemetery. The EW 2 Onshore Substation A AVEHAP PAPE contains no historic and architectural properties with potential Project views. The EW 2 Onshore Substation C AVEHAP PAPE contains one historic property with a potential Project view and is assessed as not adversely affected.

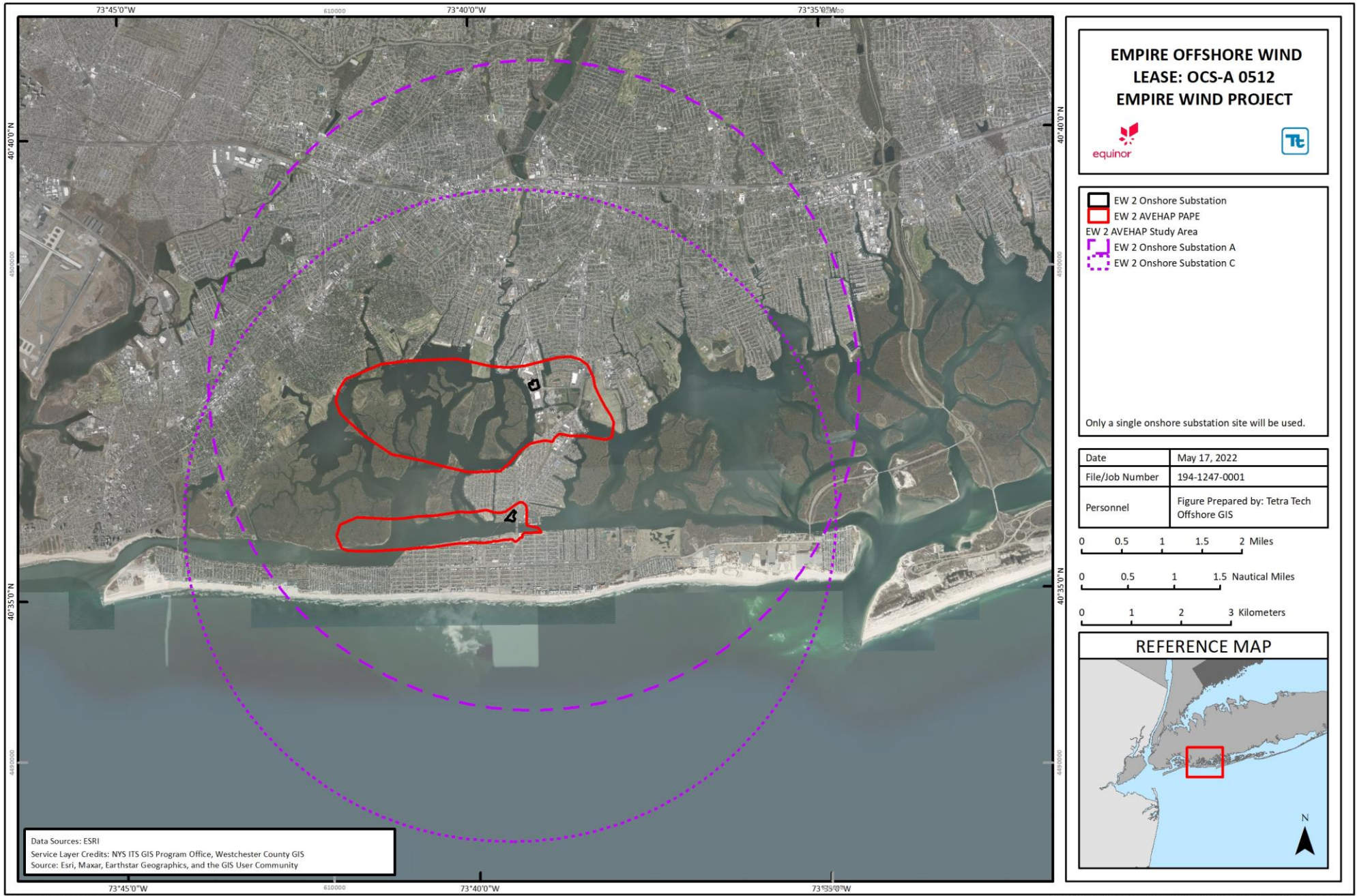


Figure Z-14 EW 2 Onshore AVEHAP PAPEs

In order to avoid and minimize impacts associated with the offshore Project components, Empire proposes to follow marking and lighting guidance and requirements (see **Section 3** of the COP for additional information). As the wind turbines will be viewed against a sky background, a light color, such as white or light gray, as dictated by USCG and BOEM requirements, will be used for the structures. The use of light-colored wind turbines will help to minimize contrast with the sky under most conditions. The proposed wind turbine design and appearance is also proposed to align with measures recommended by BOEM (BOEM 2007).

FAA and USCG lights on the wind turbines will also contribute to the Project's visual effect. These warning lights are a required safety measure; therefore, they cannot be reduced in number or eliminated. However, lighting-related impacts can be minimized by limiting the wind turbine lighting to the minimum time duration allowable by the FAA and USCG. Visual effects could be further reduced by implementing a radar-based aircraft detection lighting system. Empire is evaluating the possibility of implementing a radar-based aircraft detection lighting system (ADLS) (or a similar system) to turn the aviation obstruction lights on and off in response to detection of aircraft near the wind farm, as a base case, pending commercial availability, technical feasibility and agency review and approval. These systems are intended to reduce the amount of time that the lights are illuminated, thereby potentially minimizing the time that wind turbines are visible from shore at night. It is estimated that the amount of "lights on" time will be approximately 2 percent of the night, with most of that concentrated in the hours between sunset and midnight when airport traffic is high.

Onshore, the burial of the onshore export and interconnection cables will result in the avoidance of the potential visual effects of the Project that would otherwise occur, with the exception of the cable bridge. For the onshore aboveground Project components, which include the EW 1 onshore substation, the EW 2 Onshore Substation A or EW 2 Onshore Substation C sites, and the O&M Base, the following measures are proposed to minimize visual contrast:

- Construction Phase:
 - A Fugitive Dust Control Plan will be implemented to minimize dust (visual pollution);
 - The onshore Project Area will be maintained free of debris, trash, and waste to the extent possible during construction; and
 - Areas temporarily disturbed during construction will be restored to the conditions required by state and/or local permits.
- Operations Phase:
 - The onshore export and onshore interconnection cables will be located underground primarily under roadways, with the exception of the cable bridge, and will not be a visible during Project operations and maintenance;
 - Buildings will be a combination of clad steel frame and concrete buildings, designed to match the style and visual character of the surrounding urban landscape, and are proposed to be painted a light gray or white color. Empire will continue to work with local stakeholders throughout the permitting process and will submit final building architectural design details in the Environmental Management and Construction Plan as part of the New York state approval process for the Project;
 - Minimal presence of crews and equipment conducting maintenance activities;
 - Lighting at the onshore substation and O&M Base will be designed to reduce light pollution where feasible (e.g., downward lighting, motion-detecting sensors); and
 - In coordination with state and local permitting entities and as site design progresses, mitigation measures to reduce visual contrast will be considered such as repetition of form, line, color, and texture based on other existing elements around the site.

To offset the remaining visual impacts resulting from construction and operations of the Project, Empire will implement mitigation options, which are currently being developed through engagement from BOEM, NY SHPO, and NJ HPO, and additional interested parties. In support of identifying appropriate mitigation options, Empire is engaging with stakeholders that may be involved in this process. This includes meetings completed with and/or planned with municipalities, organizations, and/or regulatory agencies that are involved in the management of the affected properties.

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