APPENDIX Y

Terrestrial Archaeological Resources Assessment

Prepared for

equinor

TETRA TECH

APRIL 2021

Volume 2 and the Appendices are currently being updated to incorporate further refinement of the project design envelope, as detailed in Volume 1 of this COP. This includes:

- The reduction in the number of foundations, from 242 to 176;
- The incorporation of a layout for 176 foundation locations;
- The removal of the minimum sized wind turbine; and
- The removal of the piled jacket foundation as an option to support wind turbines.

ATTACHMENTS

Attachment Y-1 EW 1 Phase I Terrestrial Archaeological Survey
Attachment Y-2 EW 2 Phase I Terrestrial Archaeological Survey

ACRONYMS AND ABBREVIATIONS

Empire	Empire Offshore Wind LLC
EW	Empire Wind
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
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 and the onshore substations
Tetra Tech	Tetra Tech, Inc.

This Appendix to the Construction and Operations Plan (consisting of Attachments Y-1 and Y-2) presents complete reports of terrestrial archaeological surveys conducted by Empire Offshore Wind LLC (Empire) and its contractors in support of the Empire Offshore Wind: Empire Wind Project (EW 1 and EW 2; referred to as the Project). The Project includes both the Empire Wind 1 (EW 1) and EW 2 Project Areas developed in two phases, with onshore components proposed in Kings County, New York (EW 1) and Nassau County, New York (EW 2). The characterization of terrestrial archaeological resources in or near the Project Area, as well as an assessment of potential effects from construction, operation, and decommissioning of the Project is presented in **Volume 2c, Section 6.2 Terrestrial Archaeological Resources**.

Cultural resources include archaeological sites, historic standing structures, objects, districts, and traditional cultural properties that illustrate or represent important aspects of prehistory (before circa AD 1600) or history (after circa AD 1600) or that have important and long-standing cultural associations with established communities or social groups. Significant archaeological and architectural properties are generally defined by the eligibility criteria for listing on the National Register of Historic Places (NRHP); "historic properties" refers to any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP (36 Code of Federal Regulations § 800.16(l)). Section 106 of the National Historic Preservation Act (NHPA) (54 United States Code § 306108) is triggered when projects require federal permits, receive federal funding, or occur on federal lands. Such federal undertakings require consultation by federal agencies with the state historic preservation office and interested Native American Tribes. These consultations identify the area of potential effects and potential impact-producing factors to historic properties and potential historic properties (archaeological, architectural, or other cultural resources that are listed on, or are potentially eligible for listing on, the NRHP).

To comply with Section 106 of the NHPA, Empire contracted Tetra Tech, Inc. (Tetra Tech) to conduct desktop and field surveys of onshore Project components. These surveys are included in the following attachments:

- **Attachment Y-1, EW 1 Phase I Terrestrial Archaeological Survey**; and
- **Attachment Y-2, EW 2 Phase I Terrestrial Archaeological Survey**.

Tetra Tech found no NHRP-listed, -eligible, or potentially eligible sites at either the EW 1 or EW 2 locations.

ATTACHMENT Y-1
EW 1 PHASE I TERRESTRIAL ARCHAEOLOGICAL SURVEY

Empire Offshore Wind: Empire Wind Project (EW 1 and EW 2)

Phase I Terrestrial Archaeological Survey

Empire Wind 1 Interconnection Cable Corridor and Onshore Substation

Brooklyn, Kings County, New York

Prepared for
Empire Offshore Wind LLC

Prepared by
Tetra Tech, Inc.

6 Century Drive, Suite 300
Parsippany, NJ 07054

April 2021

MANAGEMENT SUMMARY

Tetra Tech, Inc. (Tetra Tech) conducted a Phase I terrestrial archaeological survey of the proposed Empire Wind 1 (EW 1) interconnection cable corridor and onshore substation for Empire Offshore Wind LLC (Empire) in Kings County, New York in 2019. The survey was undertaken in support of the development and operation of the Project Area for the generation of offshore wind energy and its transmission to points of interconnection onshore (the Project) to comply with the Bureau of Ocean Energy Management guidelines regarding the development of offshore wind generated power facilities, New York State guidelines, and to satisfy the requirements of federal permitting under Section 106 of the National Historic Preservation Act of 1966, as amended.

Onshore components of the Project located at the EW 1 export cable landfall site (for the purposes of this report, will be referred to as the "EW 1 facilities" or "facilities") include: (1) an export cable landfall in Brooklyn, New York; (2) onshore high voltage alternating current interconnection cable installed in subsurface trenches within public road and private property rights-of-way; and, (3) an onshore substation.

To assess the potential of the construction, operations, and decommissioning of these Project facilities to affect archaeological resources, Tetra Tech conducted background research including a review of archaeological site and standing structure files maintained by the New York State Office of Parks, Recreation and Historic Preservation, which functions as the state historic preservation office in New York (NY SHPO), and a literature review of pertinent information regarding local geology and soils, topography and hydrology, historical cartography and aerial imagery, and prehistoric and historical development in the vicinity of the facilities.

Tetra Tech concludes that no National Register of Historic Places (NRHP) listed, eligible or potentially eligible archeological resources are known within the Area of Potential Effects evaluated during this Phase I Terrestrial Archeological Survey. Tetra Tech also concludes that, overall, the onshore portions of the Project possess low sensitivity to contain intact archaeological resources that might be eligible for listing on the NRHP. This assessment of low sensitivity is due to prior large-scale ground disturbing activities including: (1) creation of made-land along Gowanus Bay; and, (2) previous installation of urban infrastructure within the public road and private parcels rights-of-way.

Tetra Tech therefore recommends that construction and operations of the Project be permitted within the areas surveyed. If any substantial modifications are made to the Project design, consultation with NY SHPO and possibly additional archaeological survey may be necessary.

MANAGEMENT SUMMARY (cont.)

NY SHPO Project Review Number:	18PR07274
Involved State and Federal Agencies:	NY SHPO (Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law) Bureau of Ocean Energy Management (Section 106 of the National Historic Preservation Act)
Phase of Survey:	Phase IA Terrestrial Archaeological Survey
Location Information:	Borough of Brooklyn, Kings County, New York
Survey Area:	
Project Description:	Offshore Wind Energy Project with associated Onshore Infrastructure
Onshore Project Area:	Export Cable Route of 0.2 miles; Substation of 4.8-acre
U.S. Geological Survey 7.5-Minute Quadrangle Map:	Jersey City, NJ
Archaeological Resources Overview:	No terrestrial archaeological resources have been previously recorded within 0.25 mile (0.4 kilometer) (0.5 mile [0.8 kilometer total) of the Project.
Report Author:	Robert M. Jacoby (M.A., RPA) and Christopher L. Borstel (Ph.D., RPA)
Date of Report:	April 2021

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ACRONYMS AND ABBREVIATIONS

ac	acre
AD	Anno Domini
APE	Area of Potential Effects
BC	Before Christ
BOEM	Bureau of Ocean Energy Management
BP	before present
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
CRIS	Cultural Resource Information System
Empire	Empire Offshore Wind LLC
EW	Empire Wind
ha	hectare
km	kilometer
Lease Area	Designated Renewable Energy Lease Area OCS-A 0512
mi	mile
NRHP	National Register of Historic Places
NY SHPO	New York State Office of Parks, Recreation and Historic Preservation
OCS	Outer Continental Shelf
the 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 and the onshore substations.
Tetra Tech	Tetra Tech, Inc.

Y-1.1 INTRODUCTION

Empire Offshore Wind LLC (Empire) proposes to construct and operate the Project located in the designated Renewable Energy Lease Area OCS-A 0512 (Lease Area). The Lease Area covers approximately 79,350 acres (32,112 hectares) and is located approximately 14 statute miles (mi; 12 nautical miles, 22 kilometers [km]) south of Long Island, New York and 19.5 mi (16.9 nautical miles, 31.4 km) east of Long Branch, New Jersey (**Figure Y-1-1**).

Empire proposes to develop the Lease Area in two individual phases. The individual phases within the Lease Area will be electrically isolated and independent from each other. Each phase of development will, independently of one another, connect via offshore substations to separate Points of Interconnection (POIs) at onshore locations by way of export cable routes and onshore substations. In this respect, the Construction and Operations Plan (COP) includes two onshore locations in New York where the renewable electricity generated will be transmitted to the electric grid.

A COP was submitted to the Bureau of Ocean Energy Management (BOEM) in January 2020, as required by 30 Code of Federal Regulations (CFR) Part 585. BOEM's approval of the COP, allowing for construction and operations of the Project, is contingent, in part, on the completion of archaeological investigations to identify potentially significant archaeological resources that may be subject to disturbances due to Project activities within the Area of Potential Effects (APE) (30 CFR § 585.626(a)(5)).

This report discusses the Phase I terrestrial archaeological survey of the Empire Wind 1 (EW 1) interconnection cable route and onshore substation located in Brooklyn, Kings County, New York (**Figure Y-1-2** and **Figure Y-1-3**). In addition to the EW 1 onshore facilities in New York, Empire is developing similar onshore infrastructure for EW 2, with export cable landfall locations in the Town of Hempstead and the City of Long Beach, New York; a separate report detailing the findings and recommendations of which is attached in **Appendix Y, Attachment Y-2** of the COP (Tetra Tech 2019a, 2019b). The results and recommendations of the Project-related marine archaeological surveys are reported under **Appendix X** of the COP (SEARCH 2018, 2019).

Y-1.1.1 Project Description

The EW 1 submarine export cable comes ashore from the lower reaches of Upper New York Bay in southwestern Brooklyn, making landfall at the South Brooklyn Marine Terminal (SBMT) (**Figure Y-1-2** and **Figure Y-1-3**). The EW 1 interconnection cable route then exits SBMT from the northwest corner, at the intersection of 2nd Avenue and 29th Street. The route then traverses north along 2nd Avenue until entering the Gowanus POI on 28th Street.

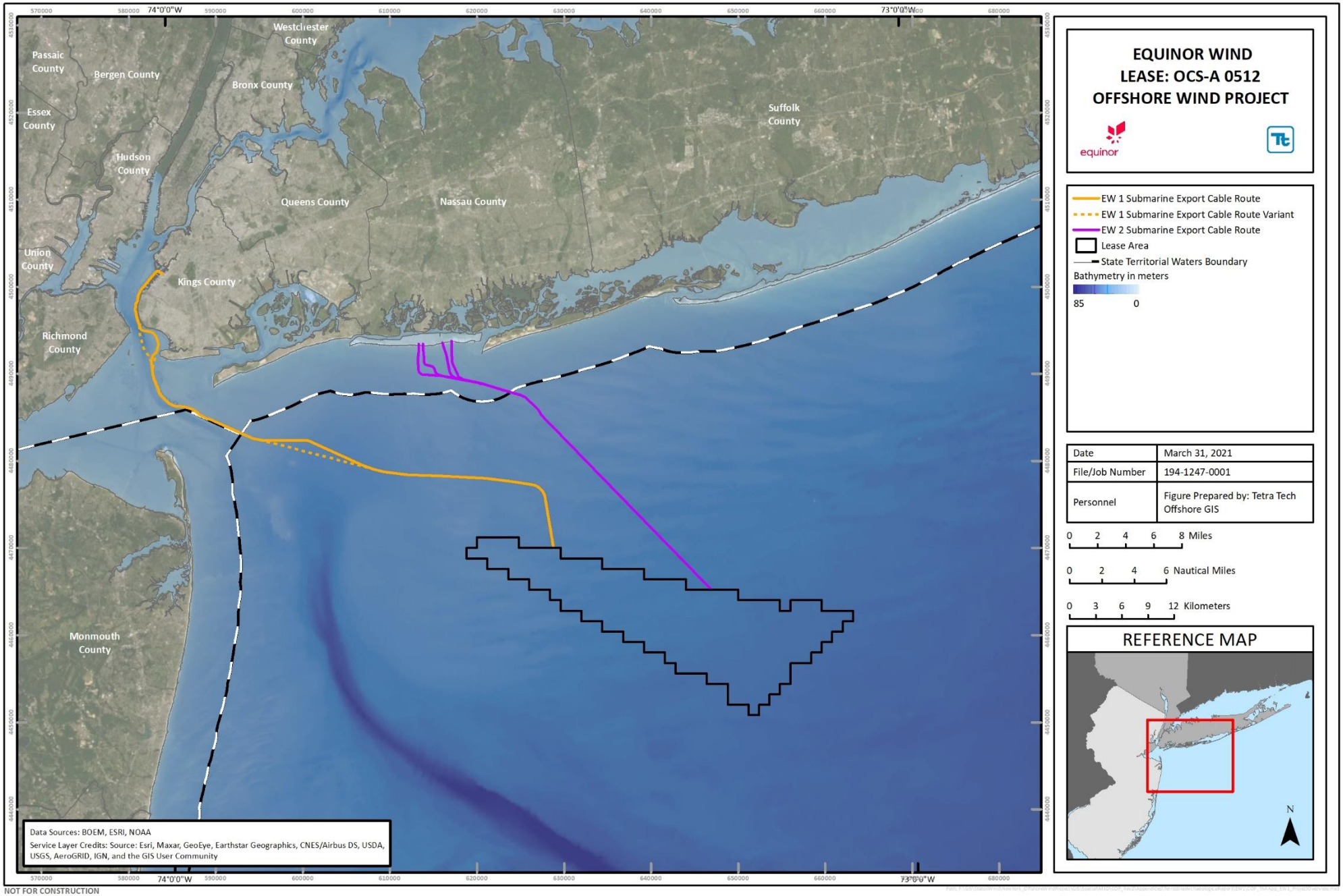


Figure Y-1-1 Project Overview

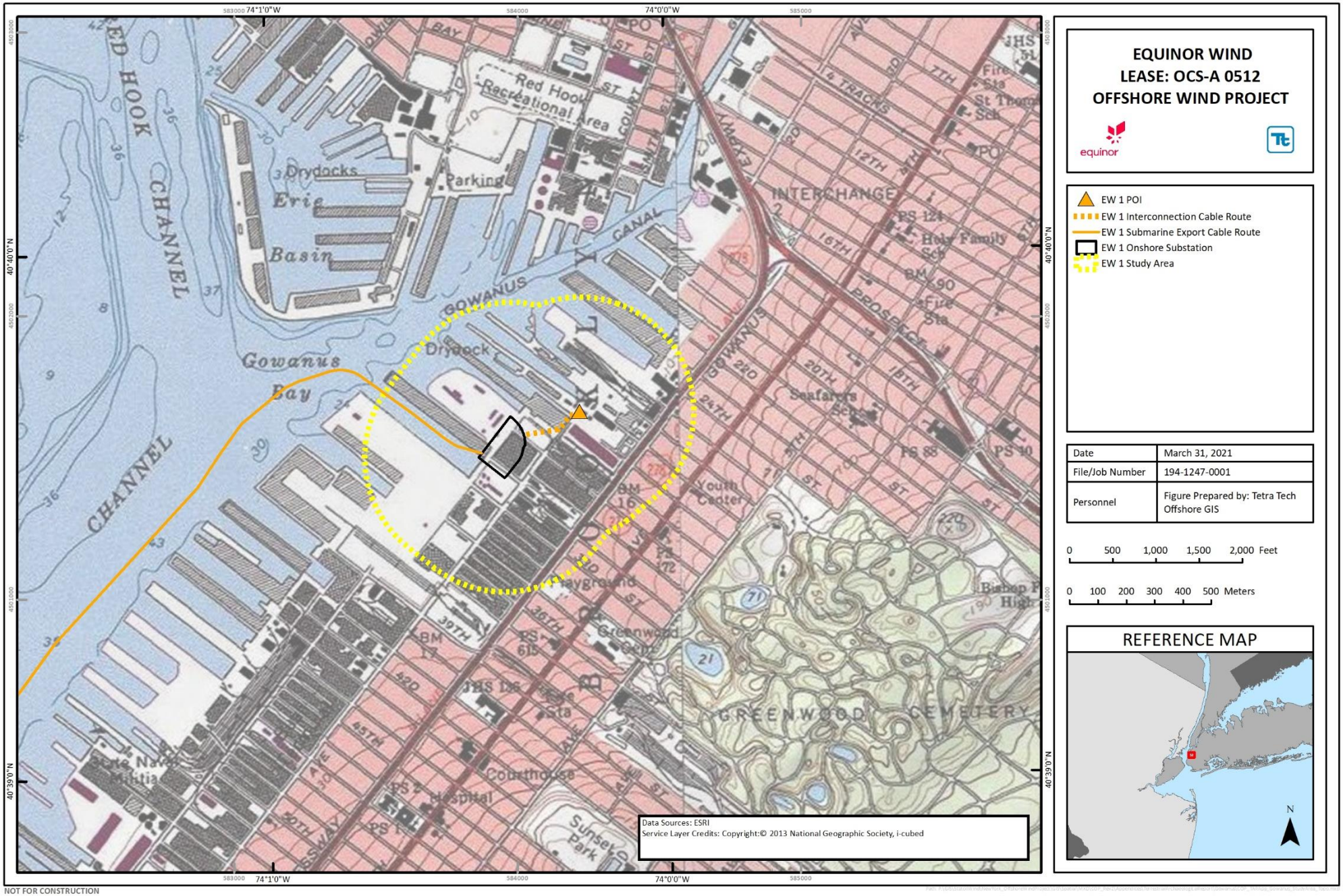


Figure Y-1-2 EW 1 Route Overview and Study Area, Topographic Background

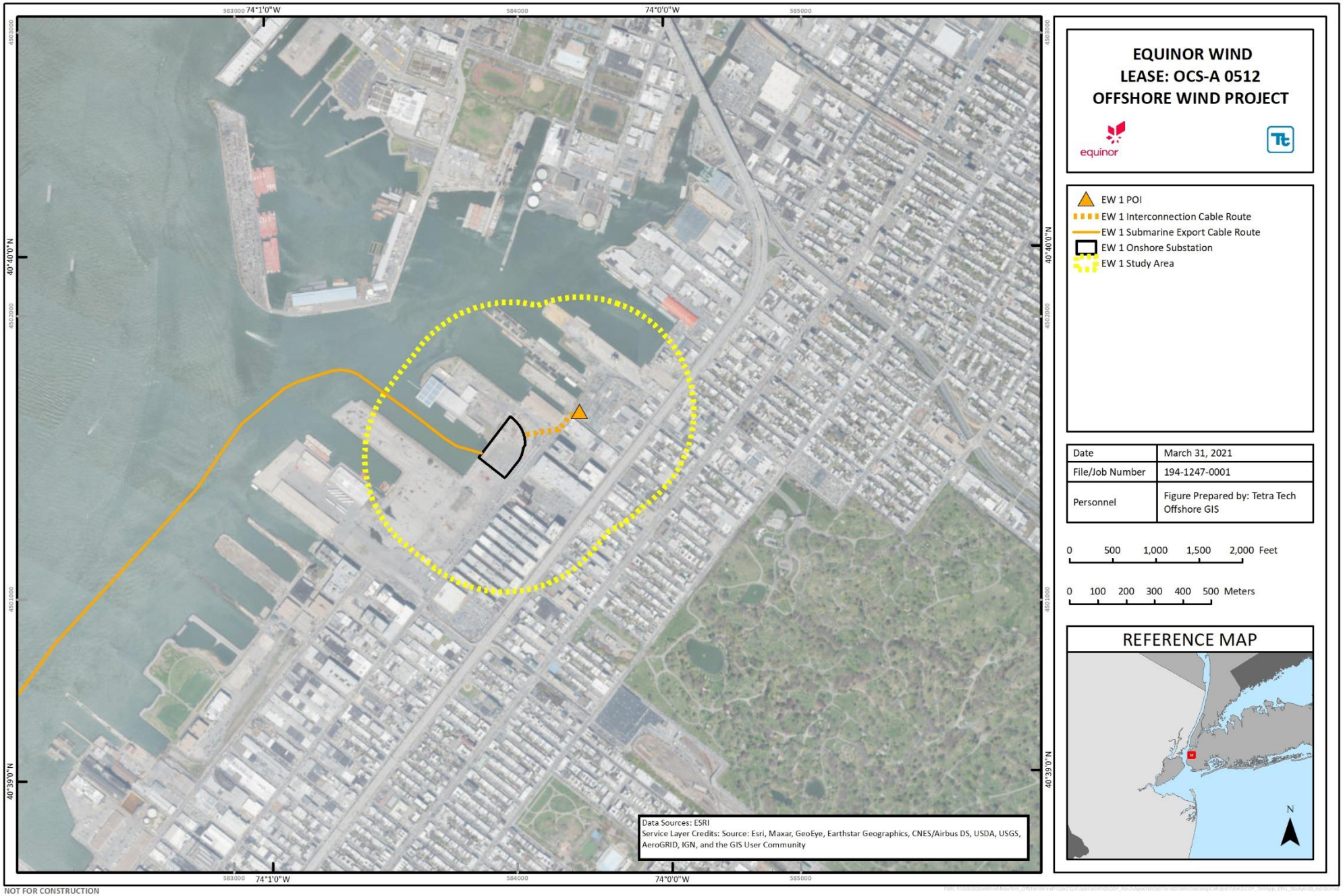


Figure Y-1-3 EW 1 Route Overview and Study Area, Aerial Background

Y-1.1.2 Regulatory Authority

The Project is subject to regulation by BOEM under provisions of the Outer Continental Shelf (OCS) Renewable Energy Program authorized by the Energy Policy Act of 2005 (42 United States Code §§ 13201 *et seq.*). In 2016, BOEM executed a Programmatic Agreement with the State Historic Preservation Officers of New Jersey and New York, 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. The Programmatic Agreement recognized that issuing renewable energy leases in the OCS constituted an undertaking subject to Section 106 of the National Historic Preservation Act of 1966, as amended. BOEM, as lead federal agency in this process, has authority to initiate consultations with state historic preservation offices, and to consult with interested Native American Tribes.

Y-1.1.3 State Historic Preservation Office Coordination

As per the Programmatic Agreement, BOEM authorized Empire and its consultants to coordinate with the New York State Office of Parks, Recreation and Historic Preservation (NY SHPO) prior to initiation of cultural resource surveys. Tetra Tech provided NY SHPO with a work plan, dated December 13, 2018, that included a Project description, a direct effects APE defined as "… all areas where ground-disturbing activity will take place including export cable corridors and all associated appurtenances such as landfalls, horizontal direct drill entry and exit locations, workspaces, equipment laydown areas, and access roads," and methodological approaches to conducting cultural resource surveys of terrestrial archaeology (including a 1-mi [1.6-km] Study Area buffer around the onshore export and interconnection cable route), marine archaeology, and historic architecture (**Addendum A**). In a letter dated December 19, 2018, NY SHPO approved Tetra Tech's work plan and noted that the agency would accept a reduction to 0.25 mi (0.4 km) on each side of the proposed onshore export and interconnection cable routes, for a 0.5-mi (0.8-km) buffer total. After this approval, Empire revised its onshore cable route to include the EW 2 onshore export and interconnection cable corridor to the existing Oceanside POI; thus, Tetra Tech provided NY SHPO with a revised work plan and updated Project description, dated August 22, 2019. NY SHPO, in a response dated August 30, 2019, accepted this work plan and expressed no further comments or questions (**Addendum A**). Separate reports detailing the findings and recommendations of this terrestrial archaeological investigation are provided in **Appendix Y, Attachment Y-2.**

Y-1.2 RESEARCH DESIGN

This section describes the objectives and methods of the Phase I survey.

Y-1.2.1 Survey Objectives

The purpose of the terrestrial archaeological survey was to satisfy regulatory compliance with BOEM's Section 106 review of Empire's COP. The survey objectives were to:

- Investigate the direct and indirect effects APE (areas that will undergo ground disturbance as a result of the Project) and identify archaeological resources that are present therein;
- Evaluate the significance of each identified resource and determine if it may be potentially eligible for listing on the National Register of Historic Places (NRHP);
- Make recommendations to avoid, minimize Project effects on, or mitigate effects to significant archaeological resources if Project avoidance is not achievable; and
- Register new archaeological sites with NY SHPO and update state site forms for previously documented sites that have been re-located during the survey.

Y-1.2.2 Research Methods

Tetra Tech developed research methods for the Phase I survey that are in accordance with New York Archaeological Council standards for archaeological investigations (NYAC 1994). BOEM's guidelines for archaeological reporting pursuant to offshore wind projects (BOEM 2017) do not provide specific procedures for conducting survey of terrestrial archaeology.

Study Area

To provide as much flexibility as possible in its early project design, Tetra Tech focused investigations on the interconnection cable route plus a 0.25-mi (0.4-km) radius (0.5 mi [0.8 km] total) buffer around it (the Study Area) (**Figure Y-1-3**).

Area of Potential Effects

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" (36 CFR § 800.16(d)). Regarding known and potential archaeological resources, this area typically refers to the direct effects APE, which is the area of ground disturbance associated with the project's construction, operations, maintenance, and decommissioning. Indirect effects to archaeological resources are less common but might include visual or auditory impacts that would adversely affect the character and setting of a significant archaeological site.

The APE for archaeology consists of areas directly or indirectly affected by ground disturbing activities associated with construction, operations and maintenance, including but not limited to trench excavating, bore and drill pads, substation construction, laydown yards, and workspaces. The site files review undertaken established that there are no NRHP-listed or NRHP-eligible sites within the Study Area, precluding any indirect effects to significant archaeological resources caused by Project activities; therefore, indirect effects will not be discussed further in this report. A summary of the maximum design scenario parameters associated with direct impacts within the APE are detailed in **Table Y-1-1**.

Table Y-1-1 Summary of Realistic Maximum Design Scenario Parameters for Terrestrial Archaeological Resources

Parameter	Realistic Maximum Scenario	Rationale
Export cable landfall	HDD in up to an 200-foot by 200-foot (61-meter by 61-meter) area; maximum vertical disturbance of up to 10 feet (3 meters)	Representative of the maximum area to be utilized to facilitate the export cable landfall, which would result in the maximum area of ground disturbance.
Interconnection cables	Up to 0.25 mi (0.8 km) of interconnection cables. Maximum vertical disturbance of up to 10 feet (3 meters); maximum horizontal disturbance of up to 50 feet (15 meters).	Representative of the maximum length of interconnector cables to be installed, which would result in the maximum area of ground disturbance.
Onshore substations	Up to an 4.8-ac (1.9-ha) area. Maximum vertical disturbance up to 15 feet (4.5 meters).	Representative of the maximum area to be utilized to facilitate the construction of the onshore substation, which would result in the maximum area of ground disturbance.

Background Research

Tetra Tech conducted background research and literature review on topics pertinent to an understanding of the environmental setting and historical development of the Study Area. These topics included bedrock geology, hydrology, soils, Native American land use, Euro-American settlement history, and socio-economic transformations. Tetra Tech reviewed historic maps and aerial imagery to identify documented structures, historic roads, and other landscape features present within the Study Area and the APE.

Site File Review

A research objective to identify local patterns in the archaeological record was achieved via a review of NY SHPO's Cultural Resource Information System (CRIS), an online archive of site files and survey reports that is viewable to qualified professionals. The review encompassed a Study Area radius extending 0.25 mi (0.4 km) from the proposed EW 1 onshore facilities. Tetra Tech reviewed CRIS for information relating to site location and type, temporal period, and NRHP-status, in addition to information regarding prior archaeological surveys conducted within the Study Area. Tetra Tech conducted an updated CRIS review in January 2021.

Pedestrian Reconnaissance

On October 30, 2018, Tetra Tech archaeologists conducted a pedestrian reconnaissance of the interconnection cable route corridor and proposed onshore substation parcel. This reconnaissance was undertaken to evaluate the extent of prior ground disturbance within the APE, and to identify locales within the APE that might have the potential to contain undocumented archaeological resources.

Y-1.3 ENVIRONMENTAL AND CULTURAL SETTING

Y-1.3.1 Environmental Setting

Geologically, the Study Area sits near the boundary between the Atlantic Coastal Plain, comprised of Cretaceous clays, silts, sands, and gravels, to the southeast, and the Manhattan Prong of the New England Upland, comprised of metamorphic and intrusive igneous rocks of Precambrian through mid-Paleozoic age, to the northwest. Published sources are unclear about the bedrock directly underlying this section of southwestern Brooklyn, but it may be Neoproterozoic (~560 million years) metamorphic "Bronx Zoo-type" Hartland formation gneiss, schist, and amphibolite, or Manhattan Schist (Brock and Brock 2001; Fisher et al. 1970; Merguerian 2003; Shah et al. 2006).

Directly overlying bedrock and/or lying atop Cretaceous sediments is a blanket of Pleistocene drift consisting of interbedded till, outwash, and glaciolacustrine sediments, possibly extending back as far back in age as the mid-Pleistocene. Near-surface glacial sediments represent the late Wisconsinan glacial advance that reached New York City ca. 21,000 years ago. The maximum late Wisconsinan glacial extent is represented by the Harbor Hill moraine, a southwest-trending ridge of interbedded till and outwash that is situated slightly southeast of the Study Area and continues west of the New York Narrows on Staten Island. During the early stages of deglaciation, the Harbor Hill moraine formed a dam that retained meltwater in the early stages of Glacial Lake Albany. As deglaciation and isostatic uplift continued, the height of Lake Albany behind the moraine varied. These changes in the height and volume of Lake Albany culminated around 13,350 calendar years ago with the breaching of the Harbor Hill moraine at the Narrows. This event is associated with catastrophic drainage of glacial lakes upstream of the moraine and resulted in the discharge of an estimated 3,200 cubic km of water through the Narrows, which scoured a deep channel from there to the Hudson Canyon, today situated some 120 mi (200 km) to the southeast (Merguerian 2003; Moss and Merguerian 2007; Stanford 2010; Thieler et al. 2007).

Although the Study Area was subject to subaerial weathering and environmental change over a period of approximately 13,000 years, no native soils remain today due to over a century of urban land use, with an emphasis on commerce and industry in the area, since the late nineteenth century. The National Resources Conservation Service maps all soils along the alignments of both the preferred and alternative alignments and in their vicinity as one of three types of urban land (NRCS 2019). The term "urban land" indicates in general that a significant portion of the mapped area contains a significant percentage of artificial impervious surfaces, such as buildings and pavement. The three map units are differentiated by substratum:

- Urban land, reclaimed substratum, 0 to 3 percent slopes (UrA) – 49 percent of the preferred alignment and 100 percent of the alternate alignment;
- Urban land, sandy substratum, 0 to 3 percent slopes (UsA) – 40 percent of the preferred alignment; and
- Urban land, till substratum, 0 to 3 percent slopes (UtA) – 11 percent of the preferred alignment.

Each of these units is a consociation, or map unit that is dominated by a single type of soil, with other types as minor components. All three units are characterized as having, by overall area, 92 percent urban land (NRCS 2019). Comparison of the mapped polygons of the three soil units with the historical development of the local landscape indicates that UrA soils (Urban land, reclaimed substratum) represent filled tidelands and formerly open water, while UsA and UtA soils (Urban land with sandy or till substratum, respectively) are predominantly fast land (i.e., historically terrestrial areas), but also contain some areas of reclaimed land.

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).

Presently, the landward section of the EW 1 Project is situated in a densely developed port district of New York City. The area is maritime and industrial-commercial in character. The shoreline is occupied by piers and the sites of former piers now decayed and demolished. The landside-built environment consists of brick and masonry warehouses, manufacturing facilities, and a diverse variety of small to medium-size commercial enterprises (**Photograph 1**). The streets are paved with macadam, which covers an older layer of cobblestones in many areas. Along portions of First and Second Avenues, sections of railroad and trolley tracks, which once served the piers and warehouses of the area, remain embedded in the pavement (**Photograph 2**). The area is slowly undergoing redevelopment after a long period of economic decline that began around 1970. There are empty lots where early twentieth-century buildings once stood, that are today typically used as parking lots and paved aprons for vehicle traffic. Despite a shift away from portside handling of cargo, the area has streets crowded with streams of vehicles passing through and loading and unloading throughout the day.

Photograph 1. Second Avenue and 29th Street, Brooklyn, NY. View to northeast.

Photograph 2. First Avenue and 50th Street, Brooklyn, NY. View to southwest.

Y-1.3.2 Pre-Contact Context

Archaeologists have divided the 13,000-year record of human habitation in coastal New York prior to European colonization into three general periods: Paleoindian (11,000 to 8000 Before Christ [BC]); Archaic (8000 to 1000 BC); and, Woodland (1000 BC to Anno Domini [AD] 1500). These periods represent broad patterns of Native American cultural adaptation to changing climatic conditions since the arrival of humans in the Study Area around 13,000 years ago. The subsequent Contact period (AD 1500 to 1700) represents the period of interaction between Native Americans and European-Americans, from initial contact with European trappers and traders to the expulsion of most Native Americans in lower New York State by the beginning of the eighteenth century.

The earliest peopling of the region occurred within a few thousand years after final retreat of the Laurentide ice sheet, although precise timing of initial human settlement is uncertain. Varve counts from Lake Hackensack deposits indicate that northern New Jersey was ice-free circa 16,000 BC with the Hudson River valley near present-day Albany ice-free some four thousand years later (Stanford 2010:56-59). The earliest securely dated Paleoindian site in the region, the Shawnee-Minisink site on the upper Delaware River, was occupied around 10,900 BC (10,937±15 ^{14}C BP) (Gingerich 2013:238-240). Elsewhere near the Study Area, Paleoindian sites have been reported on Staten Island, including the Port Mobil site which contained several fluted points manufactured from non-local material and small scrapers made from locally-sourced glacial cobbles (Kraft 1986:43).

Early Archaic (8000 to 6000 BC) sites are rare along the present New York coastal region. During this period shorelines were still dozens of miles seaward of their modern locations, and any evidence of Early Archaic period utilization of coastal settings is now inundated. The Middle Archaic period (6000 to 3500 BC) roughly corresponds with an extended warm and dry interval during the mid-Holocene. Fishing and shellfishing are seen in the archaeological record toward the latter part of the Middle Archaic, as sea level rise slowed, and estuaries and riverine habitats stabilized. In the lower Hudson River, early shell middens have radiocarbon dates of circa 5170 to 4900 BC, coeval with Neville point horizon (Schaper 1989:16; Claasen 1996:104). The Dogan Point site on the lower Hudson River in Westchester County, New York, contained a basal Middle Archaic deposit of Neville points, dating roughly to 5000 BC (Claasen 1995:131).

During the Late Archaic period (3500 to 1000 BC), shell harvesting in the lower Hudson River was intensively practiced from around 3500 to 2000 BC. Claasen (1996:105) speculated that large shell middens, like those found along the lower Hudson Valley, may have fostered colonization by native plants that were of economic interest to local groups, including sumpweed, goosefoot, and gourd/squashes, encouraging scheduled visits to these locales.

The Early Woodland period (1000 BC to AD 250) marks the inception of widespread ceramic vessel use amidst a general decline in site numbers and population density across the Eastern Woodlands. Population decline may have been in response to climatic cooling that adversely affected game numbers and flora availability, or to epidemic disease (Fiedel 2001). Native, starchy seeds, including goosefoot (*Chenopodium berlandieri*), maygrass (*Phalaris caroliana*), knotweed (*Polygonum erectum*), sumpweed (*Iva annua*), and sunflower (*Helianthus annuus*), began to appear in site assemblages across eastern North America in the Late Archaic and Early Woodland periods, and with some frequency by AD 100 (Fritz 1990). Rossville points and Vinette I ceramics have been found in association on Long Island at the Bowman Brook site. The Middle Woodland period (AD 250 to 900) marks the appearance of the first truly large shellfish middens in southern coastal New England and Long Island (Bernstein 1993). Cross noted that shellfishing along the New Jersey coast had become a major economic enterprise during this period (Cross 1956:194).

Maize agriculture was adopted by many Eastern Woodlands groups as their principal subsistence strategy between AD 900 to 1100, but its adaptation was not uniform especially in the Middle Atlantic and New England regions (Fritz 1990). Abundant fish and shellfish resources along coastal and estuarine environments may have lessened the need and desire to shift to an unpredictable labor-intensive subsistence strategy based on maize cultivation. Although some evidence of maize production dating to circa AD 990 was identified in the mid-Hudson Valley and from AD 1250 on the Housatonic River in Connecticut (Cassedy and Webb 1999), most researchers suggest that maize was not cultivated in coastal New York until as late as AD 1500, or even after initial European contact (Ceci 1990; Lavin 1988). The Study Area likely supported minimal maize horticulture during the Late Woodland period (AD 900 to 1600).

Y-1.3.3 Historic Period Context

The Contact Period (AD 1500 to 1700)

Inhabitants of New Jersey, eastern Pennsylvania, and southeastern New York were members of the Lenape, an Algonquian language group, divided between Munsee dialect-speakers north of the Raritan River, and Unami-speakers to the south (Kraft 1986). Native American bands living on the south shore of Long Island within the Study Area included the Rockaway and Massapequa. In sharp contrast to neighboring groups that were hierarchically organized into tribes (Iroquois to the north and Susquehannocks to the west) or chiefdoms (the Powhatan in Tidewater Virginia), the Lenape were loosely organized into autonomous villages of several related families. The Lenape are often described as an egalitarian band-level social organization and refrained from fusing into higher-order associations typically headed by a powerful individual. Alliances between autonomous bands, when they existed, tended to be short-term coalitions (Grumet 1979:26-28).

European mariners visited the east coast of North America during the 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 New York shores in 1609 and made the first reported contact with Native Americans in New York (Johnson 1995).

In 1624, the Dutch West India Company built Fort Orange at Albany and landed settlers on Manhattan Island, marking the first permanent European settlements in New York. The Dutch established settlements on western Long Island at Breukelen (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 slow to establish communities east of Flatbush and 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). Most English settlements were established by New England Puritans who brought with them the idea of representative government. In contrast, the governing principle of New Netherland was summed up by Governor Peter Stuyvesant's comment that "I shall govern you as a father his children" (quoted in Aliano 1995:112).

Seventeenth century settlements in Kings County outside the established towns tended to be small, isolated farmsteads or hamlets situated on the drainage headlands, or necks, that extend into the marshes and bays. 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 was used as fodder for herds of cattle, sheep, and pigs. Fishing and shellfishing were important supplements to income and diet for farming families.

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 was violently suppressed, and rumors of a slave revolt in 1741 led to the execution of dozens of enslaved people (Singer 2007:165-167). Though these events were restricted to the city proper, their effect on Long Island communities was to harden opinions and behavior toward and by the enslaved population.

As the number of Africans into New York increased through the seventeenth and eighteenth centuries, Native American communities were 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 the Lenape were largely dispersed from the region (Burrows and Wallace 1999:68-69).

American Independence and Expansion (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 (**Table Y-1-2**). As New York City grew from around 7,250 people in 1723 to almost 22,000 in 1771 (O'Callaghan 1849a: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 1849a:729, 761).

Table Y-1-2 Population Data for Kings County, New York

Year	Population	Density (pop/sq. miles)	% Change/Annum	Percent Enslaved
1698	2,010	28	-	14.6
1738	3,013	42	1.2	17.1
1790	4,495	63	0.9	31.9
1800	5,740	81	1.4	25.8
1810	8,303	117	4.5	NA
1825	14,679	207	5.1	10.3
1835	32,057	452	11.8	-
1845	78,691	1,108	14.6	-
1855	216,355	3,047	17.5	-
1865	311,090	4,382	4.4	-
1875	509,154	7,171	6.4	-
1892	991,569	13,965	5.6	-
1900	1,166,582	16,480	2.2	-
1910	1,634,351	23,019	4.0	-
1925	2,203,991	31,042	2.3	-
1970	2,602,012	36,648	0.4	-
2010	2,504,700	35,277	-0.1	-

Sources: O'Callaghan 1849a, 1849b, 1850; NYS Library 2019; U.S. Census Bureau 1908, 1910, 1973, 2012; NYC DCP 2019.

At the outbreak of the American Revolution, loyalist sympathies ran high on Long Island, especially after British forces defeated the Americans at the Battle of Long Island in late August 1776. This action, fought on the strategic heights in Brooklyn, included skirmishes within 1 mi (1.6 km) of the Study Area. 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).

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 Kings County enslaved Africans accounted for 31.9 percent of a total population of 4,495 in 1790 (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 counted as enslaved persons 10.3 percent of Kings County population.

Through the early nineteenth century Kings County remained primarily a rural district. The Town of Brooklyn, representing the original Dutch settlement of Breukelen along the East River, had a population of around 10,800 in 1825, but the other towns in Kings County (New Utrecht, Flatlands, Flatbush, Gravesend, and Bushwick) were modest in size, ranging from about 400 to 1,000 persons, and many of those inhabitants lived on dispersed farmsteads. Kings County experienced a population boom during the 1830s and 1840s, with annual increases from around 12 percent to 17 percent (**Table Y-1-2**). Nearly 1,000 men were employed in house construction in Kings County as enumerated in the 1840 census (U.S. Census Bureau 1842:141).

Key agricultural products for the region were cattle, wheat, rye, corn, oats, and butter (**Table Y-1-3**). Grain processing facilities were some of the earliest and most important manufacturing sites in the region. In Kings County this 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; there were no recorded grist mills in Kings County (U.S. Census Bureau 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 urban and overseas markets. Long Island farmers, increasingly, were not able to compete with midwestern grain prices, and instead turned to supplying New York City with market garden produce, including potatoes, beans, peas, and other vegetables (Burrows and Wallace 1999:431). In 1840 Kings County trailed only Queens County in the value of market gardens in New York State and was third in 1850. In 1855, 575 ac (232.7 ha) of market gardens were cultivated in New Utrecht, accounting for more than 14 percent of improved land in the town (NYSL 2019). **Table Y-1-3** presents key agricultural data for Kings County 1840-1900.

Table Y-1-3 Selected Agricultural Data for Kings County 1840-1900

Agricultural Products and Acreage	Year			
	1840	1860	1880	1900
Wheat (bushels)	24,964	21,927	3,240	-
Oats (bushels)	72,450	9,835	3,158	310
Rye (bushels)	8,537	4,493	2,052	-
Corn (bushels)	81,824	84,782	52,090	6,020
Potatoes (bushels)	95,805	607,182	772,246	197,216
Market garden produce ($)	84,000	319,134	842,017	260,930
Cattle	5,978	1,510	1,424	2,418
Sheep	48	34	11	-
Swine	8,360	1,880	744	88
Improved land (acres)	NA	16,006	9,967	5,980

Sources: U.S. Census Bureau, Agricultural Schedules (1842, 1864, 1882, 1902).

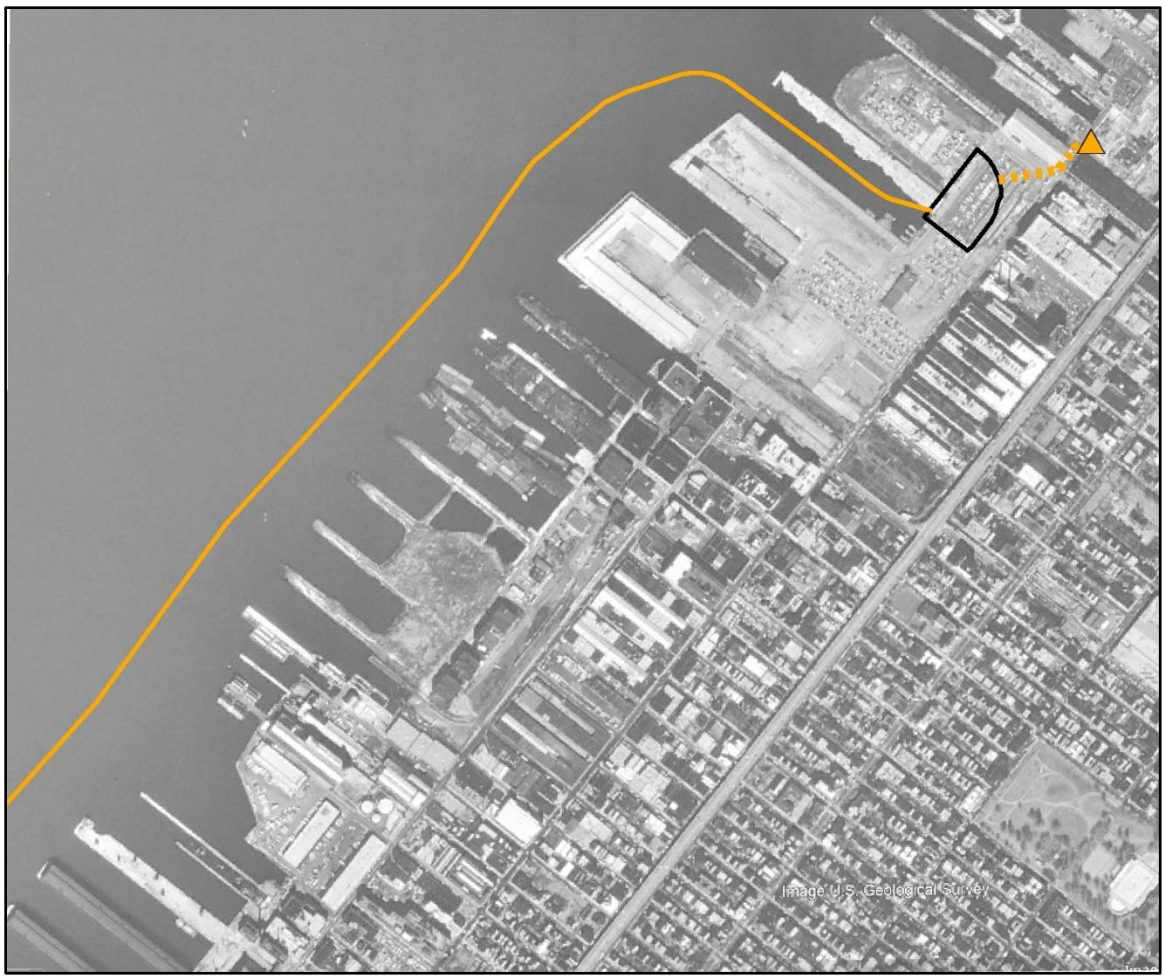
Urban Expansion and Rural Decline (1860-1960)

The status of Kings County as a leader in market gardening continued well into the nineteenth century. Between 1860 and 1880, Kings County market gardens had increased in value by 164 percent to almost $850,000 (U.S. Census Bureau 1864:102, 1882:299). Farming districts in Kings County included New Utrecht, Flatbush, and Flatlands, areas located south of the Harbor Hill moraine and, as the names imply, level terrain.

Even as local agriculture continued to play a role in the region's economy, Brooklyn's waterfront became the epicenter for goods moving from upstate New York and the Midwest to New York and overseas markets, especially grain shipments. Beginning with the Atlantic Dock in the 1840s and followed by Erie Basin in the 1850s, developers erected docks and warehouses around deep-water basins in Red Hook, Brooklyn to aggregate bulk shipments arriving down the Erie Canal and from other Eastern ports. The Erie Basin included a 500-foot (152-meter) drydock and grain elevators enclosing a 100-acre anchorage on the north edge of Gowanus Bay (Ostrander 1894:134). Dredging of Gowanus Creek, a tidal stream supporting extensive salt marshes, began in the 1850s, and by the early 1870s the mile-long Gowanus Canal and a series of basins and docks had been constructed. The canal became a focus for industrial and residential development, one of several nodes of growth in Brooklyn that by 1900 had reduced agricultural land, and farm families, by nearly two-thirds from 1860 levels (U.S. Census Bureau 1902).

In 1895, Irving Bush began development of the Gowanus Bay waterfront, constructing deep-water piers, warehouses and industrial buildings that by 1915 had become a 200-ac (81-ha) complex known as Bush Terminal (Flagg and Raber 1986:5). The terminal maintained a railroad to move cargo from piers and buildings, connecting with major trunk lines out of the city. The terminal tracks ran along First and Second Avenues and each of the side streets. Passenger trolleys also used these tracks until the mid-1950s (**Photograph 3**). The vertical integration of transshipment by rail and water with commercial and industrial facilities managed by a single organization was the first of its kind in the United States, and the largest such enterprise until the mid-twentieth century. The operation of Bush Terminal transformed industrial production in Brooklyn and created thousands of jobs, spurring development of Sunset Park as a residential and commercial neighborhood. A deep economic decline in the Gowanus waterfront began in the 1970s leading to the abandonment of many piers and former warehouses (**Photograph 4**).

Photograph 3. First Avenue and 39th Street, Brooklyn, NY, circa 1950. View to north



Photograph 4. Aerial image of Project Area, 1995

Y-1.3.4 The Archaeological Record in the Study Area

A review of CRIS identified no recorded terrestrial archaeological sites or previously conducted archaeological surveys within 0.25 mi (0.4 km) (0.5 mi [0.8 km] total) of the Project. One site has been recorded within 1 mi (1.6 km) of the Project (04701.020238) representing historic rear yard deposits that NY SHPO has determined are not NRHP-eligible. The nearest pre-contact archaeological site to the Project is an undated Native American burial (04701.017322) in Boerum Hill, Brooklyn, about 1.9 mi (3 km) northeast of the Project. The NRHP status of this site is undetermined. The nearest NRHP-eligible pre-contact resources are two Woodland-period sites on Governor's Island, the Fort Jay Prehistoric Site (06101.009523) and the Nolan Park Prehistoric Site (06101.009524), both yielding pottery fragments. Tetra Tech updated the CRIS site review in January 2021 and identified no further additions to the archaeological record.

Previous archaeological surveys recorded in CRIS and the Landmarks Preservation Commission online report archives indicate that three surveys have been conducted within 0.25 mi (0.4 km) of the Project (**Table Y-1-4**). Each of the three surveys evaluated properties along the Gowanus Bay waterfront. Raber (1985) and McVarish et al. (2008) concluded that no historic properties would be adversely affected by proposed projects and recommended no further archaeological studies. Davis (2019) concluded that the North Campus Project, which overlaps the EW 1 interconnection cable corridor, possessed low to no sensitivity for pre-contact archaeological resources. Davis also concluded that Pier 6 and a portion of the waterfront bulkhead, which do not fall within

the Project APE, possessed moderate sensitivity for historic archaeological resources. An updated review of CRIS and Landmarks Preservation Commission databases in January 2021 identified no additional archaeological surveys.

Table Y-1-4 Previous Archaeological Surveys Undertaken in the Study Area

NY SHPO Survey Report No.	Report Title	Results/ Recommendations	Author/Date
85SR61925	Survey Level Study, 31st Street Pier, Brooklyn, NY	Recommended NRHP-not eligible/ No further work	Michael Raber 1985
08SR58199	South Pier Improvement Project, Phase IA Cultural Resource Survey, Brooklyn, NY	No adverse effects/ No further work	Douglas McVarish, Patrick Heaton, and Joel Klein (John Milner) 2008
18SR56622	Made in New York (MiNY)-North Campus Project, Phase IA Archaeological Documentary Study	Low to no pre-contact sensitivity; portions of Pier 6 and bulkhead possess moderate historic sensitivity	Zachary Davis (Dewberry) 2019

Y-1.3.5 Archaeological Sensitivity within the APE

As discussed in **Section Y-1.3.1**, the Project APE is situated in an urban setting that includes maritime and land-based transportation facilities, and industrial and commercial buildings. As indicated on the 1845 Coast and Geodetic Survey (**Figure Y-1-4**) the Gowanus Bay shoreline prior to urbanization was a low-cut bank fronted by mudflats and a narrow beach. The Coast Survey[1], charged with charting the nation's important coastal waterways, has created a pictorial record of shoreline change in Gowanus Bay from the early nineteenth century onward. Because these nautical charts were intended to ensure maritime safety, they are among the most accurate early maps of New York Harbor and are useful in gauging the position of the shoreline relative to the Project APE. In the 1845 chart, the shoreline was mapped inland of the Project APE from around 39th Street northward **(Figure Y-1-4**), indicating that the entire EW 1 interconnection cable route is sited on made-land.

Development of Brooklyn's waterfront moved southward from the Atlantic Docks and Erie Basin complexes and resulted in extensive land-filling of the Gowanus Bay shoreline for Bush Terminal and other piers (**Figure Y-1-5** and **Figure Y-1-6**). Comparing coast charts from 1882 and 1906 reveals an infilling of shoreline and the construction of deep-water piers and warehouses immediately south of Gowanus Creek (**Figure Y-1-5** and **Figure Y-1-7**). A bird's-eye-view print of Brooklyn from 1897 depicts an early phase of the Bush Terminal complex with undeveloped shoreline extending to the south (**Figure Y-1-6**). A review of 1898 and 1916 insurance maps show broad continuation of construction and shoreline filling (**Figure Y-1-8** through **Figure Y-1-10**). First Avenue had become lined with warehouse or factory structures (**Figure Y-1-7**; **Photograph 5**). Shoreline filling and development of lots along the Project APE was essentially complete by 1920 (**Figure Y-1-9** and **Figure Y-1-10**; **Photograph 6**). Reconfiguration of piers, terminal buildings, and roads, including the removal of much former trackage from the streets, has occurred from the 1960s to the present (**Figure Y-1-11** and **Figure Y-1-12**).

[1] Office of Coast Survey, a branch of National Oceanic and Atmospheric Administration.

Photograph 5. Bush Terminal circa 1905

Photograph 6. Bush Terminal, 1917. View to east

Figure Y-1-13 presents a synthesis of the mapped nineteenth century shoreline relative to the present built environment and the Project APE. The figure illustrates that the EW 1 interconnection cable route will be located entirely within made-land.

Review of the available historic sources plus results of the pedestrian reconnaissance reveals that there is low to no archaeological sensitivity within the Project APE.

Y-1.4 SUMMARY AND RECOMMENDATIONS

Tetra Tech conducted a Phase I terrestrial archaeological survey of the proposed EW 1 interconnection cable corridor and onshore substation in Brooklyn, Kings County, New York in 2019, in support of the Empire Lease Area OCS-A 0512 Offshore Wind Project. The survey was undertaken to comply with BOEM guidelines regarding the development of offshore wind generated power facilities, New York State guidelines, and to satisfy the requirements of federal permitting under Section 106 of the National Historic Preservation Act of 1966.

Onshore facilities of the Project include: (1) an export cable landfall along the Gowanus Bay waterfront; (2) onshore high voltage alternating current interconnection cable installed in subsurface trenches within public rights-of-way and private easements on surface roads, sidewalks, parking areas; and, (3) an onshore substation. To assess the potential of these Project facilities to contain previously unrecorded archaeological resources, Tetra Tech conducted background research including a review of the online CRIS database maintained by NY SHPO and the online report archives of the Landmarks Preservation Commission; and a literature review of pertinent information regarding local geology and soils, topography and hydrology, historical cartography and aerial imagery, and prehistoric and historic development in the Project vicinity.

Tetra Tech finds that no NRHP listed, eligible or potentially eligible archeological resources are known within the Study Area evaluated during this Phase I Terrestrial Archaeological Survey. Further, because of the absence of recorded archaeological resources within the Study Area, project actions are not anticipated to result in adverse indirect impacts. Tetra Tech concludes that the overall sensitivity of the direct effects APE evaluated in this Phase I is negligible due to (1) late-nineteenth and early-twentieth century landfill operations; and (2) extensive maritime harbor, industrial, and commercial construction and re-construction from circa 1895 to the present.

Based on these conclusions, Tetra Tech recommends that construction and operations of the Project be permitted within the areas surveyed. If any substantial modifications are made to the Project design, consultation with NY SHPO and possibly additional archaeological survey may be necessary.

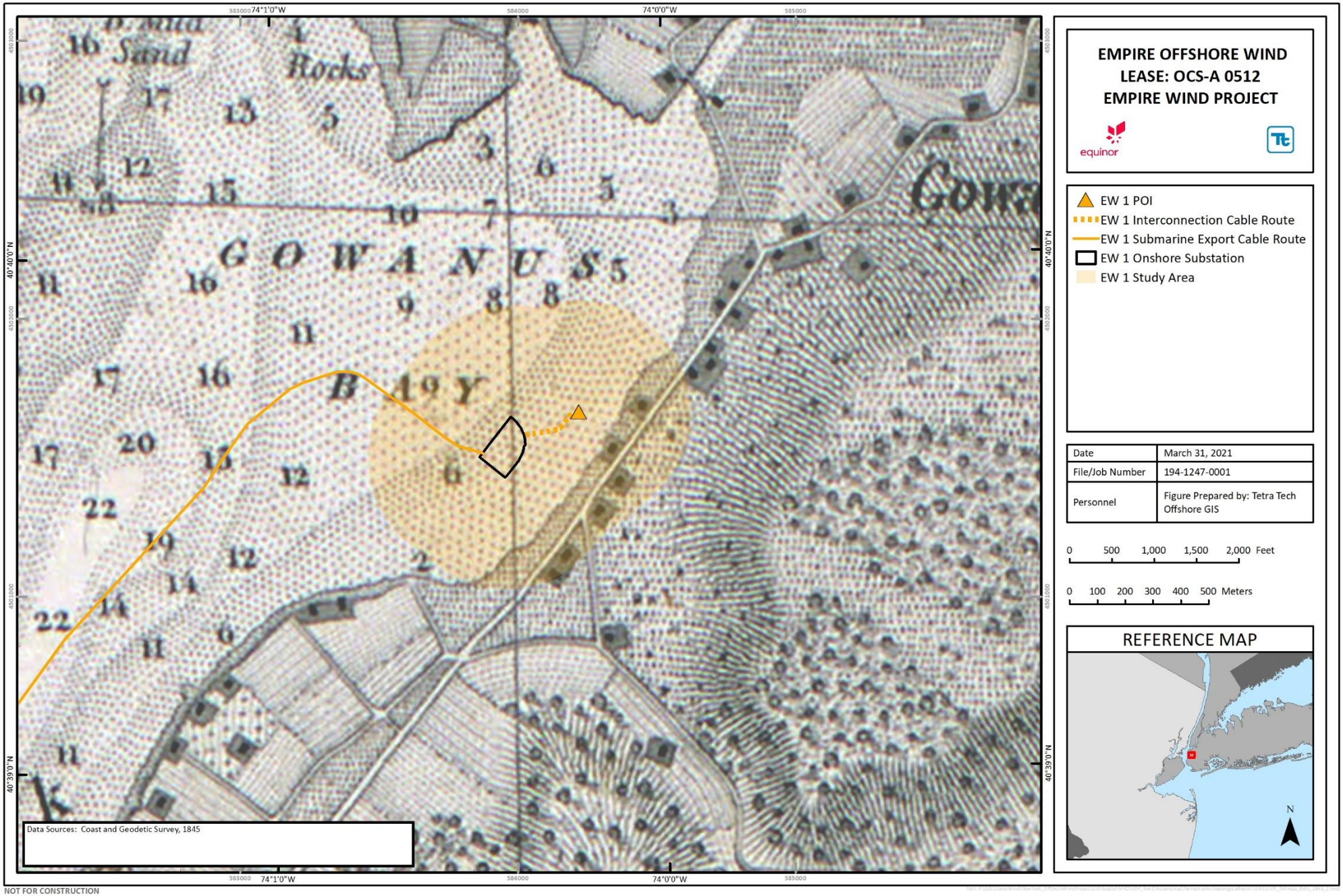


Figure Y-1-4 Coast Survey Chart (1845) showing EW 1 Export Cable Route

Figure Y-1-5 Coast Survey Chart (1882) Showing EW 1 Export Cable Route

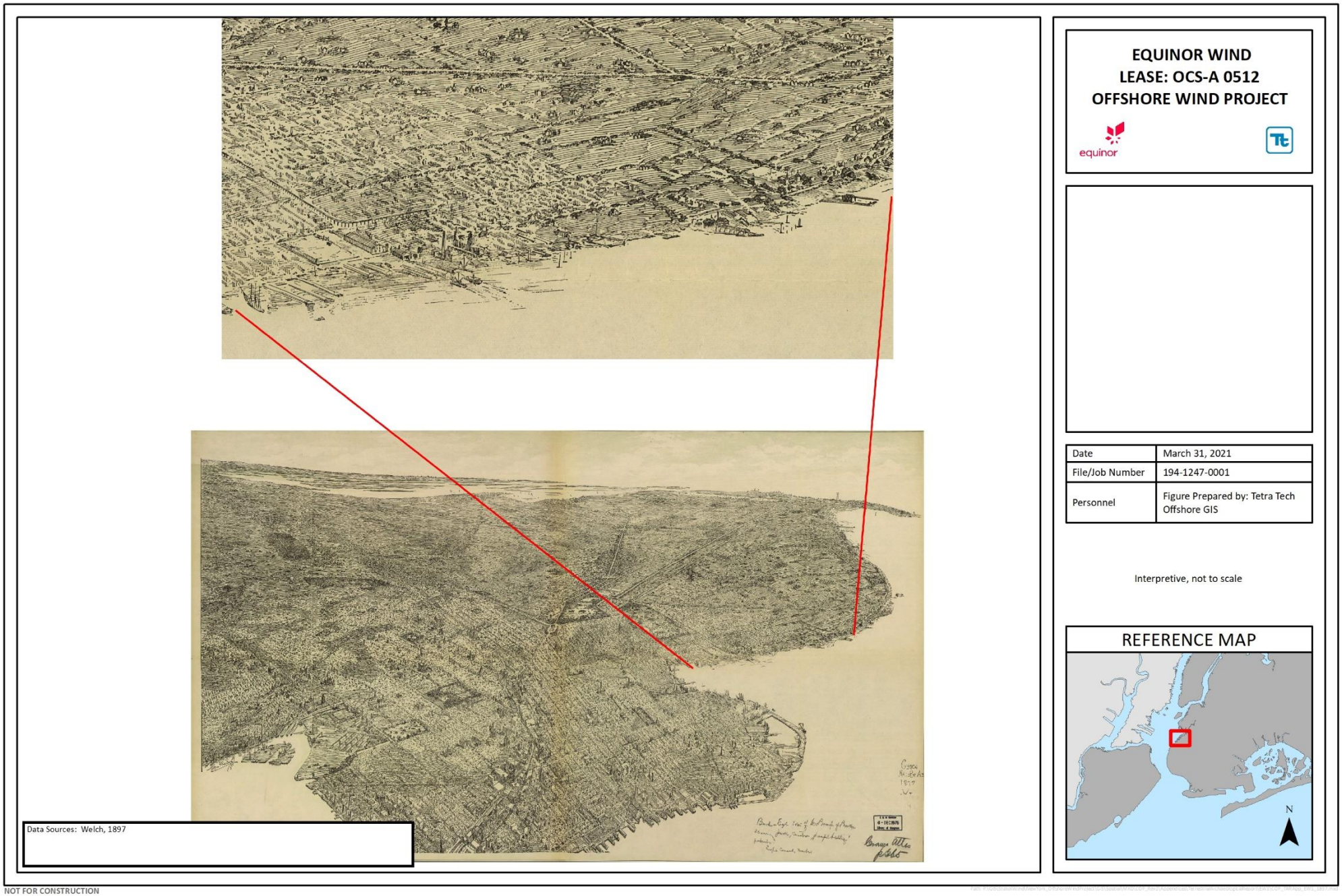


Figure Y-1-6 Bird's-Eye-View of Brooklyn (1897)

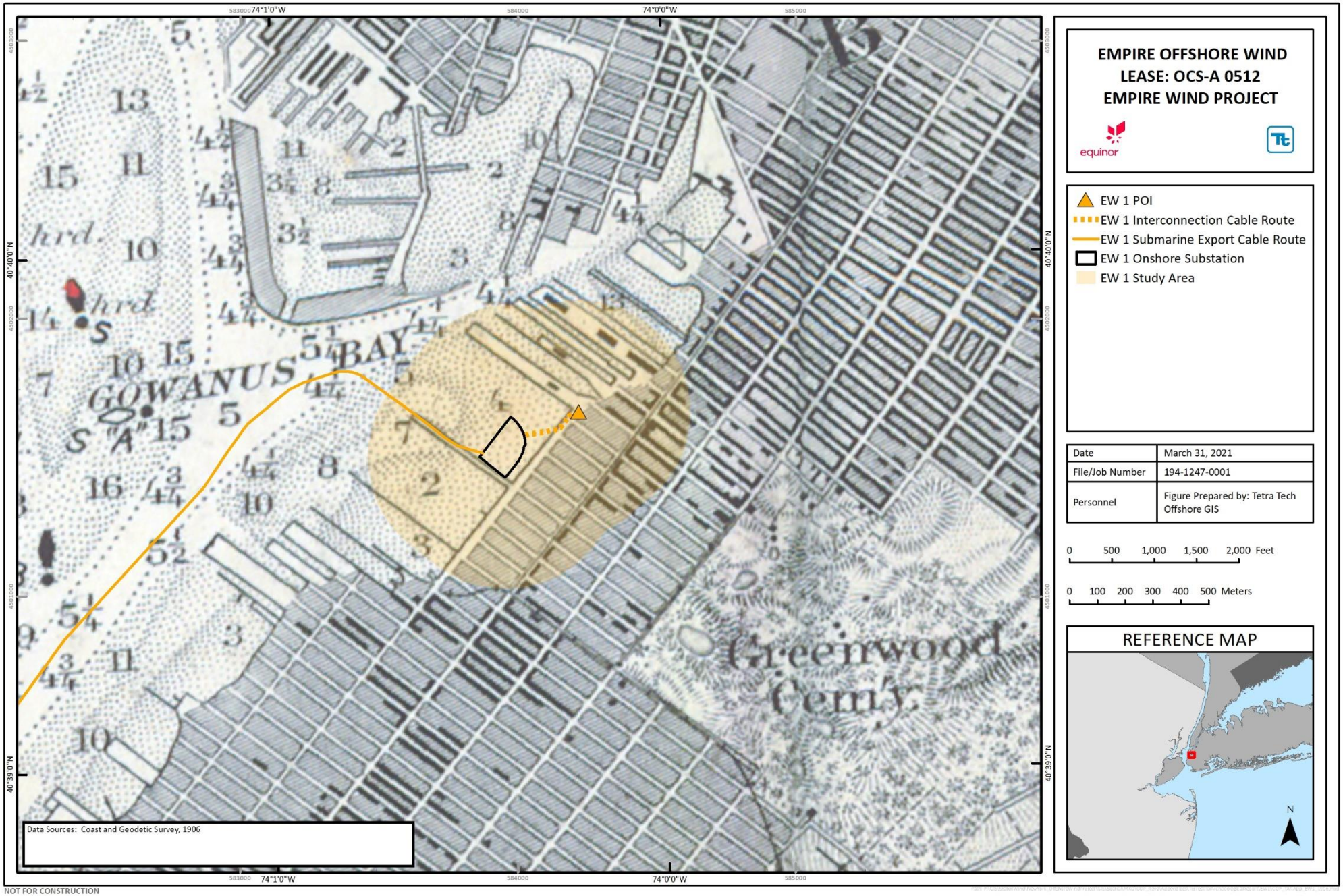


Figure Y-1-7 Coast Survey Chart (1906) Showing EW 1 Export Cable Route

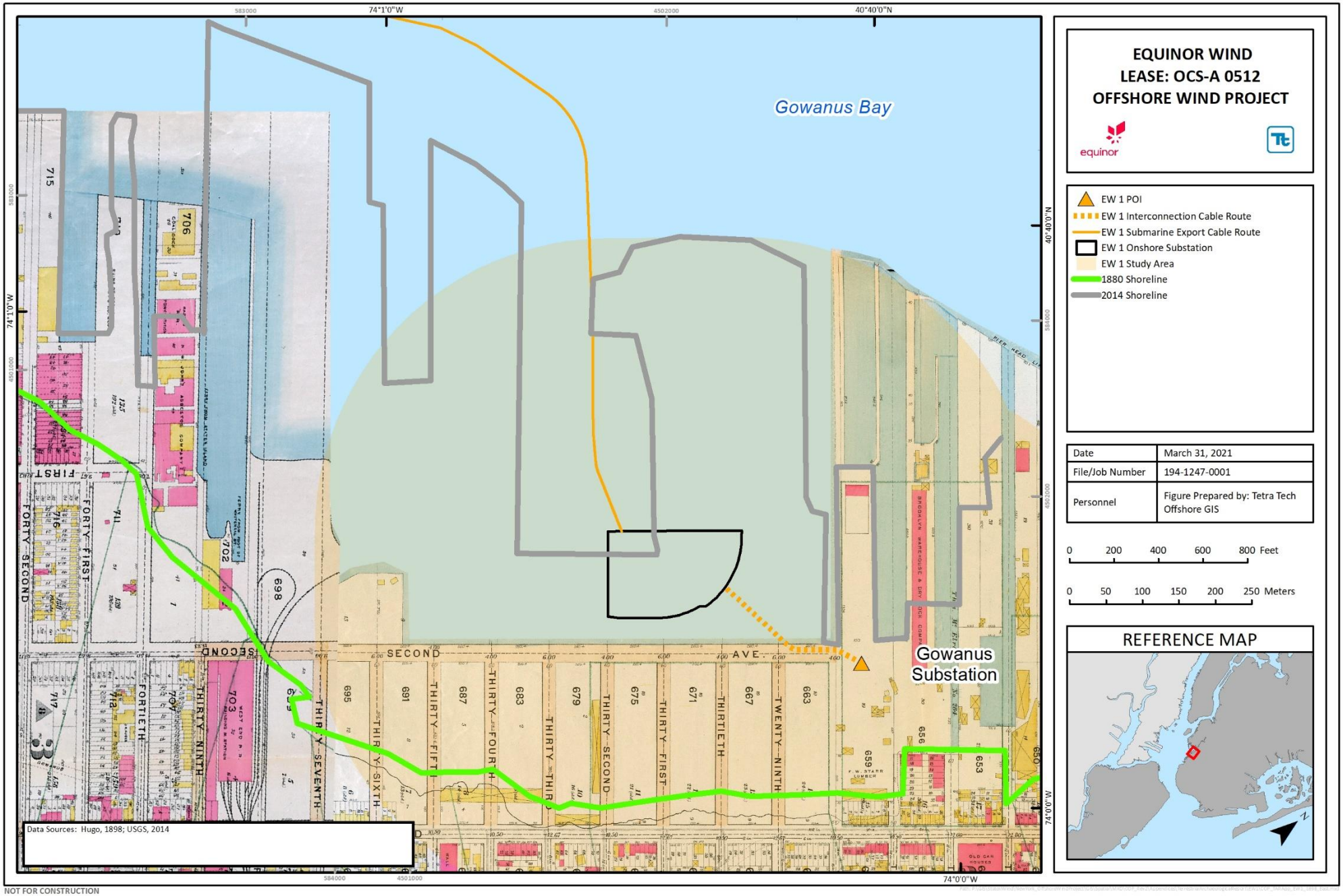


Figure Y-1-8 New York City Fire Insurance Map (1898) Showing EW 1 Export Cable Route

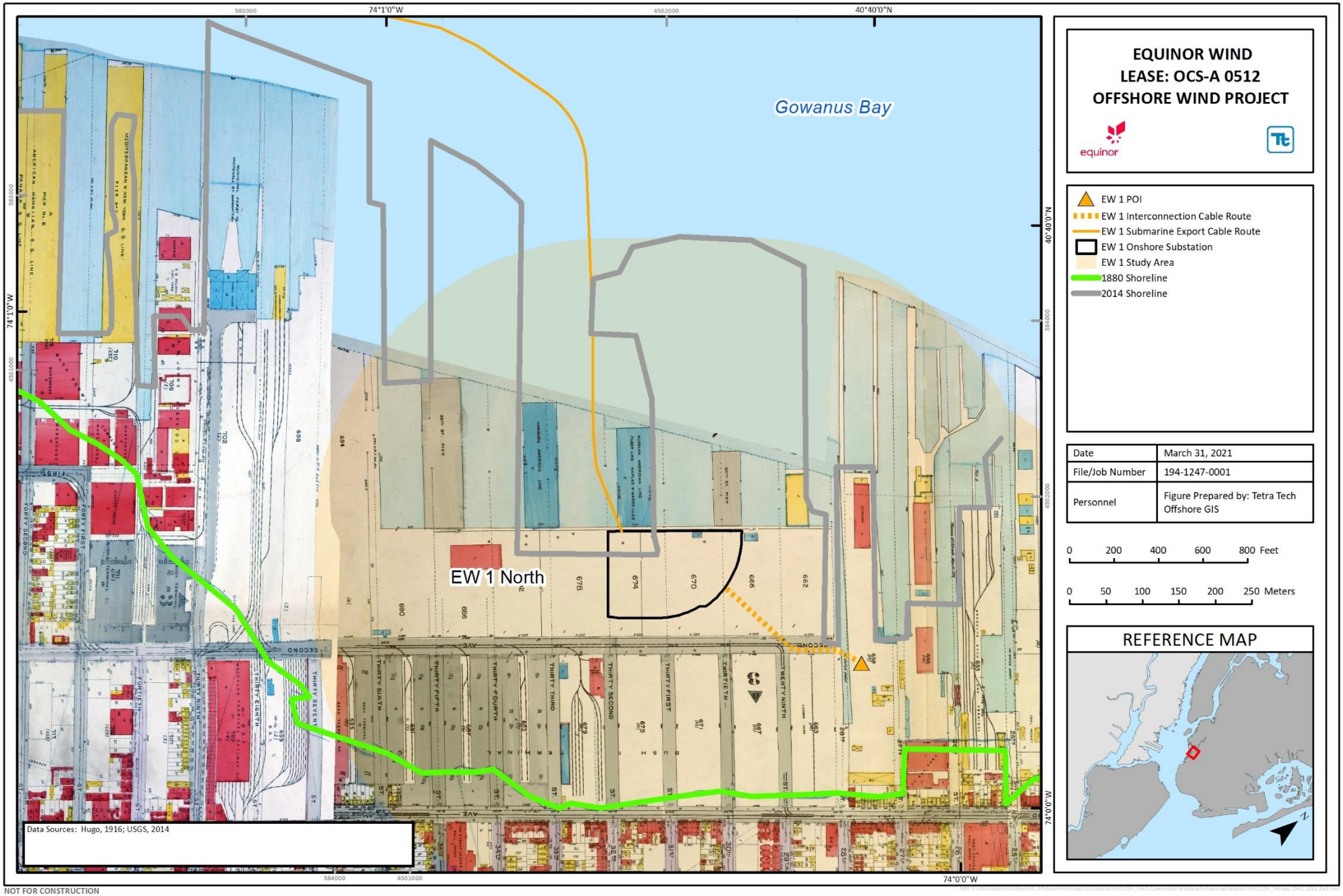


Figure Y-1-9 New York City Fire Insurance Map (1916) Showing EW 1 Export Cable Route

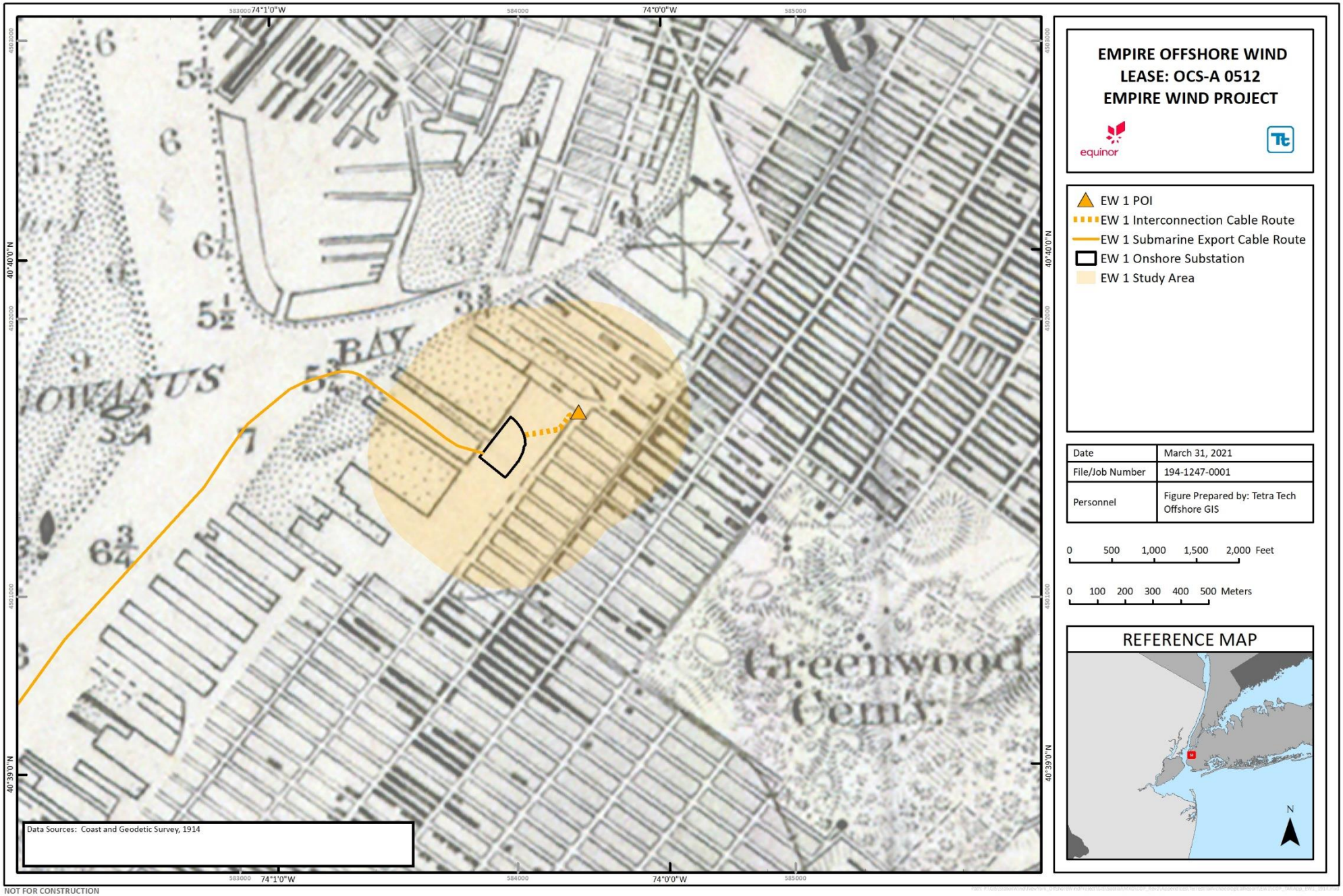


Figure Y-1-10 Coast Survey Chart (1914) Showing EW 1 Export Cable Route

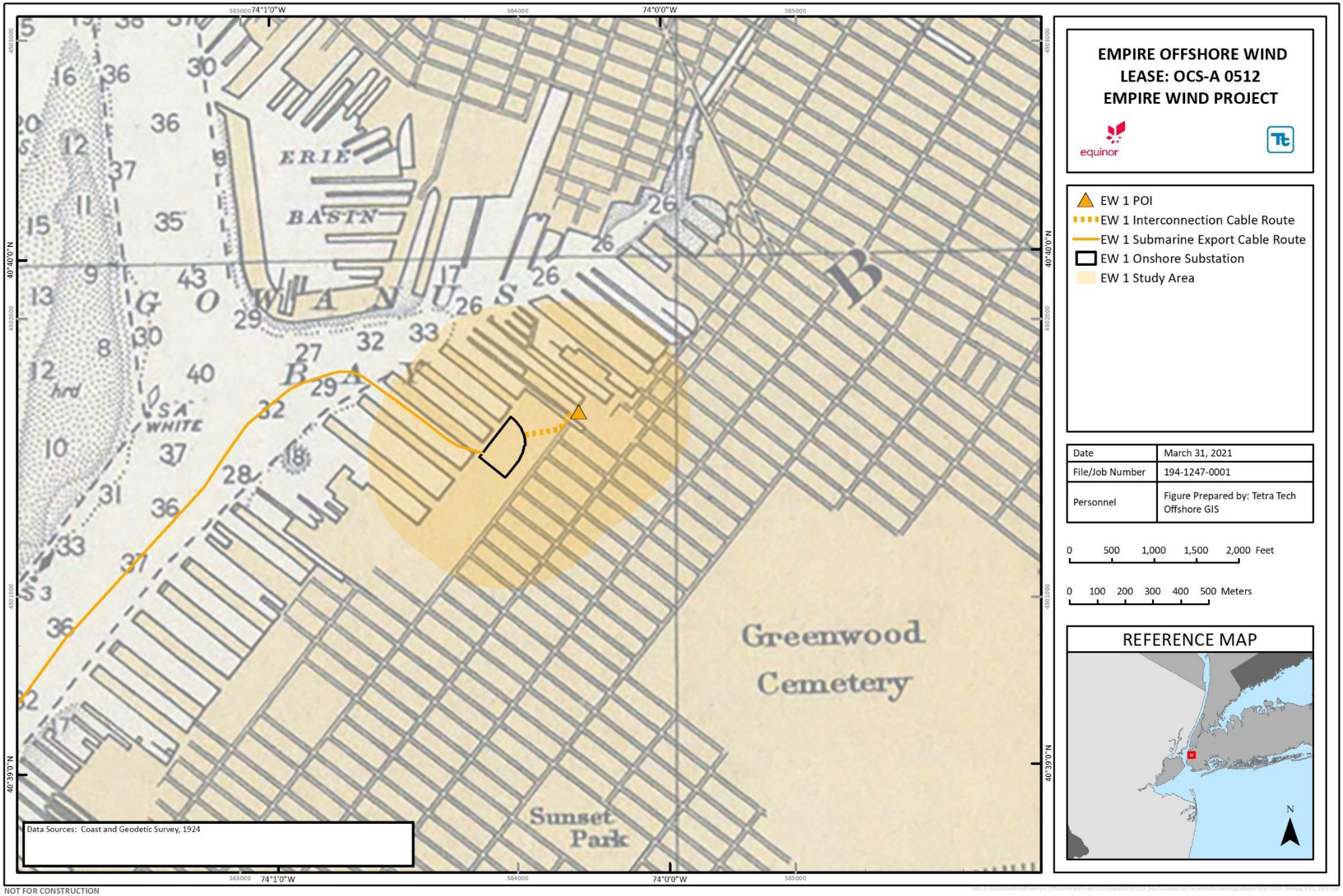


Figure Y-1-11 Coast Survey Chart (1924) Showing EW 1 Export Cable Route

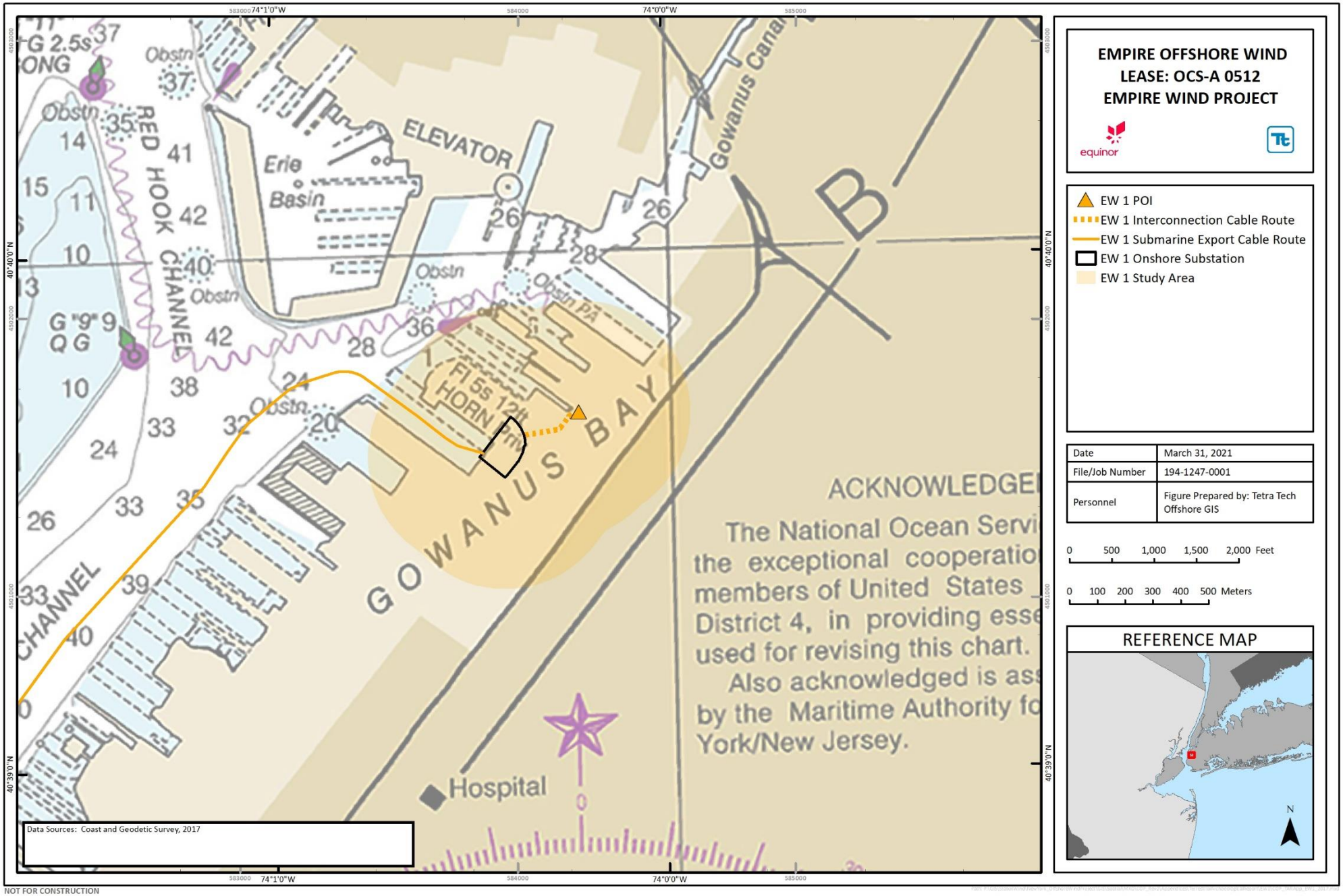


Figure Y-1-12 Coast Survey Chart (2017) Showing EW 1 Export Cable Route

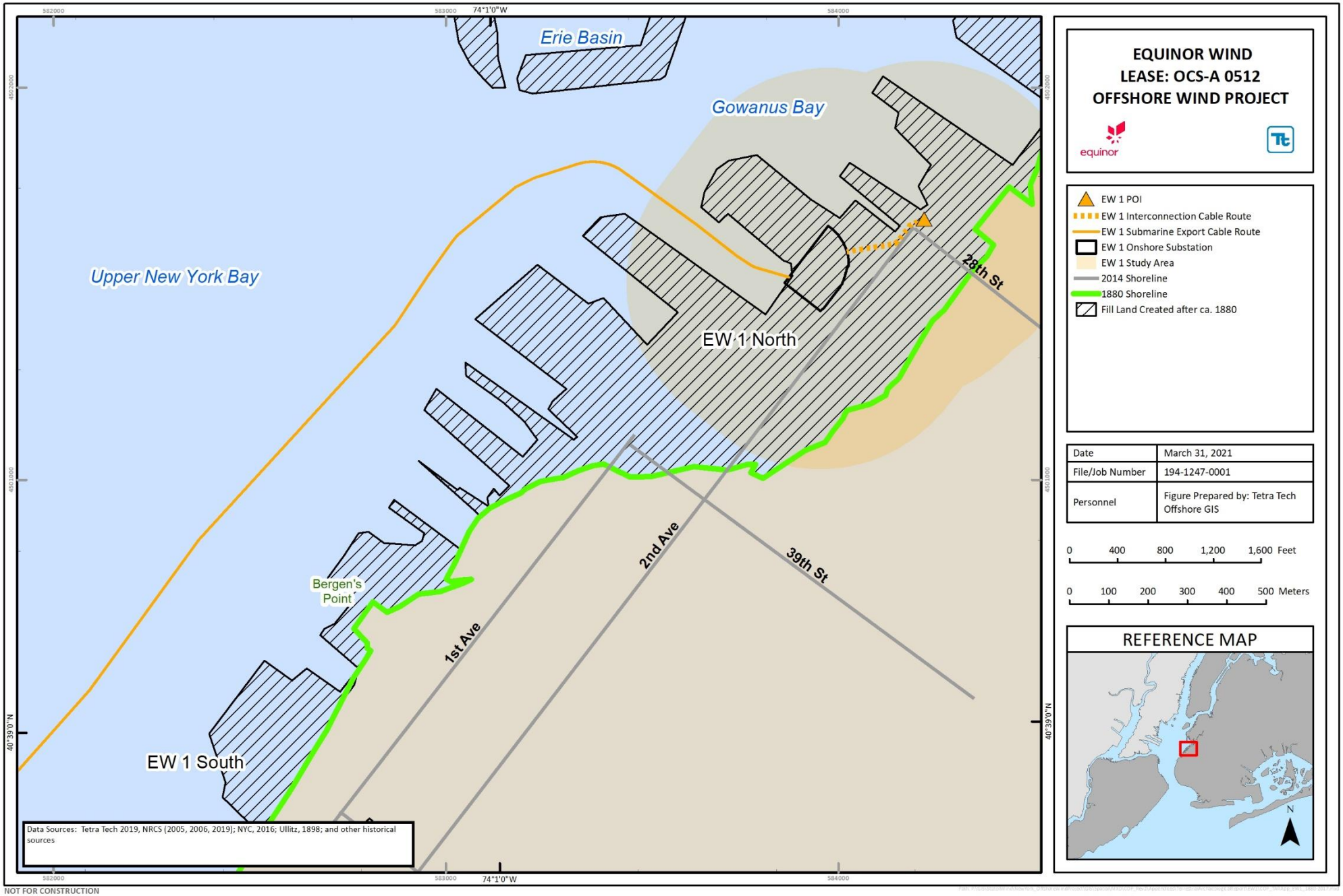


Figure Y-1-13 Gowanus Bay Shoreline Change, 1880-2017

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Tetra Tech, Inc. (Tetra Tech)
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Addendum A – Agency Correspondence

TETRA TECH

December 13, 2018

Tim Lloyd, Ph.D.
Archaeology Unit
New York State Division for Historic Preservation
Peebles Island Resource Center
Delaware Avenue
Cohoes, NY 12047

Subject: **Equinor Wind US – Empire Wind Project**
Kings, Nassau, and Suffolk Counties, NY
Initiate Project Review Under Section 106 of National Historic Preservation Act
NY Project #: 18PR07274

Dear Dr. Lloyd:

Tetra Tech is currently under contract to Equinor Wind US (Equinor) to assist with the siting and permitting of a proposed offshore wind energy project associated with the Bureau of Ocean Energy Management's (BOEM's) Lease Area OCS-A-0512 (the Project). The Project is planned for an area of approximately 80,000 acres in federal waters, located an average of 20 miles south of Long Island, east of the Rockaways (Figure 1). The Project could have the capacity to produce up to approximately 2,100 megawatts (MW) of electricity, enough to power one million homes. Equinor is currently developing the federal and state permit applications that will support construction, operation, and decommissioning of the proposed offshore wind farm(s) on the lease site where development occurs.

The energy produced by the offshore facilities could be transmitted to as many as three substations: Oceanview Substation, Neptune, Monmouth County, New Jersey; Gowanus Generating Station, Brooklyn, Kings County, New York; and Ruland Road Substation, Village of Melville in the Town of Huntington, Suffolk County, New York. As such, the New Jersey portion of the Project has been named "Boardwalk Wind" and the New York portion of the Project has been named "Empire Wind." Multiple potential routes for underwater transmission lines, landfall locations, and upland transmission to the respective substations are currently under review (Figure 1). The lead federal agency for the Project is BOEM. Among many studies that are currently planned or in progress to satisfy federal and state permitting requirements are investigations related to cultural resources. Upland archaeological surveys, historic architecture surveys, and underwater surveys will be performed in compliance with Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800, and with state

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guidelines of New Jersey and New York. Equinor will also be submitting this Project Review to the New Jersey State Historic Preservation Office in parallel with this request.

A goal of this letter is to present an overview of the approach that Tetra Tech will take to perform cultural resources studies in New York on behalf of Equinor as this work continues into 2019. We would appreciate hearing any comments or questions you may have about our proposed approach by **January 4, 2019.**

Upland Archaeology Survey

Tetra Tech will perform background research within a study area that extends approximately one mile around potential land cable routes. The Project's Area of Potential Effects (APE) for archaeology includes all areas where ground-disturbing activity will take place including export cable corridors and all associated appurtenances such as landfalls, horizontal direct drill (HDD) entry and exit locations, workspaces, equipment laydown areas, and access roads. Tetra Tech has been performing in-field reconnaissance of the alternative routes under consideration by Equinor's design team to identify areas that are both potentially sensitive for containing archaeological sites that may be eligible to the NRHP and testable. Equinor currently proposes to place its upland transmission lines within existing rights-of-way to the maximum extent practicable, primarily following public roadways. All transmission cables will be installed subsurface, as well as any supporting infrastructure (e.g., jointing vaults or manholes), to the extent practicable. In New York, several alternatives under consideration would bring transmission through extant streets located within made-land. These areas will not be recommended for archaeological investigation. Other segments of alternatives under consideration extend through portions of the Massapequa Preserve, Owls Head Park, and some sections of Shore Road Park that are located on fast land. Review of historic cartographic sources suggest that some of these areas may have potential to contain archaeological sites and they may be recommended for focused and limited subsurface testing. Additionally, areas that have been previously surveyed for other projects for which reports are available are identified. These areas are illustrated in Figures 2a and 2b.

Historic Architecture Survey

Tetra Tech's architectural historian is working with the visual impact assessment team to identify areas from which the offshore project may be visible and to identify project effects to aboveground cultural resources listed in and/or eligible to the NRHP. As a starting point, the visual assessment study area is a 35-mile radius around the proposed offshore Lease Area, as described in the draft visual impact assessment study plan, previously provided on November 7, 2018, and for which SHPO provided responses on November 29, 2018. The actual APE for historic architecture is anticipated to be within 0.5 km (0.3 mile) of shorelines within the Visual Study Area (Figure 3) where at least the hub of the turbines and above are visible. Properties most likely to be affected within the APE would likely comprise aboveground cultural resources listed in, eligible to, or potentially eligible to the NRHP that are associated with maritime settings. These cultural resources would be the focus of inventory and evaluation by the team's architectural historian.

Underwater Survey

Underwater survey will be performed for this Project by Tetra Tech's subcontractor, SEARCH, Inc. The study area for underwater archaeology will comprise the Lease Area depicted in Figure 1, and the submarine cable routes under consideration (Figure 1). Systematic remote sensing survey involving use of a combination of high resolution sub-bottom profiler, magnetometer, and side scan sonar technologies implemented along transects that generally do not exceed 30 meter intervals and that satisfy BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (March 2017) will be used to collect geophysical data within the entire Lease Area and within a 500-foot-wide submarine cable corridors. These data will be assessed by a qualified marine archaeologist to identify potentially archaeologically sensitive locations of submerged landforms that have potential to contain NRHP-eligible sites possibly related to Archaic and Paleo-Indian prehistoric time periods, and to identify potential targets suggestive of submerged marine-related cultural resources that may also be eligible to the NRHP.

We look forward to hearing from you about any concerns you and your staff may have related to our approaches to upland archaeology, historic architecture, and marine archaeology. Thank you for your attention and consideration of this Project.

Very truly yours,

Sydne B. Marshall, Ph.D., RPA
Cultural Resources Lead

Attachments:

Figure 1 Project Overview
Figure 2a Cultural Resources Survey: Gowanus Alternative
Figure 2b Cultural Resources Survey: Ruland Rd. Alternative
Figure 3 Project Visual Study Area and Historic Architecture APE

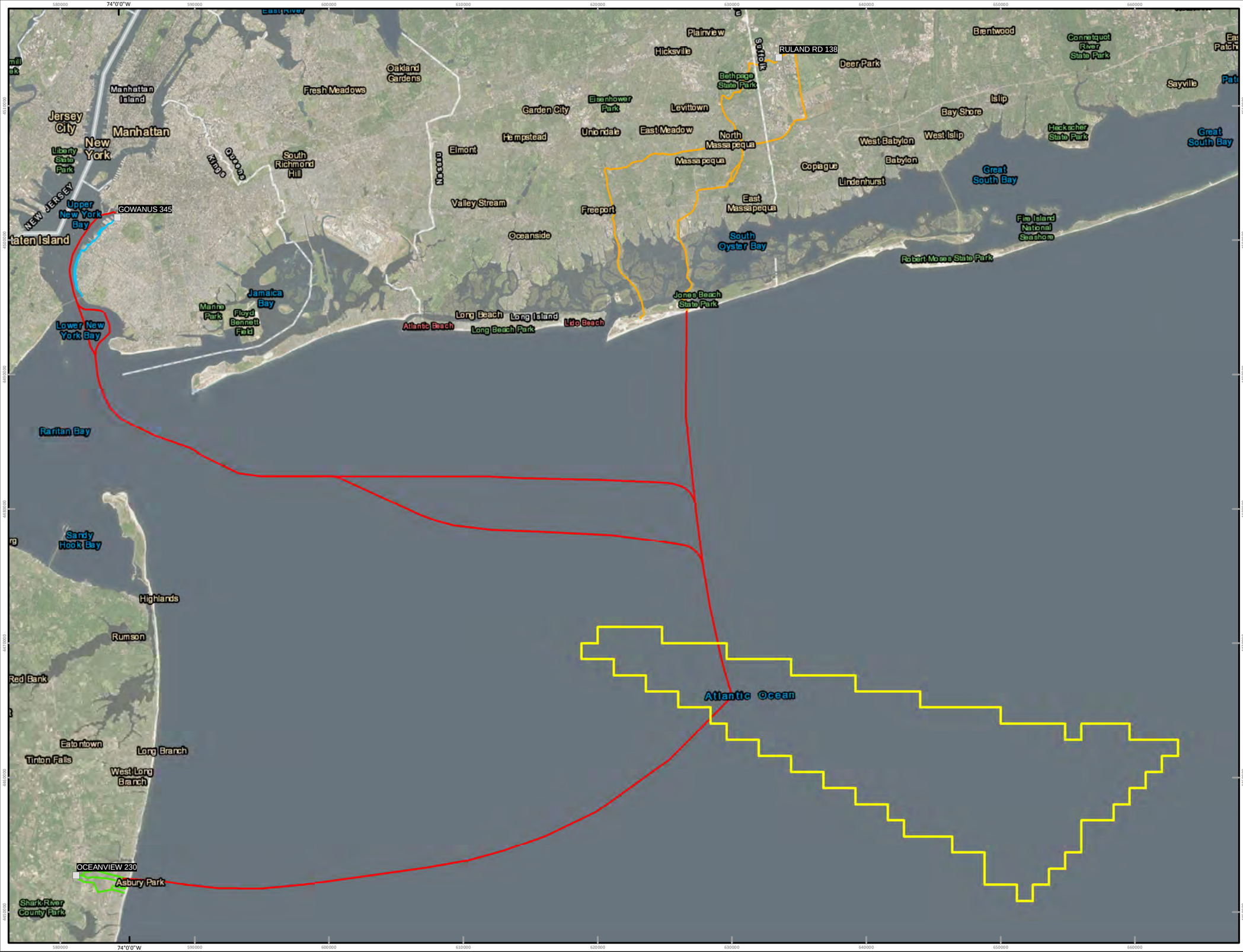
cc: M. Goff (Equinor)
L. Morales (Equinor)
S. Lundin (TT PM)
N. Schils (TT DPM)
R. Jacoby (TT)
C. Borstel (TT)
J. Sexton (TT)

Empire Wind Project

Figure 1

PROJECT OVERVIEW

equinor



Lease Area

Approximate Offshore Cable Route Corridor (500 ft wide)

Onshore Route Alternatives (Gowanus)

Onshore Route Alternatives (Oceanview)

Onshore Route Alternatives (Ruland Rd.)

Substation

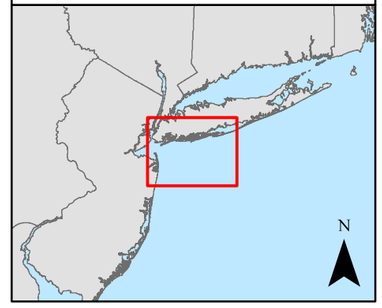
Date	12/4/2018
File/Job Number	
Personnel	Figure Prepared by:

0 1 2 3 4 Miles

0 1 2 3 Nautical Miles

0 2 4 6 8 Kilometers

REFERENCE MAP



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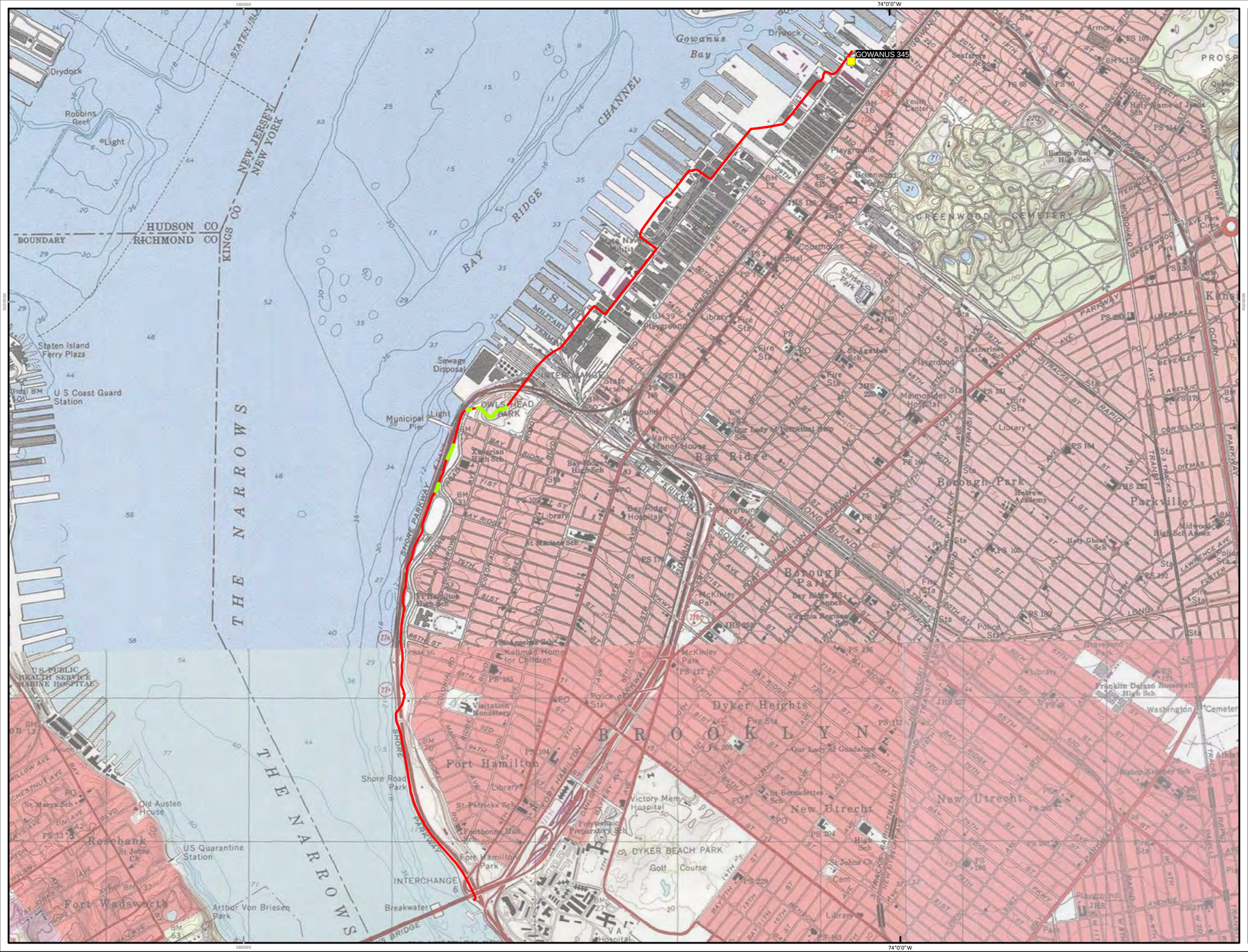

Empire Wind Project

Figure 2a

Cultural Resources Survey:
Gowanus Alternative

equinor

- Substation
- Previously Surveyed
- Recommended for Survey
- Recommended No Survey

PRELIMINARY – SUBJECT TO CHANGE

Date	12/12/2018
File/Job Number	
Personnel	Figure Prepared by:

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0 0.2 0.4 Nautical Miles

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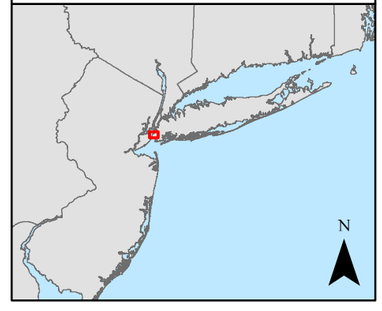

Empire Wind Project
Figure 2b

Cultural Resources Survey:
Ruland Rd. Alternative

equinor

RULAND RD 138

- Substation
- Previously Surveyed
- Recommended for Survey
- Recommended No Survey

PRELIMINARY – SUBJECT TO CHANGE

Date	12/12/2018
File/Job Number	
Personnel	Figure Prepared by:

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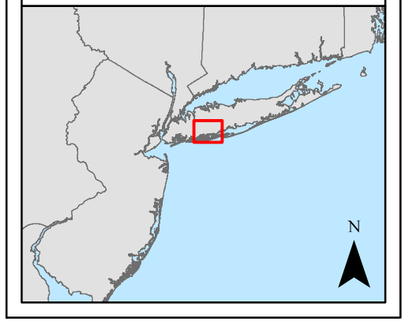
0 0.5 1 Nautical Miles

0 0.5 1 1.5 2 Kilometers

REFERENCE MAP



Empire Wind Project

Figure 3

Project Visual Study Area
and Historic Architecture APE

equinor

Historic Architecture Survey – Area of Potential Effects (APE)

35-mile Visual Study Area

Lease Area (OCS-A-05412)

Substation

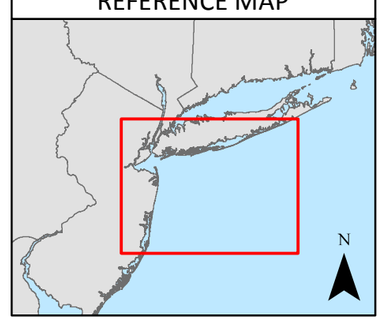
Date	12/4/2018
File/Job Number	
Personnel	Figure Prepared by:

0 2 4 6 8 Miles

0 2 4 6 Nautical Miles

0 3 6 9 12 Kilometers

REFERENCE MAP



RULAND RD 138

GOWANUS 345

OCEANVIEW 230

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NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation, and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

December 19, 2018

Dr. Sydne Marshall
Cultural Resources Discipline Lead
Tetra Tech
6 Century Drive, Suite 300
Parsippany, NJ 07054

Re: BOEM
Empire Wind Offshore Wind Farm Project
18PR07274

Dear Dr. Marshall:

Thank you for requesting the comments of the New York State Historic Preservation Office (SHPO). We have reviewed the submitted materials in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include other environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York State Environmental Conservation Law Article 8).

We have reviewed your letter dated December 13, 2018, describing your overall approach to cultural resources surveys of terrestrial archaeology, underwater archaeology, and historic architecture. We find the approach detailed in your letter to be acceptable.

On Page 2 you state, “Tetra Tech will perform background research within a study area that extends approximately one mile around potential land cable routes.” SHPO will accept a reduction of the background research study area to one-quarter mile on each side of the proposed land cable routes, making a total study area width of one-half mile straddling the cable route.

If further correspondence is required regarding this project, please refer to the SHPO Project Review (PR) number noted above. If you have any questions I can be reached at 518-268-2186.

Sincerely,

Tim Lloyd, Ph.D., RPA
Scientist - Archaeology
timothy.lloyd@parks.ny.gov

via e-mail only

TETRA TECH

August 22, 2019

Tim Lloyd, Ph.D.
Archaeology Unit
New York State Division for Historic Preservation
Peebles Island Resource Center
Delaware Avenue
Cohoes, NY 12047

Subject: **Equinor Wind US – Lease Area OCS-A 0512 Offshore Wind Project**
Nassau County, NY
Update Regarding Empire Wind Project
18PR07274

Dear Dr. Lloyd:

As described in a letter to you dated December 13, 2018, Tetra Tech is currently under contract to Equinor Wind US (Equinor) to assist with the siting and permitting of a proposed offshore wind energy project associated with the Bureau of Ocean Energy Management's (BOEM's) Lease Area OCS-A-0512 (the Project). This letter provides an update on the upland routes under consideration for the Project.

As previously described, the Project is planned for an area of approximately 80,000 acres in federal waters, located an average of 20 miles south of Long Island, east of the Rockaways (Figure 1). The Project could have the capacity to produce up to approximately 2,100 megawatts (MW) of electricity, enough to power one million homes. Equinor is currently developing the federal and state permit applications that will support construction, operation, and decommissioning of the proposed offshore wind project.

The lead federal agency for the Project is BOEM. Among many studies that are currently planned or in progress to satisfy federal and state permitting requirements are investigations related to cultural resources. Upland archaeological surveys, historic architecture surveys, and underwater surveys are ongoing in compliance with Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800, and with state guidelines of New York.

In New York, the energy produced by the offshore facilities could be transmitted to two substations. As announced by Governor Cuomo on July 18, 2019, the first phase, known as the Empire Wind Project, proposes to connect into the Gowanus Generating Station, Brooklyn, Kings County, New York. A subsequent phase considers connection to the Barrett substation, located in the Town of Hempstead,

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Nassau County, New York. An additional phase, the Boardwalk Wind Project, proposes to bring energy to New Jersey.

A goal of this letter is to present an update of the Project's upland energy transmission routes since the December 2018 letter. Although Equinor maintains its request for interconnection at the Ruland Road substation, the Barrett substation route has been added for consideration. Tetra Tech continues to perform the background research that will include the added route as part of the Area of Potential Effects (APE). Tetra Tech has been performing in-field reconnaissance of the Barrett Onshore Export Cable Route to identify areas that are both potentially sensitive for containing archaeological sites that may be eligible to the NRHP and testable. As noted in the earlier correspondence, Equinor currently expects to place its upland transmission lines within existing rights-of-way to the maximum extent practicable, primarily following public roadways. All transmission cables will be installed subsurface, as well as any supporting infrastructure (e.g., jointing vaults or manholes), to the extent practicable. The proposed transmission routes are shown in the attached figures and are described below.

Gowanus Onshore Route

The Gowanus Export Cable is proposed to make landfall in Gowanus, Brooklyn NY, with two parcels currently under consideration as the substation with which the onshore route would tie in: the Eastern Generation Narrows Substation (EGNS) and the South Brooklyn Marine Terminal (SBMT). From the EGNS site, the Gowanus Onshore Export Cable would traverse approximately 8,900 feet through portions of 1st Avenue, 2nd Avenue, and the margins of Bush Terminal including Bush Terminal Park, ultimately connecting into the Gowanus Generating Station. From the SBMT site, the Gowanus Onshore Export Cable route traverses north into the Gowanus Generating Substation (see Figure 2). A review of nineteenth century maps of the Brooklyn shoreline indicates that the Terrestrial Archaeological APE occurs in its entirety on landfill constructed into Gowanus Bay in the late nineteenth and early twentieth centuries (NYPL 2019); therefore, no additional areas are recommended for further investigation.

Barrett Onshore Export Cable Route

The Barrett Onshore Export Cable Route is proposed to make landfall on Long Beach Island, Nassau County, New York and extends approximately 3.1 miles northward to the proposed substation located on the E.F. Barrett power station parcel, in the Town of Hempstead, Nassau County, New York (Figure 3). The route would include open trench and trenchless installation of the cable. Open trench installation would occur within surface road ROW, Long Island Rail Road parking ROW, and vacant land parcels. Trenchless crossings, utilizing bores or horizontal direct drilling (HDD), are being considered for large intersections and water crossing (Reynolds Channel) between Long Beach Island and Barnum Island. The offshore cable landfall would bore/drill under the beach and boardwalk at Long Beach and connect to open trench installation along Riverside Boulevard. Equinor is examining two potential trenchless crossings of Reynolds Channel; one extends northward from Riverside Boulevard; the second potential crossing extends northward from Long Beach Road just west of the Long Beach Bridge. The cable route would cross Hog Island Channel, an arm of Barnums Channel, about 650 feet south of the proposed

substation. The substation parcel is adjacent to the existing power station and supports thick scrub-shrub vegetation and wetlands.

A pedestrian reconnaissance was conducted by registered professional archaeologists under contract to Equinor Wind in July 2019. Archaeological sensitivity is judged to be low across the full extent of the Barrett onshore cable route. Based on the site files review and pedestrian reconnaissance, it is recommended that no further archaeological investigations are warranted for the Barrett Onshore Export Cable Route and Onshore Substation.

Field and reporting efforts associated with historic architecture issues and underwater cultural resources issues are also ongoing as described within the December 2018 correspondence.

Please feel free to reach out with any questions or concerns you may have about the upland routes under consideration for the Project.

As always, thank you for your attention and consideration of this Project.

Very truly yours,

Sydne B. Marshall, Ph.D., RPA
Cultural Resources Lead

Attachments:

- Figure 1 – Project Overview
- Figure 2 – Gowanus Alternative
- Figure 3 – Barrett Alternative

cc:
- N. Schils (TT PM)
- K. Miller (TT DPM)
- R. Jacoby (TT)
- C. Borstel (TT)
- J. Sexton (TT)
- Martin Goff (Equinor)
- Laura Morales (Equinor)

View and/or Address a Response

Project 18PR07274: Empire Wind Offshore Wind Farm Project (G7V1SILNVYAF)

•View Project

Please accept the following information below as the consolidated response from NYS SHPO for the above referenced submission.

Review Responses

Reviewer	Review Type	Response
Tim Lloyd	Archaeology	Sydney, I have reviewed your letter dated August 22, 2019, regarding the updates to the project plans and the status of the ongoing cultural resource surveys. I concur with your recommendations regarding archaeological investigations of the Gowanus and Barrett Onshore Cable Routes. I have no comments or questions at this time and look forward to continued consultation.

Information Requests

Process	Status	Reviewer	Review Type	Request Type	Request Entity	Request Item	Request Description

No Request Records

Attachments

Attachment	Reviewer	Review Type	Type Name	Description

No Attachment Records

ATTACHMENT Y-2
EW 2 PHASE I TERRESTRIAL ARCHAEOLOGICAL SURVEY

Empire Offshore Wind: Empire Wind Project (EW 1 and EW 2)

Phase I Terrestrial Archaeological Survey

Empire Wind 2 Onshore Export and Interconnection Cable Corridor and Onshore Substation

City of Long Beach and Town of Hempstead

Nassau County, New York

Prepared for
Empire Offshore Wind LLC

Prepared by
Tetra Tech, Inc.

6 Century Drive, Suite 300
Parsippany, NJ 07054

April 2021

MANAGEMENT SUMMARY

Tetra Tech, Inc. (Tetra Tech) conducted a Phase I terrestrial archaeological survey of the proposed Empire Wind 2 (EW 2) onshore export and interconnection cable corridor and onshore substation for Empire Offshore Wind LLC (Empire) in Nassau County, New York in 2019. The survey was undertaken in support of the development and operation of the Project Area for the generation of offshore wind energy and its transmission to interconnections onshore (the Project) to comply with the Bureau of Ocean Energy Management guidelines regarding the development of offshore wind generated power facilities, New York State guidelines, and to satisfy the requirements of federal permitting under Section 106 of the National Historic Preservation Act of 1966, as amended.

Onshore components of the Project located at the EW 2 export cable landfall sites (for the purposes of this report, will be referred to as the "EW 2 facilities" or "facilities") include: (1) up to two potential export cable landfalls, located in the City of Long Beach and/or in the unincorporated hamlet of Lido Beach, Town of Hempstead, New York; (2) onshore high voltage alternating current onshore export cables installed in subsurface trenches within public road and private property rights-of-way in the City of Long Beach and Town of Hempstead, New York; (3) an onshore substation to be built on one of two parcels in the unincorporated hamlet of Oceanside, Town of Hempstead; and, 4) onshore interconnection cables to be installed in subsurface trenches connecting the onshore substation to the existing Oceanside Point of Interconnection. To assess the potential of the construction, operations, and decommissioning of these Project facilities to affect archaeological resources, Tetra Tech conducted background research including a review of archaeological site and standing structure files maintained by the New York State Office of Parks, Recreation and Historic Preservation, which functions as the state historic preservation office in New York (NY SHPO), and a literature review of pertinent information regarding local geology and soils, topography and hydrology, historical cartography and aerial imagery, and prehistoric and historical development in the Project vicinity. In January 2021, Tetra Tech updated the site file review to capture any resources that may have been added to the database since the original file review in November 2018.

Tetra Tech concludes that no National Register of Historic Places (NRHP) listed, eligible or potentially eligible archaeological resources are known within the Area of Potential Effects evaluated during this Phase I Terrestrial Archaeological Survey. Tetra Tech also concludes that, overall, the onshore portions of the Project possess low sensitivity to contain intact archaeological resources that might be eligible for listing on the NRHP. This assessment of low sensitivity is due to prior large-scale natural or ground disturbing activities including: (1) barrier island dynamics; (2) early twentieth century dredging and land-filling of marshland; (3) the construction of suburban developments on Long Beach Island, Barnum Island, and adjacent marshland; (4) the cyclical episodes of infrastructure repair and replacement beneath surface roads where the export cable is to be installed; and, (5) industrial development and demolition of a tank farm, and subsequent redevelopment at the proposed location of the EW 2 Onshore Substation A. Based on this assessment of overall low sensitivity, Tetra Tech recommended that a Phase IB archaeological survey was not warranted.

Tetra Tech further concludes that Project elements will cross a relict upland that exhibits potential for the presence of undisturbed native soils beneath road pavement and possesses moderate archaeological sensitivity. Tetra Tech therefore recommends that:

- Construction and operations of the Project be permitted within the areas surveyed;
- As deemed necessary by the NY SHPO, an archaeological monitor will be present at three locations during construction phase excavation of the onshore export cable trench. The three locations are:

- An approximately 1,000-foot (300-meter) section of EW 2 Route IP-A from the intersection of Williams Lane and Long Beach Road to the intersection of Long Beach Road and Sherman Road in the incorporated village of Island Park and the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring be undertaken from the vicinity of No. 520 Long Beach Road (latitude 40.610198°N, longitude -73.650853°W) northeastward along Long Beach Road to the vicinity of the intersection of Long Beach Road and Sherman Road (latitude 40.612317°N, longitude -73.648187°W);
- An approximately 250-foot (76-meter) section of EW 2 Route IP-B near its junction with EW 2 Route IP-C at Sherman Road, in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from a point southwest of No. 46 Saratoga Boulevard (latitude 40.610456°N, longitude -73.648133°W) to the corridor's junction with EW 2 Route IP-C (latitude 40.611190°N, longitude -73.648058°W); and
- An approximately 650-foot (200-meter) section of EW 2 Route IP-C from the intersection of Saratoga Boulevard and Sherman Road to the intersection of Sherman Road and Long Beach Road, in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring be undertaken from the vicinity of No. 33 Saratoga Boulevard (latitude 40.610690°N, longitude -73.647847°W) northward along Sherman Road to the intersection of Long Beach Road and Ladomus Avenue (latitude 40.612477°N, longitude -73.648015°W); and

- The goal of archaeological monitoring is to identify any archaeological resources that potentially may be revealed during construction activities. If the archaeological monitor identifies archaeological resources during construction, each resource will be evaluated for its potential eligibility to the NRHP, and if determined NRHP-eligible, Empire will choose an appropriate action, in consultation with NY SHPO, to avoid, minimize, or mitigate Project effects to that resource.

With implementation of the above measures, no significant adverse impacts to archaeological resources would be expected to result from construction or operations of the proposed EW 2 onshore facilities. If any substantial modifications are made to the Project design, consultation with NY SHPO and possibly additional archaeological survey may be necessary.

MANAGEMENT SUMMARY (cont.)

NY SHPO Project Review Number:	18PR07274
Involved State and Federal Agencies:	NY SHPO (Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law) Bureau of Ocean Energy Management (Section 106 of the National Historic Preservation Act)
Phase of Survey:	Phase IA/IB Terrestrial Archaeological Survey
Location Information:	Town of Hempstead and City of Long Beach, Nassau County, New York
Survey Area:	
Project Description:	Offshore Wind Energy Project with associated Onshore Infrastructure
Onshore Project Area:	Onshore Export Cable Corridor of 5.7 miles; Onshore Substation of 7.4 acres
U.S. Geological Survey 7.5-Minute Quadrangle Map:	Hempstead, NY
Archaeological Resources Overview:	No terrestrial archaeological resources have been previously recorded within 1 mile (1.6 kilometers) of the Project
Report Author:	Robert M. Jacoby, M.A., RPA
Date of Report:	April 2021

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ACRONYMS AND ABBREVIATIONS

ac	acre
AD	Anno Domini
APE	Area of Potential Effects
BC	before Christ
BOEM	Bureau of Ocean Energy Management
BP	before present
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
CRIS	Cultural Resource Information System
Empire	Empire Offshore Wind LLC
EW	Empire Wind
EW 2 facilities/facilities	Onshore components of the Project
ft	foot
ha	hectare
km	kilometer
Lease Area	Designated Renewable Energy Lease Area OCS-A 0512
LIRR	Long Island Rail Road
m	meter
mi	mile
NRHP	National Register of Historic Places
NY SHPO	New York State Office of Parks, Recreation and Historic Preservation
OCS	Outer Continental Shelf
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 and the onshore substations.
Tetra Tech	Tetra Tech, Inc.

Y-2.1 INTRODUCTION

Empire Offshore Wind LLC (Empire) proposes to construct and operate the Project located in the designated Renewable Energy Lease Area OCS-A 0512 (Lease Area). The Lease Area covers approximately 79,350 acres (ac, 32,112 hectares [ha]) and is located approximately 14 statute miles (mi; 12 nautical miles, 22 kilometers [km]) south of Long Island, New York and 19.5 mi (16.9 nautical miles, 31.4 km) east of Long Branch, New Jersey (**Figure Y-2-1**).

Empire proposes to develop the Lease Area in two individual phases. The individual phases within the Lease Area will be electrically isolated and independent from each other. Each phase of development will, independently of one another, connect via offshore substations to separate Points of Interconnection (POIs) at onshore locations by way of export cable routes and onshore substations. In this respect, the Construction and Operations Plan (COP) includes two onshore locations in New York where the renewable electricity generated will be transmitted to the electric grid.

A COP was submitted to the Bureau of Ocean Energy Management (BOEM) in January 2020, as required by 30 Code of Federal Regulations (CFR) Part 585. BOEM's approval of the COP, allowing for construction and operations of the Project, is contingent, in part, on the completion of archaeological investigations to identify potentially significant archaeological resources that may be subject to disturbances due to Project activities within the area of potential effects (APE; 30 CFR § 585.626(a)(5)).

This report discusses the Phase I terrestrial archaeological survey of the Empire Wind (EW) 2 onshore export and interconnection cable routes and onshore substation located in the City of Long Beach and the Town of Hempstead, Nassau County, New York (**Figure Y-2-2** and **Figure Y-2-3**). In addition to the EW 2 onshore facilities, Equinor Wind is developing similar onshore infrastructure at EW 1 in Brooklyn, New York (see **Figure Y-2-1**) as an individual phase; a separate report detailing the findings and recommendations of this terrestrial archaeological investigation is attached in **Appendix Y, Attachment Y-1** of the COP (Tetra Tech 2019). The results and recommendations of the Project-related marine archaeological surveys are reported under **Appendix X Marine Archaeological Resources Assessment** of the COP (SEARCH 2018, 2019).

Y-2.1.1 Project Description

The EW 2 Project facilities include four potential export cable landfalls, including: the EW 2 Landfall A (at Riverside Boulevard), the EW 2 Landfall B (at Monroe Boulevard), the EW 2 Landfall C (Lido Beach West Town Park), and the EW 2 Landfall D (Lido Beach Town Park); and eleven onshore export cable route segments, EW 2 Long Beach A through E (EW 2 Route LB-A to -E), the EW 2 Route LB Variant, and EW 2 Island Park A through E (EW 2 Route IP-A to -E). These segments will be used to mature the development of up to two complete onshore export cable routes, from landfall to the onshore substation. There are two HDD sites for crossing Reynolds Channel, which separates Long Beach Island and Barnum Island, connecting the EW 2 LB onshore export cable route segments to the EW 2 IP onshore export cable route segments. Two onshore substation parcels are under consideration, EW 2 Onshore Substation A and EW 2 Onshore Substation B. Two interconnection cable routes connecting the onshore substation to the existing Oceanside POI are also proposed; the EW 2 Interconnection Cable Route A (EW 2 Route IC-A) will connect the EW 2 Onshore Substation A to the POI, while the EW 2 Interconnection Cable Route B (EW 2 Route IC-B) will connect the EW 2 Onshore Substation B to the POI. The onshore export and interconnection cables will be installed within the rights-of-way of the corridor segments. Typically, the onshore export and interconnection cables will be installed approximately 3 to 10 feet (ft, 0.9 to 3 meters [m]) below grade within open-cut trenches on road shoulders, sidewalks, parking areas, or within transit and utility easements.

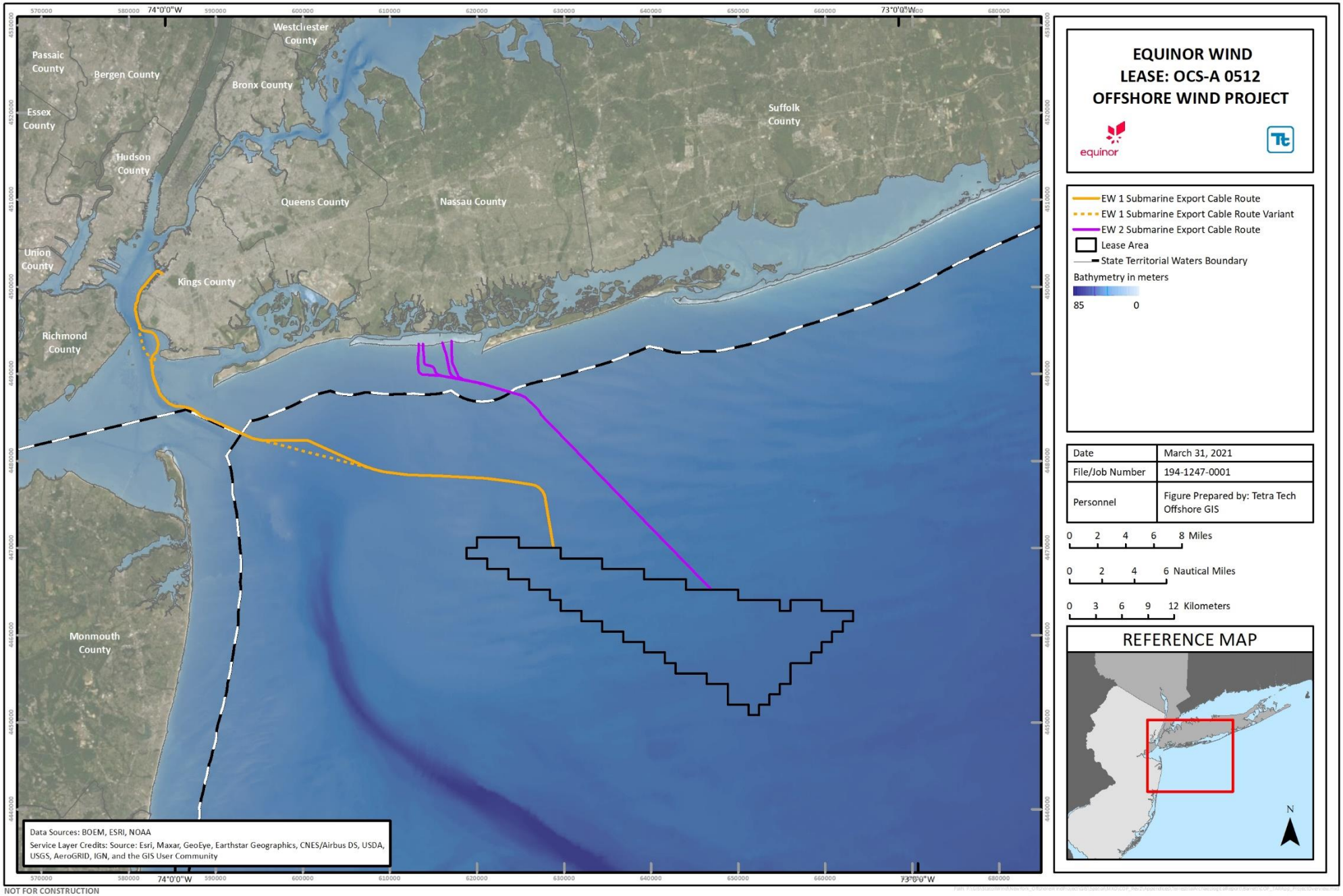

Figure Y-2-1 Project Overview

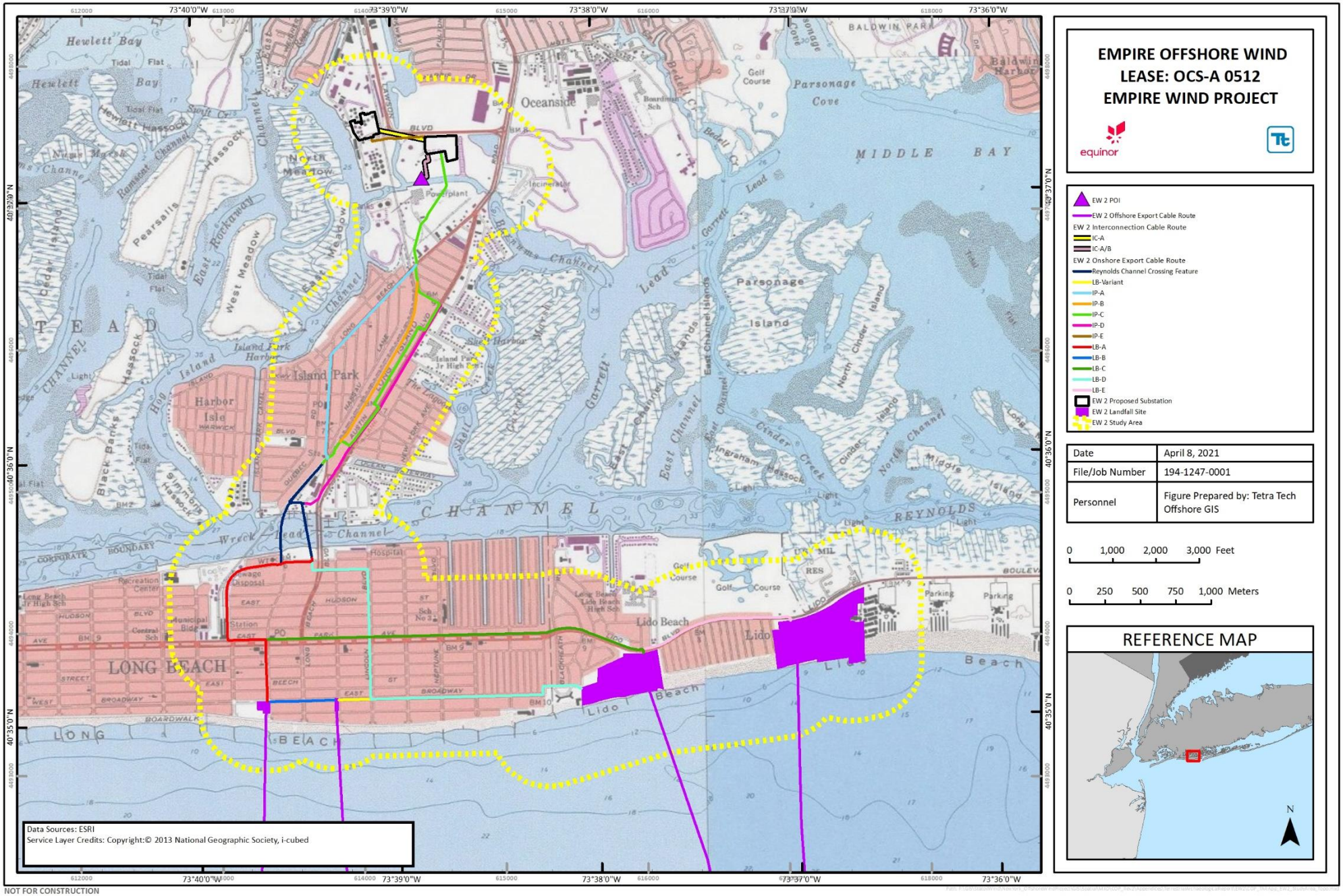

Figure Y-2-2 EW 2 Onshore Export and Interconnection Cable Route Corridor and Study Area Overview, Topography

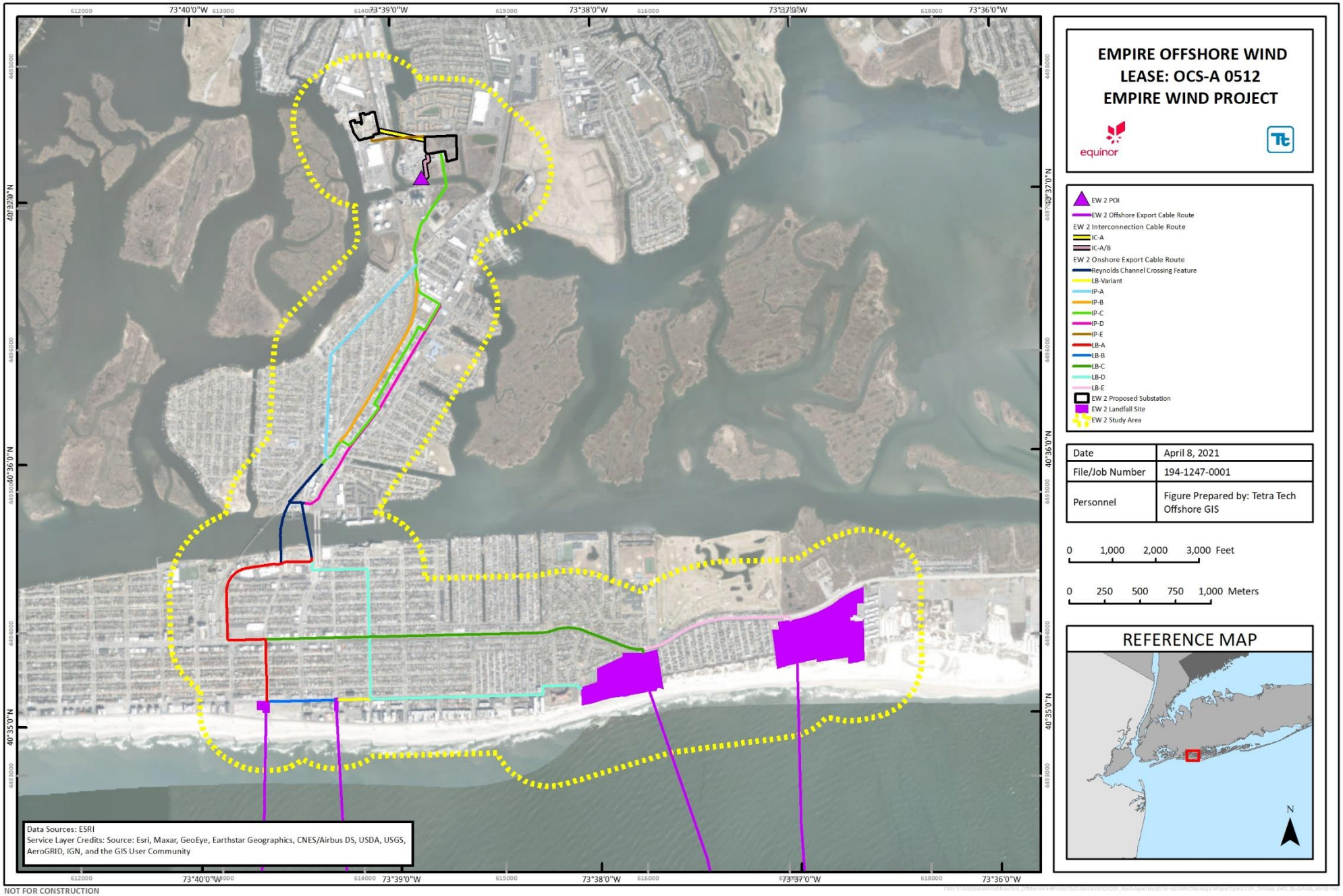

Figure Y-2-3 EW 2 Onshore Export and Interconnection Cable Route Corridor and Study Area Overview, Aerial

The four potential landfalls (**Figure Y-2-2** and **Figure Y-2-3**), include: **EW 2 Landfall A:** Riverside Boulevard, **EW 2 Landfall B:** Monroe Boulevard, **EW 2 Landfall C:** Lido Beach West Town Park, and **EW 2 Landfall D:** Lido Beach Town Park. The respective onshore export and interconnection cable corridor segments are:

EW 2 Route LB-A:

- from EW 2 Landfall A, Riverside Boulevard, 1 mi (1.5 km)

EW 2 Route LB-B:

- from EW 2 Landfall B, Monroe Boulevard, 0.1 mi (0.1 km)
- East Broadway, 0.3 mi (0.5 km)
- junction with EW 2 Route LB-A

EW 2 Route LB-C:

- from EW 2 Landfall C, Parking lot, 0.1 mi (0.2 km)
- Lido Boulevard/East Park Avenue, 1.7 mi (2.7 km)
- junction with EW 2 Route LB-A

EW 2 Route LB-D:

- from EW 2 Landfall C, Parking lot, 0.3 mi (0.5 km)
- Richmond Road, 0.2 mi (0.2 km)
- Maple Boulevard, 0.04 mi (0.06 km)
- East Broadway, 0.8 mi (1.2 km)
- Lincoln Boulevard, 0.6 mi (0.9 km)
- East Harrison Street, 0.2 mi (0.3 km)
- Long Beach Boulevard (transverse), 0.03 mi (0.05 km)
- Long Beach Road, 0.04 mi (0.06 km)
- junction with EW 2 Route LB-A

EW 2 Route LB-E:

- from EW 2 Landfall D, Ball Field, 0.1 mi (0.2 km)
- Lido Boulevard, 0.6 mi (0.9 km)
- junction with EW 2 Route LB-C or EW 2 Route LB-D

EW 2 Route LB Variant:

- diverge from EW 2 Route LB-D at Lincoln Boulevard
- East Broadway, 0.2 mi (0.2 km)
- junction with EW 2 Route LB-B

Reynolds Channel Crossing:

- Riverside Boulevard extension, 0.1 mi (0.1 km) and 1 acre (0.4 ha)
- Park Place, 0.1 mi (0.2 km) and 1.4 ac (0.6 ha)
- Railroad Place, 2.4 ac (1 ha)

- Long Island Rail Road (LIRR) Parking Lot, and 0.9 acre (0.4 ha)

EW 2 Route IP-A:

- from the Reynolds Channel Crossing, at the intersection of Long Beach Road and the LIRR in the vicinity of the LIRR Island Park station
- Long Beach Road, 1 mi (1.6 km)
- junction with EW 2 Route IP-C at Ladomus Avenue

EW 2 Route IP-B:

- from the Reynolds Channel Crossing, in LIRR Island Park station parking lot
- LIRR service road, 0.8 mi (1.3 km)
- junction with EW 2 Route IP-C at Sherman Road

EW 2 Route IP-C:

- from the Reynolds Channel Crossing, Service roads and LIRR parking lot, 0.6 mi (0.9 km)
- Sagamore Road, 0.03 mi (0.05 km)
- Industrial Place, 0.4 mi (0.6 km)
- Trafalgar Boulevard, 0.03 mi (0.05 km)
- Austin Boulevard, 0.1 mi (0.2 km)
- Sherman Road, 0.2 mi (0.3 km)
- Long Beach Road, 0.04 mi (0.06 km)
- Ladomus Avenue, 0.05 mi (0.07 km)
- EW 2 Onshore Substation B site, 0.5 mi (0.8 km)

EW 2 Route IP-D:

- from the Reynolds Channel Crossing, parking lot and side yard, 0.05 mi (0.08 km)
- Austin Boulevard, 1 mi (1.6 km)
- junction with EW 2 Route IP-C at Saratoga Boulevard.

EW 2 Route IP-E:

- from the junction of EW 2 Route IP-C at the EW 2 Onshore Substation B site
- within the EW 2 Onshore Substation B site, 0.2 mi (0.4 km)
- cross the LIRR right of way to the west 0.6 mi (0.1 km)
- traverse Daly Boulevard to the north, 0.2 mi (0.3 km)
- EW 2 Onshore Substation A site.

EW 2 Onshore Substation A:

- Daly Boulevard and Hampton Road, Oceanside, New York, 6.2 ac (2.5 ha)

EW 2 Onshore Substation B:

- 4001 Daly Boulevard, Oceanside, New York, 7.2 ac (2.9 ha)

EW 2 Route IC-A:

- HDD from the EW 2 Onshore Substation A site to the EW 2 Onshore Substation B site, 0.3 mi (0.5 km)
- within the EW 2 Onshore Substation B parcel, 0.2 mi (0.3 km)

EW 2 Route IC-B:

- within the EW 2 Onshore Substation B parcel, 0.2 mi (0.3 km)

Y-2.1.2 Regulatory Authority

The Project is subject to regulation by BOEM under provisions of the Outer Continental Shelf (OCS) Renewable Energy Program authorized by the Energy Policy Act of 2005 (42 United States Code §§ 13201 *et seq.*). In 2016, BOEM executed a Programmatic Agreement (2016) with the State Historic Preservation Officers of New Jersey and New York, 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. The Programmatic Agreement recognized that issuing renewable energy leases in the OCS constituted an undertaking subject to Section 106 of the National Historic Preservation Act of 1966, as amended. BOEM, as lead federal agency in this process, has authority to initiate consultations with state historic preservation offices, and to consult with interested Native American Tribes.

Y-2.1.3 State Historic Preservation Office Coordination

As per the Programmatic Agreement, BOEM authorized Empire and its consultants to coordinate with the New York State Office of Parks, Recreation and Historic Preservation (NY SHPO) prior to initiation of cultural resource surveys. Tetra Tech provided NY SHPO with a work plan, dated December 13, 2018, that included a Project description, a direct effects APE defined as "… all areas where ground-disturbing activity will take place including export cable corridors and all associated appurtenances such as landfalls, horizontal direct drill entry and exit locations, workspaces, equipment laydown areas, and access roads," and methodological approaches to conducting cultural resource surveys of terrestrial archaeology (including a 1-mi (1.6-km) Study Area buffer around the onshore export and interconnection cable route), marine archaeology, and historic architecture (**Addendum A**). In a letter dated December 19, 2018, NY SHPO approved Tetra Tech's work plan and noted that the agency would accept a reduction to 0.25 mi (0.4 km) on each side of the proposed onshore export and interconnection cable routes, for a 0.5-mi (0.8-km) buffer total. After this approval, Empire revised its export cable routing to include the EW 2 onshore export and interconnection cable corridors to the existing Oceanside POI; thus, Tetra Tech provided NY SHPO with a revised work plan and Project description, dated August 22, 2019. NY SHPO, in a response dated August 30, 2019, accepted this work plan and expressed no further comments or questions. Tetra Tech will provide NY SHPO with an updated Project description, this report will be updated once a response is received back (**Addendum A**). Separate reports detailing the findings and recommendations of this terrestrial archaeological investigation are provided in **Addendum A.**

Y-2.2 RESEARCH DESIGN

This section describes the objectives and methods of the Phase I survey.

Y-2.2.1 Survey Objectives

The purpose of the terrestrial archaeological survey was to satisfy regulatory compliance with BOEM's Section 106 review of Empire's COP. The survey objectives were to:

- Investigate the direct and indirect effects APE and identify archaeological resources that are present therein;
- Evaluate the significance of each identified resource and determine if it may be potentially eligible for listing on the National Register of Historic Places (NRHP);
- Make recommendations to avoid, minimize Project effects on, or mitigate effects to significant archaeological resources if Project avoidance is not achievable; and
- Register new archaeological sites with NY SHPO and update state site forms for previously documented sites that were re-located during the survey.

Y-2.2.2 Research Methods

Tetra Tech developed research methods for the Phase I survey that are in accordance with New York Archaeological Council standards for archaeological investigations (NYAC 1994). BOEM's guidelines for archaeological reporting pursuant to offshore wind projects (2017) do not provide specific procedures for conducting survey of terrestrial archaeology.

Y-2.2.2.1 Study Area

To provide as much flexibility as possible in its early project design, Tetra Tech focused investigations on the onshore export and interconnection cable routes and onshore substation locations plus a 0.25-mi (0.4-km) radius buffer (0.5 mi [0.8 km] total) around it (the Study Area). The direct effects APE was defined as any areas where Project construction, operations, or maintenance will result in ground disturbing activities.

Y-2.2.2.2 Area of Potential Effects

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" (36 CFR § 800.16(d)). Regarding known and potential archaeological resources, this area typically refers to the direct effects APE, which is the area of ground disturbance associated with the Project's construction, operations, maintenance, and decommissioning. Indirect effects to archaeological resources are less common but might include visual or auditory impacts that would adversely affect the character and setting of a significant archaeological site.

The APE for archaeology consists of areas directly or indirectly affected by ground disturbing activities associated with construction and operations and maintenance, including but not limited to trench excavating, bore and drill pads, substation construction, laydown yards, and workspaces. The site files review undertaken established that there are no NRHP-listed or NRHP-eligible sites within the Study Area, precluding any indirect effects to significant archaeological resources caused by Project activities; therefore, indirect effects will not be discussed further in this report. A summary of the maximum design scenario parameters associated with direct impacts within the APE are detailed in **Table Y-2-1**.

Table Y-2-1 Summary of Realistic Maximum Design Scenario Parameters for Terrestrial Archaeological Resources

Parameter	Realistic Maximum Scenario	Rationale
Export cable landfall	HDD in up to a 246-ft by 246-ft (75-m by 75-m) area; maximum vertical disturbance of up to 10 ft (3 m)	Representative of the maximum area to be utilized to facilitate the export cable landfall, which would result in the maximum area of ground disturbance.

Parameter	Realistic Maximum Scenario	Rationale
Onshore export and interconnection cables	Up to 5.7 mi (9.2 km) of onshore export and interconnection cables. Maximum vertical disturbance of up to 10 ft (3 m); maximum horizontal disturbance of up to 150 ft (46 m).	Representative of the maximum length of onshore export and interconnection cables to be installed, which would result in the maximum area of ground disturbance.
Onshore substations	Up to an 7.4-ac (3.0-ha) area. Maximum vertical disturbance up to 15 ft (4.5 m).	Representative of the maximum area to be utilized to facilitate the construction of the onshore substation, which would result in the maximum area of ground disturbance.

Y-2.2.2.3 Background Research

Tetra Tech conducted background research and literature review on topics pertinent to an understanding of the environmental setting and historical development of the Study Area. These topics included bedrock geology, hydrology, soils, Native American land use, Euro-American settlement history, and socio-economic transformations. Tetra Tech reviewed historic maps and aerial imagery to identify documented structures, historic roads, and other landscape features present within the Study Area and the APE.

Y-2.2.2.4 Site File Review

A research objective to identify local patterns in the archaeological record was achieved via a review of NY SHPO's Cultural Resource Information System (CRIS), an online archive of site files and survey reports that is viewable to qualified professionals. The review encompassed a Study Area extending in a 0.25-mi (0.4-km) radius from the proposed EW 2 onshore facilities. Tetra Tech reviewed CRIS for information relating to site location and type, temporal period, and NRHP-status, in addition to information regarding prior archaeological surveys conducted within the Study Area. In January 2021, Tetra Tech updated the site file review to capture any resources that may have been added to the database since the original review in November 2018. The 2021 review identified no additional sites or archaeological surveys within the Study Area.

Y-2.2.2.5 Pedestrian Reconnaissance

On July 24, 2019, Tetra Tech archaeologists conducted a pedestrian reconnaissance of the onshore export and interconnection cable corridor. The proposed EW 2 Onshore Substation B parcel is sited on made-land within high-security fencing and was not accessed. This reconnaissance was undertaken to evaluate the extent of prior ground disturbance within the APE, and to identify locales within the APE that might have the potential to contain undocumented archaeological resources.

Y-2.3 ENVIRONMENTAL AND CULTURAL SETTING

Y-2.3.1 Environmental Setting

Long Island 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 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 Wisconsinan glaciation. 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). Moraine sediments (till) are the product of rock debris transported and deposited by the leading edge of an ice sheet (Ritter 1978:394). The outwash plain generally consists of well-sorted sand and gravel deposited by meltwater streams flowing southward from the ice front. These outwash deposits have a maximum thickness of 600 ft (183 m). Older Pleistocene and Cretaceous sediments underlie the late-glacial outwash plain and jointly form Long Island's freshwater aquifers. Paleozoic metamorphic bedrock underlies the deepest Cretaceous deposits. This basement rock lies about 350 ft (107 m) below the ground surface in western Long Island, and dips steeply to the southeast; in north-central Long Island the bedrock is encountered at depths of 1,000 ft (305 m) (Needell et. al. 1987:2). Aside from small exposures of Fordham gneiss in Long Island City at the western extent of Queens County, Long Island is conspicuously bare of pre-Cretaceous bedrock outcrops (Fuller 1914:66).

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).

Presently, Long Beach Island and Barnum Island are densely developed residential and commercial communities with limited remnant environments of the kind prevalent prior to 1900.

Y-2.3.2 Pre-Contact Context

Archaeologists have divided the 13,000-year record of human habitation in coastal New York prior to European colonization into three general periods: Paleoindian (11,000 to 8000 Before Christ [BC]); Archaic (8000 to 1000 BC); and, Woodland (1000 BC to Anno Domini [AD] 1500). These periods represent broad patterns of Native American cultural adaptation to changing climatic conditions since the arrival of humans in the Study Area around 13,000 years ago. The subsequent Contact period (AD 1500 to 1700) represents the period of interaction between Native Americans and European-Americans, from initial contact with European trappers and traders to the expulsion of most Native Americans in lower New York State by the beginning of the eighteenth century.

The earliest peopling of the region occurred within a few thousand years after final retreat of the Laurentide ice sheet, although precise timing of initial human settlement is uncertain. Varve counts from Lake Hackensack deposits indicate that northern New Jersey was ice-free circa 16,000 BC with the Hudson River valley near present-day Albany ice-free some four thousand years later (Stanford 2010:56-59). The earliest securely dated

Paleoindian site in the region, the Shawnee-Minisink site on the upper Delaware River, was occupied around 10,900 BC (10,937±15 ^{14}C BP) (Gingerich 2013:238-240). Elsewhere near the Study Area, Paleoindian sites have been reported on Staten Island, including the Port Mobil site which contained several fluted points manufactured from non-local material and small scrapers made from locally-sourced glacial cobbles (Kraft 1986:43).

Early Archaic (8000 to 6000 BC) sites are rare along the present New York coastal region. During this period shorelines were still dozens of miles seaward of their modern locations, and any evidence of Early Archaic period utilization of coastal settings is now inundated. The Middle Archaic period (6000 to 3500 BC) roughly corresponds with an extended warm and dry interval during the mid-Holocene. Fishing and shellfishing are seen in the archaeological record toward the latter part of the Middle Archaic, as sea level rise slowed, and estuaries and riverine habitats stabilized. In the lower Hudson River, early shell middens have radiocarbon dates of circa 5170 to 4900 BC, coeval with Neville point horizon (Schaper 1989:16; Claasen 1996:104). The Dogan Point site on the lower Hudson River in Westchester County, New York, contained a basal Middle Archaic deposit of Neville points, dating roughly to 5000 BC (Claasen 1995:131).

During the Late Archaic period (3500 to 1000 BC), shell harvesting in the lower Hudson River was intensively practiced from around 3500 to 2000 BC. Claasen (1996:105) speculated that large shell middens, like those found along the lower Hudson Valley, may have fostered colonization by native plants that were of economic interest to local groups, including sumpweed (*Iva annua*), goosefoot (*Chenopodium berlandieri*), and gourd/squashes, encouraging scheduled visits to these locales.

The Early Woodland period (1000 BC to AD 250) marks the inception of widespread ceramic vessel use amidst a general decline in site numbers and population density across the Eastern Woodlands. Population decline may have been in response to climatic cooling that adversely affected game numbers and flora availability, or to epidemic disease (Fiedel 2001). Native, starchy seeds, including goosefoot, maygrass (*Phalaris caroliana*), knotweed (*Polygonum erectum*), sumpweed, and sunflower (*Helianthus annuus*), began to appear in site assemblages across eastern North America in the Late Archaic and Early Woodland periods, and with some frequency by AD 100 (Fritz 1990). Rossville points and Vinette I ceramics have been found in association on Long Island at the Bowman Brook site. The Middle Woodland period (AD 250 to 900) marks the appearance of the first truly large shellfish middens in southern coastal New England and Long Island (Bernstein 1993). Cross noted that shellfishing along the New Jersey coast had become a major economic enterprise during this period (Cross 1956:194).

Maize agriculture was adopted by many Eastern Woodlands groups as their principal subsistence strategy between AD 900 to 1100, but its adaptation was not uniform especially in the Middle Atlantic and New England regions (Fritz 1990). Abundant fish and shellfish resources along coastal and estuarine environments may have lessened the need and desire to shift to an unpredictable labor-intensive subsistence strategy based on maize cultivation. Although some evidence of maize production dating to circa AD 990 was identified in the mid-Hudson Valley and from AD 1250 on the Housatonic River in Connecticut (Cassedy and Webb 1999), most researchers suggest that maize was not cultivated in coastal New York until as late as AD 1500, or even after initial European contact (Ceci 1990; Lavin 1988). The Study Area likely supported minimal maize horticulture during the Late Woodland period (AD 900 to 1600).

Y-2.3.3 Historic Period Context

Y-2.3.3.1 The Contact Period (AD 1500 to 1700)

Inhabitants of New Jersey, eastern Pennsylvania, and southeastern New York were members of the Lenape, an Algonquian language group, divided between Munsee dialect-speakers north of the Raritan River, and Unami-speakers to the south (Kraft 1986). Native American bands living on the south shore of Long Island included, west to east, the Rockaway, Massapequa, and Montauk. In sharp contrast to neighboring groups that were hierarchically organized into tribes (Iroquois to the north and Susquehannocks to the west) or chiefdoms (the Powhatan in Tidewater Virginia), the Lenape were loosely organized into autonomous villages of several related families. The Lenape are often described as an egalitarian band-level social organization and refrained from fusing into higher-order associations typically headed by a powerful individual. Alliances between autonomous bands, when they existed, tended to be short-term coalitions (Grumet 1979:26-28).

European mariners visited the east coast of North America during the 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 New York shores in 1609 and made the first reported contact with Native Americans in New York.

In 1612 the Dutch established a fort on Manhattan Island to trade for furs with groups upriver. Two years later the Dutch established Fort Orange on the Hudson River near present day Albany, opening trade with the Mahican and Mohawk groups, and in 1621 formed the Dutch West India Company to regulate the increasingly profitable economic relations between settlers and Native Americans. During this period, French inroads to the St. Lawrence valley and English settlement of New England introduced intense trade competition between the European powers in North America and exacerbated existing hostilities among Native American groups and between Euro-Americans and Native Americans (Taylor 2001).

The focus of the fur trade was in the upper Hudson Valley, involving Iroquois and Mahican groups and to interior Pennsylvania and the Ohio Valley with the Susquehannocks, and it is in these areas that abundant amounts of European goods are found in Contact period sites (Kraft and Mounier 1989). Documentary evidence indicates that Lenape bands did not practice maize agriculture, but rather relied on a foraging strategy that included hunting, fishing, and the collection of starchy seeds (Becker 1999:47). Not until pressed by the mounting exchange between Europeans and the Susquehannocks, did Lenape cultivate maize in quantities beyond small garden plots.

Dutch and English trading with Native American groups on Long Island appears to have been on a more limited scale than with groups in the Hudson and Mohawk valleys and may reflect an absence of local resources deemed economically desirable to Europeans. There is some evidence, however, of trade activity between the Dutch and Massapequa at the Fort Massapeag site in Oyster Bay, Nassau County. Excavations of the palisaded structure on a headland between Massapequa Creek and Jones Creek recovered wampum shell-bead debris, glass beads, white-clay tobacco pipes, and triangular brass arrow points. The presence of Bowman's Brook and Overpeck stamped and cordmarked pottery at the site also suggests that Massapequa were in contact with Munsee bands west of the Hudson River (Solecki and Grumet 1994).

Y-2.3.3.2 The Colonial Period (1624-1776)

In 1624, the Dutch West India Company built Fort Orange at Albany and landed settlers on Manhattan Island, marking the first permanent European settlements in New York. 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 slow to establish

communities east of Flatbush and 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). Most English settlements were established by New England Puritans who brought with them the idea of representative government. In contrast, the governing principle of New Netherland was summed up by Governor Peter Stuyvesant's comment that "I shall govern you as a father his children" (quoted in Aliano 1995:112).

The English towns of New Netherland were initially granted a form of religious tolerance in exchange for oaths of allegiance to Dutch rule. Conflict ensued in 1653 after an assembly of English towns requested increased autonomy in the naming of magistrates and the writing of local ordinances. Stuyvesant reacted by declaring the assembly illegal and forbade religious freedom except for the Dutch Reformed Church. A wave of disobedience from Long Island English to Dutch authority followed this crackdown, causing an irreparable rift between the two communities. Only in 1663 did the West India Company relent to demands for religious tolerance but this ruling had not been enforced yet when Dutch authorities were ousted by the English in 1664.

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 were utilized for livestock foraging. Fishing and shellfishing were important supplements to income and diet for farming families.

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 was violently suppressed, and rumors of a slave revolt in 1741 led to the execution of dozens of enslaved people (Singer 2007:165-167). Though these events were restricted to the city proper, their effect on Long Island communities was to harden opinions and behavior toward and by the enslaved population.

As the number of Africans into New York increased through the seventeenth and eighteenth centuries, Native American communities were 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).

Y-2.3.3.3 American Independence and Expansion (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 around 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).

New York's economy grew during the middle decades of the eighteenth century with the expansion of trade to Britain, to other North American colonies, and to the West Indies. War with the French (King George's War from 1739-1748 and the French and Indian War from 1754-1761) stimulated local manufacturing and agriculture to supply the British army and fleet. By 1774 Governor William Tryon had written to London that most of the good land on Long Island was under cultivation (O'Callaghan 1849a:748). The French wars, however, were financially draining to Britain and led to a series of taxes and tariffs imposed on the colonists to sustain the British empire. In turn, these economic burdens were a major cause of calls for independence from Britain.

At the start of the American Revolution loyalist sympathies ran high on Long Island, especially along the South Shore. After the skirmishes in Lexington and Concord, Massachusetts in 1775, the patriot majority in northern Hempstead seceded as the Town of North Hempstead (Robinson 1996:82). When British forces defeated the Americans at the Battle of Brooklyn in late August 1776, towns across Long Island defied Congress and supported the English crown. It appears that a majority in Queens County (then encompassing Nassau County) 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).

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 Queens County enslaved Africans accounted for 14.4 percent of a total population of 16,014 in 1790 (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 counted as enslaved persons 11.5 percent of the Queens county population (New York State Library 2019).

Through the early nineteenth century Queens County remained primarily a rural district. The county had no large towns on the order of neighboring Kings County to the west and was characterized by a far lower population density. Annual growth, too, was lower in Queens County than Kings County. A telling detail of this contrast was the number of men employed in house construction in 1840; nearly 1,000 in Kings County, while only 29 in Queens (U.S. Census Bureau 1841:141).

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, with 41 grist mills recorded in the county in 1840 (U.S. Census Bureau 1841:140). The flour produced in Queens County was not 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. Long Island farmers, increasingly, were not able to compete with midwestern grain prices, and instead turned to supplying New York City with market garden produce, including potatoes, beans, peas, and other vegetables (Burrows and Wallace 1999:431). Queens County led the state in value of market garden produce in 1840 and 1850; Queens tripled its market output in that period (U.S. Census Bureau 1841, 1853).

The LIRR 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 (U.S. Census Bureau 1853).

Y-2.3.3.4 Urban Expansion and Rural Decline (1860-1960)

The status of Queens County as a leader in market gardening continued unabated into the late nineteenth century. Between 1860 and 1880, Queens County market gardens had increased in value by 49 percent to more than $1.3 million (U.S. Census Bureau 1864:102, 1882:299). Nassau County (following its separation from Queens County in 1899) ranked eighth among United States counties in market garden acreage in 1900 (9,010 ac) and led the nation in cabbage acreage (U.S. Census Bureau 1902:320-321).

Contributing to the transformation of Long Island's economy was oystering along the South Shore near Freeport and Oceanside. This industry was able to freight oysters to New York City after the Southern Railroad was built in 1865, connecting the villages of Freeport, Merrick, Massapequa, and Copiague. The rail service also accelerated development of seaside resorts in Long Beach and Rockaway, bringing them within easy travel to a wide variety of urban dwellers (Munsell 1882:150-151, 172). The LIRR 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 Wantaugh 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).

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 it nearly doubled again. During this expansion the communities of Long Beach and Island Park were established. A second, deeper expansion of suburban development occurred after the Second World War, when highway construction and widespread automobile ownership fostered the growth of new communities built on the flat agricultural lands across Long Island. Not until the 1970s, when the county's population reached almost 1.5 million, did this expansion level off. By the end of the twentieth century agriculture had all but vanished in Nassau County; in 2002, the county contained 65 farms occupying 1,118 ac (452.4 ha), of which 222 ac (89.8 ha) were harvested for hay and only 78 ac (31.6 ha) were cultivated for vegetables (USDA 2002).

Y-2.3.3.5 Long Beach Island and Barnum Island

Long Beach Island is a barrier island on Long Island's south shore between Rockaway to the west and Jones Beach Island to the east. The island has no surface sources of fresh water, and up until the late nineteenth century contained no permanent structures aside from a U.S. Life Saving Service station (**Figure Y-2-4**). The lure of sea bathing and proximity to New York City marked the island for development as a resort destination, and in 1880 the New York & Long Beach Rail Road and the Long Beach Hotel were constructed (Munsell 1882:170). Large-scale land-making commenced around 1906 as bayside salt marsh was drained and filled, a process ultimately doubling the island's landmass. Residential and commercial development quickly followed, and by 1930 the island contained almost 6,000 full-time residents and an estimated 100,000 summer visitors.

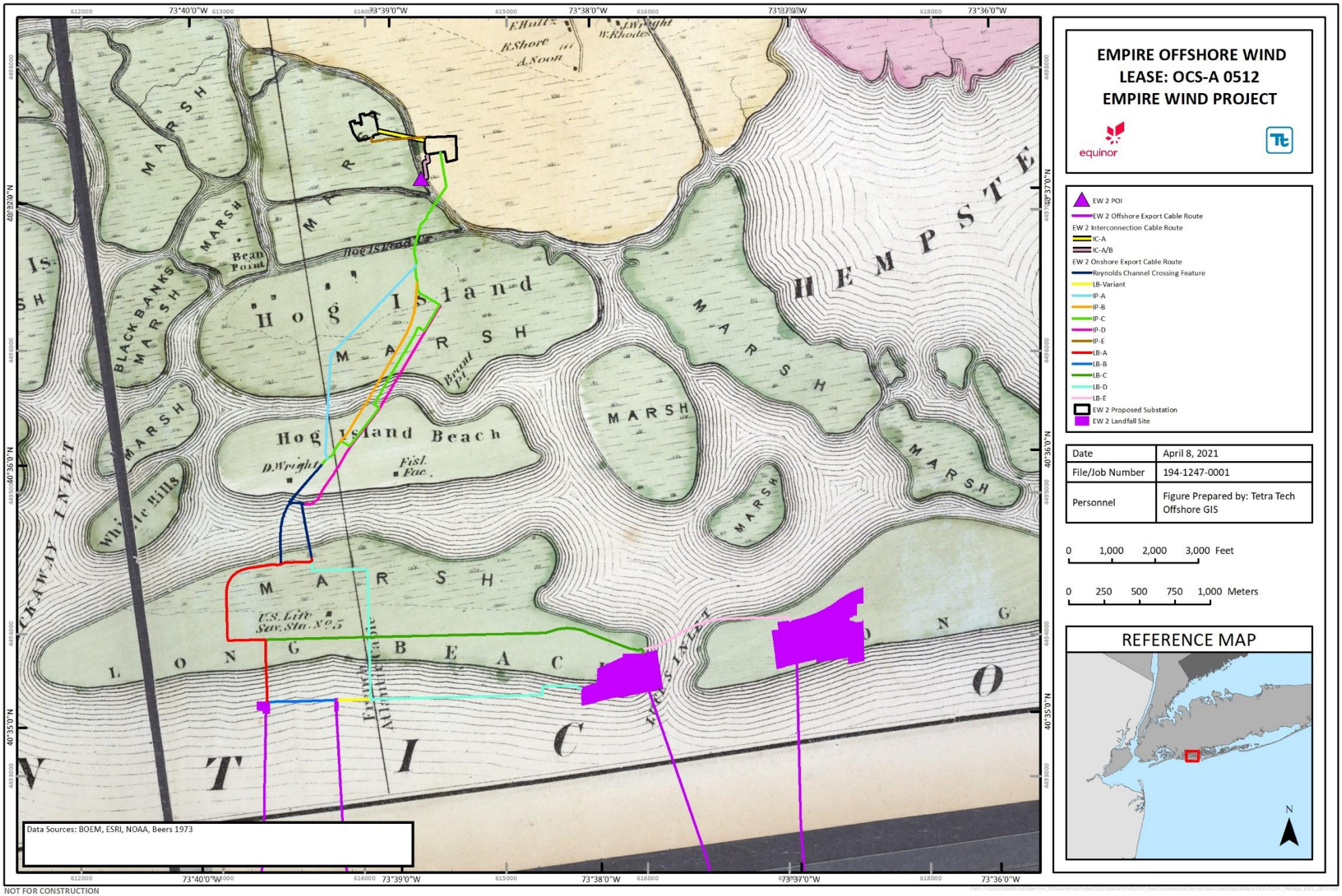

Figure Y-2-4 1873 *Atlas of Long Island, South Part of Hempstead*, showing EW 2 Export Cable Route

Situated between Long Beach Island and the Long Island mainland, Barnum Island is the result of early twentieth century land-making on salt marsh. Originally known as Hog Island (**Figure Y-2-4**), this low-lying marsh contained a narrow strip of upland along its western margin along what is now Long Beach Road, and on which was built the Queens County poor farm in the 1870s (Munsell 1882:152). Land-making began in the early 1920s (New York Times, April 23, 1922), followed by rapid residential and commercial development and village incorporation in 1926.

Y-2.3.4 The Archaeological Record in the Study Area

A review of CRIS identified no recorded terrestrial archaeological sites or previously conducted archaeological surveys within 1 mi (1.6 km) of the onshore facilities of the Project. Within the Study Area radius, two underwater anomalies of undetermined NRHP status are present in the Atlantic Ocean south of Long Beach Island. Within a 2-mi (3.2-km) radius of the Project CRIS records a possible shipwreck location in the Atlantic Ocean, of the *Mexico*, a nineteenth century sailing vessel. There are no recorded terrestrial archaeological sites along the 9.5-mi (15.3-km) length of Long Beach Island nor on Barnum Island, the two land masses containing the bulk of the EW 2 onshore export and interconnection cable route. The nearest recorded terrestrial archaeological site to the Project is the Smith's Pond Pump Station – Feature 24 (05947.000004), facilities of a nineteenth century water-delivery system located about 3.1 mi (4.9 km) north of the proposed substation. The NRHP status of this site is undetermined. The Abraham Hewlett Historic Site (05901.003482) is located 3.5 mi (5.6 km) northwest of the Project and is represented by a low-density scatter of late nineteenth century and early twentieth century domestic refuse. CRIS records indicate NY SHPO has determined this site is not eligible to the NRHP.

The nearest recorded pre-contact period site to the Project is the Seaford Park Site (05901.000040), located along Cedar Creek in the Village of Seaford about 8.1 mi (13 km) northeast of the Project. The Seaford Park Site consisted of three large shell mounds on the margins of salt marsh adjacent to South Oyster Bay. A suite of radiocarbon dates from the mounds ranges from AD 530±50 to AD 670±60 (Cammisa 1995:33). The site is interpreted as specialized shellfish-processing stations associated with one or more base camps located on uplands along Cedar Creek, Seamans Creek, or another nearby stream.

Y-2.3.5 Archaeological Sensitivity within the APE

Archaeological sensitivity is defined as the potential of a locale to contain previously undocumented archaeological resources, usually scaled as some increment between low and high. Sensitivity for precontact resources is based on an assessment of documented regional site patterns, results of previous archaeological surveys undertaken in the vicinity, and key environmental factors that may have influenced the selection of site locations. Assessments for historic period sensitivity would employ similar sources of evidence, in addition to reviews of historic maps, aerial imagery, photographs, and documents. The goal of sensitivity assessment is to identify areas within the Project APE with a high potential for possessing undocumented archaeological resources.

The EW 2 onshore export and interconnection cable route crosses two types of landform, the coastal barrier island and *spartina* salt marsh islands. Barrier islands evolve through dynamic and complex onshore and offshore processes involving wind, wave energy, sediment circulation, and storms that modify island morphology through erosion, accretion, and migration. Typically, *spartina* salt marshes fringe the landward side of barrier islands and occur in sheltered embayments where the forces of surf and storms are less severe. The barrier islands, *spartina* salt marsh, intertidal mudflats and open water embayments forming Hempstead Bay developed as post-glacial sea level rise moderated circa 4000 to 6000 years BP to create conditions for the establishment of stable estuarine habitats and the growth of shellfish communities (Bernstein 1993:47-50; Dent 1995:204;

Donnelly 2000:77; Merwin 2010:24). There is evidence of long-term human adaptation to coastal environments in New York and southern New England, with a focus on the exploitation of shellfish (Bernstein 2006:277). Claasen (1996:104) noted intensive shellfish harvesting in the lower Hudson as early as 3500 BC. Shellfish may have become, for coastal groups, an important food source after circa 500 BC, indicated by the once-ubiquitous shell middens across the region (Bernstein 1993:5; Ritchie 1980:166).

Late nineteenth century maps depict extensive salt marshes throughout the Project vicinity (**Figure Y-2-4** through **Figure Y-2-6**). Estuarine environments of this sort would have contained rich sources of fish, shellfish, water fowl, and aquatic mammals as well as plant resources, and may have been destinations for pre-contact task groups exploiting these items. Archaeological expressions of these task visits may include shell middens, lithic tool debris, and simple fire hearths. These historic maps also illustrate a narrow upland that rises above the marsh on Hog Island (**Figure Y-2-4**), later known as Barnum Island (**Figure Y-2-5** and **Figure Y-2-6**). The Beers 1873 map (**Figure Y-2-4**) depicts four structures on this upland and the U.S. Coast and Geodetic Survey map of 1895 (**Figure Y-2-5**) shows the upland with the label "Poor House," representing the Queens County poor farm built on Barnum Island in the 1870s. The EW 2 Route IP-C will cross the eastern edge of this topographic rise, as will the northern terminus of EW 2 Route IP-B. A portion of the EW 2 Route IP-A will cross the western edge of the topographic upland.

The barrier island (Long Beach Island) and marsh island (Barnum Island) were potential destinations for task groups during pre-contact and historic periods. Present archaeological sensitivity, however, is low. This assessment is based on long-term barrier island dynamics affecting Long Beach Island, and historic episodes of land-making and suburban development on Long Beach Island and Barnum Island.

Geodetic mapping of Long Island from 1835 to 1990 indicates a general east to west migration of its associated barrier islands following sediment transport routes of near-shore currents. Erosion at the east end of Long Beach Island has been as high as -23 ft (-7 m) per year, with accretion occurring at the western end (USACE 2015:11). The overall long-term rate of beach erosion for all Long Island barrier islands is -2 ft (-0.6 m) per year (Hapke et al. 2010:29). The processes that circulate and re-deposit barrier island sediments would result in significant disturbances to soil horizons containing potential archaeological deposits. Not surprisingly, CRIS contains no records of pre-contact sites on Long Island's south shore barrier islands.

The land-making activities of the early twentieth century involved dredging canals through the marsh and using the dredge spoils to fill and expand the islands. Land-making doubled the size of Long Beach Island and in the process covered the marsh under several feet of fill. Barnum Island was dredged and filled and its perimeter bulkheaded, eliminating all native marsh environs. By 1929, Long Beach Island and all but the northernmost edge of Barnum Island had been transformed into made-land (**Figure Y-2-7**). The northern edge of Barnum Island and the eastern shoreline of Hog Island Channel north of Barnum Island at the EW 2 Onshore Substation A locale were filled in the early 1950s for the site of the E.F. Barrett Power Station and a tank farm (**Figure Y-2-8**). By 1966, the *spartina* marsh in the EW 2 Onshore Substation B locale had been filled as made-land (**Figure Y-2-9**).

As noted above, the onshore export and interconnection cable corridors will be sited, to a large extent, within existing public road rights-of-way including the LIRR Island Park Station parking lot, and on public utility parcels including the E.F. Barrett Power Station (**Photograph 1** through **Photograph 2**). The installation of suburban infrastructure including roads and utilities, parking lots, the power station, and construction and demolition of a tank farm at proposed EW 2 Onshore Substation A have introduced an additional tier of ground disturbances within the Project APE, including the onshore export cable routes, interconnection cable routes to POI, and the onshore substation locales.

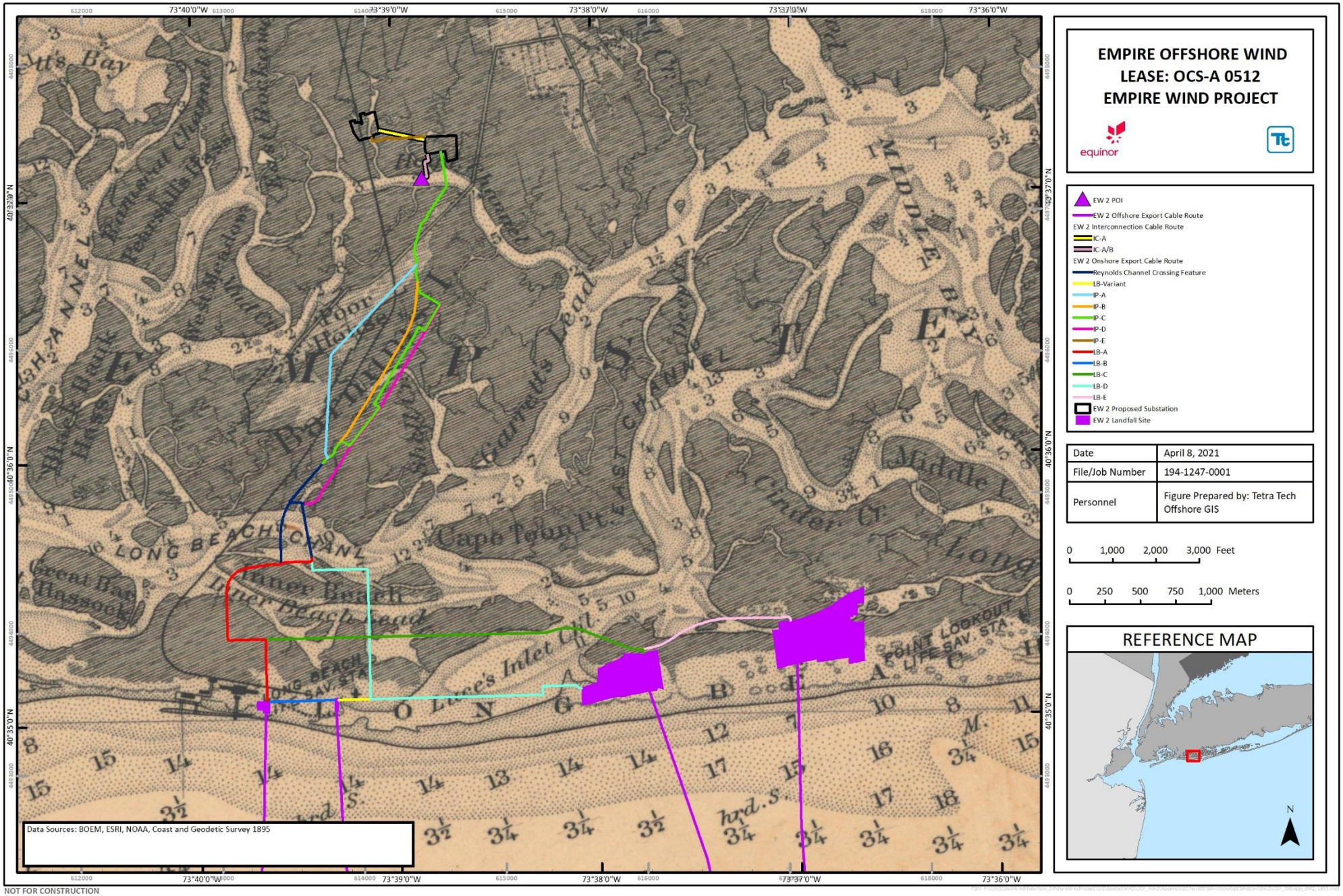

Figure Y-2-5 1895 U.S. Coast and Geodetic Survey chart, *Fire Island Beach to Rockaway Beach, New York*, showing EW 2 Export Cable Route

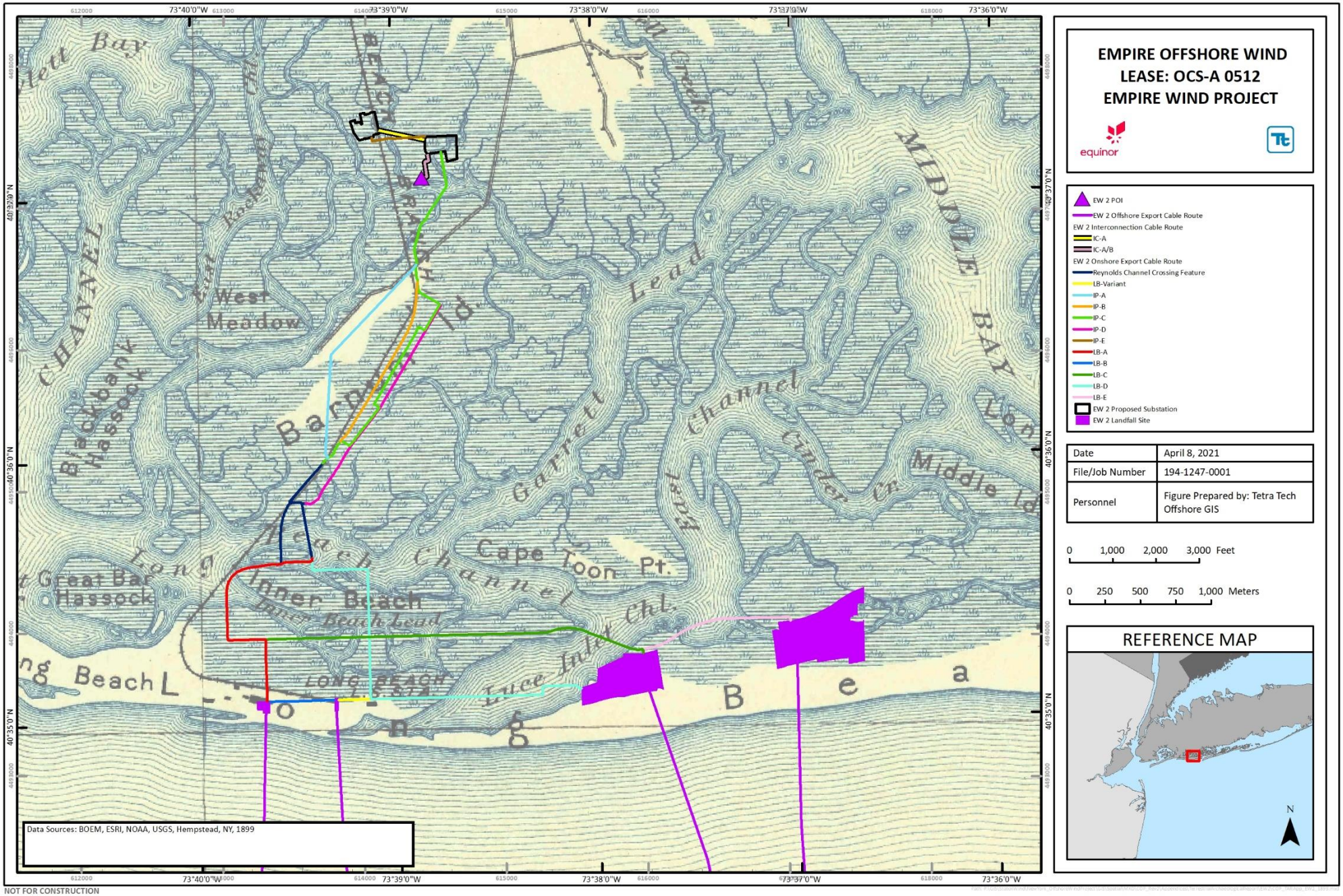

Figure Y-2-6 1899 USGS Topographic Map, *Hempstead, NY*, Showing EW 2 Export Cable Route

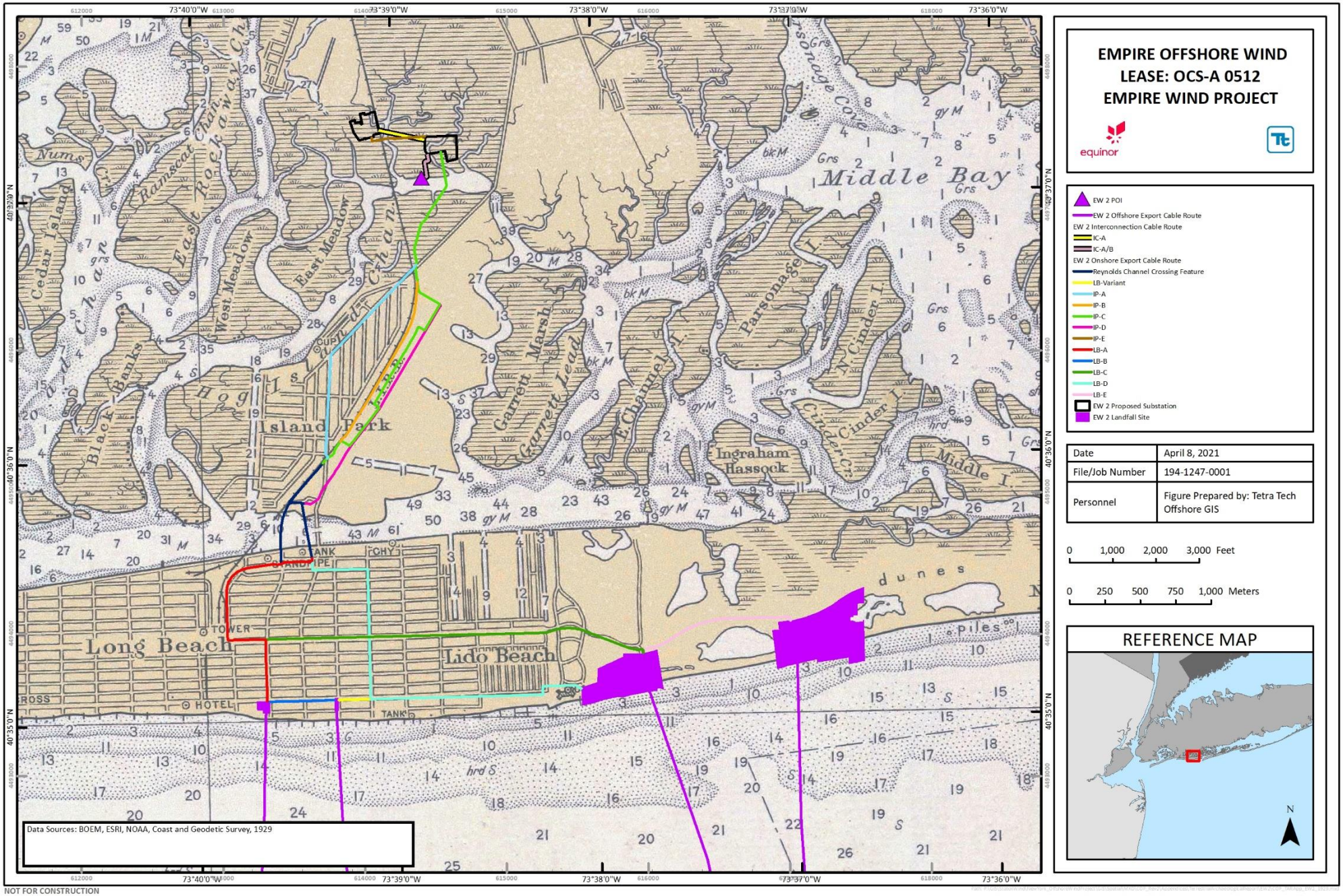

Figure Y-2-7 1929 U.S. Coast and Geodetic Survey Chart, *Hempstead Bay*, Showing EW 2 Export Cable Route

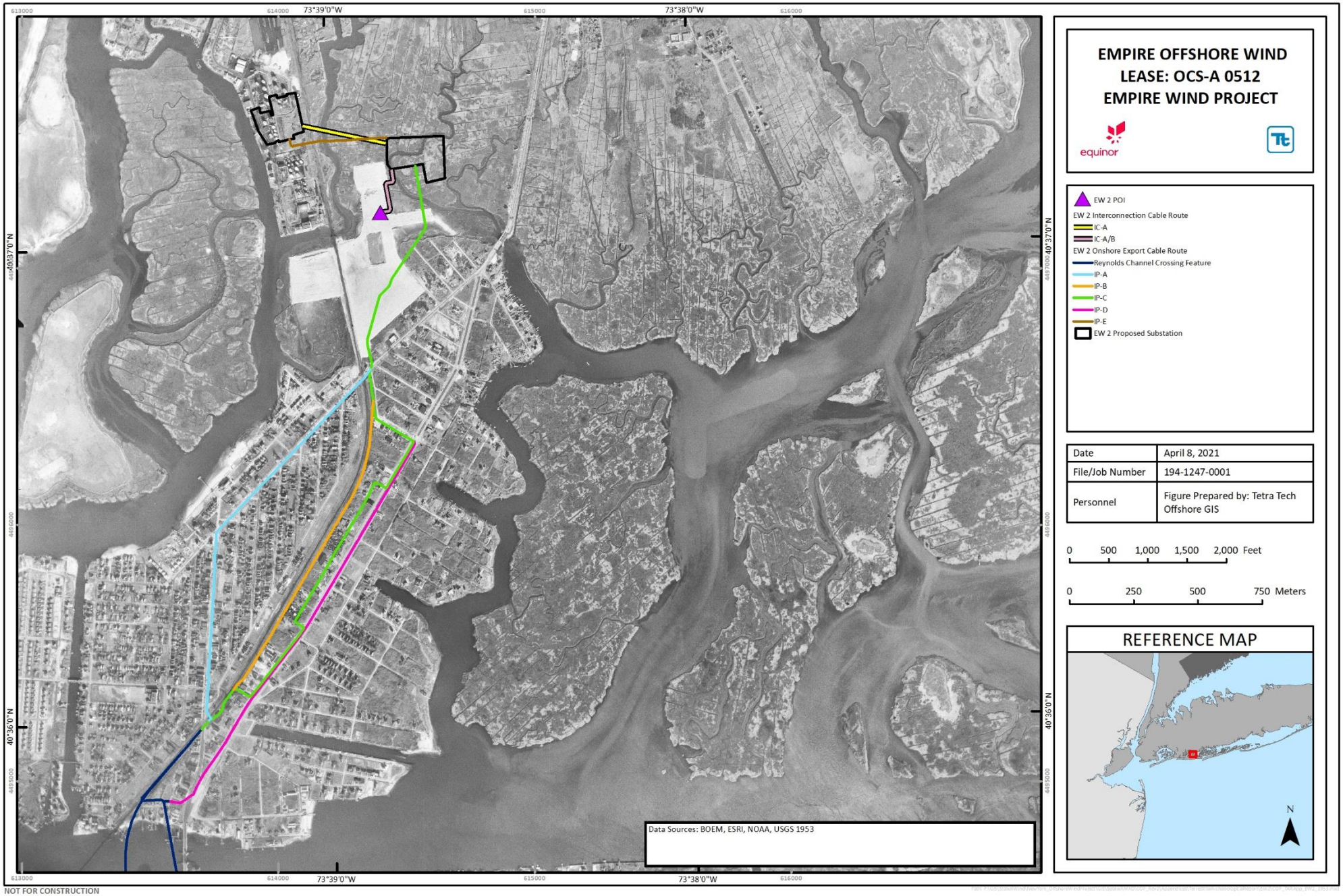

Figure Y-2-8 1953 USGS aerial of Island Park, NY and environs, showing EW 2 Export Cable Route

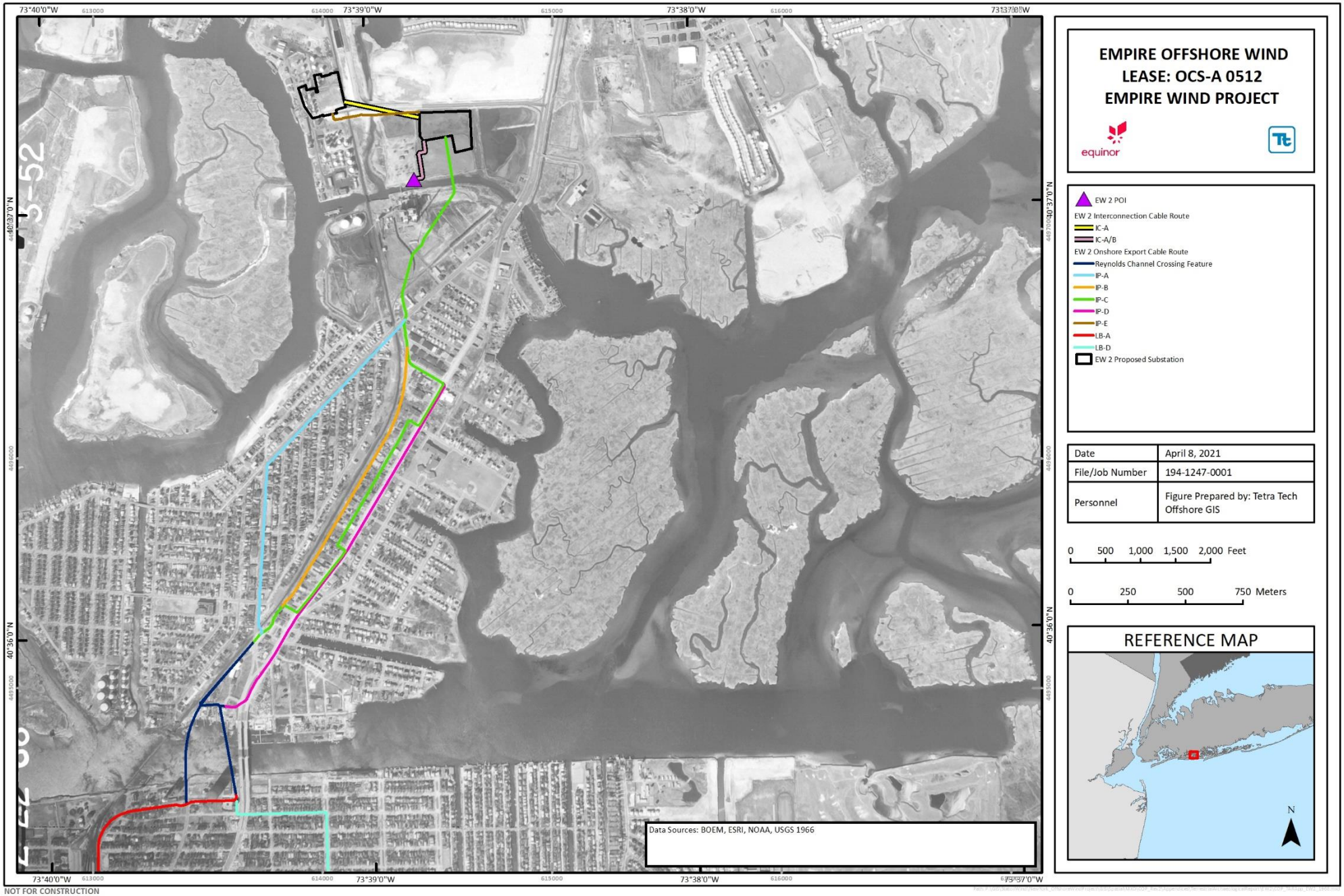

Figure Y-2-9 1966 USGS aerial of Island Park, NY and environs, showing EW 2 Export Cable Route

Photograph 1 EW 2 Landfall A, Riverside Boulevard south of E. Broadway, City of Long Beach, NY. View to north.

Photographer: R. Jacoby, July 24, 2019

Photograph 2 EW 2 Route IP-C, LIRR Island Park Station. View to northeast.

Photographer: R. Jacoby, July 23, 2019

Tetra Tech concludes that the land-making dredge and fill activities, and road and utility construction, have resulted in significant ground disturbances to potential culture-bearing soil horizons within the Project APE. Available information regarding the precise nature of the dredge and fill operations of land-making (e.g., depth and lateral extent of fill) is sparse. Garrett Marsh lying east of Barnum Island across Shell Creek provides some perspective on the degree of fill on Barnum Island (**Figure Y-2-7**). Garrett Marsh exhibits about 2 ft (0.6 m) of relief above mean sea level in contrast to the 5 to 8 ft (1.5 to 2.4 m) of relief on Barnum Island. The difference suggests that the layer of fill on Barnum Island measures somewhere between 3 and 6 ft (0.9 to 1.8 m) in thickness. A conversation with a local contractor with excavation experience on Barnum Island confirms this estimate.[1] If the pre-1900 upland on Barnum Island (**Figure Y-2-4** through **Figure Y-2-6**) had been, minimally, 3 ft (0.9 m) above the surrounding marsh (a lessor height is unlikely to have been noted on the U.S. Geology Survey and Coast and Geodetic Survey maps), then the fill covering the upland may have been very thin, if not completely absent. As noted above, the EW 2 Route IP-C and EW 2 Route IP-B will cross the eastern edge of the mapped upland, near the intersection of Sherman Road and Long Beach Road in the unincorporated hamlet of Barnum Island, Town of Hempstead (**Photograph 3**); and the EW 2 Route IP-A will cross the western edge of the mapped upland along Long Beach Road in the incorporated village of Island Park, Town of Hempstead. Estimating that cable trench excavations will be approximately 3 to 10 ft (0.9 to 3 m) below grade, Tetra Tech concludes that the base of the trench has the potential to intrude into intact native soils in one or all of these three locales. As one of the few uplands mapped within the expansive marsh lagoon in Hempstead Bay, this landform possesses sensitivity for the presence of pre-contact and historic period archaeological resources, notwithstanding the high degree of infrastructure development and possible ground disturbances incurred during the past hundred years (**Figure Y-2-10**).

Photograph 3 EW 2 Route IP-C, Sherman Road, Island Park, NY. View to north. Route segment exhibits moderate archaeological sensitivity and is recommended for archaeological monitoring during construction phase.

Photographer: R. Jacoby, July 23, 2019

[1] Robert M. Jacoby personal communication with Bill Bitetto, B&B Contracting, September 13, 2019.

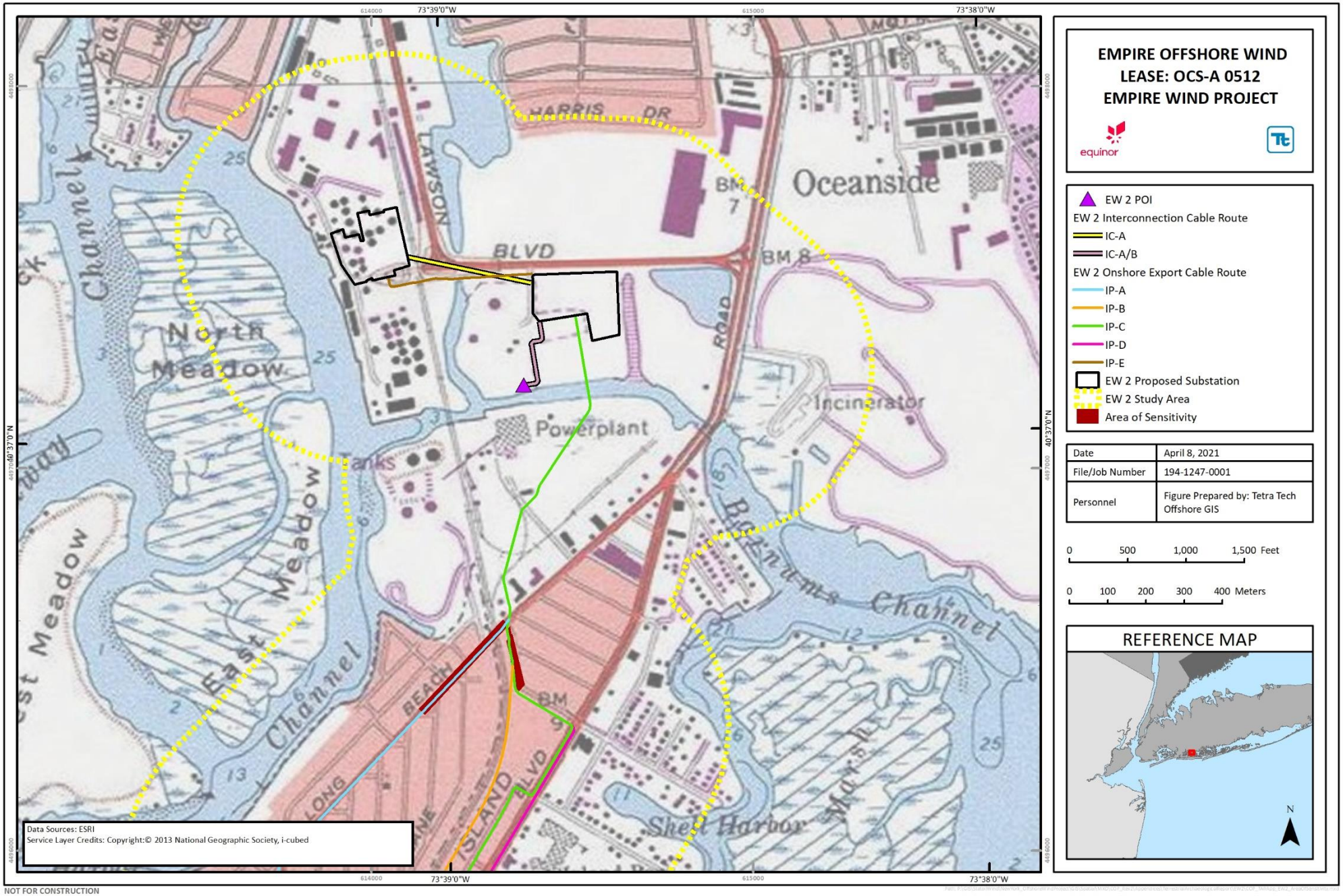

Figure Y-2-10 Portion of the EW 2 Onshore Export Cable Route with a Potential for Sensitivity

Y-2.4 SUMMARY AND RECOMMENDATIONS

Tetra Tech conducted a Phase I terrestrial archaeological survey of the proposed EW 2 onshore export and interconnection cable routes and onshore substation locations in Nassau County, New York in 2019, in support of the Project. The survey was undertaken to comply with BOEM guidelines regarding the development of offshore wind generated power facilities, New York State guidelines, and to satisfy the requirements of federal permitting under Section 106 of the National Historic Preservation Act of 1966.

Onshore facilities of the Project include: (1) four potential onshore export cable landfalls on Long Beach Island; (2) onshore high voltage alternating current onshore export cable installed in subsurface trenches within public rights-of-way and private easements on surface roads, sidewalks, parking areas, and undeveloped parcels in the City of Long Beach and the Town of Hempstead; (3) a horizontal-directional-drill segment beneath Reynolds Channel; (4) an onshore substation to be built on a vacant parcel (EW 2 Onshore Substation B) or a recently redeveloped parcel (EW 2 Onshore Substation A) in the unincorporated hamlet of Oceanside, Town of Hempstead, New York; and (5) an onshore interconnection cable to be installed in subsurface trenches connecting the onshore substation to the existing Oceanside POI. To assess the potential of the locations of these Project facilities to contain previously unrecorded archaeological resources, Tetra Tech conducted background research including a review of the online CRIS database maintained by NY SHPO; and a literature review of pertinent information regarding local geology and soils, topography and hydrology, historical cartography and aerial imagery, and prehistoric and historic development in the Project vicinity.

Tetra Tech finds that no NRHP listed, eligible or potentially eligible archaeological resources are known within the Study Area evaluated during this Phase I Terrestrial Archaeological Survey. Further, because of the absence of recorded archaeological resources within the Study Area, project actions are not anticipated to result in adverse indirect impacts. Tetra Tech concludes that the overall sensitivity of the direct effects APE evaluated in this Phase I is low due to (1) barrier island dynamics; (2) early twentieth century dredging and land-filling of marshland; (3) the construction of suburban developments on Long Beach Island and Barnum Island; (4) the cyclical episodes of infrastructure repair and replacement beneath surface roads where the onshore export and interconnection cable is to be installed; and, (5) industrial development at the EW 2 Onshore Substation A and EW 2 Onshore Substation B locations and subsequent demolition of the tank farm at the EW 2 Onshore Substation A parcel.

Tetra Tech further concludes that, notwithstanding the high degree of suburban development on Barnum Island and resulting low overall sensitivity of the area, a short section of the Project APE exhibits moderate sensitivity for the presence of archaeological resources where the onshore export cable corridor will cross the eastern edge of an upland depicted on late-nineteenth century maps. This upland was one of the few mapped uplands depicted in the Hempstead Bay region prior to the development of suburban communities on Long Beach Island and Barnum Island. As a topographic highpoint, the area may have attracted pre-contact hunter-gather groups for fishing and shellfishing tasks. During the 1870s the Queens County poor house was sited on the western spur of this upland. Based on these conclusions, Tetra Tech recommends:

- Construction and operations of the Project be permitted within the areas surveyed; and
- As deemed necessary by the NY SHPO, an archaeological monitor be present during construction period excavation of the export cable trench at three potential locations:
    - An approximately 1,000-ft (300-m) section of EW 2 Route IP-A from the intersection of Williams Lane and Long Beach Road to the intersection of Long Beach Road and Sherman Road in the incorporated village of Island Park and the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring

be undertaken from the vicinity of No. 520 Long Beach Road (latitude 40.610198°N, longitude -73.650853°W) northeastward along Long Beach Road to the vicinity of the intersection of Long Beach Road and Sherman Road (latitude 40.612317°N, longitude -73.648187°W).

- An approximately 250-ft (76-m) section of EW 2 Route IP-B near its junction with EW 2 Route IP-C at Sherman Road, in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from a point southwest of No. 46 Saratoga Boulevard (latitude 40.610456°N, longitude -73.648133°W) to the corridor's junction with EW 2 Route IP-C (latitude 40.611190°N, longitude -73.648058°W).
- An approximately 650-ft (200-m) section of EW 2 Route IP-C from the intersection of Saratoga Boulevard and Sherman Road to the intersection of Sherman Road and Long Beach Road, in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring be undertaken from the vicinity of No. 33 Saratoga Boulevard (latitude 40.610690°N, longitude -73.647847°W) northward along Sherman Road to the intersection of Long Beach Road and Ladomus Avenue (latitude 40.612477°N, longitude -73.648015°W).

The goal of archaeological monitoring is to identify any archaeological resources that potentially may be revealed during construction activities. If the archaeological monitor identifies archaeological resources during construction, each resource will be evaluated for its potential eligibility to the NRHP, and if determined NRHP-eligible, Empire will choose an appropriate action, in consultation with NY SHPO, to avoid, minimize, or mitigate Project effects to that resource. With implementation of the above measures, no significant adverse impacts to archaeological resources would be expected to result from construction or operations of the proposed EW 2 onshore facilities. If any substantial modifications are made to the Project design, consultation with NY SHPO and possibly additional archaeological survey may be necessary.

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Addendum A – Agency Correspondence

TETRA TECH

December 13, 2018

Tim Lloyd, Ph.D.
Archaeology Unit
New York State Division for Historic Preservation
Peebles Island Resource Center
Delaware Avenue
Cohoes, NY 12047

Subject: **Equinor Wind US – Empire Wind Project**
Kings, Nassau, and Suffolk Counties, NY
Initiate Project Review Under Section 106 of National Historic Preservation Act
NY Project #: 18PR07274

Dear Dr. Lloyd:

Tetra Tech is currently under contract to Equinor Wind US (Equinor) to assist with the siting and permitting of a proposed offshore wind energy project associated with the Bureau of Ocean Energy Management's (BOEM's) Lease Area OCS-A-0512 (the Project). The Project is planned for an area of approximately 80,000 acres in federal waters, located an average of 20 miles south of Long Island, east of the Rockaways (Figure 1). The Project could have the capacity to produce up to approximately 2,100 megawatts (MW) of electricity, enough to power one million homes. Equinor is currently developing the federal and state permit applications that will support construction, operation, and decommissioning of the proposed offshore wind farm(s) on the lease site where development occurs.

The energy produced by the offshore facilities could be transmitted to as many as three substations: Oceanview Substation, Neptune, Monmouth County, New Jersey; Gowanus Generating Station, Brooklyn, Kings County, New York; and Ruland Road Substation, Village of Melville in the Town of Huntington, Suffolk County, New York. As such, the New Jersey portion of the Project has been named "Boardwalk Wind" and the New York portion of the Project has been named "Empire Wind." Multiple potential routes for underwater transmission lines, landfall locations, and upland transmission to the respective substations are currently under review (Figure 1). The lead federal agency for the Project is BOEM. Among many studies that are currently planned or in progress to satisfy federal and state permitting requirements are investigations related to cultural resources. Upland archaeological surveys, historic architecture surveys, and underwater surveys will be performed in compliance with Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800, and with state

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guidelines of New Jersey and New York. Equinor will also be submitting this Project Review to the New Jersey State Historic Preservation Office in parallel with this request.

A goal of this letter is to present an overview of the approach that Tetra Tech will take to perform cultural resources studies in New York on behalf of Equinor as this work continues into 2019. We would appreciate hearing any comments or questions you may have about our proposed approach by **January 4, 2019.**

Upland Archaeology Survey

Tetra Tech will perform background research within a study area that extends approximately one mile around potential land cable routes. The Project's Area of Potential Effects (APE) for archaeology includes all areas where ground-disturbing activity will take place including export cable corridors and all associated appurtenances such as landfalls, horizontal direct drill (HDD) entry and exit locations, workspaces, equipment laydown areas, and access roads. Tetra Tech has been performing in-field reconnaissance of the alternative routes under consideration by Equinor's design team to identify areas that are both potentially sensitive for containing archaeological sites that may be eligible to the NRHP and testable. Equinor currently proposes to place its upland transmission lines within existing rights-of-way to the maximum extent practicable, primarily following public roadways. All transmission cables will be installed subsurface, as well as any supporting infrastructure (e.g., jointing vaults or manholes), to the extent practicable. In New York, several alternatives under consideration would bring transmission through extant streets located within made-land. These areas will not be recommended for archaeological investigation. Other segments of alternatives under consideration extend through portions of the Massapequa Preserve, Owls Head Park, and some sections of Shore Road Park that are located on fast land. Review of historic cartographic sources suggest that some of these areas may have potential to contain archaeological sites and they may be recommended for focused and limited subsurface testing. Additionally, areas that have been previously surveyed for other projects for which reports are available are identified. These areas are illustrated in Figures 2a and 2b.

Historic Architecture Survey

Tetra Tech's architectural historian is working with the visual impact assessment team to identify areas from which the offshore project may be visible and to identify project effects to aboveground cultural resources listed in and/or eligible to the NRHP. As a starting point, the visual assessment study area is a 35-mile radius around the proposed offshore Lease Area, as described in the draft visual impact assessment study plan, previously provided on November 7, 2018, and for which SHPO provided responses on November 29, 2018. The actual APE for historic architecture is anticipated to be within 0.5 km (0.3 mile) of shorelines within the Visual Study Area (Figure 3) where at least the hub of the turbines and above are visible. Properties most likely to be affected within the APE would likely comprise aboveground cultural resources listed in, eligible to, or potentially eligible to the NRHP that are associated with maritime settings. These cultural resources would be the focus of inventory and evaluation by the team's architectural historian.

Underwater Survey

Underwater survey will be performed for this Project by Tetra Tech's subcontractor, SEARCH, Inc. The study area for underwater archaeology will comprise the Lease Area depicted in Figure 1, and the submarine cable routes under consideration (Figure 1). Systematic remote sensing survey involving use of a combination of high resolution sub-bottom profiler, magnetometer, and side scan sonar technologies implemented along transects that generally do not exceed 30 meter intervals and that satisfy BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (March 2017) will be used to collect geophysical data within the entire Lease Area and within a 500-foot-wide submarine cable corridors. These data will be assessed by a qualified marine archaeologist to identify potentially archaeologically sensitive locations of submerged landforms that have potential to contain NRHP-eligible sites possibly related to Archaic and Paleo-Indian prehistoric time periods, and to identify potential targets suggestive of submerged marine-related cultural resources that may also be eligible to the NRHP.

We look forward to hearing from you about any concerns you and your staff may have related to our approaches to upland archaeology, historic architecture, and marine archaeology. Thank you for your attention and consideration of this Project.

Very truly yours,

Sydne B. Marshall, Ph.D., RPA
Cultural Resources Lead

Attachments:

Figure 1 Project Overview
Figure 2a Cultural Resources Survey: Gowanus Alternative
Figure 2b Cultural Resources Survey: Ruland Rd. Alternative
Figure 3 Project Visual Study Area and Historic Architecture APE

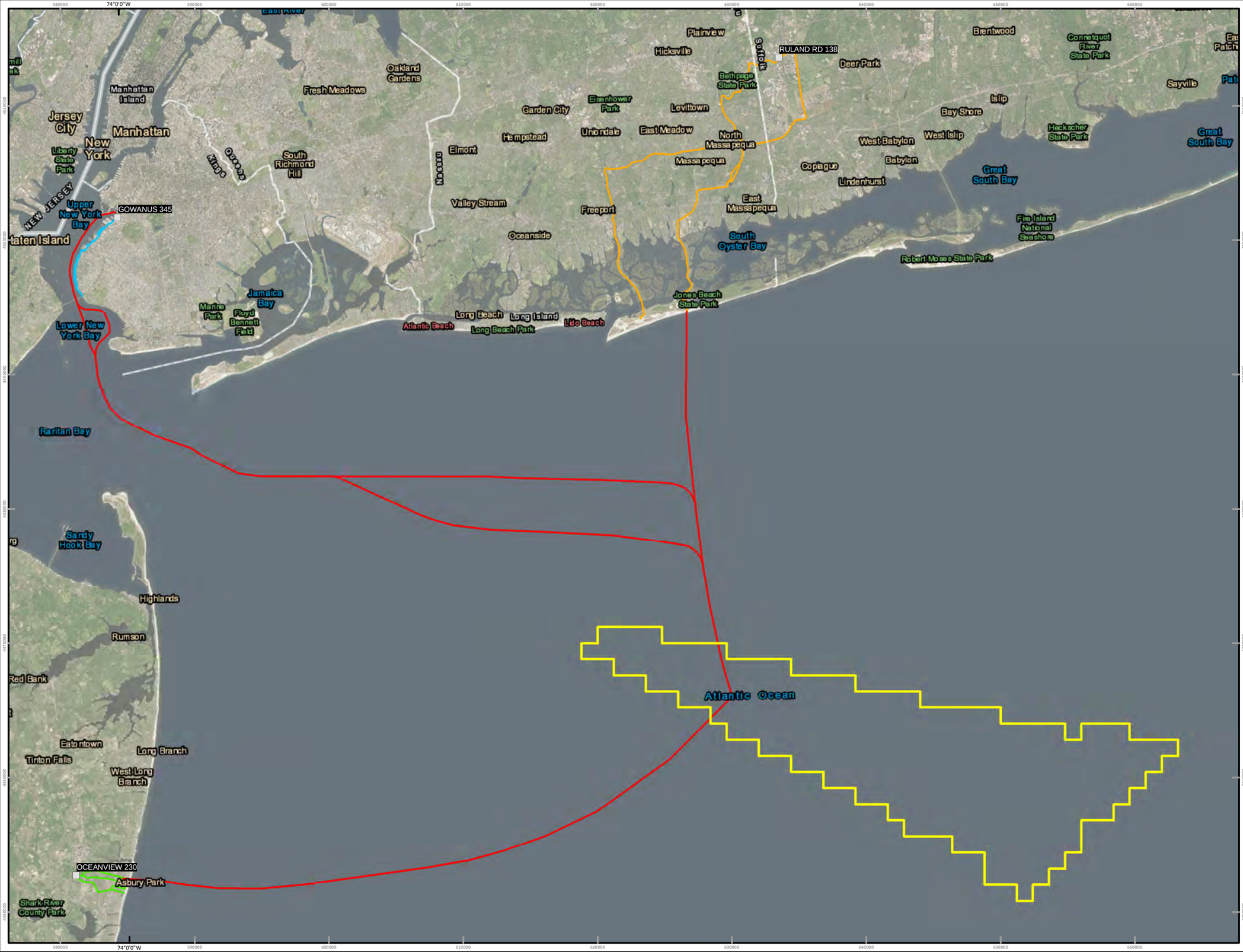
cc: M. Goff (Equinor)
L. Morales (Equinor)
S. Lundin (TT PM)
N. Schils (TT DPM)
R. Jacoby (TT)
C. Borstel (TT)
J. Sexton (TT)

Empire Wind Project

Figure 1

PROJECT OVERVIEW

equinor



Lease Area

Approximate Offshore Cable Route Corridor (500 ft wide)

Onshore Route Alternatives (Gowanus)

Onshore Route Alternatives (Oceanview)

Onshore Route Alternatives (Ruland Rd.)

Substation

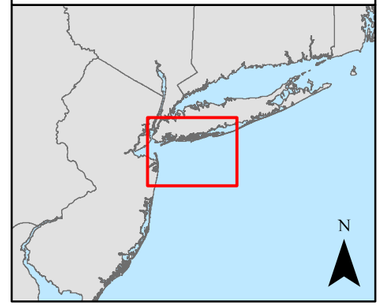
Date	12/4/2018
File/Job Number	
Personnel	Figure Prepared by:

0 1 2 3 4 Miles

0 1 2 3 Nautical Miles

0 2 4 6 8 Kilometers

REFERENCE MAP



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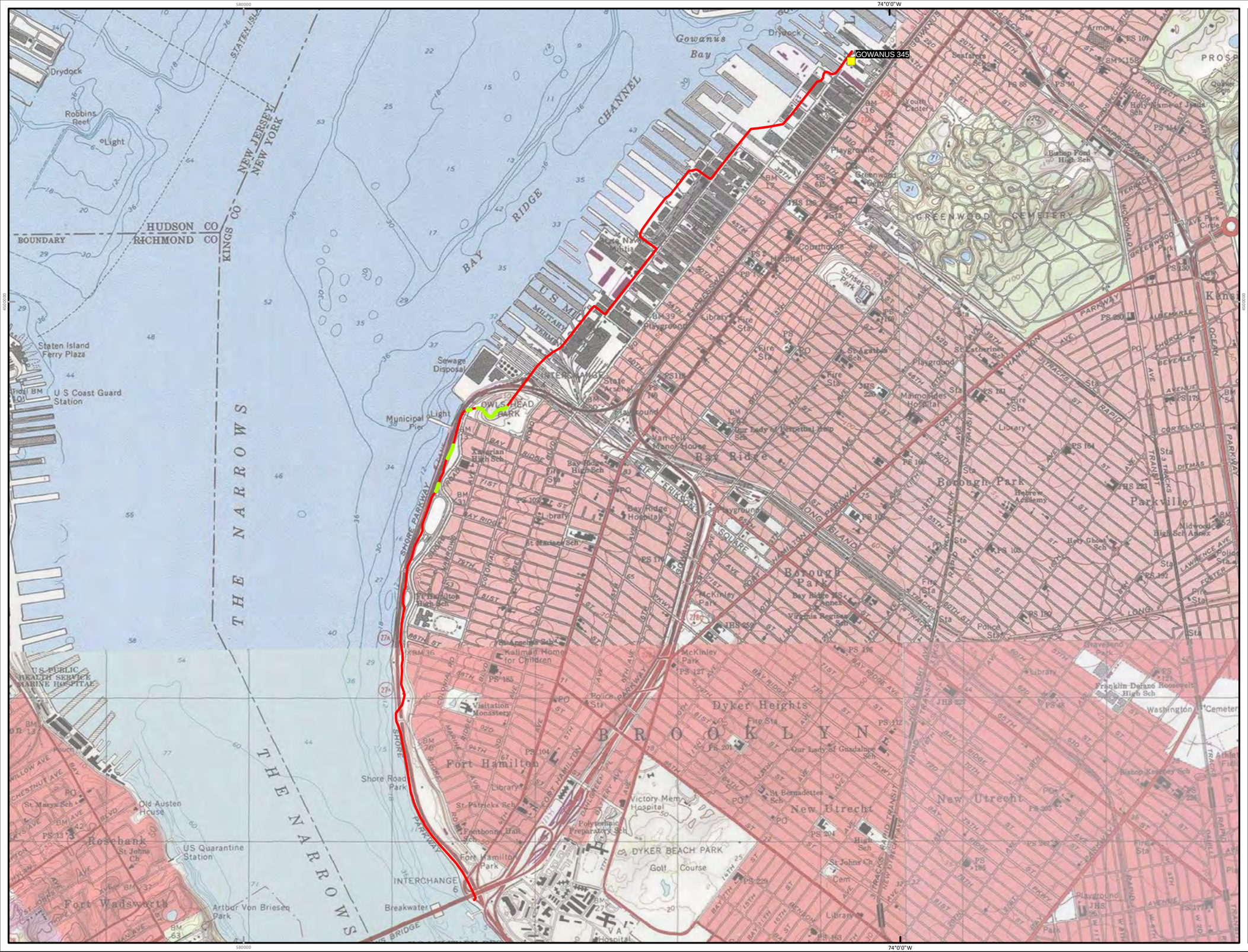

Empire Wind Project

Figure 2a

Cultural Resources Survey:
Gowanus Alternative

equinor

- Substation
- Previously Surveyed
- Recommended for Survey
- Recommended No Survey

PRELIMINARY – SUBJECT TO CHANGE

Date	12/12/2018
File/Job Number	
Personnel	Figure Prepared by:

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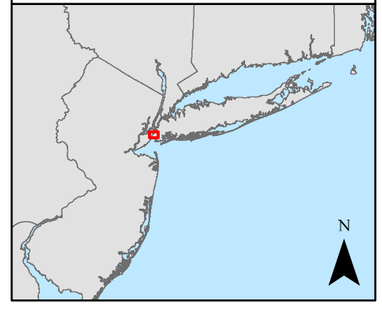
0 0.2 0.4 Nautical Miles

0 0.25 0.5 0.75 1 Kilometers

REFERENCE MAP



Empire Wind Project
Figure 2b

Cultural Resources Survey:
Ruland Rd. Alternative

equinor

RULAND RD 138

- Substation
- Previously Surveyed
- Recommended for Survey
- Recommended No Survey

PRELIMINARY – SUBJECT TO CHANGE

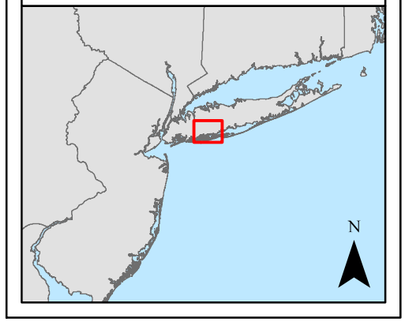
Date	12/12/2018
File/Job Number	
Personnel	Figure Prepared by:

0 0.5 1 1.5 2 Miles

0 0.5 1 Nautical Miles

0 0.5 1 1.5 2 Kilometers

REFERENCE MAP



Empire Wind Project

Figure 3

Project Visual Study Area
and Historic Architecture APE

equinor

Historic Architecture Survey – Area of Potential Effects (APE)

35-mile Visual Study Area

Lease Area (OCS-A-05412)

Substation

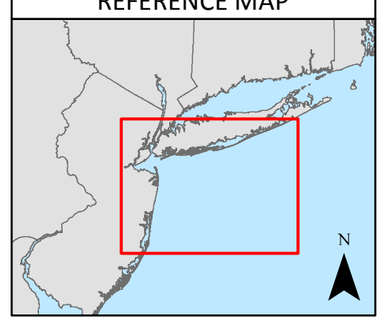
Date	12/4/2018
File/Job Number	
Personnel	Figure Prepared by:

0 2 4 6 8 Miles

0 2 4 6 Nautical Miles

0 3 6 9 12 Kilometers

REFERENCE MAP



RULAND RD 138

GOWANUS 345

OCEANVIEW 230

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NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation, and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

December 19, 2018

Dr. Sydne Marshall
Cultural Resources Discipline Lead
Tetra Tech
6 Century Drive, Suite 300
Parsippany, NJ 07054

Re: BOEM
Empire Wind Offshore Wind Farm Project
18PR07274

Dear Dr. Marshall:

Thank you for requesting the comments of the New York State Historic Preservation Office (SHPO). We have reviewed the submitted materials in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include other environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York State Environmental Conservation Law Article 8).

We have reviewed your letter dated December 13, 2018, describing your overall approach to cultural resources surveys of terrestrial archaeology, underwater archaeology, and historic architecture. We find the approach detailed in your letter to be acceptable.

On Page 2 you state, “Tetra Tech will perform background research within a study area that extends approximately one mile around potential land cable routes.” SHPO will accept a reduction of the background research study area to one-quarter mile on each side of the proposed land cable routes, making a total study area width of one-half mile straddling the cable route.

If further correspondence is required regarding this project, please refer to the SHPO Project Review (PR) number noted above. If you have any questions I can be reached at 518-268-2186.

Sincerely,

Tim Lloyd, Ph.D., RPA
Scientist - Archaeology
timothy.lloyd@parks.ny.gov

via e-mail only

TETRA TECH

August 22, 2019

Tim Lloyd, Ph.D.
Archaeology Unit
New York State Division for Historic Preservation
Peebles Island Resource Center
Delaware Avenue
Cohoes, NY 12047

Subject: **Equinor Wind US – Lease Area OCS-A 0512 Offshore Wind Project**
Nassau County, NY
Update Regarding Empire Wind Project
18PR07274

Dear Dr. Lloyd:

As described in a letter to you dated December 13, 2018, Tetra Tech is currently under contract to Equinor Wind US (Equinor) to assist with the siting and permitting of a proposed offshore wind energy project associated with the Bureau of Ocean Energy Management's (BOEM's) Lease Area OCS-A-0512 (the Project). This letter provides an update on the upland routes under consideration for the Project.

As previously described, the Project is planned for an area of approximately 80,000 acres in federal waters, located an average of 20 miles south of Long Island, east of the Rockaways (Figure 1). The Project could have the capacity to produce up to approximately 2,100 megawatts (MW) of electricity, enough to power one million homes. Equinor is currently developing the federal and state permit applications that will support construction, operation, and decommissioning of the proposed offshore wind project.

The lead federal agency for the Project is BOEM. Among many studies that are currently planned or in progress to satisfy federal and state permitting requirements are investigations related to cultural resources. Upland archaeological surveys, historic architecture surveys, and underwater surveys are ongoing in compliance with Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800, and with state guidelines of New York.

In New York, the energy produced by the offshore facilities could be transmitted to two substations. As announced by Governor Cuomo on July 18, 2019, the first phase, known as the Empire Wind Project, proposes to connect into the Gowanus Generating Station, Brooklyn, Kings County, New York. A subsequent phase considers connection to the Barrett substation, located in the Town of Hempstead,

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Nassau County, New York. An additional phase, the Boardwalk Wind Project, proposes to bring energy to New Jersey.

A goal of this letter is to present an update of the Project's upland energy transmission routes since the December 2018 letter. Although Equinor maintains its request for interconnection at the Ruland Road substation, the Barrett substation route has been added for consideration. Tetra Tech continues to perform the background research that will include the added route as part of the Area of Potential Effects (APE). Tetra Tech has been performing in-field reconnaissance of the Barrett Onshore Export Cable Route to identify areas that are both potentially sensitive for containing archaeological sites that may be eligible to the NRHP and testable. As noted in the earlier correspondence, Equinor currently expects to place its upland transmission lines within existing rights-of-way to the maximum extent practicable, primarily following public roadways. All transmission cables will be installed subsurface, as well as any supporting infrastructure (e.g., jointing vaults or manholes), to the extent practicable. The proposed transmission routes are shown in the attached figures and are described below.

Gowanus Onshore Route

The Gowanus Export Cable is proposed to make landfall in Gowanus, Brooklyn NY, with two parcels currently under consideration as the substation with which the onshore route would tie in: the Eastern Generation Narrows Substation (EGNS) and the South Brooklyn Marine Terminal (SBMT). From the EGNS site, the Gowanus Onshore Export Cable would traverse approximately 8,900 feet through portions of 1st Avenue, 2nd Avenue, and the margins of Bush Terminal including Bush Terminal Park, ultimately connecting into the Gowanus Generating Station. From the SBMT site, the Gowanus Onshore Export Cable route traverses north into the Gowanus Generating Substation (see Figure 2). A review of nineteenth century maps of the Brooklyn shoreline indicates that the Terrestrial Archaeological APE occurs in its entirety on landfill constructed into Gowanus Bay in the late nineteenth and early twentieth centuries (NYPL 2019); therefore, no additional areas are recommended for further investigation.

Barrett Onshore Export Cable Route

The Barrett Onshore Export Cable Route is proposed to make landfall on Long Beach Island, Nassau County, New York and extends approximately 3.1 miles northward to the proposed substation located on the E.F. Barrett power station parcel, in the Town of Hempstead, Nassau County, New York (Figure 3). The route would include open trench and trenchless installation of the cable. Open trench installation would occur within surface road ROW, Long Island Rail Road parking ROW, and vacant land parcels. Trenchless crossings, utilizing bores or horizontal direct drilling (HDD), are being considered for large intersections and water crossing (Reynolds Channel) between Long Beach Island and Barnum Island. The offshore cable landfall would bore/drill under the beach and boardwalk at Long Beach and connect to open trench installation along Riverside Boulevard. Equinor is examining two potential trenchless crossings of Reynolds Channel; one extends northward from Riverside Boulevard; the second potential crossing extends northward from Long Beach Road just west of the Long Beach Bridge. The cable route would cross Hog Island Channel, an arm of Barnums Channel, about 650 feet south of the proposed

substation. The substation parcel is adjacent to the existing power station and supports thick scrub-shrub vegetation and wetlands.

A pedestrian reconnaissance was conducted by registered professional archaeologists under contract to Equinor Wind in July 2019. Archaeological sensitivity is judged to be low across the full extent of the Barrett onshore cable route. Based on the site files review and pedestrian reconnaissance, it is recommended that no further archaeological investigations are warranted for the Barrett Onshore Export Cable Route and Onshore Substation.

Field and reporting efforts associated with historic architecture issues and underwater cultural resources issues are also ongoing as described within the December 2018 correspondence.

Please feel free to reach out with any questions or concerns you may have about the upland routes under consideration for the Project.

As always, thank you for your attention and consideration of this Project.

Very truly yours,

Sydne B. Marshall, Ph.D., RPA
Cultural Resources Lead

Attachments:

- Figure 1 – Project Overview
- Figure 2 – Gowanus Alternative
- Figure 3 – Barrett Alternative

cc:
- N. Schils (TT PM)
- K. Miller (TT DPM)
- R. Jacoby (TT)
- C. Borstel (TT)
- J. Sexton (TT)
- Martin Goff (Equinor)
- Laura Morales (Equinor)

View and/or Address a Response

Project 18PR07274: Empire Wind Offshore Wind Farm Project (G7V1SILNVYAF)

•View Project

Please accept the following information below as the consolidated response from NYS SHPO for the above referenced submission.

Review Responses

Reviewer	Review Type	Response
Tim Lloyd	Archaeology	Sydney, I have reviewed your letter dated August 22, 2019, regarding the updates to the project plans and the status of the ongoing cultural resource surveys. I concur with your recommendations regarding archaeological investigations of the Gowanus and Barrett Onshore Cable Routes. I have no comments or questions at this time and look forward to continued consultation.

Information Requests

Process	Status	Reviewer	Review Type	Request Type	Request Entity	Request Item	Request Description

No Request Records

Attachments

Attachment	Reviewer	Review Type	Type Name	Description

No Attachment Records