APPENDIX Y

Terrestrial Archaeological Resources Assessment

Prepared for

equinor

TETRA TECH

MARCH 2023

ATTACHMENTS

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, the onshore substations, and the O&M Base
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, 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 IA Terrestrial Archaeological Survey**; and
- **Attachment Y-2, EW 2 Phase IA Terrestrial Archaeological Survey**.

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

ATTACHMENT Y-1
EW 1 PHASE IA TERRESTRIAL ARCHAEOLOGICAL SURVEY

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

Phase IA Terrestrial Archaeological Survey

Empire Wind 1 Interconnection Cable Corridor, Onshore Substation, and O&M Base

Brooklyn, Kings County, New York

Prepared for
Empire Offshore Wind LLC

Prepared by
Tetra Tech, Inc.

6 Century Drive, Suite 300
Parsippany, NJ 07054

October 2022

MANAGEMENT SUMMARY

Tetra Tech, Inc. (Tetra Tech) conducted a Phase IA terrestrial archaeological survey of the proposed Empire Wind 1 (EW 1) interconnection cable corridor, onshore substation, and Operations and Maintenance (O&M) Base 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; (3) an onshore substation; and (4) an O&M Base.

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 archaeological resources are known within the Area of Potential Effects evaluated during this Phase IA 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 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; Onshore Substation of 4.8 acre; O&M Base of 6.5 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:	October 2022

TABLE OF CONTENTS

TABLES

FIGURES

PHOTOGRAPHS

ADDENDUMS

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
PAPE	Preliminary Area of Potential Effects
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, the onshore substations, and the O&M Base.
SHPO	State Historic Preservation Office
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 wind farms. Empire Wind 1 (EW 1) and Empire Wind 2 (EW 2) will be electrically isolated and independent from each other. Each wind farm will 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 Project includes two onshore locations in New York where the renewable electricity generated will be transmitted to the electric grid.

A Construction and Operations Plan (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)). The APE will be defined by BOEM through the Section 106 process, therefore, this report describes the preliminary APE (PAPE), as identified by Tetra Tech, Inc. (Tetra Tech).

This report discusses the Phase IA terrestrial archaeological survey of the EW 1 interconnection cable route, onshore substation, and Operations and Maintenance (O&M) Base[1] 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,b). 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. An O&M Base will be located adjacent to the EW 1 onshore substation at SBMT.

[1] While the O&M Base will serve both EW 1 and EW 2, the facility will be located at SBMT, adjacent to the EW 1 onshore substation, and will therefore be included within this assessment.

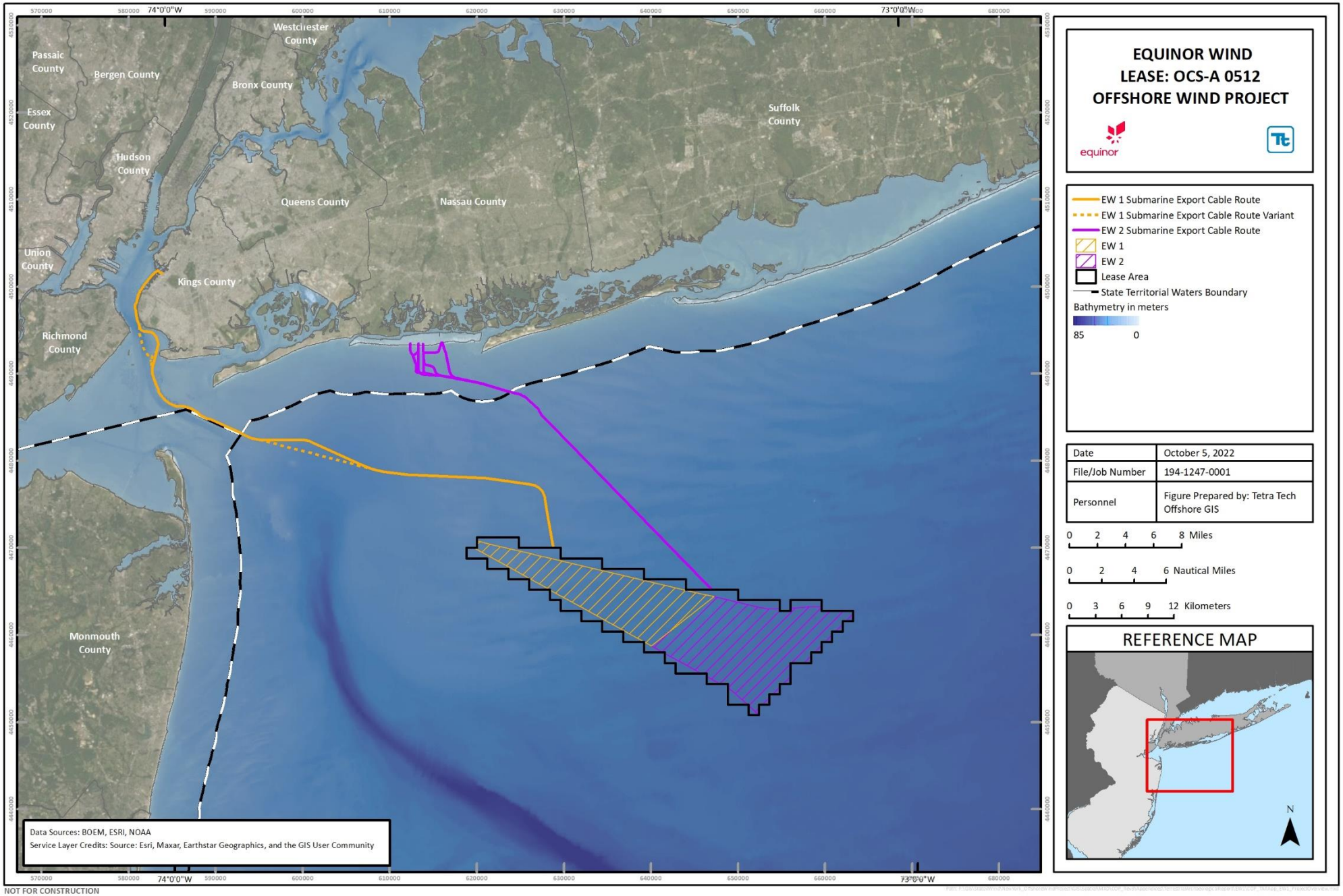


Figure Y-1-1 Project Overview

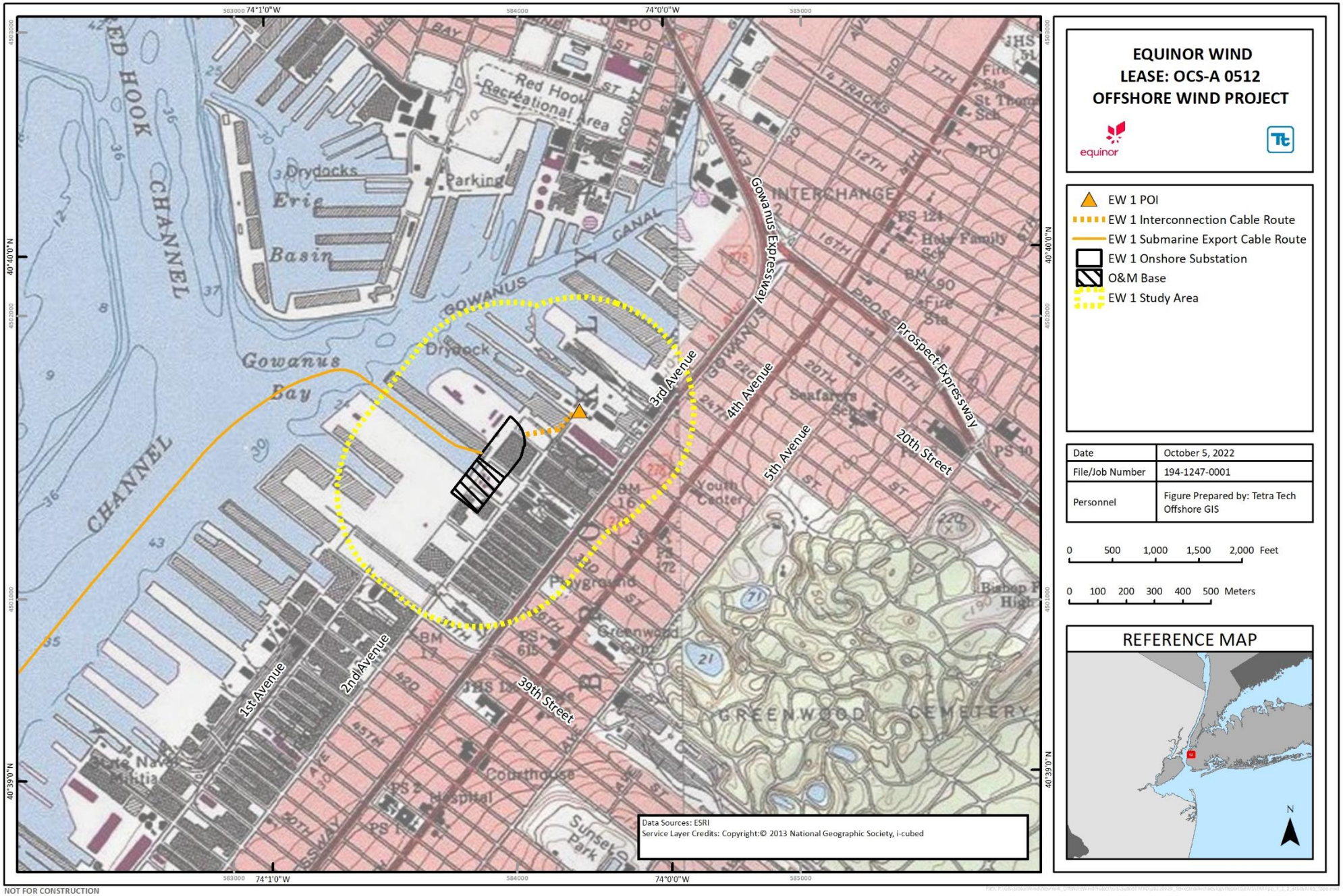


Figure Y-1-2 EW 1 Route Overview and Study Area, Topographic Background

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. BOEM's guidelines direct lessees to adhere to the guidance provided by the State Historic Preservation Office (SHPO) of the affected state(s) (BOEM 2017).

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 PAPE 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[2]. 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 IA 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 PAPE (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);

[2] While the O&M Base was not included within this letter, the facility will be located at SBMT, adjacent to the EW 1 onshore substation, and is therefore covered under the 1-mi (1.6-km) Study Area.

- 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 IA survey that are in accordance with New York Archaeological Council standards for archaeological investigations (NYAC 1994). While BOEM's guidelines for archaeological reporting pursuant to offshore wind projects (BOEM 2017) do not provide specific procedures for conducting survey of terrestrial archaeology, they do direct lessees to adhere to the guidance provided by the SHPO of the affected state(s).

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.

Preliminary Area of Potential Effects

The PAPE 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 PAPE 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	Maximum length of 0.2 mi (0.4 km) of interconnection cables. Maximum vertical disturbance of up to 10 feet (3 meters); maximum horizontal disturbance or breadth 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

Parameter	Realistic Maximum Scenario	Rationale
		substation, which would result in the maximum area of ground disturbance.
O&M Base	Up to a 6.5-ac (1.8-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 O&M Base, 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 PAPE.

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 and O&M Base parcel. This reconnaissance was undertaken to evaluate the extent of prior ground disturbance within the PAPE, and to identify locales within the PAPE 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 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 (**Photographs 1 and 2**). 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 (**Photographs 3 and 4**). 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. Second Avenue and 29th Street, Brooklyn, NY. View to northwest.

Photograph 3. First Avenue and 50th Street, Brooklyn, NY. View to southwest.

Photograph 4. First Avenue and 49th Street, Brooklyn, NY. View to northeast.

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.

Paleoindian Period

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). Shawnee-Minisink is located approximately 60 mi (97 km) northwest of the Project Area.

Shawnee-Minisink contained well-made Clovis-type fluted projectile points, end scrapers, and gravers, distinctive implements that characterize early Paleoindian toolkits. It was the discovery of a Clovis point in association with extinct paleofauna at the Blackwater Draw site in New Mexico in the 1920s that forced archaeologists to recognize the antiquity of this widely distributed point type. The Blackwater Draw find and others in the Great Plains provided direct evidence of big game hunting as a Paleoindian subsistence stratagem, and it was long assumed that eastern Clovis groups also practiced a specialized hunting adaptation to megafauna or herd animals, despite the absence of identified kill sites or large mammal faunal remains at eastern sites (Ritchie 1980:3). The belief that megafauna hunting was the focus of Clovis subsistence practices suggested that human predation and overkill was a causative agent of much of the genera extinction that occurred in North America at the close of the Pleistocene (Martin 1967). Both of these assumptions (specialized hunting adaptation and megafauna overkill) have been strongly challenged over the past few decades, and it is now generally conceded that Clovis and other Paleoindian groups resident in eastern North America relied on a broad range of subsistence resources, including fruiting seeds, fish, and small animals, as well as herd game (Dent 2007:127-129). Recent analysis suggests that megafauna had mostly vanished from the northeast by the time Paleoindians arrived (Boulanger and Lyman 2014).

A notable characteristic of the Paleoindian lithic toolkit was the preference for high quality stone, often traceable to sources great distances from its use. This consumer choice reveals two important implications for Paleoindian social organization and technology. First, Paleoindians operated within small, highly mobile bands employing a foraging strategy, moving frequently across large territories to exploit known or potential resources (Binford 1980). Movements were scheduled to exploit seasonally available resources across a wide spectrum of environment zones. And second, the preference for quality stone and the requisite skills to work it was probably related to their highly mobile lifestyle, ensuring that the life span and utility of tools were optimized while groups were far removed from new stone sources (Anderson 2013:918).

Aside from Shawnee-Minisink, there are no well-dated Paleoindian sites in the Middle Atlantic region. Nonetheless, Pagoulatos (2004) has identified 96 Paleoindian sites in New Jersey, with 300 to 400 individual

fluted points found in the state (Kraft 1986:35; Gingerich 2013:142). In Pagoulatos' (2004) survey, 52 percent of Paleoindian sites were located on terrace landforms; 26 percent were located on periglacial features; and the remaining sites occurred on flood plains, knolls, cuestas, upland divides, or rockshelters. Near the study area, Paleoindian sites have been reported in the upper Passaic River basin and on Staten Island, including the Port Mobil site that contained several fluted points manufactured from non-local material and small scrapers made from locally-sourced glacial cobbles (Kraft 1986:43). The Port Mobil site is approximately 15 mi (24 km) southeast of the Project Area.

The record of Paleoindian settlement pattern in the northeast is somewhat obscured by the submergence of the continental shelf due to sea level rise. The paleo-shoreline at the time of the last glacial maximum (circa 21,000 years ago) is estimated to have been 80 mi (128.7 km) seaward of the current shoreline, and between 25 to 30 mi (40.2 to 48.2 km) seaward by the early Holocene, circa 8000 BC. Potential exploitation of terrestrial and marine resources at paleo-shoreline locations by Paleoindian groups is suggested by occasional finds of mammoth and mastodon teeth from scallop fishing at 25 to 30 meters below modern mean sea level, roughly paralleling the terminal-Pleistocene paleo-shoreline (Uchupi et al. 2001:124).

Biface technology during the final thousand-year interval of the Paleoindian period displays basic continuity with earlier forms; large lanceolate points, parallel flaking, and preference for high quality stone. Late Paleoindian points differed from their predecessors by generally lacking the channel flute, and sometimes exhibiting basal tangs. Toolkits from northeastern late Paleoindian sites show a striking absence of the formal endscrapers that characterized the Clovis and other fluted point assemblages. Expedient flake tools began to appear among toolkits, leading some researchers to postulate that late Paleoindian groups were "settling in" to local environments resulting in reduced range mobility and greater reliance on local lithic sources (Lothrop et al. 2016:237-238).

Archaic Period

The Archaic period is marked by climate warming that gradually resulted in greater biodiversity in the resource base. Modification of tool technology, increased site size, and changing site distribution reflect utilization of a broader spectrum of resources and ecological zones. Archaeologists divide the period into three subperiods: Early (8000 to 6000 BC); Middle (6000 to 4000 BC); and Late (4000 to 1000 BC).

Early Archaic Period (8000 to 6000 BC)

The adaptive strategies of groups during the Early Archaic period was more a continuation of established late Paleoindian broad-spectrum subsistence practices than a dramatic shift to new routines. Bands remained nomadic but appear to have exploited more restricted territories than their Paleoindian predecessors, making more repetitive visits to fewer strategic locations (Anderson 2013). Biface technology shows significant modifications from Paleoindian forms, adding hafting notches to basal, corner or side positions, with blades often exhibiting serrated or beveled edges. Notched points, such as Thebes, Big Sandy, Palmer, and Kirk types, are found widely distributed east of the Mississippi River (Justice 1987). The addition of ground-stone implements to toolkits suggests that nuts and seeds had become an important component of Early Archaic diets. These adaptive modifications in subsistence practices were probably responses to increasingly dry conditions throughout the period. Climatic warming led to forest closure after 8000 BC and increasing dominance of northern hardwoods over Boreal conifers, producing a more favorable habitat for such species as white-tailed deer and elk. (Davis 1983; Snow 1980).

Sea level rise continued though the Early Archaic and it appears likely that many sites from this period have been inundated, as paleoshorelines circa 9000 BP ranged from 20-50 mi (32-80 km) east of the current

beachfront (Merwin 2010). Early Archaic sites in the Outer Coastal Plain typically exhibit low density artifact scatters with a limited range of tool types. Kirk points from Site 28MO57 in Monmouth County, New Jersey (located approximately 20 mi [32 km] southwest of the Project Area) were manufactured from high-quality Reading Prong jasper, while Kirks from other coastal plain sites were made of local pebble cherts, suggesting that Early Archaic resource procurement was a mix of collecting and foraging strategies (Pagoulatos 2003:26).

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). The Dogan Point site is located approximately 35 mi (56 km) north of the Project Area.

Middle Archaic Period (6000 to 4000 BC)

The Middle Archaic period roughly corresponds with an extended warm and dry interval during the mid-Holocene. This climatic trend established the oak-chestnut forest as the dominant vegetational cover in the region, although excessive drought conditions probably introduced grassland prairies to some inter-drainage uplands (Sassaman 2010:23). Whether tied to this environmental shift or independent of it, biface technology markedly changed from notched to stemmed forms at the onset of the Middle Archaic and include broad-bladed Genesee stemmed varieties and Stark and Neville points from New England (Justice 1987). This change of form in bifacial tools may reflect stylistic variations introduced by in-migrating groups, or a technological adaptation to a shifting resource base, or both.

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). While it appears unlikely that shellfish (or fish) had become a specialized focus of Middle Archaic subsistence, resident populations were nonetheless aware of these resources, and capable of exploiting them. The Middle Archaic is poorly represented in the region. Deep soil horizons containing a Guilford-like point are attributable to the late-Middle Archaic from Site 28-Me-1-D (Area D) at the Abbott Farm Complex near Trenton, New Jersey (Wall et al. 1996:14). Abbott Farm is located approximately 50 mi (80 km) southwest of the Project Area. 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).

The Turkey Swamp Site, located in southwestern Monmouth County, New Jersey, located approximately 35 mi (56 km) southwest of the Project Area, yielded several unfluted, large triangular points that bore the hallmark of late-Paleoindian culture, according to the excavators (Cavallo 1981). Radiocarbon assays associated with these points, however, indicate an early Middle Archaic occupation c. 7660±325 BP to 8739±165 BP (Grossman-Bailey 2001:222).

Late Archaic Period (4000 to 1000 BC)

The Late Archaic period is characterized by increased population (as inferred by larger and more numerous sites), the onset of long-distance trade networks, and an increased focus on riverine settings for site locations.

Ceremonialism grew in importance, with more elaborate, formalized burial practices and the presence of exotic raw materials as symbols of enhanced status and rank (Fiedel 1992).

Extensive shellfish middens appeared in the lower Hudson River and lower Delaware River during this period, and freshwater shellfish were probably exploited along the Raritan River and other inland drainages (Claasen 1996; Kraft 1986:78). Shell harvesting in the lower Hudson River was intensively practiced from around 3500 to 2000 BC (Claasen 1996:104). Claasen 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 (Claasen 1996:105). This type of scheduled visit to exploit certain high value resources may have involved forays of task groups from an aggregated base camp located nearby. Social aggregation is thought to have occurred during warmer weather along floodplains, and proximal to lakes, streams, and wetlands. Toolkits associated with base camps would have included grinding stones, hammerstones, axes, celts, and other heavy-duty items. In contrast, the performance of specialized activities at task sites would be reflected generally in low artifact density and low tool diversity (Kraft and Mounier 1982:61-68).

The manufacture and use of small notched point and narrow stemmed point types was common across the northeast, exemplified by Vosberg, Brewerton, Lamoka, and Bare Island varieties. Each of these point types is visible in the archaeological record for at least a millennium, and in the case of Brewerton varieties for more than 1,500 years (Wall et al. 1996; Justice 1987). Toward the latter part of the Late Archaic period, a suite of large points collectively termed broadspears saw wide distribution throughout the southeast and Middle Atlantic regions. In New York, broadspear types include Snook Kill and Perkiomen points. While there is general consensus that broadspear use began in the southeast circa 2500 BC and followed into the Middle Atlantic by 1800 BC, there is substantial disagreement on what this means. One model is that the broadspear tradition is a distinct ethnic style borne by migrating groups from the southeast who settled along major rivers and exploited the runs of anadromous fish (Turnbaugh 1975). Others (e.g., Custer 1984) contend that the various broadspear point types represented a functional tool form rather than an ethnic style, while the notion itself that anadromous fish played a major role in subsistence and settlement patterning during the Broadspear Late Archaic has been challenged (Carlson 1988; Sassaman 2010:159-161).

Appearing around the same time as broadspears, cooking vessels carved from the mineral steatite (also called soapstone) were in wide use across the eastern seaboard. Steatite was quarried from outcroppings in the Ridge and Valley province extending from Alabama to Maine, and fashioned into rectangular, straightsided vessels. Steatite use peaked from between circa 2000 to 1000 BC, although it is present in dated contexts as early as 4300 BC (Truncer 2004:506). Steatite vessel distribution is closely mapped to the area of nut-producing deciduous forests, and may have functioned as stone-boiling containers for processing hickory, oak, and other nuts (Truncer 2004:507). Steatite quarries, though absent from New Jersey, were abundant in eastern Pennsylvania and northern Connecticut, and significant numbers of steatite vessels and vessel fragments have been collected in New Jersey, with special focus along the Delaware River.

The dramatic decrease in sea level rise during the preceding Middle Archaic period fostered stable environmental conditions by the start of the Late Archaic for the establishment of anadromous fish runs into the coastal rivers and for shellfish colonies to mature within the estuarine and riverine settings. The presence of large quantities of local pebble and cobble cherts among the lithic assemblage led Grossman-Bailey (2001:243) to interpret residential mobility during the Late Archaic to have been limited to individual drainage basins.

Woodland Period

The Woodland period was a time of increasing cultural complexity and social stratification; increased reliance on gathered plant resources in the diet; and an increased trend in territoriality, circumscribed mobility, and semi-sedentary settlement patterning. The period is usually divided into subperiods: Early Woodland (1000 BC to AD 250); Middle Woodland (AD 250 to 900); and Late Woodland (AD 900 to 1600).

Early Woodland Period (1000 BC to AD 250)

The Early Woodland period 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). The shift from soapstone to clay for utilitarian vessels did not, at first, radically change subsistence strategies or practices. This is inferred by the earliest pottery in the Middle Atlantic region, the rectangular, flat-bottomed Marcey Creek ware (circa 1500 to 900 BC), made in open imitation of soapstone vessels. It is likely that the two served much the same function, rendering nut fats or bone grease. In comparison with steatite, pottery exhibited poor thermal properties and was far more liable to break, traits that may have initially discouraged its use. Clay had the advantage, however, of being available almost anywhere. If populations did decline at the onset of the Early Woodland period, then it is likely that the trade and alliance networks established during the Late Archaic had fragmented, disrupting steatite supply lines, and fostering its replacement with more easily obtainable clay. Ceramic technology, known but dismissed for almost a millennium in the Middle Atlantic region, was seemingly adopted to continue Late Archaic lifeways during a period of demographic and cultural crisis. Only later, did pottery's advantages (its portability, storage capability, and capacity to be shaped into many forms and designs), begin to transform cultural patterns in important ways.

In the Early Woodland, biface technology abandoned broadspears in favor of narrower forms, including the Orient Fishtail (1200 to 700 BC) and Meadowood (1000 to 500 BC) during the early phase of the period, with Rossville points common toward the end of the period. Vinette I, an exterior- cordmarked, conical-shaped ceramic vessel is associated with Meadowood and Rossville points (Williams and Thomas 1982:113). Rossville points and Vinette I ceramics have been found in association on Staten Island at the Bowman's Brook site, located approximately 8 mi (13 km) southwest of the Project Area. Excavations at the Abbott Farm Complex near the Delaware River at Trenton revealed a cluster of Early Woodland hearths and stone-boiling features, interpreted to have functioned as fish processing stations. Associated with these features were Vinette I sherds (Wall et. al. 1996:363-365).

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).

Middle Woodland Period (AD 400 to 900)

The Middle Woodland period 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 (1956: 194). The expansion of the resource base is paralleled by an increase in the number of storage pits noted in the archeological record (DeBoer 1988; Snow 1980:282). During this period, settlement patterns have a decidedly riverine and coastal focus (Kraft 1986:105-107; Williams and Thomas 1982:122). Large lithic workshops and anadromous fish processing camps from this period were excavated at the Abbott Farm Complex near Trenton (Cavallo 1987; Wall et al. 1996). Associated point types of this period include Fox Creek stemmed and lanceolate forms, found at sites in the middle

Delaware River valley and tributary drainages, including Abbott Farm and Plenge. The Plenge site is located approximately 50 mi (80 km) west of the Project Area.

Trade and exchange networks flourished during the Middle Woodland, especially in areas influenced by the Hopewell tradition in the Midwest and Ohio Valley. Some Hopewellian manifestations are visible in western New York in the form of mortuary practices and artifact types of the Squawkie Hill Phase (Ritchie 1980:214-227), and while there is little evidence of this in eastern New York, there are suggestions that Middle Woodland groups utilized down-the-line exchange in both directions; mid-Atlantic coast shells have been found in the Ohio Valley, and Hopewell-like platform pipes occasionally appear in the east (Stewart 1989:60-63; Stewart 1998:170-171).

Presently, no evidence exists for maize horticulture in the northeast during the Middle Woodland period. 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). The presence of these nutritious seeds suggests that people were collecting them, and perhaps fostering conditions for their production, even tending small garden plots. This small-scale practice of horticulture complemented the principal hunting, foraging, and fishing strategies that fed people, and importantly, it laid the framework for the types of social organization and technological requirements that would be needed when maize was eventually adopted as the primary (or at least important) food resource along the Susquehanna, Delaware, and Hudson River drainages.

Late Woodland Period (AD 900 to 1600)

Important cultural adaptations during the Late Woodland period have been archeologically recognized on a wide scale in New York, and include the tending of cultigens (maize, beans, and squash), decrease in residential mobility, and use of the bow and arrow as a new and highly efficient hunting (and warring) weapon. These adaptations are perhaps all related to the region's population rise, with increased competition for resources and an intensification of local ethnic identity.

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). Colder climate and a shorter growing season in the northeast may have proven sub-optimal for the eight-row maize that was grown effectively in the southeast and lower Midwest. 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).

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,b, 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)

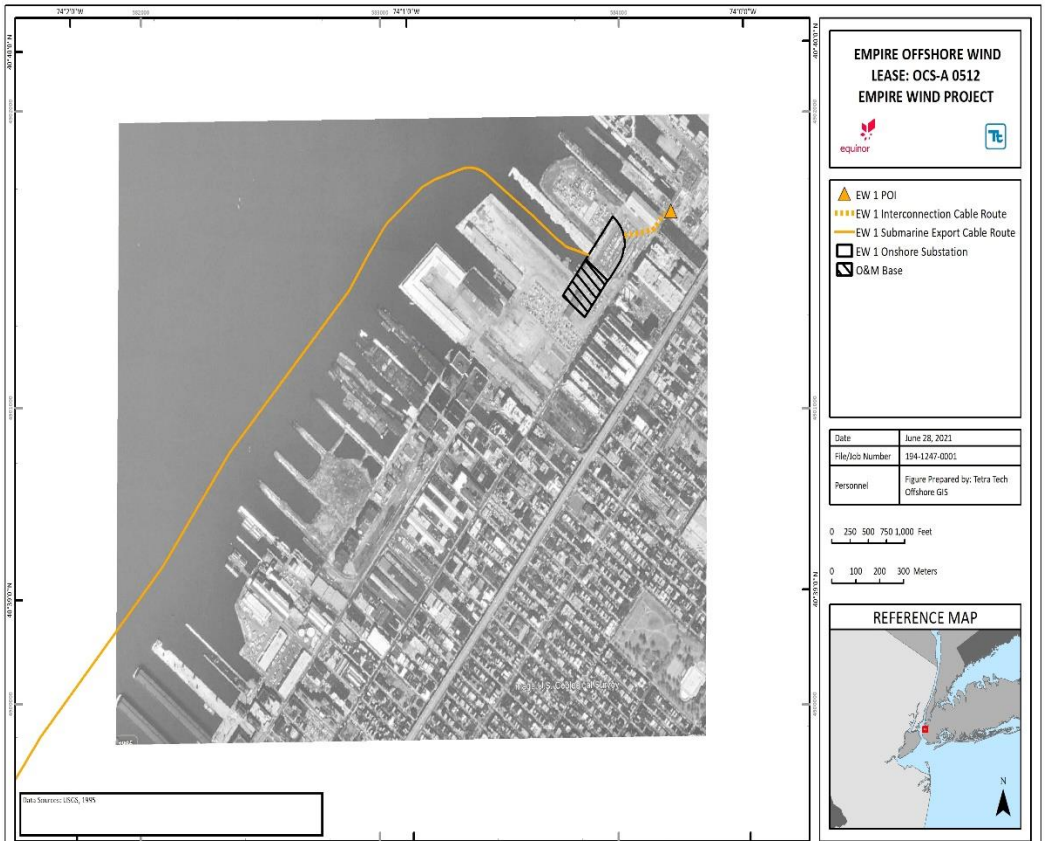
The status of Kings County as a leader in market gardening continued well into the nineteenth century. Between 1860 and 1880, Kings County market gardens had increased in value by 164 percent to almost $850,000 (U.S. Census Bureau 1864:102, 1882:299). Farming districts in Kings County included New Utrecht, 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 5**). 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 (**6**).

Photograph 5. First Avenue and 39th Street, Brooklyn, NY, circa 1950. View to north.



Photograph 6. 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 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, and are located approximately 2 mi (3 km) north of the Project Area. 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) both conducted Phase IA documentary research and pedestrian reconnaissance, and concluded that no historic properties would be adversely affected by proposed projects and recommended no further archaeological studies. The Raber (1985) and McVarish et al. (2008) survey areas are shown in **Figure Y-1-4.** Davis (2019) conducted a Phase IA survey consisting of documentary research and pedestrian reconnaissance, and 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 PAPE, possessed moderate sensitivity for historic archaeological resources. An updated review of CRIS and Landmarks Preservation Commission databases in March 2022 identified no additional archaeological surveys.

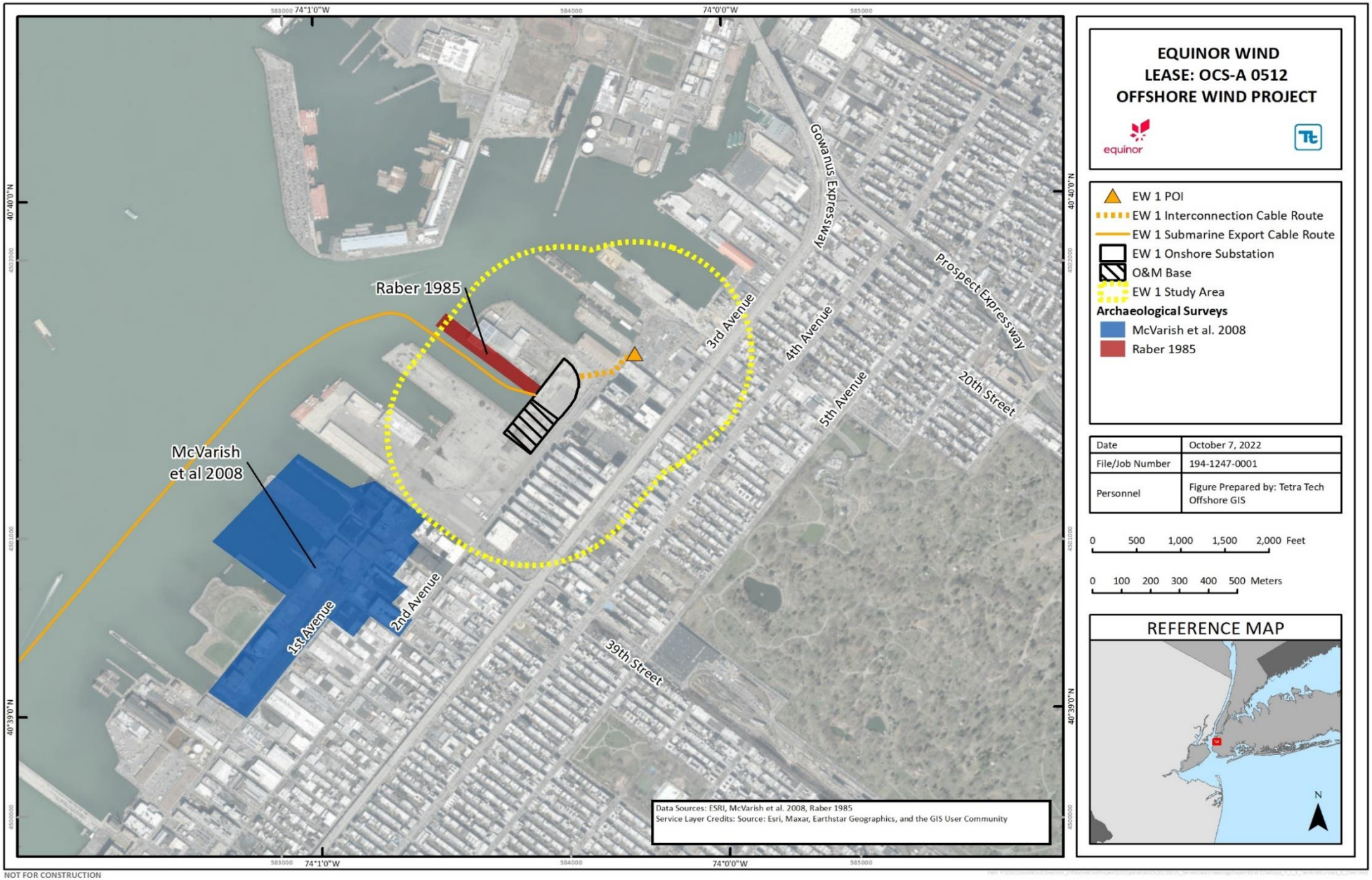


Figure Y-1-4 Prior Archeological Surveys Conducted Near the Study Area

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 PAPE

As discussed in **Section Y-1.3.1**, the Project PAPE 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[3], 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 PAPE. In the 1845 chart, the shoreline was mapped inland of the Project PAPE from around 39th Street northward **(5**), 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 (**6** and 7). 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 (**6** and **Figure Y-1-8**). 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 (**7**). A review of 1898 and 1916 insurance maps show broad continuation of construction and shoreline filling (**Figure Y-1-**9 through **Figure Y-1-11**). First Avenue had become lined with warehouse or factory structures (**Figure Y-1-8**; **Photograph 7**). Shoreline filling and development of lots along the Project PAPE was essentially complete by 1920 (**10** and **1**; **Photograph 8**). 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 (**2** and **Figure Y-1-13**).

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

Photograph 7. Bush Terminal circa 1905

Photograph 8. Bush Terminal, 1917. View to east

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

Tetra Tech Secretary of the Interior (SOI)-qualified archaeologists performed a pedestrian reconnaissance of the Project Area on October 30, 2018, to observe current land uses and conditions, and to identify any areas where shovel tests could be excavated to reveal local soil stratigraphy. As expected from a review of the Project layout, maps, and aerial imagery, all accessible portions of the proposed EW 1 interconnection cable route were located within paved roads, precluding the ability to excavate shovel tests. The reconnaissance confirmed the conclusions of the background research that the proposed EW 1 interconnection cable route and O&M building were located, in their entirety, on made-land supporting dense urban development.

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

Y-1.4 SUMMARY AND RECOMMENDATIONS

Tetra Tech conducted a Phase IA terrestrial archaeological survey of the proposed EW 1 interconnection cable corridor, onshore substation, and O&M Base 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; (3) an onshore substation; and (4) an O&M Base. 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 archaeological resources are known within the Study Area evaluated during this Phase IA 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 PAPE evaluated in this Phase IA 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. Tetra Tech further recommends that no further archaeological investigations or construction monitoring is warranted. Tetra Tech found no previously identified NRHP-listed, -eligible, or potentially eligible site at either the EW 1 or EW 2 locations.

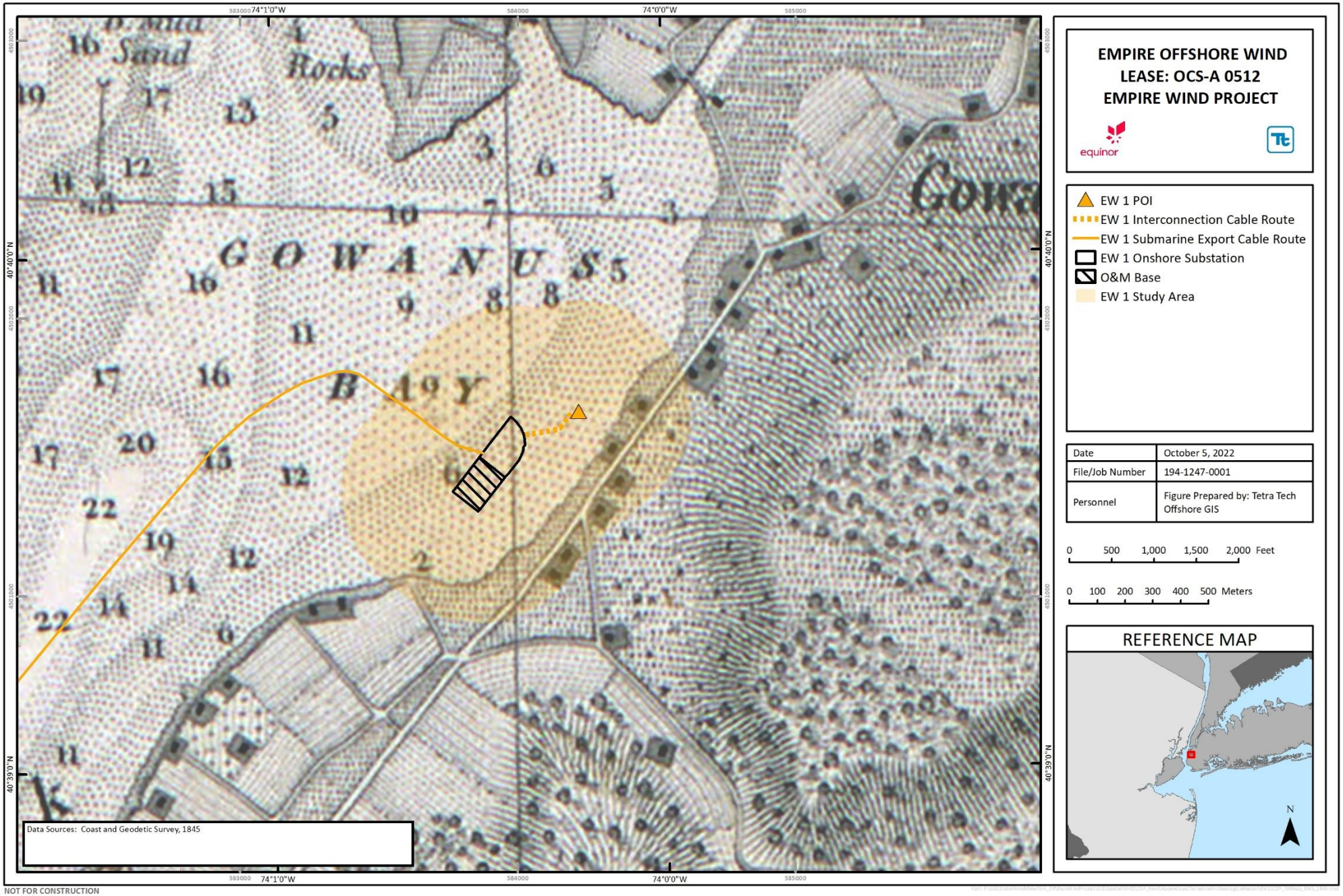


Figure Y-1-5 Coast Survey Chart (1845) showing EW 1 Export Cable Route

Figure Y-1-6 Coast Survey Chart (1882) Showing EW 1 Export Cable Route

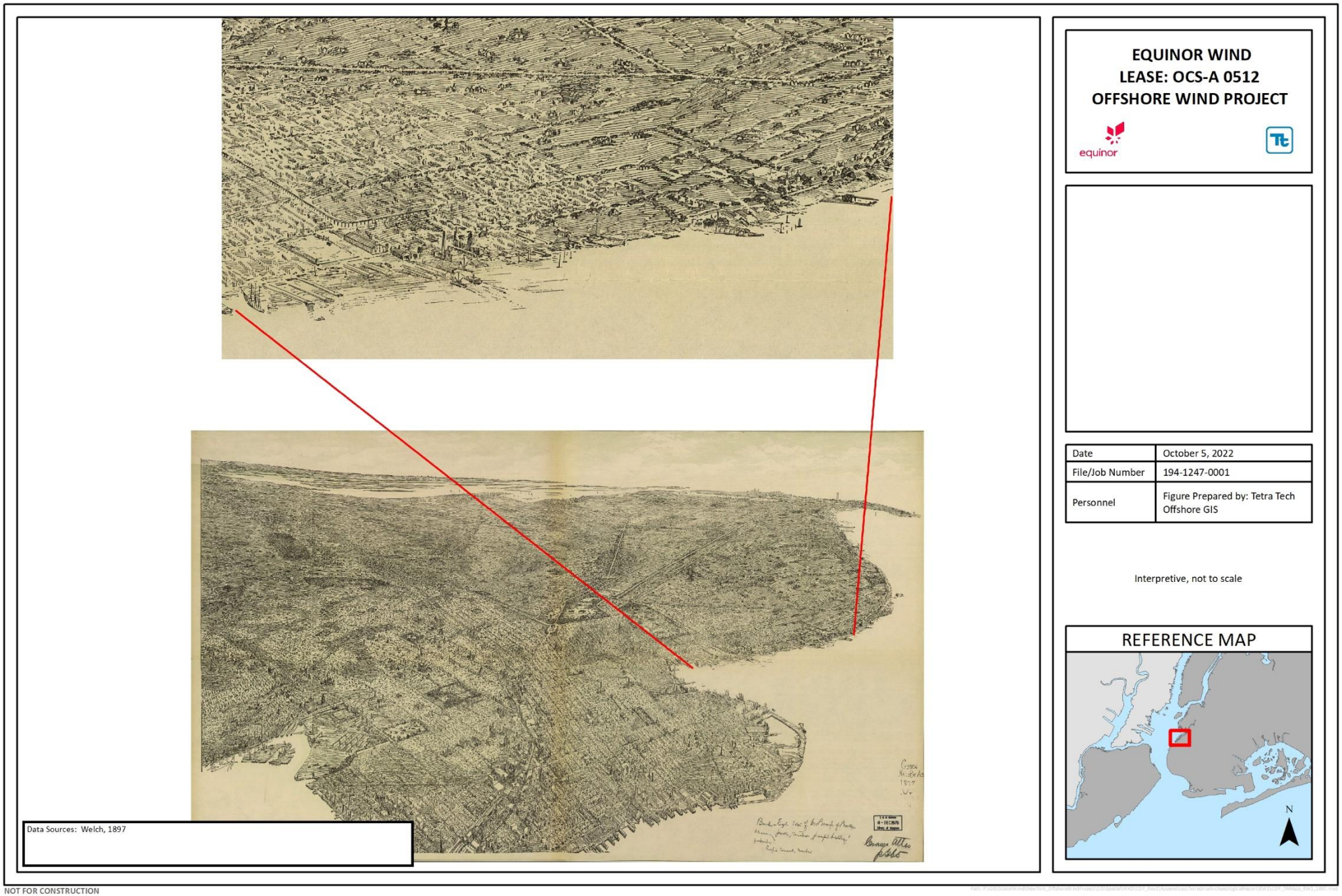


Figure Y-1-7 Bird's-Eye-View of Brooklyn (1897)

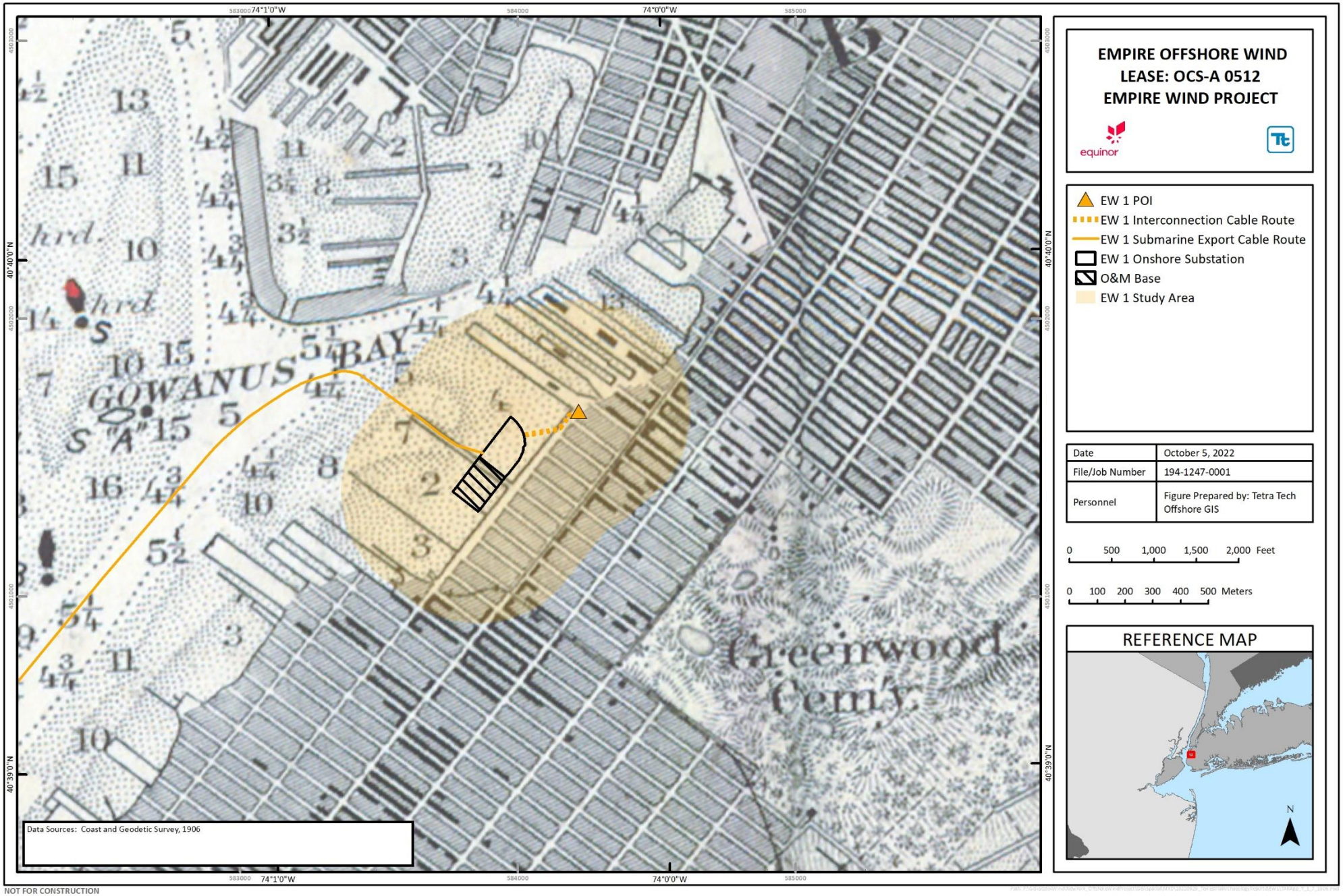


Figure Y-1-8 Coast Survey Chart (1906) Showing EW 1 Export Cable Route

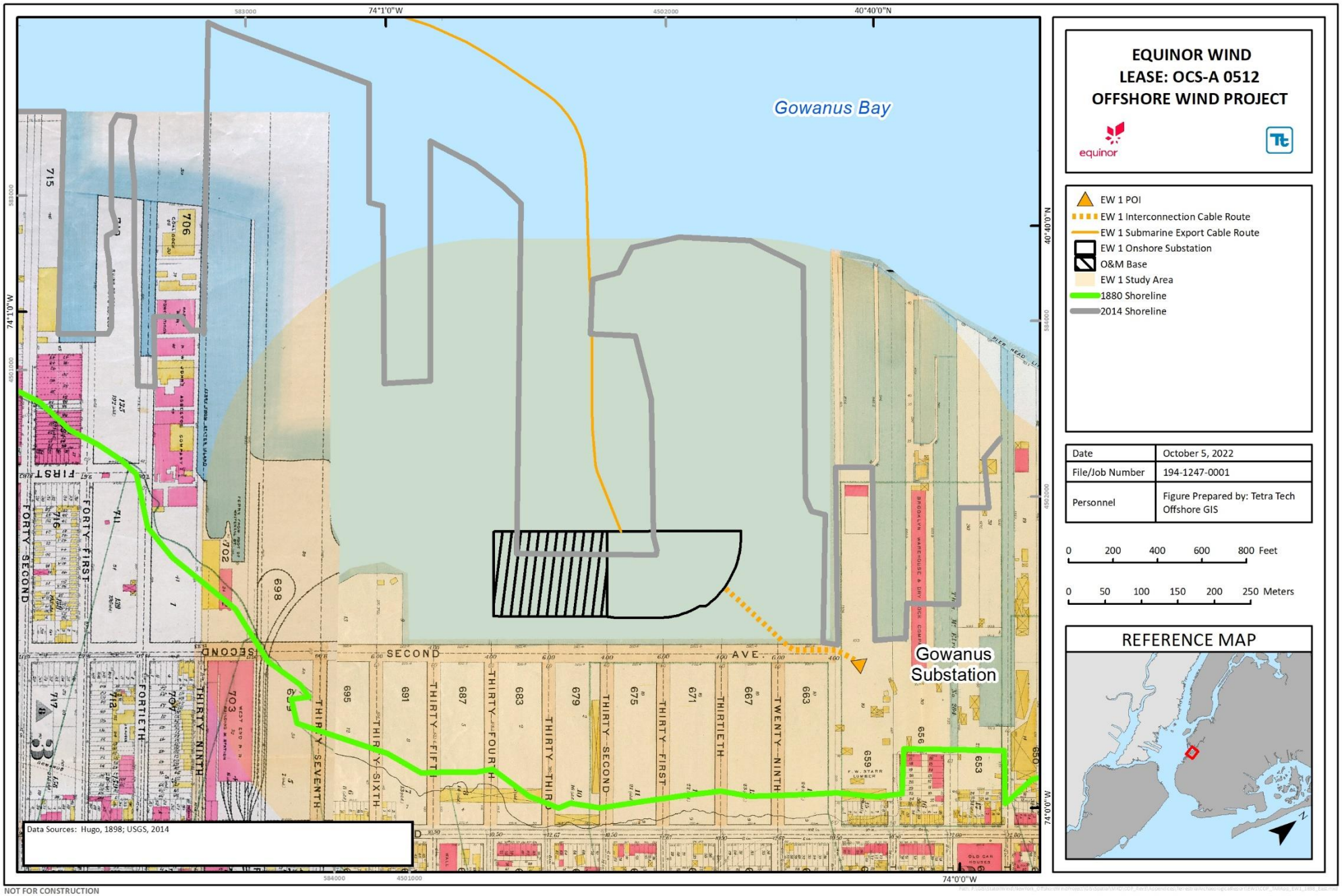


Figure Y-1-9 New York City Fire Insurance Map (1898) Showing EW 1 Export Cable Route

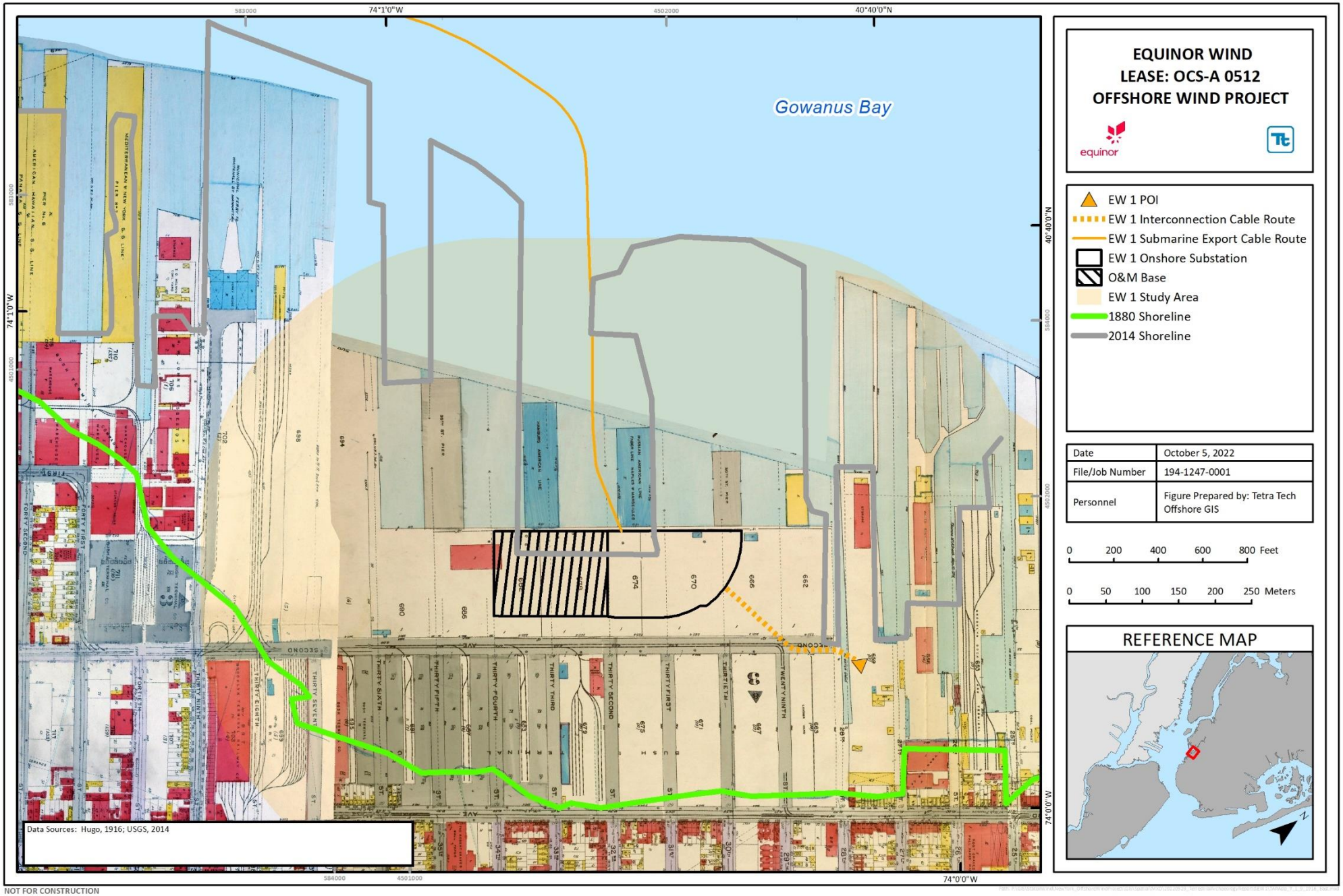


Figure Y-1-10 New York City Fire Insurance Map (1916) Showing EW 1 Export Cable Route

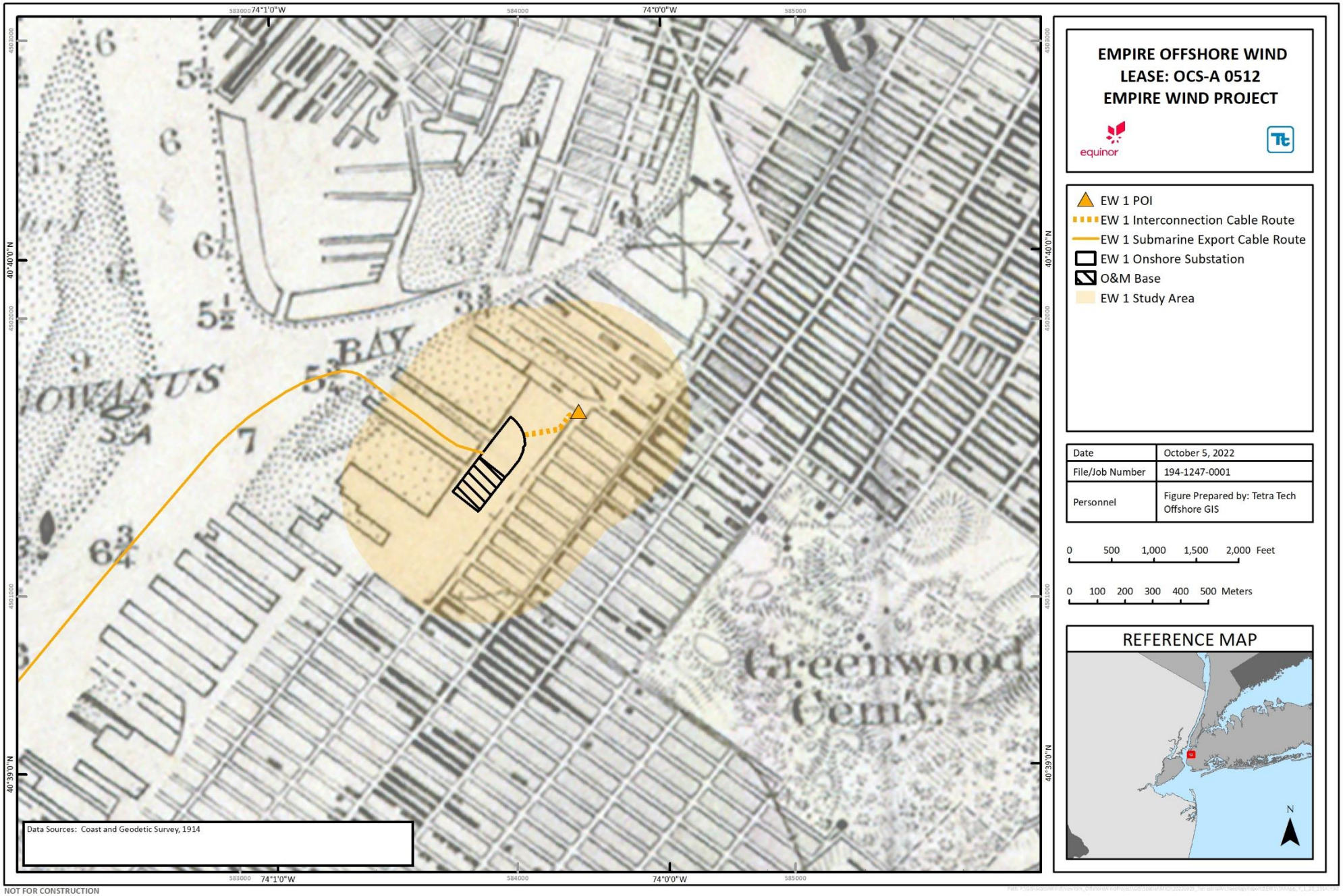


Figure Y-1-11 Coast Survey Chart (1914) Showing EW 1 Export Cable Route

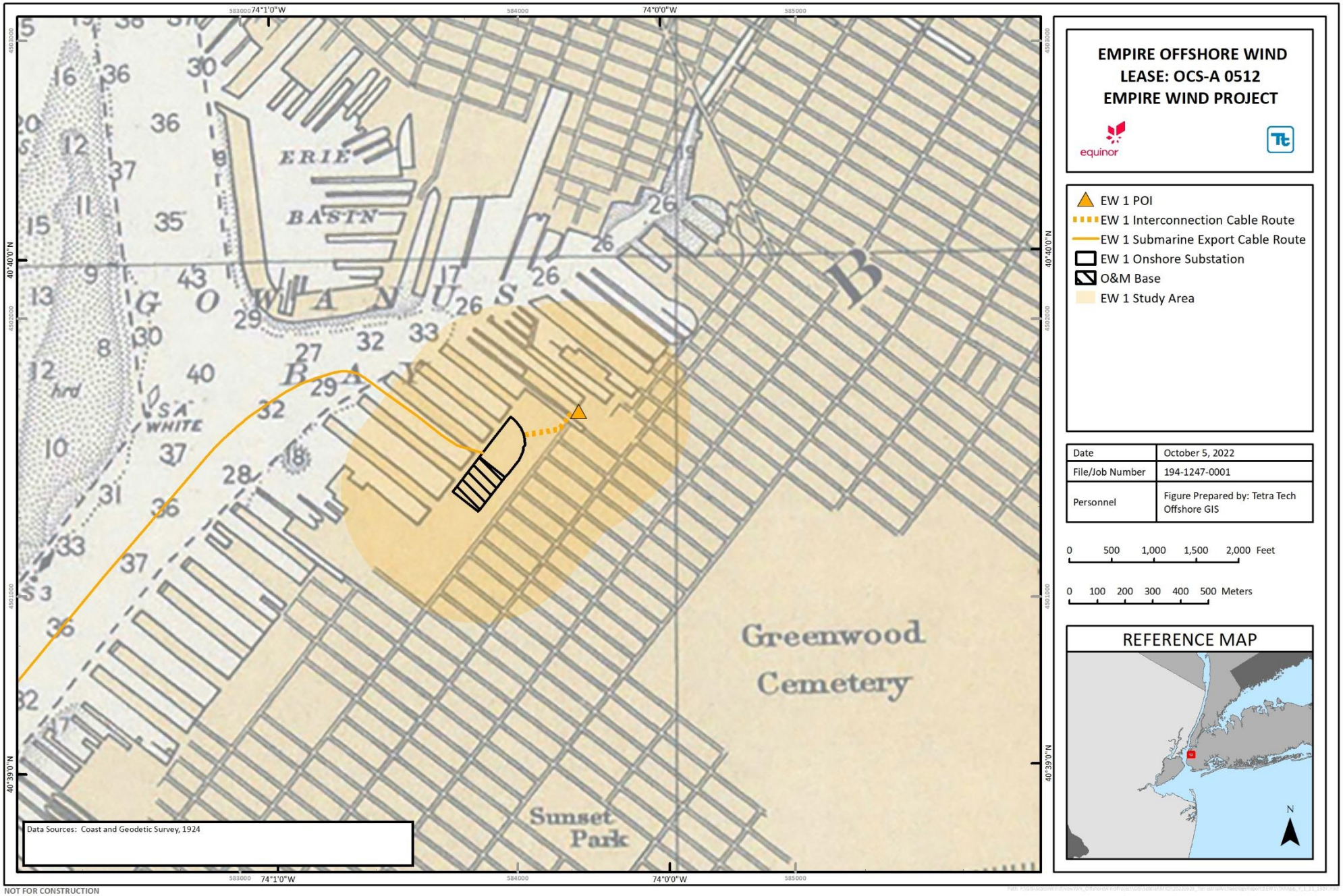


Figure Y-1-12 Coast Survey Chart (1924) Showing EW 1 Export Cable Route

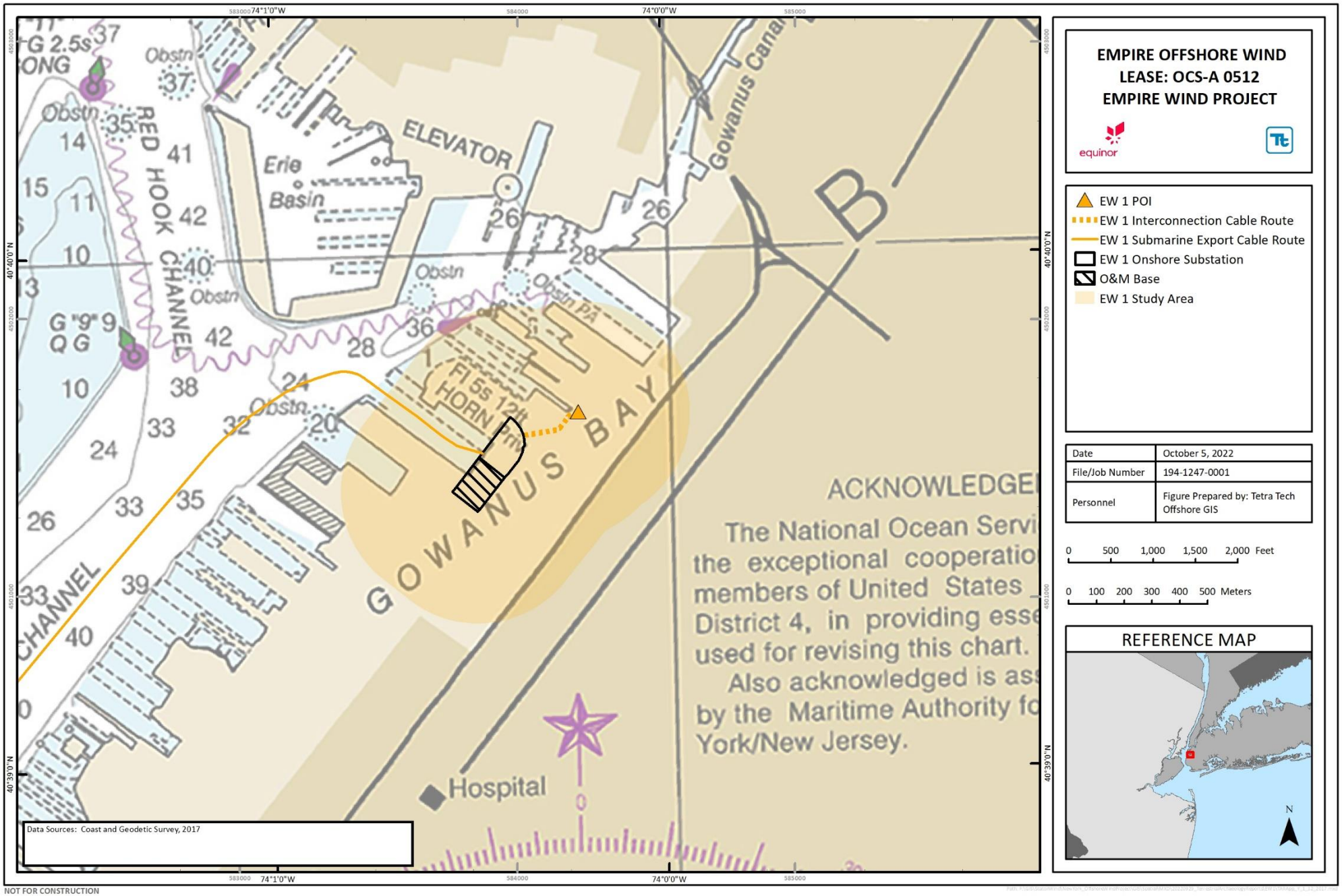


Figure Y-1-13 Coast Survey Chart (2017) Showing EW 1 Export Cable Route

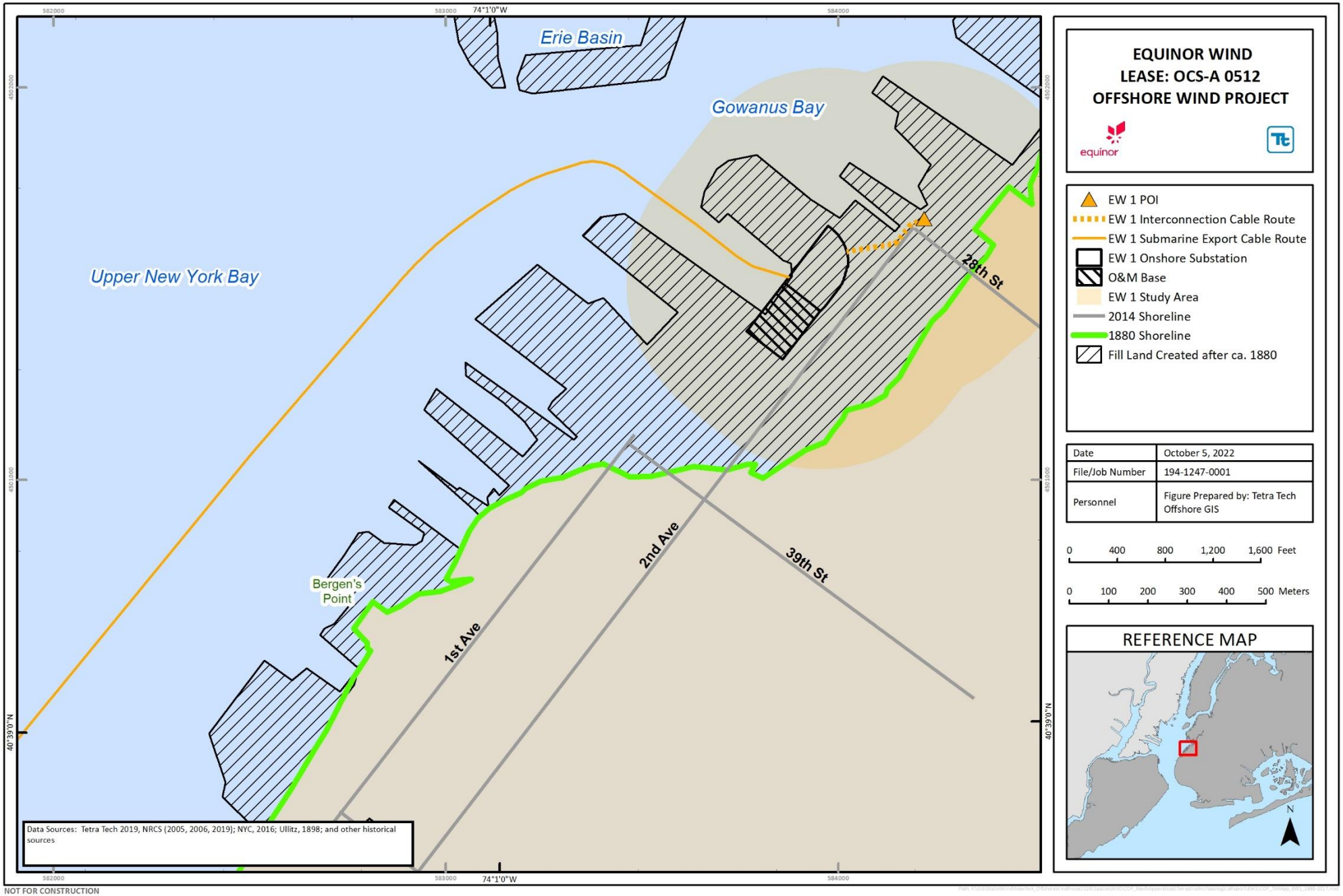


Figure Y-1-14 Gowanus Bay Shoreline Change, 1880-2017

Y-1.5 REFERENCES

Aliano, David
1995 Long Island's Struggle for Civil Liberty under the Dutch Regime. *Long Island Historical Journal*, 8:111-118.

Anderson, David G.
2013 Paleoindian and Archaic Periods in North America. In *The Cambridge World Prehistory*, edited by Paul Bahn and Colin Renfrew, pp. 913-932, Cambridge University Press.

Bernstein, David J.
1993 *Prehistoric Subsistence on the Southern New England Coast: The Record from Narragansett Bay*. Academic Press, San Diego, CA.

Binford, Lewis R.
1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45:4-20.

BOEM (Bureau of Ocean Management)
2017 Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP), Electronic document, https://www.boem.gov/sites/default/files/renewable-energy-program/COP-Guidelines.pdf, accessed August 21, 2018.

Boulanger, Matthew T. and R. Lee Lyman
2014 Northeastern North American Pleistocene megafauna chronologically overlapped minimally with Paleoindians. *Quaternary Science Reviews* 85:35-46.

Brock, Pamela Chase and P.W.G. Brock
2001 Bedrock Geology of New York City: More Than 600 M.Y. of Geologic History -- Field Guide for the Long Island Geologists Field Trip, October 27, 2001. Electronic document, https://pbisotopes.ess.sunysb.edu/reports/ny-city/, accessed September 26, 2019.

Burrows, Edwin G. and M. Wallace
1999 *Gotham: A History of New York City to 1898*. Oxford University Press, New York.

Carlson, Catherine C.
1988 "Where's the Salmon?": A Re-evaluation of the Role of Anadromous Fisheries in the Aboriginal Northeast. In, *Holocene Human Ecology in Northeastern North America*, edited by George P. Nicholas, pp. 47-80. Springer, New York.

Cassedy, Daniel and P. Webb
1999 New Data on the Chronology of Maize Horticulture in Eastern New York and Southern New England. In *Current Northeastern Paleobotany*, edited by John Hart, pp. 85-99. New York State Museum, Albany.

Cavallo, John
1987 *Area B (28ME1-B), Archaeological Data Recovery, I-295 and Wetlands Area Interchange*. The Cultural Resource Group, Louis Berger and Associates, East Orange, NJ. Report prepared for the NJ Department of Transportation and the Federal Highway Administration.

Ceci, Lynn
1990 Maize Cultivation in Coastal New York: The Archaeological, Agronomical, and Documentary Evidence. *North American Archaeologist*, 11:147-176.

Claasen, Cheryl
1995 Dogan Point and its Social Context. In *Dogan Point: a Shell Matrix Site in the Lower Hudson Valley*, edited by Cheryl Claasen, pp. 129-142. Archaeological Services, Bethlehem, CT.

1996 The Shell Matrix at Dogan Point. In *A Golden Chronograph for Robert E. Funk*, edited by Chris Lindner and Edward V. Curtin, pp. 99-107. Occasional Publications in Northeastern Anthropology, No. 15.

Cross, Dorothy
1956 *Archaeology of New Jersey, Vol. II: The Abbott Farm Site*. Archaeological Society of New Jersey, Trenton, NJ.

Davis, Margaret Bryan
1983 Holocene Vegetational History of the Eastern United States. In *Late-Quaternary Environments of the United States, Volume 2, The Holocene,* edited by H.E. Wright, Jr., pp. 166-181. University of Minnesota Press, Minneapolis.

Davis, Zachary
2019 Made in New York (MiNY) – North Campus Project, Phase IA Archaeological Documentary Study. Prepared for the New York City Economic Development Corp and New York City Department of Small Business Services. Prepared by Dewberry Engineering, Parsippany, NJ.

DeBoer, Warren R
1988 Subterranean Storage and the Organization of Surplus; The View from Eastern North America. *Southeastern Archaeology* 7:1-20.

Dent, Richard J.
2007 Seed Collecting and Fishing at the Shawnee Minisink Paleoindian Site: Everyday Life in the Late Pleistocene, In *Foragers of the Terminal Pleistocene in North America*, edited by Renee B. Walker and Boyce N. Driskell, pp. 116-131. University of Nebraska Press, Lincoln.

Fiedel, Stuart J.
2001 What Happened in the Early Woodland? *Archaeology of Eastern North America*, 29:101-142.

Fisher, Donald W., Y.W. Isachsen and L.V. Rickard
1970 *Geologic Map of New York: Lower Hudson Sheet*. Map and Chart Series 15. New York State Museum and Science Service, Albany.

Flagg, Thomas R. and M.S. Raber
1986 Documentation for Determination of Eligibility for Bush Terminal, Brooklyn, Kings County, New York. Prepared for U.S. Army Corps of Engineers – New York District. On file with NY SHPO, CRIS.

Fritz, Gayle J.
1990 Multiple Pathways to Farming in Precontact Eastern North America. *Journal of World Prehistory*, 4:387-435.

Gingerich, Joseph A.M.
2013 Revisiting Shawnee Minisink. In *In the Eastern Fluted Point Tradition*, edited by Joseph A.M. Gingerich, pp. 218-258. University of Utah Press, Salt Lake City.

Grossman-Bailey, Ilene
2001 "The People Who Lived by the Ocean": Native American Resource Use and Settlement in the Outer Coastal Plain of New Jersey. Ph.D. Diss., Department of Anthropology, Temple University, Philadelphia, PA.

Grumet, Robert S.
1979 *"We Are Not So Great Fools:" Changes in Upper Delawaran Socio-Political Life 1630-1758*. PhD Dissertation, Department of Anthropology, Rutgers University, New Brunswick, New Jersey.

Johnson, Donald S.
1995 *Charting the Sea of Darkness: The Four Voyages of Henry Hudson*. Kodansha International, New York.

Justice, Noel D
1987 Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States. Indiana University Press, Bloomington.

Kraft, Herbert C. and R.A. Mounier
1982 The Archaic Period in New Jersey: ca. 8000 B.C. – 1000 B.C. In New Jersey's Archaeological Resources from the Paleo-Indian Period to the Present: A Review of Research Problems and Survey Priorities, edited by Olga Chesler, pp. 52-102.

1986 *The Lenape: Archaeology, History, and Ethnography*. New Jersey Historical Society, Newark.

Lavin, Lucianne
1988 Coastal Adaptation in Southern New England and Southern New York. *Archaeology of Eastern North America*, 16:101-120.

Lothrop, Jonathan C, Darrin L. Lowery, Arthur E. Spiess, and Christopher J. Ellis
2016 Early Human Settlement of Northeastern North America. *PaleoAmerica*, 2:192-251.

Martin, Paul S.
1967 Prehistoric overkill. In *Pleistocene Extinctions: the Search for a Cause*, edited by P.S. Martin and H.E. Wright, Jr., pp. 75-120. Yale University Press, New Haven.

McNamara, Patrick J.
1995 "By the Rude Storms of Faction Blown": Thomas Jones, a Long Island Loyalist. *Long Island Historical Journal*, 7:178-190.

McVarish, Douglas C., P.J. Heaton and J.I. Klein
2008 South Pier Improvement Project: Phase 1A Cultural Resources Survey, Brooklyn, New York. Prepared for ESS Group, Inc., East Providence, RI. Prepared by John Milner & Assoc., Croton-on-Hudson, NY.

Merguerian, Charles
2003 The Narrows Flood – Post-Woodfordian Brach of the Narrows Channel, NYC. In *Program for the Tenth Annual Conference on Geology of Long Island and Metropolitan New York*. Electronic document, https://www.geo.sunysb.edu/lig/Conferences/abstracts-03/merguerian-03.pdf, accessed January 25, 2019.

Merwin, Daria Elizabeth
2010 *Submerged Evidence of Early Human Occupation in the New York Bight*. Ph.D. dissertation, Stony Brook University.

Moss, Cheryl J., and C. Merguerian
2007 Different and Distinct—Implications of Unusual Glacial Strata in Brooklyn. In Program for the Fourteenth Annual Conference on Geology of Long Island and Metropolitan New York. Electronic document, https://dspace.sunyconnect.suny.edu/bitstream/handle/1951/47855/moss-07.pdf?sequence=1, accessed January 25, 2019.

Moss, Richard Shannon
1993 *Slavery on Long Island: A Study in Local Institutional and Early African-American Communal Life*. Garland Publishing, Inc., New York.

Munsell, W.W. (publisher)
1882 *History of Queens County, New York*. W.W. Munsell & Co., New York.

NRCS (Natural Resources Conservation Service)
2019 Web Soil Survey. Electronic document, https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx, accessed September 26, 2019.

NYAC (New York Archaeological Council)
1994 Standards for Cultural Resource Investigations and the Curation of Archaeological Materials in New York State. Electronic document, https://nysarchaeology.org/wp-content/uploads/2013/12/NYACStandards.pdf, accessed December 4, 2018.

NYC DCP (New York City Department of City Planning)
2019 NYC Population: 2010 Census. Electronic document, https://www1.nyc.gov/site/planning/data-maps/nyc-population/census-2010.page, accessed January 16, 2019.

NYSL (New York State Library)
2019 Census – New York State. Electronic document, http://www.nysl.nysed.gov/scandocs/nyscensus.htm, accessed January 14, 2019.

O'Callaghan, E.B.
1849a *The Documentary History of the State of New-York*. Vol. I. Weed, Parsons & Co., Albany, NY.

1849b *The Documentary History of the State of New-York*. Vol. II. Weed, Parsons & Co., Albany, NY.

1850 *The Documentary History of the State of New-York*. Vol. III. Weed, Parsons & Co., Albany, NY.

Office of Coast Survey (Coast Survey)
1845 Map of New York Bay and Harbor and Environs. Coast Chart 120. NOAA.

1882 New York Bay and Harbor, New York. Coast Chart 120. NOAA.

1906 New York Bay and Harbor, New York. Coast Chart 120. NOAA.

1914 New York Bay and Harbor, New York. Coast Chart 120. NOAA.

1924 New York Harbor, New York. Coast Chart 369. NOAA.

2017 New York Harbor, New York. Coast Chart 12327. NOAA

Ostrander, Stephen
1894 *A History of the City of Brooklyn and Kings County*, Vol. II. Self-published.

Pagoulatos, Peter
2003 Early Archaic Settlement Patterns of New Jersey. *Archaeology of Eastern North America*, 31:15-44.

2004 Paleoindian Site Location in New Jersey. *Archaeology of Eastern North America*, 32:123-149.

Raber, Michael
1985 Survey Level Study for Determination of Significance and Management Recommendations: 31st Street Pier, Brooklyn, New York, Brooklyn Reach 2, New York Harbor Collection and Removal of Drift Project. Prepared for U.S. Army Corps of Engineer – New York District.

Ritchie, William A.
1980 *The Archaeology of New York State*. Harbor Hill Books, Harrison, New York.

Sassaman, Kenneth E
2010 *The Eastern Archaic, Historicized*. Rowman & Littlefield, Lanham, Maryland.

Schaper, Hans F.
1989 Shell Middens in the Lower Hudson Valley. *The Bulletin: Journal of the New York State Archaeological Association*, 98:13-24.

SEARCH
2018 Archaeological Resource Assessment of Two Buoy Deployment Areas within the New York Lease Area (OCS-A-0512), New York Bight. Final Report. Prepared for Equinor Wind US LLC, Stamford, CT.

2019 Marine Archaeological Resources Assessment for the Equinor Wind Offshore Wind Project, Construction and Operations Plan. Revised Preliminary Draft Report. Prepared for Equinor Wind US LLC, Stamford, CT.

Shah, Ajitkumar, S. Chakraborty and K. Kim
2006 The Geological Setting of New York City and the Geotechnical Challenges in Urban Construction. Conference Paper 646. 10th International Congress of the International Association for Engineering Geology and the Environment, Nottingham, England. Electronic document, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.518.2421&rep=rep1&type=pdf, accessed January 25, 2019.

Singer, Alan
2007 Slavery in Colonial and Revolutionary New York: Complicity and Resistance. *Long Island Historical Journal*, 20:163-173.

Snow, Dean R.
1980 *The Archaeology of New England*. Academic Press, New York.

Stanford, Scott D.
2010 Glacial Geology and Geomorphology of the Passaic, Hackensack, and Lower Hudson Valleys, New Jersey and New York, In *Field Trip Guidebook*, edited by Alan I. Benimoff, pp. 47-83. Prepared for the New York State Geological Association 82nd Annual Meeting, Staten Island, New York. Electronic document, http://www.nysga-online.net/download/2010s-nysga-guidebooks/, accessed November 21, 2018.

Stewart, R. Michael
1989 Trade and Exchange in Middle Atlantic Region Prehistory. *Archaeology of Eastern North America*, 17:47-78.

1998 Unraveling the Mystery of Zoned Decorated Pottery: Implications for Middle Woodland Society in the Middle Atlantic Region. *Journal of Middle Atlantic Archaeology*, 14:161-182.

Svenson, Henry K.
1936 The Early Vegetation of Long Island. *Brooklyn Botanic Garden Record*, 25:207-227. Electronic document, https://www.biodiversitylibrary.org/item/41119#page/248/mode/1up, accessed November 15, 2018.

Tetra Tech, Inc. (Tetra Tech)
2019a Phase I Terrestrial Archaeological Survey, Equinor Wind Lease Area OCS-A 0512, Offshore Wind Project, Empire Wind 2 Onshore Export and Interconnection Cable Corridor and Onshore Substation, City of Long Beach and Town of Hempstead, Nassau County, New York. Draft Report. Prepared for Equinor Wind US LLC, Stamford, CT.

2019b Phase I Terrestrial Archaeological Survey, Equinor Wind Lease Area OCS-A 0512, Offshore Wind Project, Boardwalk Wind 1 Onshore Export and Interconnection Cable Corridor and Onshore Substation, Asbury Park and Neptune Township, Monmouth County, New Jersey. Draft Report. Prepared for Equinor Wind US LLC, Stamford, CT.

Thieler, E. Robert, B. Butman, W.C. Schwab, M.A. Allison, N.W. Driscoll, J.P. Donnelly, and E. Uchupi
2007 A Catastrophic Meltwater Flood Even and the Formation of the Hudson Shelf Valley. *Paleogeography, Paleoclimatology, Paleoecology* 246:120-136. Electronic document, https://darchive.mblwhoilibrary.org/bitstream/handle/1912/1630/Thieler?sequence=1, accessed January 25, 2019.

Truncer, James
2004 Steatite Vessel Age and Occurrence in Temperate Eastern North America. *American Antiquity*, 69:487-513.

Turnbaugh, William A
1975 Toward an Explanation of the broadpoint dispersal in eastern North American prehistory. *Journal of Anthropological Research*, 31:51-68.

Uchupi, E., N. Driscoll, R.D. Ballard, and S.T. Bolmer
2001 Drainage of late Wisconsin glacial lakes and the morphology and late quaternary stratigraphy of the New Jersey-southern New England continental shelf and slope. *Marine Geology*, 172:117-145.

U.S. Census Bureau
1842 Sixth Census of the United States - Compendium of the Enumeration of the Inhabitants and Statistics of the United States. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1840/1840.pdf, accessed January 19, 2019.

1864 Agriculture of the United States in 1860; compiled of the original returns of the 8th Census. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1860/1860b-06.pdf, accessed January 19, 2019.

1882 Report on the Productions of Agriculture – Tenth Census of the United States. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1880/1880a_v3-01.pdf, accessed January 20, 2019.

1902 Twelfth Census of the United States. Agriculture, Part II: Crops and Irrigation. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1900/06/02/1836/33398096v6p2.pdf, accessed January 20, 2019.

1908 First Census of the United States, 1790 – New York: Heads of Families. U.S. Census Bureau, Washington, D.C. Electronic document, https://www2.census.gov/library/publications/decennial/1790/heads_of_families/new_york/1790g-02.pdf?#, accessed January 4, 2019.

1910 Thirteenth Census of the United States. Bulletins. Population: New York City. Number of Inhabitants, by Enumeration Districts. Electronic document, ftp://ftp.census.gov/library/publications/decennial/1910/bulletins/demographics/374-population-new-york-city-number-of-inhabitants-by-enumeration-districts.pdf, accessed January 15, 2019.

1973 1970 Census of Population. Vol. 1: Characteristics of the Population. Part 34: New York.

2012 New York: 2010. Summary Population and Housing Characteristics. 2010 Census of Population and Housing. Electronic document, ftp://ftp2.census.gov/library/publications/2012/dec/cph-1-34.pdf, accessed January 16, 2019.

Wall, Robert D., R.M. Stewart, and John Cavallo
1996 *The Lithic Technology of the Trenton Complex*. Trenton Complex Archaeology: Report 13. The Cultural Resource Group, Louis Berger & Associates, Inc., East Orange, New Jersey. Prepared for the Federal Highway Administration and the New Jersey Department of Transportation, Bureau of Environmental Analysis, Trenton.

Wall, Robert D., R.M. Stewart, J. Cavallo, and V. Busby
1996 *Area D Site (28Me1-D) Data Recovery*. Trenton Complex Archaeology: Report 9. The Cultural Resource Group, Louis Berger & Associates, Inc., East Orange, New Jersey. Prepared for the Federal Highway Administration and the New Jersey Department of Transportation, Bureau of Environmental Analysis, Trenton.

White, Shane
1995 Slavery in New York State in the Early Republic. *Australasian Journal of American Studies*, 14:1-29.

Williams, Lorraine E. and Ronald A. Thomas
1982 The Early/Middle Woodland Period in New Jersey (ca. 1000 B.C. – A.D. 1000). In *New Jersey's Archaeological Resources from the Paleo-Indian Period to the Present: A Review of Research Problems and Survey Priorities*, edited by Olga Chesler, pp. 103-138.

Addendum A – Agency Correspondence

ATTACHMENT Y-2
EW 2 PHASE IA TERRESTRIAL ARCHAEOLOGICAL SURVEY

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

Phase IA 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

October 2022

MANAGEMENT SUMMARY

Tetra Tech, Inc. (Tetra Tech) conducted a Phase IA 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 EW 2 (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 Village of Island Park or 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. Empire provided a Project-update letter to the NY SHPO in April 2021, introducing the additional EW 2 onshore export and interconnection cable routes and EW 2 Onshore Substation A. NY SHPO confirmed receipt of the update and had no comments at the time. Empire also provided a supplemental Project-update letter introducing an additional EW 2 export cable landfall site (EW 2 Landfall E), EW 2 Onshore Substation C, and additional EW 2 onshore export and interconnection cable route segments on May 10, 2022. Empire continues to engage with stakeholders with regards to potential impacts to archaeological resources. If any substantial modifications are made to the Project design, including the identification of temporary work spaces and laydown areas, Empire will review archaeological site and standing structure files maintained by NY SHPO, historical cartography and aerial imagery, and prehistoric and historical development in the vicinity of the spaces and will consult with NY SHPO as appropriate, and may conduct additional archaeological surveys.

As the Project design has evolved through mid-2022, Tetra Tech has investigated an expanded PAPE to encompass the various alternative landfalls, onshore export cable routes, and proposed substation locales, as well as nearby areas to allow for flexibility as the design matures. The most recent site file review of CRIS data was undertaken on May 11, 2022. Tetra Tech concludes that no National Register of Historic Places (NRHP) listed, eligible or potentially eligible archaeological resources are known within the Preliminary Area of Potential Effects evaluated during this Phase IA 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; (5) industrial development and demolition of a tank farm, and subsequent redevelopment at the proposed location of the EW 2 Onshore Substation A; and (6) shoreline armoring and land-making at the proposed location of the EW 2 Onshore Substation C, in addition to the nearby Long Beach Bridge and the Long Island Rail Road bridge crossing Reynolds Channel. Based on this assessment of overall low sensitivity, Tetra Tech recommended that a Phase IB archaeological survey was not warranted. Notwithstanding this recommendation, Empire will ensure, based on discussions with BOEM, that a Secretary of the Interior-qualified professional archaeologist will be present during all phases of Project-related onshore construction that will result in significant ground disturbances, to monitor construction activities for the presence of archaeological resources that may be potentially eligible for listing in the NRHP.

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;
- An archaeological monitor be present at seven potential locations during construction phase excavation of the onshore export cable trench. The seven locations are:
    - 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 the Long Island Railroad 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 40.610198ºN, longitude -73.650853ºW) northeastward along Long Beach Road to the vicinity of the intersection of Long Beach Road and the Long Island Railroad (latitude 40.611958ºN, longitude -73.648596ºW).
    - An approximately 330-ft (100-m) section of EW 2 Route IP-B at the southern terminus of Parente Lane North northward to the intersection of IP-B with IP-C, in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from a point near the southern terminus of Parente Lane North (latitude 40.609920ºN, longitude -73.648570ºW) to the corridor's junction with EW 2 Route IP-C (latitude 40.610805ºN, longitude -73.648451ºW).
    - An approximately 650-ft (200-m) section of EW 2 Route IP-C from the intersection of Saratoga Boulevard and Sherman Road, under the Long Island Railroad, to the intersection of IP-C with IP-A at Long Beach Road, then northeastward to the intersection of Long Beach Road and , 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 D'Amato Drive to the intersection of Long Beach Road and the Long Island Railroad (latitude 40.611911°N, longitude -73.648633°W).
    - An approximately 370-ft (112-m) section of EW 2 Route IP-F from near No. 11 Parente Lane North to the intersection of Kildare Road in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from a point opposite No. 11 Parente Lane North (latitude 40.610487ºN,

longitude -73.648496°W) north and westward along Parente Lane North to the intersection of Kildare Road and Parente Lane North (latitude 40.610855°N, longitude -73.649474°W).

- An approximately 110-ft (35-m) section of EW 2 Route IP-F along Kildare Road from the intersection of Parente Lane North northward to the intersection of Long Beach Road in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from the intersection of Parente Lane North (latitude 40.610855°N, longitude -73.649474°W) to the intersection of Long Beach Road (latitude 40.611188°N, longitude -73.649505°W).
- An approximately 475-ft (145-m) section of EW 2 Route IP-F along Long Beach Road from the intersection of Kildare Road northeastward to the intersection of North Nassau Lane with Waterford Road in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from the intersection of Long Beach Road and Kildare Road (latitude 40.611188°N, longitude -73.649505°W) to the intersection of Waterford Road and North Nassau Lane (latitude 40.612314°N, longitude -73.649209°W).
- An approximately 800-ft (245 m) section of EW 2 Route IP-G along Long Beach Road from the intersection of Sherman Road northeastward to the intersection of Long Beach Road and McCarthy Road in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from the intersection of Long Beach Road and Sherman Road (latitude 40.612256°N, longitude -73.648163°W) to the intersection of Long Beach Road and McCarthy Road (latitude 40.613648°N, longitude -73.646087°W).

- The goal of archaeological monitoring is to identify any archaeological resources that potentially may be revealed during construction activities and identify resources in areas where Phase IB survey techniques could have been obstructed or inefficient (i.e., pavement or surface inundation). 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 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 5.6 miles; Onshore Substation of 6.4 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:	October 2022

TABLE OF CONTENTS

TABLES

FIGURES

PHOTOGRAPHS

ADDENDUMS

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 EW 2 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
NYSM	New York State Museum
OCS	Outer Continental Shelf
PAPE	Preliminary Area of Potential Effects
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, the onshore substations, and the O&M Base.
SHPO	State Historic Preservation Office
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 wind farms. Empire Wind 1 (EW 1) and Empire Wind 2 (EW 2) will be electrically isolated and independent from each other. Each wind farm will 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 Project includes two onshore locations in New York where the renewable electricity generated will be transmitted to the electric grid.

A Construction and Operations Plan (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)). The APE will be defined by BOEM through the Section 106 process, therefore, this report describes the preliminary APE (PAPE), as identified by Tetra Tech, Inc. (Tetra Tech).

This report discusses the Phase IA 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, Empire is developing similar onshore infrastructure at EW 1 in Brooklyn, New York (see **Figure Y-2-1**) as an individual wind farm; 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 E (at Laurelton Boulevard), and onshore export and interconnection cable route segments, which are detailed below. These segments will be used to mature the development of up to two complete onshore export cable routes, from the export cable landfall to the onshore substation and from the onshore substation to the Oceanside POI. 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 within rights of way such as road shoulders, sidewalks, parking areas, or within transit and utility easements. There are up to two horizontal directional drilling sites for crossing Reynolds Channel, which separates Long Beach Island and Barnum Island that are under consideration.

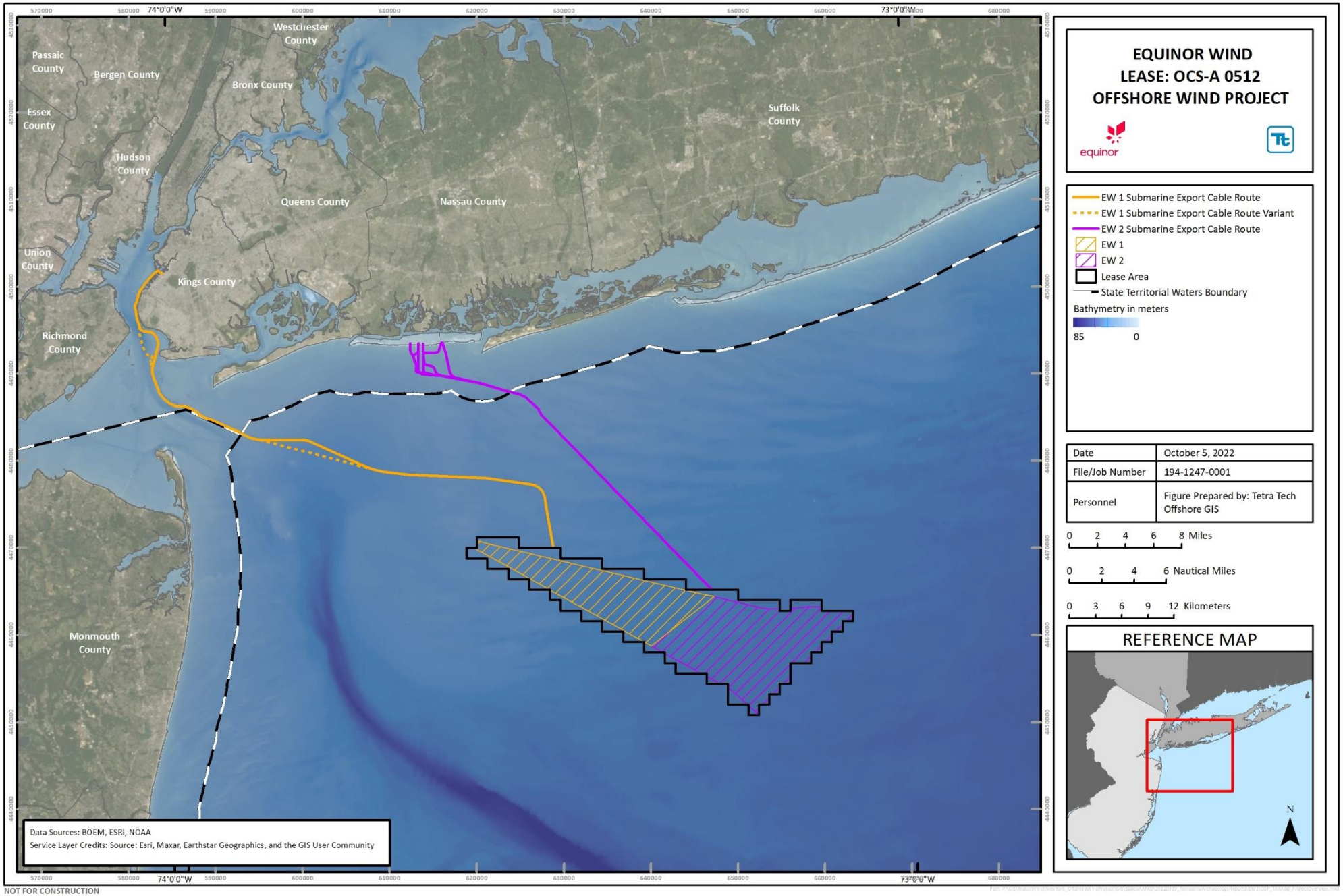


Figure Y-2-1 Project Overview

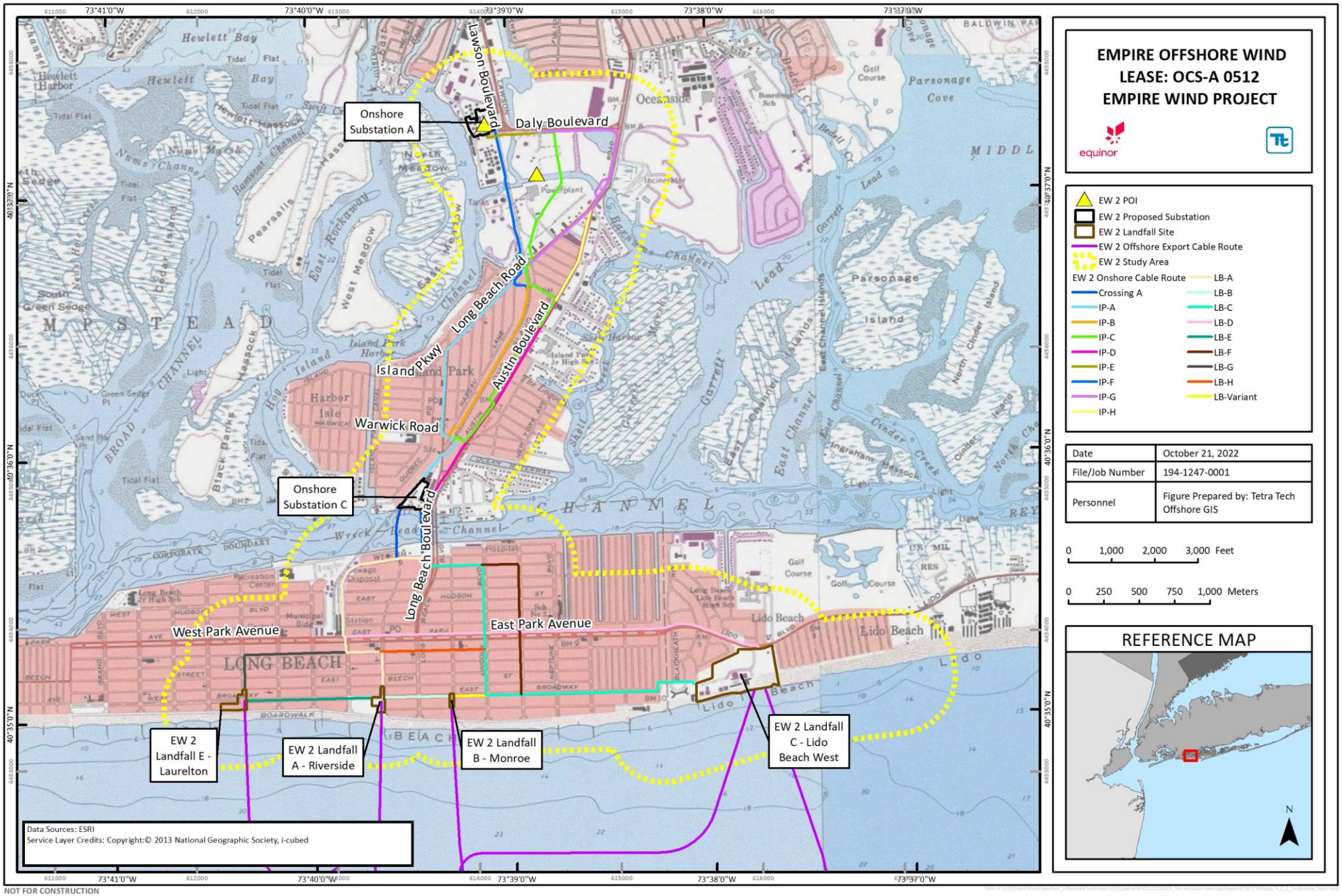


Figure Y-2-2 EW 2 Onshore Export and Interconnection Cable Route Corridor and Study Area Overview, Topography

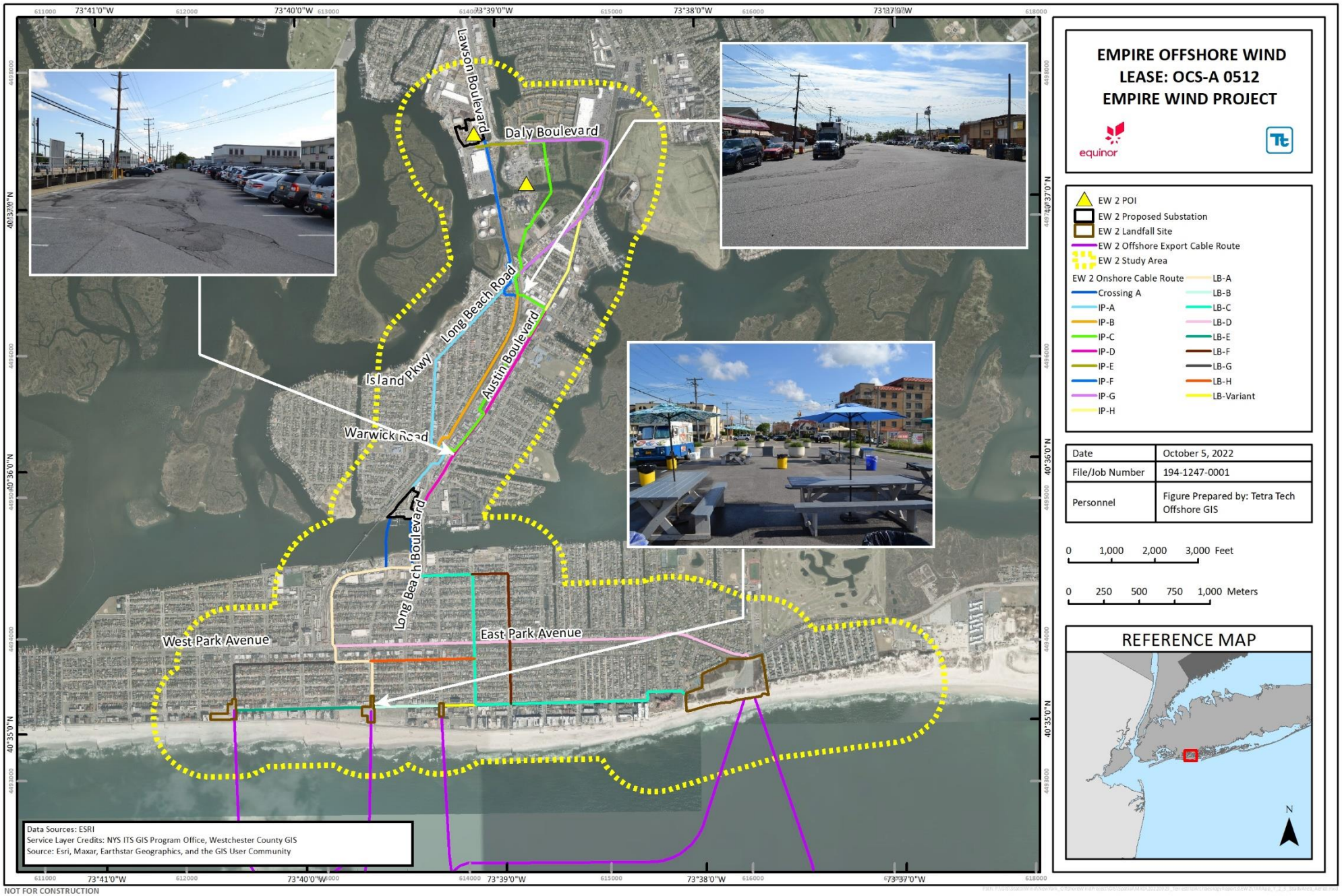


Figure Y-2-3 EW 2 Onshore Export and Interconnection Cable Route Corridor and Study Area Overview, Aerial

Two onshore substation parcels are under consideration: EW 2 Onshore Substation A and EW 2 Substation C.

- EW 2 Onshore Substation A: Daly Boulevard and Hampton Road, Oceanside, New York, 6.2 ac (2.5 ha); and
- EW 2 Onshore Substation C: 15 Railroad Place, Island Park, New York, 5.2 ac (2.1 ha).

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 E: Laurelton Boulevard.

The respective onshore export and interconnection cable corridor segments are:

EW 2 Route LB-A:

- from EW 2 Landfall A, Riverside Boulevard, 0.2 mi (0.3 km)
- Walnut Street, 0.17 mi (0.27 km)
- Edwards Boulevard, 0.07 mi (0.1 km)
- Reverend JJ Evans Boulevard, 0.2 mi (0.3 km)
- Park Place, 0.5 mi (0.7 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, 0.3 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-D:

- 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-E:

- from EW 2 Landfall E, West Broadway, 0.6 mi (1.0 km)
- junction with EW 2 Route LB-A or LB-B

EW 2 Route LB-F:

- from EW 2 Route LB-C northward on Franklin Boulevard, 0.6 mi (0.9 km)
- East Harrison Street, 0.16 mi (0.25 km)
- junction with EW 2 Route LB-C

EW 2 Route LB-G:

- from EW 2 Landfall E, Laurelton Boulevard, 0.2 mi (0.3 km)
- West Walnut Street, 0.5 mi (0.7 km)
- Edwards Boulevard, 0.06 mi (0.1 km)
- junction with EW 2 Route LB-A

EW 2 Route LB-H:

- diverge from EW 2 Route LB-A at East Walnut Street
- East Walnut Street, 0.5 mi (0.7 km)
- junction with EW 2 Route LB-C

EW 2 Route LB Variant:

- diverge from EW 2 Route LB-C 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)
- 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)
- through the Oceanside POI parcel, 0.6 mi (1.0 km)
- junction with EW 2 Route IP-E

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 Oceanside POI parcel
- 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 Route IP-F:

- from north terminus of EW 2 Route IP-B, Parente Lane North, 0.1 mi (0.2 km)
- Kildare Road, 0.02 mi (0.04 km)
- North Nassau Lane, 0.05 mi (0.08 km)
- Service road, 0.04 mi (0.07 km)
- Long Island Railroad service road, including a cable bridge over Barnum's Channel, 0.55 mi (0.9 km)
- EW 2 Onshore Substation A site

EW 2 Route IP-G:

- from intersection of EW 2 Route IP-A and EW 2 Route IP-B, Long Beach Road, 0.7 mi (1.2 km)
- Daly Boulevard, 0.5 mi (0.8 km)
- EW 2 Onshore Substation A site

EW 2 Route IP-H:

- from intersection of EW 2 Route IP-C and EW 2 Route IP-D, 0.43 mi (0.7 km)
- Junction with EW 2 Route IP-G

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. BOEM's guidelines direct lessees to adhere to the guidance provided by the State Historic Preservation Office (SHPO) of the affected state(s) (BOEM 2017).

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, Inc. (Tetra Tech) provided NY SHPO with a work plan, dated December 13, 2018, that included a Project description, a direct effects PAPE 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. Separate reports with Project-related agency correspondence detailing the findings and recommendations of this terrestrial archaeological investigation are provided in **Addendum A**. Empire provided a Project-update letter to the NY SHPO in April 2021, introducing the additional EW 2 onshore export and interconnection cable routes and onshore substation site. NY SHPO confirmed receipt of the update and had no comments at the time. In August 2021, Empire provided NY SHPO a Project-update letter presenting proposed locations of geotechnical borings. Tetra Tech recommended that no further archaeological investigation was warranted on the basis of nil archaeological sensitivity at the locations, and on August 17, 2021, NY SHPO concurred without further comment. Empire also provided a supplemental Project-update letter introducing an additional EW 2 export cable landfall site (EW 2 Landfall E), EW 2 Onshore Substation C, and additional EW 2 onshore export and interconnection cable route segments on May 10, 2022. Empire continues to engage with stakeholders regarding potential impacts to historic resources.

Y-2.2 RESEARCH DESIGN

This section describes the objectives and methods of the Phase IA 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 PAPE 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 IA 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 landfalls, 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 them (the Study Area). The direct effects PAPE 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.

Y-2.2.2.3 Preliminary Area of Potential Effects

The expanded PAPE for archaeology consists of areas that may be directly 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. A buffer area is also included to increase archeological coverage in areas where the Project is still being refined. To allow for possible changes in the specific location of activities as the Project design matures, the PAPE is composed of a 952.9-acre area in Long Island and a 446.2-acre area in Island Park encompassing all proposed onshore cable routes, landfall sites, and substation sites under consideration (**Figure Y-2-4**). 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 expanded PAPE are detailed in **Table Y-2-1**.

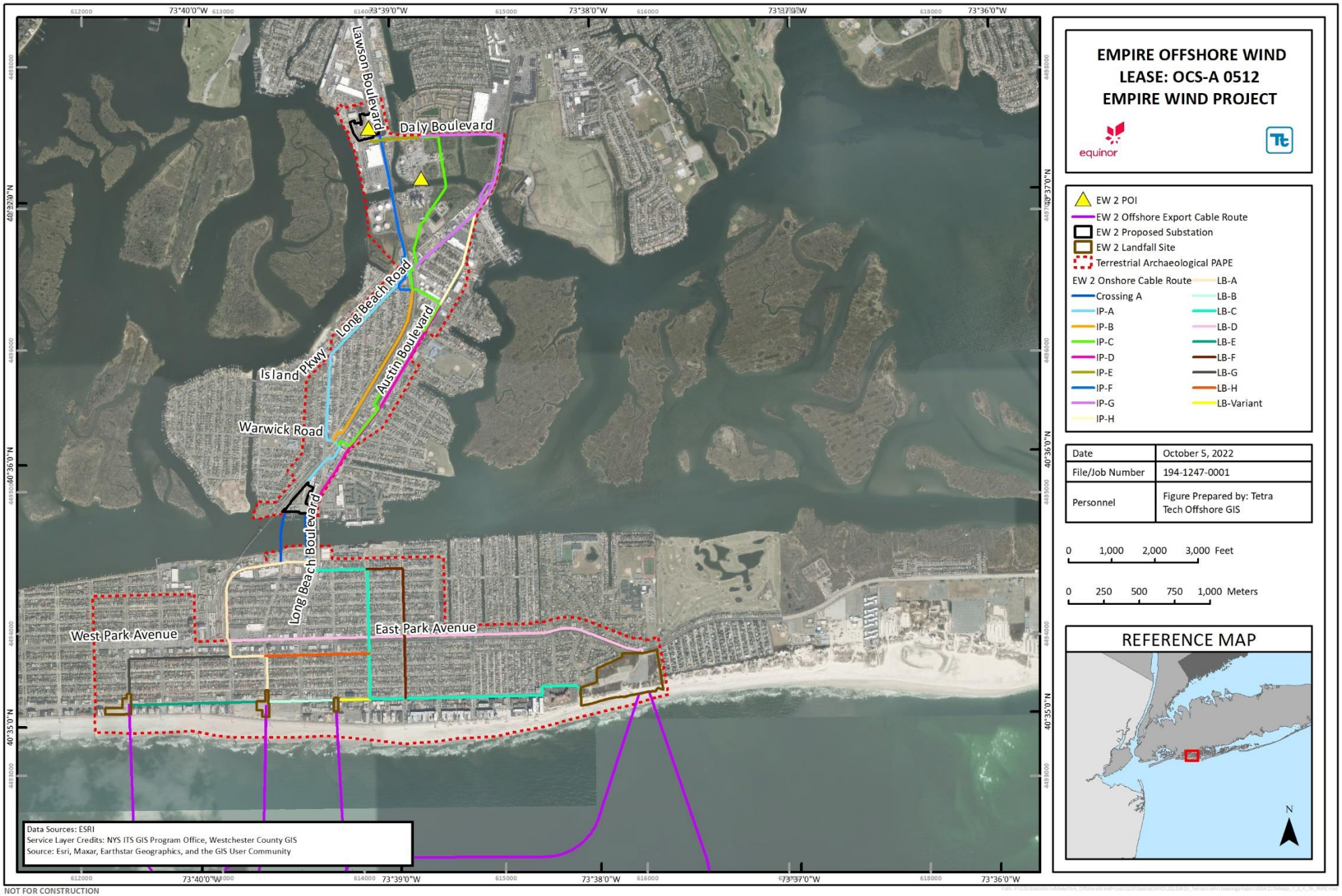


Figure Y-2-4 EW 2 Terrestrial Archaeological PAPE

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

Parameter	Realistic Maximum Scenario	Rationale
Export cable landfall	Horizontal directional drilling in up to a 260-ft by 680-ft (79-m by 207-m) area; maximum vertical disturbance of up to 80 ft (24 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.
Onshore export and interconnection cables	Up to 5.6 mi (9.1 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 6.4-ac (2.6-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-2.2.2.4 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 PAPE.

Y-2.2.2.5 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. Further reviews of CRIS data, historic cartography, and historic aerial imagery were undertaken throughout 2021 and up through May 11, 2022 as the Project Design Envelope evolved.

Y-2.2.2.6 Pedestrian Reconnaissance

On July 24, 2019, Tetra Tech archaeologists conducted a pedestrian reconnaissance of the onshore export and interconnection cable corridor. Tetra Tech archaeologists conducted a pedestrian reconnaissance of the proposed EW 2 Onshore Substation A and EW 2 Onshore Substation C sites on May 13, 2021. This reconnaissance was undertaken to evaluate the extent of prior ground disturbance within the PAPE, and to identify locales within the PAPE that might have the potential to contain undocumented archaeological resources. As expected from reviews of the Project layout, Tetra Tech identified no portions of the proposed

Project where subsurface shovel tests or hand augers would have been practical at exposing soil stratigraphy. For further information, see Section 2.3.5.

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.

Paleoindian Period

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). Shawnee-Minisink is located approximately 78 mi (125 km) northwest of the Project Area.

Shawnee-Minisink contained well-made Clovis-type fluted projectile points, end scrapers, and gravers, distinctive implements that characterize early Paleoindian toolkits. It was the discovery of a Clovis point in association with extinct paleofauna at the Blackwater Draw site in New Mexico in the 1920s that forced archaeologists to recognize the antiquity of this widely distributed point type. The Blackwater Draw find and others in the Great Plains provided direct evidence of big game hunting as a Paleoindian subsistence stratagem, and it was long assumed that eastern Clovis groups also practiced a specialized hunting adaptation to megafauna or herd animals, despite the absence of identified kill sites or large mammal faunal remains at eastern sites (Ritchie 1980:3). The belief that megafauna hunting was the focus of Clovis subsistence practices suggested that human predation and overkill was a causative agent of much of the genera extinction that occurred in North America at the close of the Pleistocene (Martin 1967). Both of these assumptions (specialized hunting adaptation and megafauna overkill) have been strongly challenged over the past few decades, and it is now generally conceded that Clovis and other Paleoindian groups resident in eastern North America relied on a broad range of subsistence resources, including fruiting seeds, fish, and small animals, as well as herd game (Dent 2007:127-129). Recent analysis suggests that megafauna had mostly vanished from the northeast by the time Paleoindians arrived (Boulanger and Lyman 2014).

A notable characteristic of the Paleoindian lithic toolkit was the preference for high quality stone, often traceable to sources great distances from its use. This consumer choice reveals two important implications for Paleoindian social organization and technology. First, Paleoindians operated within small, highly mobile bands employing a foraging strategy, moving frequently across large territories to exploit known or potential resources (Binford 1980). Movements were scheduled to exploit seasonally available resources across a wide spectrum of environment zones. And second, the preference for quality stone and the requisite skills to work it was probably related to their highly mobile lifestyle, ensuring that the life span and utility of tools were optimized while groups were far removed from new stone sources (Anderson 2013:918).

Aside from Shawnee-Minisink, there are no well-dated Paleoindian sites in the Middle Atlantic region. Nonetheless, Pagoulatos (2004) has identified 96 Paleoindian sites in New Jersey, with 300 to 400 individual fluted points found in the state (Kraft 1986:35; Gingerich 2013:142). In Pagoulatos' (2004) survey, 52 percent

of Paleoindian sites were located on terrace landforms; 26 percent were located on periglacial features; and the remaining sites occurred on flood plains, knolls, cuestas, upland divides, or rockshelters. Near the study area, Paleoindian sites have been reported in the upper Passaic River basin and on Staten Island, including the Port Mobil site that contained several fluted points manufactured from non-local material and small scrapers made from locally-sourced glacial cobbles (Kraft 1986:43). The Port Mobil site is approximately 30 mi (48 km) southeast of the Project Area.

The record of Paleoindian settlement pattern in the northeast is somewhat obscured by the submergence of the continental shelf due to sea level rise. The paleo-shoreline at the time of the last glacial maximum (circa 21,000 years ago) is estimated to have been 80 mi (128.7 km) seaward of the current shoreline, and between 25 to 30 mi (40.2 to 48.2 km) seaward by the early Holocene, circa 8000 BC. Potential exploitation of terrestrial and marine resources at paleo-shoreline locations by Paleoindian groups is suggested by occasional finds of mammoth and mastodon teeth from scallop fishing at 25 to 30 meters below modern mean sea level, roughly paralleling the terminal-Pleistocene paleo-shoreline (Uchupi et al. 2001:124).

Biface technology during the final thousand-year interval of the Paleoindian period displays basic continuity with earlier forms; large lanceolate points, parallel flaking, and preference for high quality stone. Late Paleoindian points differed from their predecessors by generally lacking the channel flute, and sometimes exhibiting basal tangs. Toolkits from northeastern late Paleoindian sites show a striking absence of the formal endscrapers that characterized the Clovis and other fluted point assemblages. Expedient flake tools began to appear among toolkits, leading some researchers to postulate that late Paleoindian groups were "settling in" to local environments resulting in reduced range mobility and greater reliance on local lithic sources (Lothrop et al. 2016:237-238).

Archaic Period

The Archaic period is marked by climate warming that gradually resulted in greater biodiversity in the resource base. Modification of tool technology, increased site size, and changing site distribution reflect utilization of a broader spectrum of resources and ecological zones. Archaeologists divide the period into three subperiods: Early (8000 to 6000 BC); Middle (6000 to 4000 BC); and Late (4000 to 1000 BC).

Early Archaic Period (8000 to 6000 BC)

The adaptive strategies of groups during the Early Archaic period was more a continuation of established late Paleoindian broad-spectrum subsistence practices than a dramatic shift to new routines. Bands remained nomadic but appear to have exploited more restricted territories than their Paleoindian predecessors, making more repetitive visits to fewer strategic locations (Anderson 2013). Biface technology shows significant modifications from Paleoindian forms, adding hafting notches to basal, corner or side positions, with blades often exhibiting serrated or beveled edges. Notched points, such as Thebes, Big Sandy, Palmer, and Kirk types, are found widely distributed east of the Mississippi River (Justice 1987). The addition of ground-stone implements to toolkits suggests that nuts and seeds had become an important component of Early Archaic diets. These adaptive modifications in subsistence practices were probably responses to increasingly dry conditions throughout the period. Climatic warming led to forest closure after 8000 BC and increasing dominance of northern hardwoods over Boreal conifers, producing a more favorable habitat for such species as white-tailed deer and elk. (Davis 1983; Snow 1980).

Sea level rise continued though the Early Archaic and it appears likely that many sites from this period have been inundated, as paleoshorelines circa 9000 BP ranged from 20-50 mi (32-80 km) east of the current beachfront (Merwin 2010). Early Archaic sites in the Outer Coastal Plain typically exhibit low density artifact

scatters with a limited range of tool types. Kirk points from Site 28MO57 in Monmouth County, New Jersey (located approximately 25 mi [40 km] southwest of the Project Area) were manufactured from high-quality Reading Prong jasper, while Kirks from other coastal plain sites were made of local pebble cherts, suggesting that Early Archaic resource procurement was a mix of collecting and foraging strategies (Pagoulatos 2003:26).

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 (located approximately 40 mi (64 km) north of the Project Area), contained a basal Middle Archaic deposit of Neville points, dating roughly to 5000 BC (Claasen 1995:131).

Middle Archaic Period (6000 to 4000 BC)

The Middle Archaic period roughly corresponds with an extended warm and dry interval during the mid-Holocene. This climatic trend established the oak-chestnut forest as the dominant vegetational cover in the region, although excessive drought conditions probably introduced grassland prairies to some inter-drainage uplands (Sassaman 2010:23). Whether tied to this environmental shift or independent of it, biface technology markedly changed from notched to stemmed forms at the onset of the Middle Archaic and include broad-blade Genesee stemmed points and Stark and Neville points from New England (Justice 1987). This change of form in bifacial tools may reflect stylistic variations introduced by in-migrating groups, or a technological adaptation to a shifting resource base, or both.

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). While it appears unlikely that shellfish (or fish) had become a specialized focus of Middle Archaic subsistence, resident populations were nonetheless aware of these resources, and capable of exploiting them. The Middle Archaic is poorly represented in the region. Deep soil horizons containing a Guilford-like point are attributable to the late-Middle Archaic from Site 28-Me-1-D (Area D) at the Abbott Farm Complex near Trenton, New Jersey (Wall et al. 1996:14). Abbott Farm is located approximately 60 mi (96 km) southwest of the Project Area. 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).

The Turkey Swamp Site, located in southwestern Monmouth County, New Jersey, located approximately 40 mi (64 km) southwest of the Project Area, yielded several unfluted, large triangular points that bore the hallmark of late-Paleoindian culture, according to the excavators (Cavallo 1981). Radiocarbon assays associated with these points, however, indicate an early Middle Archaic occupation c. 7660±325 BP to 8739±165 BP (Grossman-Bailey 2001:222).

Late Archaic Period (4000 to 1000 BC)

The Late Archaic period is characterized by increased population (as inferred by larger and more numerous sites), the onset of long-distance trade networks, and an increased focus on riverine settings for site locations.

Ceremonialism grew in importance, with more elaborate, formalized burial practices and the presence of exotic raw materials as symbols of enhanced status and rank (Fiedel 1992).

Extensive shellfish middens appeared in the lower Hudson River and lower Delaware River during this period, and freshwater shellfish were probably exploited along the Raritan River and other inland drainages (Claasen 1996; Kraft 1986:78). Shell harvesting in the lower Hudson River was intensively practiced from around 3500 to 2000 BC (Claasen 1996:104). Claasen 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 (Claasen 1996:105). This type of scheduled visit to exploit certain high value resources may have involved forays of task groups from an aggregated base camp located nearby. Social aggregation is thought to have occurred during warmer weather along floodplains, and proximal to lakes, streams, and wetlands. Toolkits associated with base camps would have included grinding stones, hammerstones, axes, celts, and other heavy-duty items. In contrast, the performance of specialized activities at task sites would be reflected generally in low artifact density and low tool diversity (Kraft and Mounier 1982:61-68).

The manufacture and use of small notched point and narrow stemmed point types was common across the northeast, exemplified by Vosberg, Brewerton, Lamoka, and Bare Island varieties. Each of these point types is visible in the archaeological record for at least a millennium, and in the case of Brewerton varieties for more than 1,500 years (Wall et al. 1996a; Justice 1987). Toward the latter part of the Late Archaic period, a suite of large points collectively termed broadspears saw wide distribution throughout the southeast and Middle Atlantic regions. In New York, broadspear types include Genesee, Snook Kill, and Perkiomen points. While there is general consensus that broadspear use began in the southeast circa 2500 BC and followed into the Middle Atlantic by 1800 BC, there is substantial disagreement on what this means. One model is that the broadspear tradition is a distinct ethnic style borne by migrating groups from the southeast who settled along major rivers and exploited the runs of anadromous fish (Turnbaugh 1975). Others (e.g., Custer 1984) contend that the various broadspear point types represented a functional tool form rather than an ethnic style, while the notion itself that anadromous fish played a major role in subsistence and settlement patterning during the Broadspear Late Archaic has been challenged (Carlson 1988; Sassaman 2010:159-161).

Appearing around the same time as broadspears, cooking vessels carved from the mineral steatite (also called soapstone) were in wide use across the eastern seaboard. Steatite was quarried from outcroppings in the Ridge and Valley province extending from Alabama to Maine, and fashioned into rectangular, straightsided vessels. Steatite use peaked from between circa 2000 to 1000 BC, although it is present in dated contexts as early as 4300 BC (Truncer 2004:506). Steatite vessel distribution is closely mapped to the area of nut-producing deciduous forests, and may have functioned as stone-boiling containers for processing hickory, oak, and other nuts (Truncer 2004:507). Steatite quarries, though absent from New Jersey, were abundant in eastern Pennsylvania and northern Connecticut, and significant numbers of steatite vessels and vessel fragments have been collected in New Jersey, with special focus along the Delaware River.

The dramatic decrease in sea level rise during the preceding Middle Archaic period fostered stable environmental conditions by the start of the Late Archaic for the establishment of anadromous fish runs into the coastal rivers and for shellfish colonies to mature within the estuarine and riverine settings. The presence of large quantities of local pebble and cobble cherts among the lithic assemblage led Grossman-Bailey (2001:243) to interpret residential mobility during the Late Archaic to have been limited to individual drainage basins.

Woodland Period

The Woodland period was a time of increasing cultural complexity and social stratification; increased reliance on gathered plant resources in the diet; and an increased trend in territoriality, circumscribed mobility, and semi-sedentary settlement patterning. The period is usually divided into subperiods: Early Woodland (1000 BC to AD 250); Middle Woodland (AD 250 to 900); and Late Woodland (AD 900 to 1600).

Early Woodland Period (1000 BC to AD 250)

The Early Woodland period 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). The shift from soapstone to clay for utilitarian vessels did not, at first, radically change subsistence strategies or practices. This is inferred by the earliest pottery in the Middle Atlantic region, the rectangular, flat-bottomed Marcey Creek ware (circa 1500 to 900 BC), made in open imitation of soapstone vessels. It is likely that the two served much the same function, rendering nut fats or bone grease. In comparison with steatite, pottery exhibited poor thermal properties and was far more liable to break, traits that may have initially discouraged its use. Clay had the advantage, however, of being available almost anywhere. If populations did decline at the onset of the Early Woodland period, then it is likely that the trade and alliance networks established during the Late Archaic had fragmented, disrupting steatite supply lines, and fostering its replacement with more easily obtainable clay. Ceramic technology, known but dismissed for almost a millennium in the Middle Atlantic region, was seemingly adopted to continue Late Archaic lifeways during a period of demographic and cultural crisis. Only later, did pottery's advantages (its portability, storage capability, and capacity to be shaped into many forms and designs), begin to transform cultural patterns in important ways.

In the Early Woodland, biface technology abandoned broadspears in favor of narrower forms, including the Orient Fishtail (1200 to 700 BC) and Meadowood (1000 to 500 BC) during the early phase of the period, with Rossville points common toward the end of the period. Vinette I, an exterior- cordmarked, conical-shaped ceramic vessel is associated with Meadowood and Rossville points (Williams and Thomas 1982:113). Rossville points and Vinette I ceramics have been found in association on Staten Island at the Bowman's Brook site, located approximately 25 mi (40 km) southwest of the Project Area. Excavations at the Abbott Farm Complex near the Delaware River at Trenton revealed a cluster of Early Woodland hearths and stone-boiling features, interpreted to have functioned as fish processing stations. Associated with these features were Vinette I sherds (Wall et. al. 1996b:363-365).

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).

Middle Woodland Period (AD 400 to 900)

The Middle Woodland period marks the appearance of the first truly large shellfish middens in southern coastal New England and Long Island (Bernstein 1993). The Seaford Park Site, on a headland of Long Island approximately 8 mi (13 km) northeast of the Project Area, contained three large shell middens that attest to the importance of this resource. Cross noted that shellfishing along the New Jersey coast had become a major economic enterprise during this period (1956: 194). The expansion of the resource base is paralleled by an increase in the number of storage pits noted in the archeological record (DeBoer 1988; Snow 1980:282). During this period, settlement patterns have a decidedly riverine and coastal focus (Kraft 1986:105-107; Williams and Thomas 1982:122). Large lithic workshops and anadromous fish processing camps from this period were

excavated at the Abbott Farm Complex near Trenton (Cavallo 1987; Wall et al. 1996). Associated point types of this period include Fox Creek stemmed and lanceolate forms, found at sites in the middle Delaware River valley and tributary drainages, including Abbott Farm and Plenge. The Plenge site is located approximately 68 mi (110 km) west of the Project Area.

Trade and exchange networks flourished during the Middle Woodland, especially in areas influenced by the Hopewell tradition in the Midwest and Ohio Valley. Some Hopewellian manifestations are visible in western New York in the form of mortuary practices and artifact types of the Squawkie Hill Phase (Ritchie 1980:214-227), and while there is little evidence of this in eastern New York, there are suggestions that Middle Woodland groups utilized down-the-line exchange in both directions; mid-Atlantic coast shells have been found in the Ohio Valley, and Hopewell-like platform pipes occasionally appear in the east (Stewart 1989:60-63; Stewart 1998:170-171).

Presently, no evidence exists for maize horticulture in the northeast during the Middle Woodland period. 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). The presence of these nutritious seeds suggests that people were collecting them, and perhaps fostering conditions for their production, even tending small garden plots. This small-scale practice of horticulture complemented the principal hunting, foraging, and fishing strategies that fed people, and importantly, it laid the framework for the types of social organization and technological requirements that would be needed when maize was eventually adopted as the primary (or at least important) food resource along the Susquehanna, Delaware, and Hudson River drainages.

Late Woodland Period (AD 900 to 1600)

Important cultural adaptations during the Late Woodland period have been archeologically recognized on a wide scale in New York, and include the tending of cultigens (maize, beans, and squash), decrease in residential mobility, and use of the bow and arrow as a new and highly efficient hunting (and warring) weapon. These adaptations are perhaps all related to the region's population rise, with increased competition for resources and an intensification of local ethnic identity.

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). Colder climate and a shorter growing season in the northeast may have proven sub-optimal for the eight-row maize that was grown effectively in the southeast and lower Midwest. 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).

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 (approximately 25 miles (40.23 km) north of the Project Area). 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-2-5**). 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.

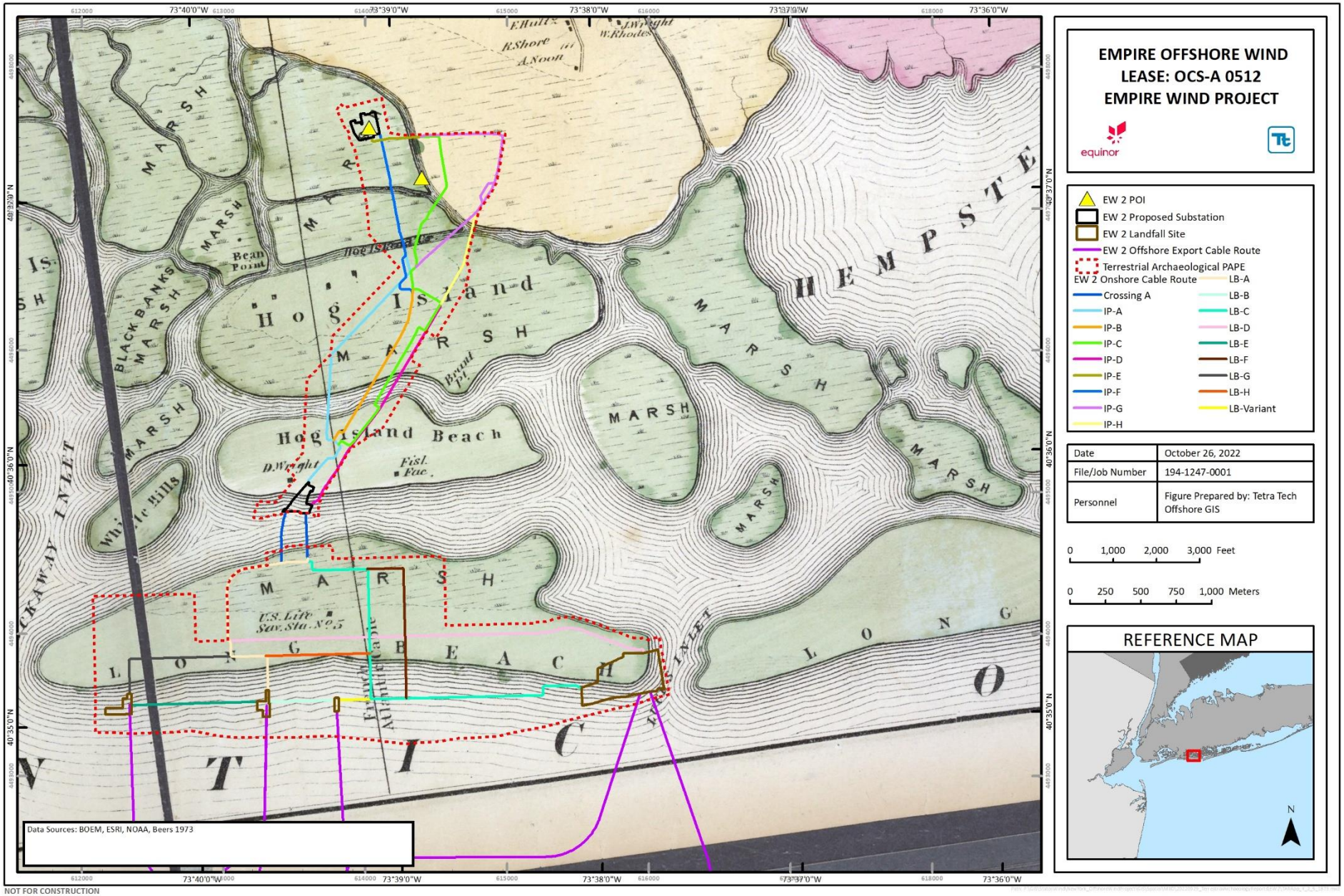


Figure Y-2-5 1873 *Atlas of Long Island, South Part of Hempstead*, showing EW 2 Export Cable Route

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-2-5**), 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

The site files review identified no recorded NY SHPO terrestrial archaeological sites and one recorded New York State Museum (NYSM) Area (No. 7774) within the Study Area. CRIS includes no information regarding the NYSM Area. Unlike recorded NY SHPO or NYSM sites, which represent locations of recovered artifacts or cultural features, "NYSM Areas" were intended to mark locales of potential resources. A Phase IA archaeological assessment survey was undertaken in 2020 for the Long Beach Water Pollution Control Consolidation Project, located tangentially within the Study Area on Long Beach Island (**Figure Y-2-12**). The investigators concluded that there was a low potential for the recovery of in situ, significant, precontact or historic period archaeological resources within the project area (Loorya and Rutigliano 2020). 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 Oceanside POI. 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 a headland near 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, unevaluated for NRHP status, 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 PAPE

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 PAPE 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-2-5** through **Figure Y-2-7**). Estuarine environments of this sort would have contained rich sources of fish, shellfish, waterfowl, 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. Sites of somewhat longer duration may have occurred on large marsh islands with well-drained upland, but in general, the bayshore marsh islands would not have been able to support prolonged visits because of the lack of potable water and frequent flooding. This situation stands in contrast to the Seaford Park Site, which is situated on a well-drained headland of the Long Island mainland with ready access to mainland tributaries. These historic maps also illustrate a narrow upland that rises above the marsh on Hog Island (**Figure Y-2-5**), later known as Barnum Island (**Figure Y-2-6** and **Figure Y-2-7**). The Beers 1873 map (**Figure Y-2-5**) depicts four structures on this upland and the U.S. Coast and Geodetic Survey map of 1895 (**Figure Y-2-6**) shows the upland with the label "Poor House," representing the Queens County poor farm built on Barnum Island in the 1870s. The following routes will cross a portion of this topographic rise:

- EW 2 Route IP-A
- EW 2 Route IP-B
- EW 2 Route IP-C
- EW 2 Route IP-F
- EW 2 Route IP-G

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. In contrast to the Seaford Park Site, which is situated on headland of the Long Island mainland, Barnum Island is a marsh island with an extensive documented history of land-making and dense urban development.

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-2-8**). 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-2-9**). By 1966, the *Spartina* marsh adjacent to the Oceanside POI had been filled as made-land (**Figure Y-2-10**). The locale of the proposed EW 2 Onshore Substation C is on the north shore of Reynolds Channel, situated between the Long Island Railroad to the west and the Long Beach Bridge to the east. The shoreline at the proposed substation is bulkheaded. Late nineteenth century USGS geodetic and topographic sheets depicted this locale as marshland (**Figure Y-2-6** and **Figure Y-2-7**). Tetra Tech interprets the locale's proximity to the railroad and the bridge as evidence of likely ground disturbance from construction activities of fill layers created by the Barnum Island land-making episodes.

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 the proposed EW 2 Onshore Substation A introduce an additional tier of ground disturbances within the Project PAPE, including the onshore export cable routes, interconnection cable routes to POI, and the onshore substation locales.

With barrier island dynamics and knowledge of community development well understood in this instance, Tetra Tech conducted a series of pedestrian reconnaissance visits to support the conclusion that the EW 2 Project Area possessed low sensitivity for the presence of undocumented archaeological resources that might be NRHP-eligible. Teams of SOI-qualified archaeologists walked interconnection cable routes from the beach landfalls to the proposed substations to identify any portions of the Project that could be considered amenable to subsurface archaeological testing or that exhibited clear evidence of prior ground disturbance. As expected from a thorough review of the Project layout, all portions of the proposed Project were aligned within paved streets, adjacent to ballasted rail lines, or conveyed via existing bridges across Reynolds Channel and Barnums Channel.

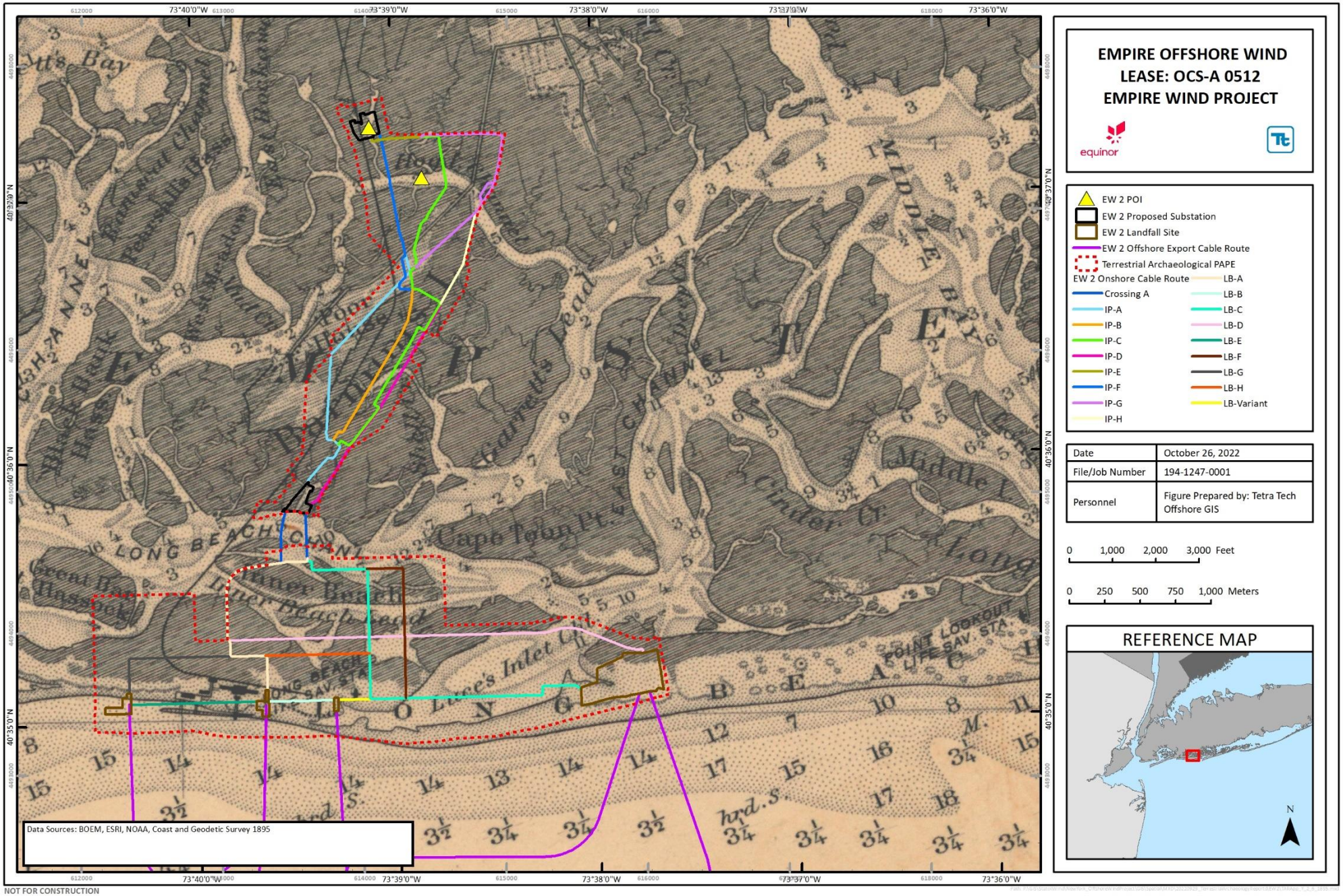


Figure Y-2-6 1895 U.S. Coast and Geodetic Survey chart, *Fire Island Beach to Rockaway Beach, New York*, showing EW 2 Export Cable Route

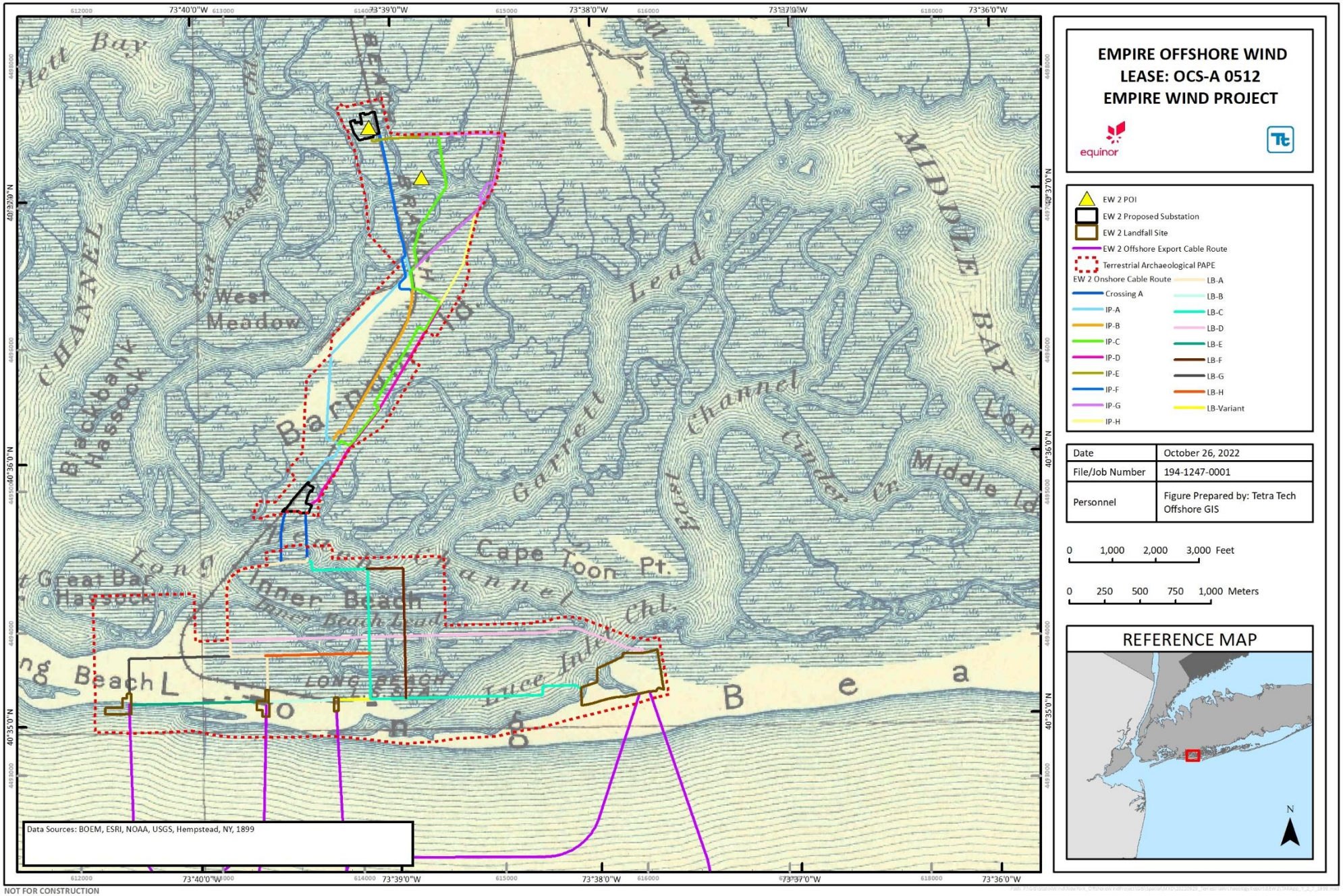


Figure Y-2-7 1899 USGS Topographic Map, *Hempstead, NY*, Showing EW 2 Export Cable Route

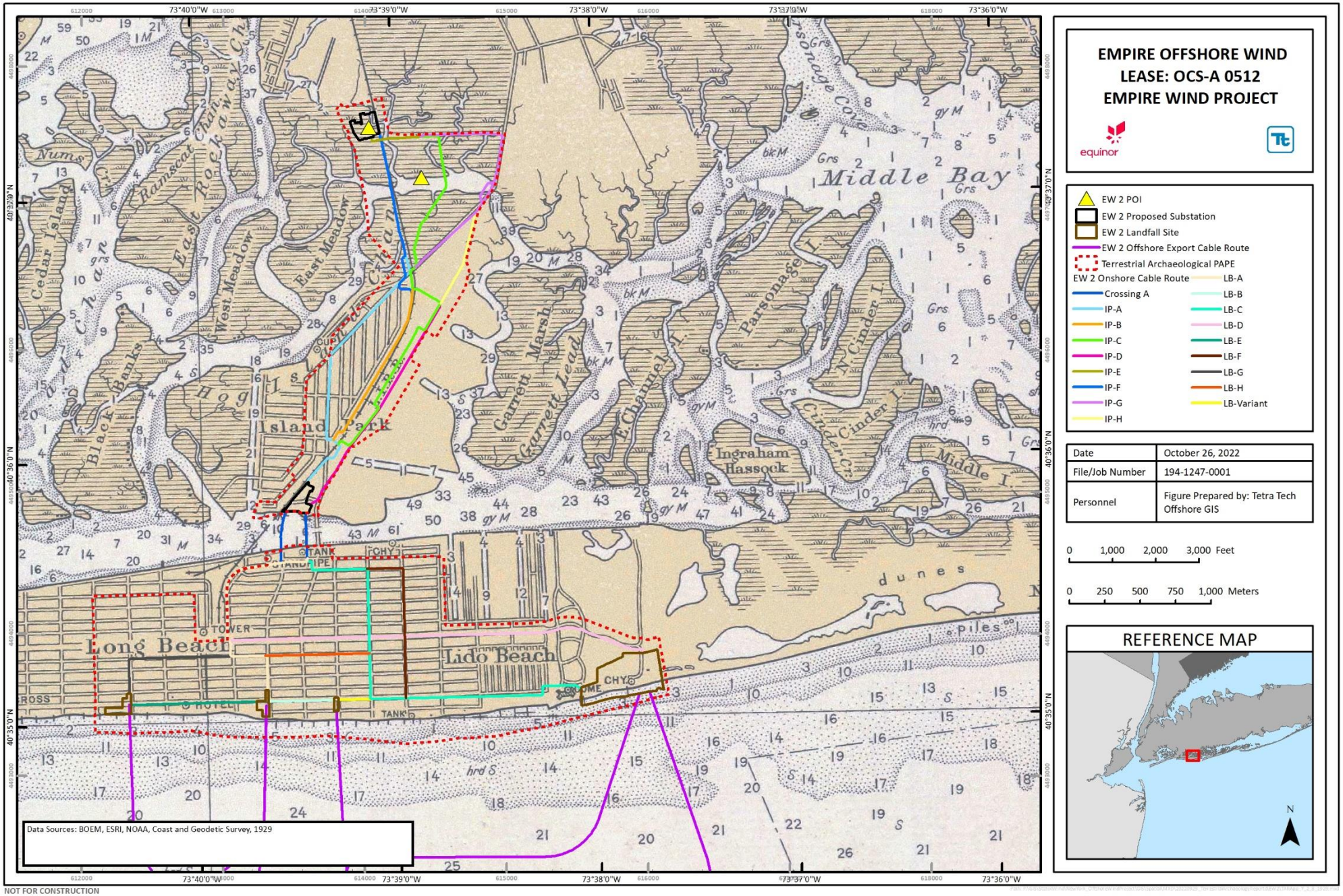


Figure Y-2-8 1929 U.S. Coast and Geodetic Survey Chart, *Hempstead Bay*, Showing EW 2 Export Cable Route

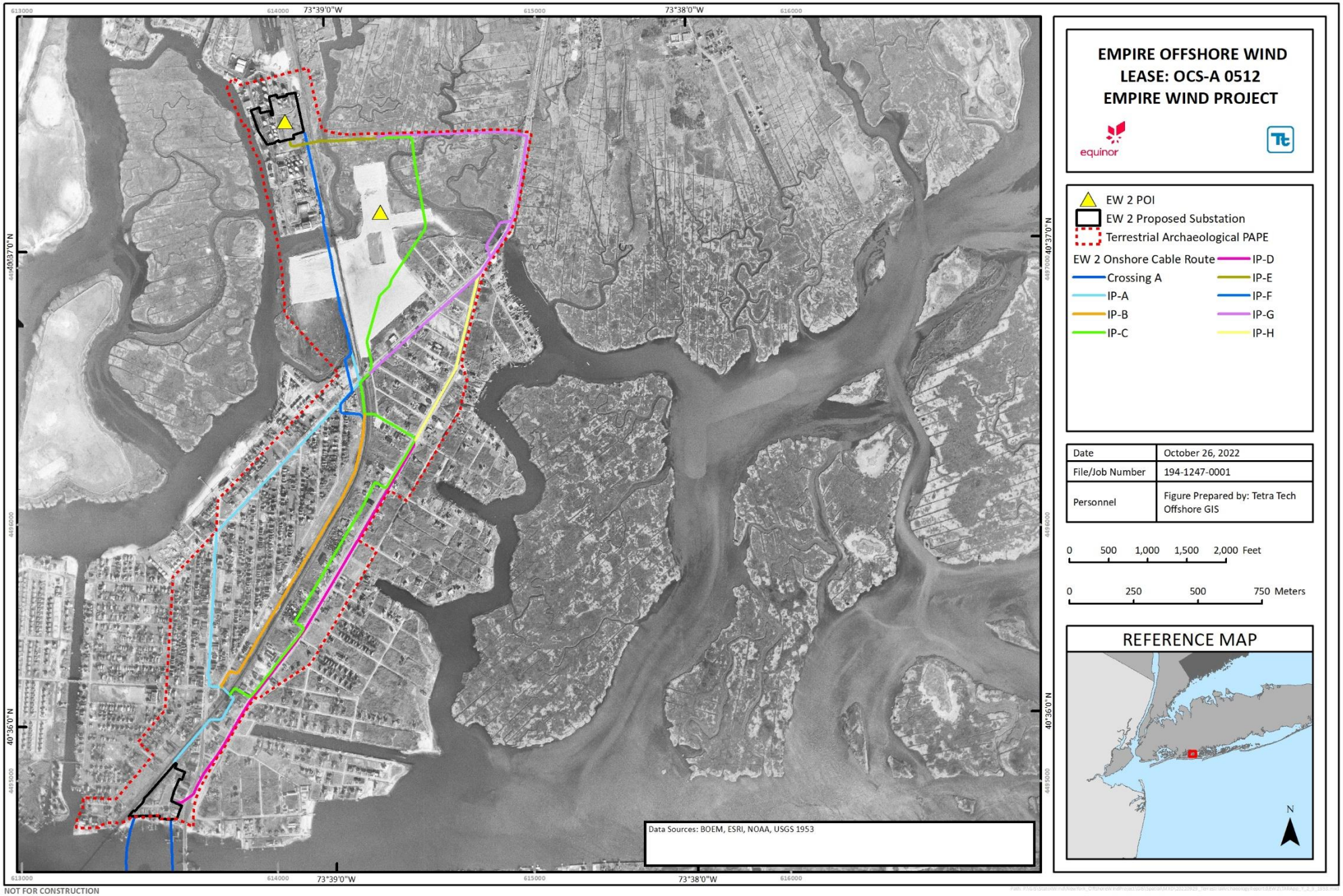


Figure Y-2-9 1953 USGS aerial of Island Park, NY and environs, showing EW 2 Export Cable Route

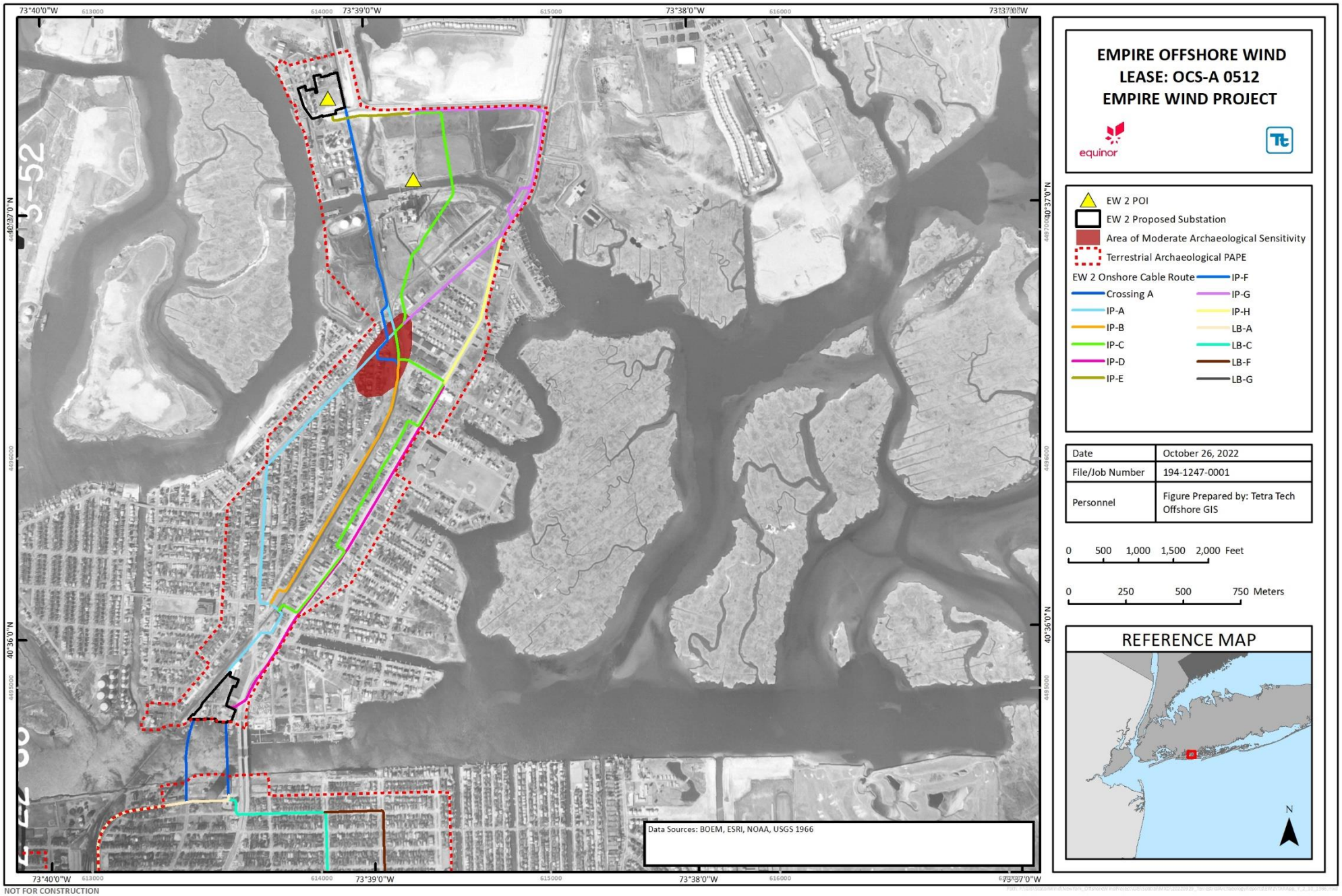


Figure Y-2-10 1966 USGS aerial of Island Park, NY and environs, showing EW 2 Export Cable Route

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-A, 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 PAPE. 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-2-8**). 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 supports this estimate.[1] If the pre-1900 upland on Barnum Island (**Figure Y-2-5** through **Figure Y-2-7**) 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 moderate 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-2-11**).

Photograph 3 EW 2 Route IP-C, Saratoga Boulevard, Island Park, NY. View to southeast. Foreground portion of the 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.

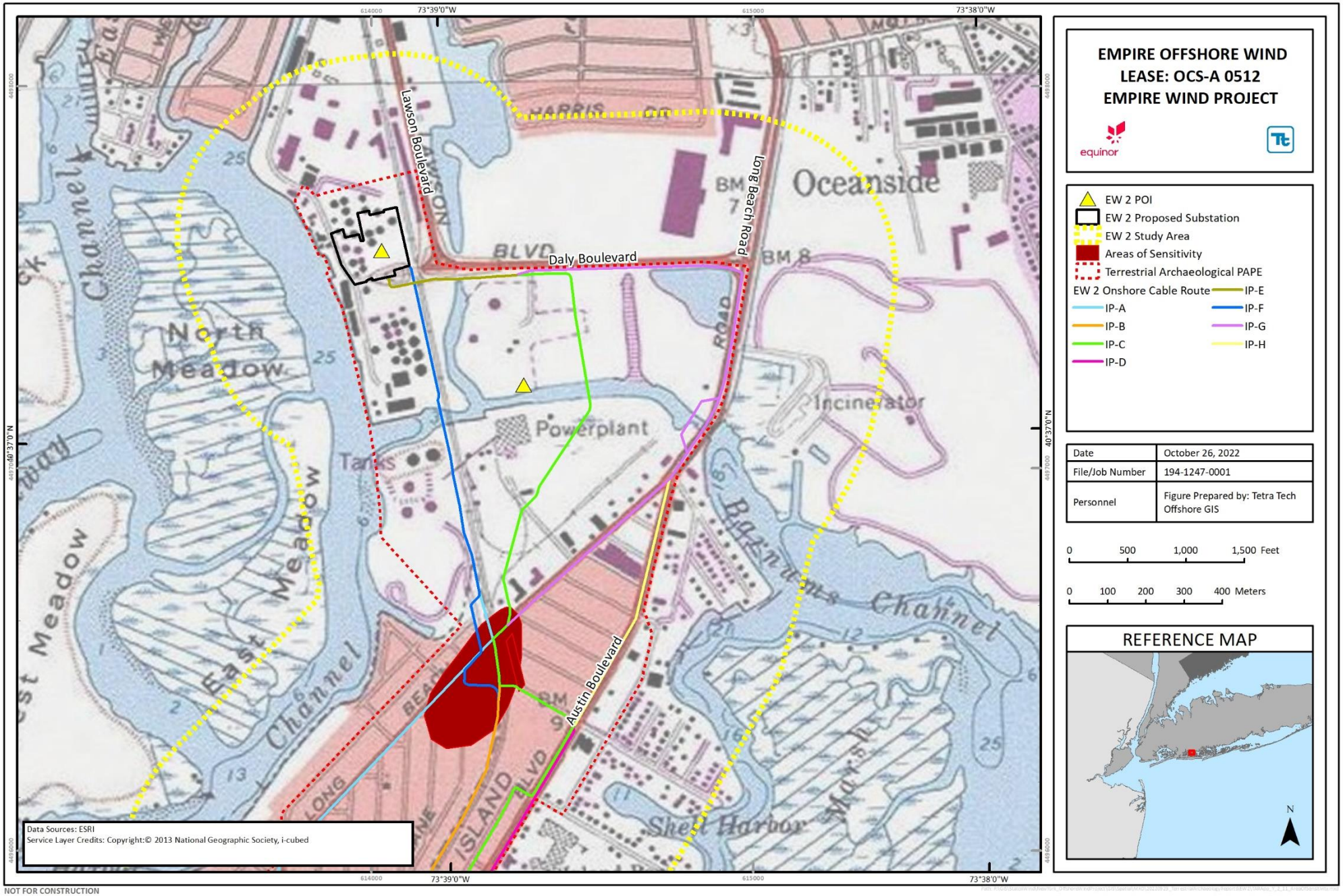


Figure Y-2-11 Portion of the EW 2 Onshore Export Cable Route with a Potential for Sensitivity

Y-2.4 SUMMARY AND RECOMMENDATIONS

Tetra Tech conducted a Phase IA 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. As the Project design has evolved through mid-2022, Tetra Tech has investigated an expanded PAPE to encompass the various alternative landfalls, onshore export cable routes, and proposed substation locales. The most recent site file review of CRIS data was undertaken on May 11, 2022.

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 either a commercial property adjacent to Railroad Place in the incorporated Village of Island Park, Town of Hempstead (EW 2 Onshore Substation C), 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 IA Terrestrial Archaeological Survey. Further, because of the absence of recorded significant 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 PAPE evaluated in this Phase IA 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, (5) industrial development at the EW 2 Onshore Substation A location and subsequent demolition of the tank farm at the EW 2 Onshore Substation A parcel, and (6) shoreline armoring and land-making at the EW 2 Onshore Substation C.

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 PAPE 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
- An archaeological monitor be present during construction period excavation of the export cable trench at seven 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 the Long Island Railroad 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 40.610198ºN, longitude -73.650853ºW) northeastward along Long Beach Road to the vicinity of the intersection of Long Beach Road and the Long Island Railroad (latitude 40.611958ºN, longitude -73.648596ºW).
- An approximately 330-ft (100-m) section of EW 2 Route IP-B at the southern terminus of Parente Lane North northward to the intersection of IP-B with IP-C, in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from a point near No. 19 Parente Lane North (latitude 40.609920ºN, longitude -73.648570ºW) to the corridor's junction with EW 2 Route IP-C (latitude 40.610805ºN, longitude -73.648451ºW).
- An approximately 650-ft (200-m) section of EW 2 Route IP-C from the intersection of Saratoga Boulevard and Sherman Road, under the Long Island Railroad, to the intersection of IP-C with IP-A at Long Beach Road, then northeastward to the intersection of the Route with 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 D'Amato Drive to the intersection of Long Beach Road and the Long Island Railroad (latitude 40.611911°N, longitude -73.648633°W).
- An approximately 370-ft (112-m) section of EW 2 Route IP-F from near No. 11 Parente Lane North to the intersection of Kildare Road in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from a point opposite No. 11 Parente Lane North (latitude 40.610487ºN, longitude -73.648496ºW) north and westward along Parente Lane North to the intersection of Kildare Road and Parente Lane North (latitude 40.610855ºN, longitude -73.649474ºW).
- An approximately 110-ft (35-m) section of EW 2 Route IP-F along Kildare Road from the intersection of Parente Lane North northward to the intersection of Long Beach Road in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from the intersection of Parente Lane North (latitude 40.610855ºN, longitude -73.649474ºW) to the intersection of Long Beach Road (latitude 40.611188ºN, longitude -73.649505ºW).
- An approximately 475-ft (145-m) section of EW 2 Route IP-F along Long Beach Road from the intersection of Kildare Road northeastward to the intersection of North Nassau Lane with Waterford Road in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from the intersection of Long Beach Road and Kildare Road (latitude 40.611188ºN, longitude -73.649505ºW) to the intersection of Waterford Road and North Nassau Lane (latitude 40.612314ºN, longitude -73.649209ºW).
- An approximately 800-ft (245 m) section of EW 2 Route IP-G along Long Beach Road from the intersection of Sherman Road northeastward to the intersection of Long Beach Road and McCarthy Road in the unincorporated hamlet of Barnum Island, Town of Hempstead, Nassau County, New York. Tetra Tech recommends monitoring undertaken from the intersection of

Long Beach Road and Sherman Road (latitude 40.612256ºN, longitude -73.648163ºW) to the intersection of Long Beach Road and McCarthy Road (latitude 40.613648ºN, longitude -73.646087ºW).

Based on discussions with BOEM, Empire will provide a Secretary of the Interior-qualified professional archaeologist to monitor all onshore Project-related construction that results in significant ground disturbance in the EW 2 onshore work areas (**Figure Y-2-12**). The goal of archaeological monitoring is to identify any archaeological resources that potentially may be revealed during construction activities and identify resources in areas where Phase IB survey techniques could have been obstructed or inefficient (i.e., pavement or surface inundation). 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.

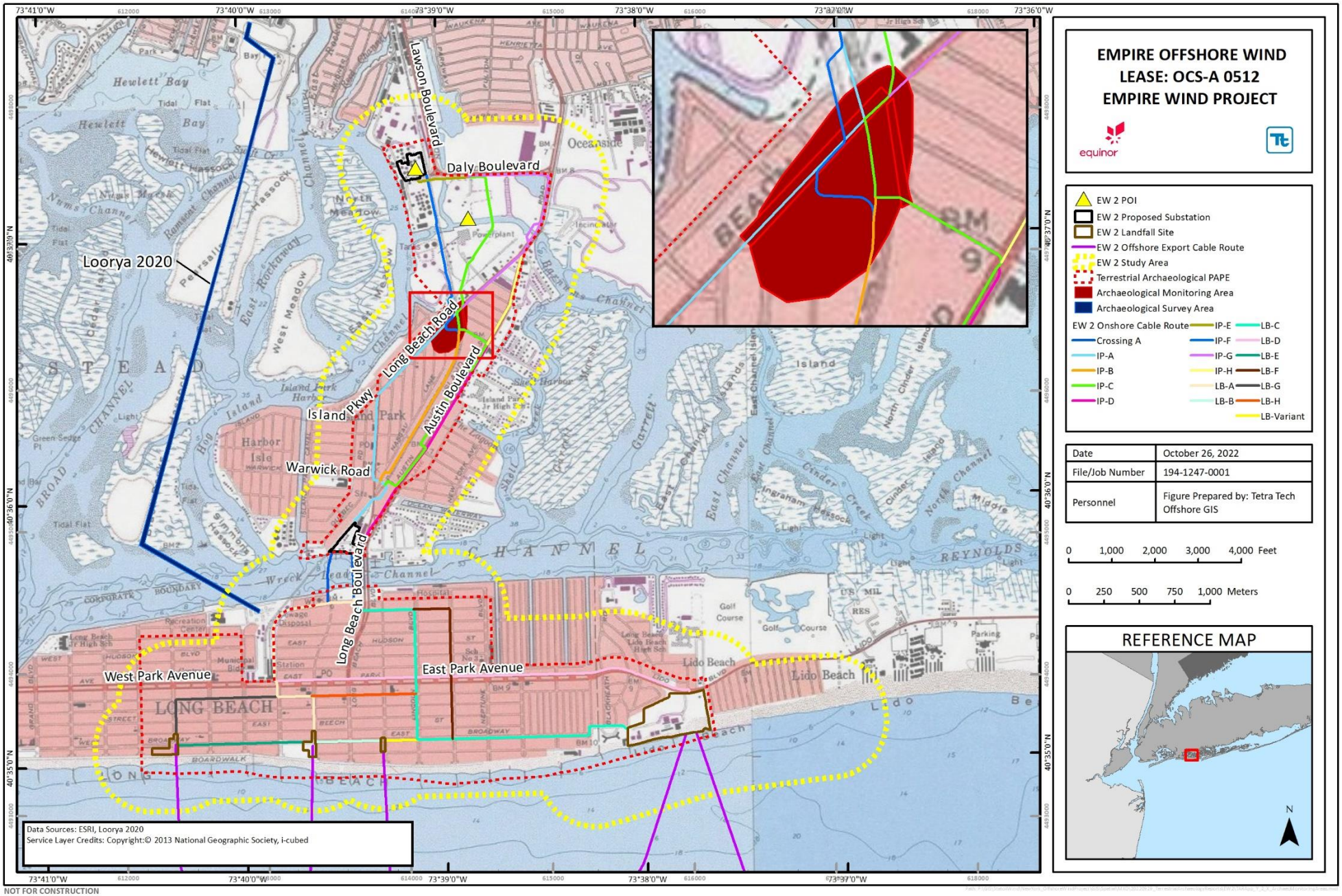


Figure Y-2-12 Recommended Archeological Monitoring Areas in Vicinity of EW 2 Onshore Export Cable Route

Y-2.5 REFERENCES

Aliano, David
1995 Long Island's Struggle for Civil Liberty under the Dutch Regime. *Long Island Historical Journal*, 8:111-118.

Anderson, David G.
2013 Paleoindian and Archaic Periods in North America. In *The Cambridge World Prehistory*, edited by Paul Bahn and Colin Renfrew, pp. 913-932, Cambridge University Press.

Becker, Marshall Joseph
1999 Cash Cropping by Lenape Foragers: Preliminary Notes on Native Maize Sales to Swedish Colonists and Cultural Stability during the Early Colonial Period. *Bulletin of the Archaeological Society of New Jersey* 54:45-47.

Beers, F.W.
1873 South Part of Hempstead. *Atlas of Long Island, New York*. Beers, Comstock & Cline, New York.

Bernstein, David J.
1993 *Prehistoric Subsistence on the Southern New England Coast: The Record from Narragansett Bay*. Academic Press, San Diego, CA.

2006 Long-Term Continuity in the Archaeological Record from the Coast of New York and Southern New England, USA. *Journal of Island and Coastal Archaeology*, 1(2):271-284.

Binford, Lewis R.
1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45:4-20.

Boulanger, Matthew T. and R. Lee Lyman
2014 Northeastern North American Pleistocene megafauna chronologically overlapped minimally with Paleoindians. *Quaternary Science Reviews* 85:35-46.

BOEM (Bureau of Ocean Energy Management)
2017 Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30CFR Part 585. Electronic document, https://www.boem.gov/Guidelines_for_Providing_Archaeological_and_Historic_Property_Information_Pursuant_to_30CFR585/, accessed October 21, 2018.

Burrows, Edwin G. and M. Wallace
1999 *Gotham: A History of New York City to 1898*. Oxford University Press, New York.

Cammisa, Alfred
1995 Archaeological Investigations at the Seaford Park Archaeological Site. *The Bulletin: Journal of the New York State Archaeological Association*, 110:26-37.

Carlson, Catherine C.
1988 "Where's the Salmon?": A Re-evaluation of the Role of Anadromous Fisheries in the Aboriginal Northeast. In, *Holocene Human Ecology in Northeastern North America*, edited by George P. Nicholas, pp. 47-80. Springer, New York.

Cassedy, Daniel and P. Webb
1999 New Data on the Chronology of Maize Horticulture in Eastern New York and Southern New England. In *Current Northeastern Paleobotany*, edited by John Hart, pp. 85-99. New York State Museum, Albany.

Cavallo, John
1987 *Area B (28ME1-B), Archaeological Data Recovery, I-295 and Wetlands Area Interchange*. The Cultural Resource Group, Louis Berger and Associates, East Orange, NJ. Report prepared for the NJ Department of Transportation and the Federal Highway Administration.

Ceci, Lynn
1990 Maize Cultivation in Coastal New York: The Archaeological, Agronomical, and Documentary Evidence. *North American Archaeologist*, 11:147-176.

Claasen, Cheryl
1995 Dogan Point and its Social Context. In *Dogan Point: a Shell Matrix Site in the Lower Hudson Valley*, edited by Cheryl Claasen, pp. 129-142. Archaeological Services, Bethlehem, CT.

1996. The Shell Matrix at Dogan Point. In *A Golden Chronograph for Robert E. Funk*, edited by Chris Lindner and Edward V. Curtin, pp. 99-107. Occasional Publications in Northeastern Anthropology, No. 15.

Cross, Dorothy
1956 *Archaeology of New Jersey, Vol. II: The Abbott Farm Site.* Archaeological Society of New Jersey, Trenton, NJ.

Davis, Margaret Bryan
1983 Holocene Vegetational History of the Eastern United States. In *Late-Quaternary Environments of the United States, Volume 2, The Holocene,* edited by H.E. Wright, Jr., pp. 166-181. University of Minnesota Press, Minneapolis.

DeBoer, Warren R
1988 Subterranean Storage and the Organization of Surplus; The View from Eastern North America. *Southeastern Archaeology* 7:1-20.

Dent, Richard J.
1995 *Chesapeake Prehistory: Old Traditions, New Directions*. Plenum, New York.

2007 Seed Collecting and Fishing at the Shawnee Minisink Paleoindian Site: Everyday Life in the Late Pleistocene, In *Foragers of the Terminal Pleistocene in North America*, edited by Renee B. Walker and Boyce N. Driskell, pp. 116-131. University of Nebraska Press, Lincoln.

Donnelly, Jeffrey P.
2000 *Sedimentary Records of Late Holocene Salt Marsh Development, Storms and Sea Levels in the Northeastern United States*. Ph.D. dissertation, Brown University. UMI, Ann Arbor, MI.

Fasanella, R. Marc
1994 Robert Moses and the Making of Jones Beach State Park. *Long Island Historical Journal*, 7:99-110.

Fiedel, Stuart J.
2001 What Happened in the Early Woodland? *Archaeology of Eastern North America*, 29:101-142.

Fritz, Gayle J.
1990 Multiple Pathways to Farming in Precontact Eastern North America. *Journal of World Prehistory*, 4:387-435.

Fuller, Myron L.
1914 *The Geology of Long Island, New York*. U.S. Geological Survey, Washington, D.C.

Gingerich, Joseph A.M.
2013 Revisiting Shawnee Minisink. In *In the Eastern Fluted Point Tradition*, edited by Joseph A.M. Gingerich, pp. 218-258. University of Utah Press, Salt Lake City.

Grossman-Bailey, Ilene
2001 "The People Who Lived by the Ocean": Native American Resource Use and Settlement in the Outer Coastal Plain of New Jersey. Ph.D. Diss., Department of Anthropology, Temple University, Philadelphia, PA.

Grumet, Robert S.
1979 *We Are Not So Great Fools: Changes in Upper Delawaran Socio-Political Life 1630-1758*. PhD Dissertation, Department of Anthropology, Rutgers University, New Brunswick, New Jersey.

Hapke, Cheryl J., E. A. Himmelstoss, M.G. Kratzmann, J.H. List and E. R. Thieler
2010 National Assessment of Shoreline Change: Historical Shoreline Change along the New England and Mid-Atlantic Coasts. U.S. Geological Survey, Open-File Report 2010-1118.

Justice, Noel D
1987 Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States. Indiana University Press, Bloomington.

Kass, Sean
2004/2005 The Long Island Rail Road and Its Promotion of Long Island, 1900-1930. *Long Island Historical Journal*, 17:80-100.

Kraft, Herbert C.
1986 *The Lenape: Archaeology, History, and Ethnography*. New Jersey Historical Society, Newark.

Kraft, Herbert C. and R.A. Mounier
1982 The Archaic Period in New Jersey: ca. 8000 B.C. – 1000 B.C. In New Jersey's Archaeological Resources from the Paleo-Indian Period to the Present: A Review of Research Problems and Survey Priorities, edited by Olga Chesler, pp. 52-102.

1989 Evidence of Contact and Trade in the Middle Atlantic Region and with the Minisink Indians of the Upper Delaware River Valley. *Journal of Middle Atlantic Archaeology*, 5:77-102.

Lavin, Lucianne
1988 Coastal Adaptation in Southern New England and Southern New York. *Archaeology of Eastern North America*, 16:101-120.

Loorya, Alyssa and Elissa Rutigliano
2020 Phase IA Historical Documentary Report and Archaeological Assessment for the Long Beach Water Pollution Control Plant (WPCP) Consolidation, Nassau County, New York. Prepared for NYS OPRHP, NYS Governor's Office of Storm Recovery, and Louis Berger, U.S. Prepared by Chrysalis Archaeological Consultants, Inc.

Lothrop, Jonathan C, Darrin L. Lowery, Arthur E. Spiess, and Christopher J. Ellis
2016 Early Human Settlement of Northeastern North America. *PaleoAmerica*, 2:192-251.

Martin, Paul S.
1967 Prehistoric overkill. In *Pleistocene Extinctions: the Search for a Cause*, edited by P.S. Martin and H.E. Wright, Jr., pp. 75-120. Yale University Press, New Haven.

McNamara, Patrick J.
1995 *By the Rude Storms of Faction Blown*: Thomas Jones, a Long Island Loyalist. *Long Island Historical Journal*, 7:178-190.

Merwin, Daria Elizabeth
2010 *Submerged Evidence of Early Human Occupation in the New York Bight*. Ph.D. dissertation, Stony Brook University.

Moss, Cheryl J.
2013 Evidence of Glacial Readvances During Recession from the Last Glacial Maximum from the Citifield Stadium Site, Queens, New York City, NY: in Hanson, G. N. (ed.), *Long Island Geologists Program* pp. 1-11. 20th Annual Conference on Geology of Long Island and Metropolitan New York, 13 April 2013, State University of New York at Stony Brook, NY.

Moss, Richard Shannon
1993 *Slavery on Long Island: A Study in Local Institutional and Early African-American Communal Life*. Garland Publishing, Inc., New York.

Munsell, W.W. [publisher]
1882 *History of Queens County, New York*. W.W. Munsell & Co., New York.

Needell, Sally, R.S. Lewis and S.M. Colman
1987 The Quaternary Geology of East-Central Long Island Sound. *Miscellaneous Field Studies*, Map MF-1939-B, U.S. Geological Survey, Washington, D.C.

New York Archaeological Council (NYAC)
1994 Standards for Cultural Resource Investigations and the Curation of Archaeological Materials in New York State. Electronic document, https://nysarchaeology.org/wp-content/uploads/2013/12/NYACStandards.pdf, accessed December 4, 2018.

New York State Library
2019 Census – New York State. Electronic document, http://www.nysl.nysed.gov/scandocs/nyscensus.htm, January 14, 2019.

New York Times
1922 *A 700-Acre Development*. April 23, 1922, Section 8, p. 1. Electronic document, https://timesmachine.nytimes.com/timesmachine/1922/04/23/issue.html, accessed September 13, 2019.

O'Callaghan, E.B.
1849 *The Documentary History of the State of New-York*. Vol. I. Weed, Parsons & Co., Albany, NY.

Pagoulatos, Peter
2003 Early Archaic Settlement Patterns of New Jersey. *Archaeology of Eastern North America*, 31:15-44.

2004 Paleoindian Site Location in New Jersey. *Archaeology of Eastern North America*, 32:123-149.

Psuty, N.P., M. Duffy, J.F. Pace, D.E. Skidds, and T.M. Silveria
2010 *Northeast Coastal and Barrier Geomorphological Monitoring: Part I – Ocean Shoreline Position*. Natural Resources Report NPS/NCBN/NRR-2010/185. National Park Service, Fort Collins, CO.

Ritchie, William A.
1980 *The Archaeology of New York State*. Harbor Hill Books, Harrison, New York.

Ritter, Dale F.
1978 *Process Geomorphology*. Wm. C. Brown Company Publishers, Dubuque, Iowa.

Robinson, Michael J.
1996. The Town of Hempstead Archives, 1644-1996: A Wealth of Municipal History. *Long Island Historical Journal*, 9:79-89.

Sassaman, Kenneth E
2010 *The Eastern Archaic, Historicized*. Rowman & Littlefield, Lanham, Maryland.

Schaper, Hans F.
1989 Shell Middens in the Lower Hudson Valley. *The Bulletin: Journal of the New York State Archaeological Association*, 98:13-24.

SEARCH
2018 Archaeological Resource Assessment of Two Buoy Deployment Areas within the New York Lease Area (OCS-A-0512), New York Bight. Final Report. Prepared for Equinor Wind US LLC, Stamford, CT.

2019 Marine Archaeological Resources Assessment for the Equinor Wind Offshore Wind Project, Construction and Operations Plan. Revised Preliminary Draft Report. Prepared for Equinor Wind US LLC, Stamford, CT.

Singer, Alan
2007 Slavery in Colonial and Revolutionary New York: Complicity and Resistance. *Long Island Historical Journal*, 20:163-173.

Sirkin, Les
1995 *Western Long Island Geology*. The Book and Tackle Shop Publishers, Watch Hill, Rhode Island.

Snow, Dean R.
1980 *The Archaeology of New England*. Academic Press, New York.

Solecki, Ralph S. and R.S. Grumet
1994 The Fort Massapeag Archaeological Site National Historic Landmark. *The Bulletin: Journal of the New York State Archaeological Association*, 108:18-28.

Stanford, Scott D.
2010 Glacial Geology and Geomorphology of the Passaic, Hackensack, and Lower Hudson Valleys, New Jersey and New York, In *Field Trip Guidebook*, edited by Alan I. Benimoff, pp. 47-83. Prepared for the New York State Geological Association 82nd Annual Meeting, Staten Island, New York. Electronic document, http://www.nysga-online.net/wp-content/uploads/2018/09/2010_bookmarked.pdf, accessed November 21, 2018.

Stewart, R. Michael
1989 Trade and Exchange in Middle Atlantic Region Prehistory. *Archaeology of Eastern North America*, 17:47-78.

1998 Unraveling the Mystery of Zoned Decorated Pottery: Implications for Middle Woodland Society in the Middle Atlantic Region. *Journal of Middle Atlantic Archaeology*, 14:161-182.

Svenson, Henry K.
1936 The Early Vegetation of Long Island. *Brooklyn Botanic Garden Record*, 25:207-227. Electronic document, https://www.biodiversitylibrary.org/item/41119#page/248/mode/1up, accessed November 15, 2018.

Taylor, Alan
2001 *American Colonies: The Settling of North America*. Penguin Books, New York.

Tetra Tech, Inc. (Tetra Tech)
2019 Phase I Terrestrial Archaeological Survey, Equinor Wind Lease Area OCS-A 0512, Offshore Wind Project, Empire Wind 1 Onshore Export and Interconnection Cable Corridor and Onshore Substation, Brooklyn, Kings County, New York. Draft Report. Prepared for Equinor Wind US LLC, Stamford, CT.

Truncer, James
2004 Steatite Vessel Age and Occurrence in Temperate Eastern North America. *American Antiquity*, 69:487-513.

Turnbaugh, William A
1975 Toward an Explanation of the broadpoint dispersal in eastern North American prehistory. *Journal of Anthropological Research*, 31:51-68.

Uchupi, E., N. Driscoll, R.D. Ballard, and S.T. Bolmer
2001 Drainage of late Wisconsin glacial lakes and the morphology and late quaternary stratigraphy of the New Jersey-southern New England continental shelf and slope. *Marine Geology*, 172:117-145.

U.S. Army Corps of Engineers (USACE)
2015 *Hurricane Sandy Limited Reevaluation Report. Vol. 1. Main Report and Environmental Assessment*. Atlantic Coast of Long Island, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Coastal Storm Risk management Project.

U.S. Census Bureau
1841 Sixth Census of the United States - Compendium of the Enumeration of the Inhabitants and Statistics of the United States. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1840/1840.pdf, accessed January 19, 2019.

1853 Seventh Census of the United States: New York. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1850/1850a-06.pdf, accessed January 19, 2019.

1864 Agriculture of the United States in 1860; compiled of the original returns of the 8th Census. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1860/1860b-06.pdf, accessed January 19, 2019.

1882 Report on the Productions of Agriculture – Tenth Census of the United States. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1880/1880a_v3-01.pdf, accessed January 20, 2019.

1902 Twelfth Census of the United States. Agriculture, Part II: Crops and Irrigation. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/1900/06/02/1836/33398096v6p2.pdf, accessed January 20, 2019.

1908 First Census of the United States, 1790 – New York: Heads of Families. U.S. Census Bureau, Washington, D.C. Electronic document, https://www2.census.gov/library/publications/decennial/1790/heads_of_families/new_york/1790g-02.pdf?#, accessed January 4, 2019.

U.S. Coast and Geodetic Survey
1895 *Fire Island Beach to Rockaway Beach, New York*. Coast Chart No. 119. Washington, D.C.

U.S. Coast and Geodetic Survey
1929 *Hempstead Bay, New York*. Coast Chart No. 579. Washington, D.C.

U.S. Department of Agriculture (USDA)
2002 2002 Census of Agriculture – New York. Electronic document, http://usda.mannlib.cornell.edu/usda/AgCensusImages/2002/01/32/1704/Table-01.pdf, accessed January 20, 2019.

U.S. Geological Survey (USGS)
1899 *Hempstead, NY*. 7.5-minute quadrangle. Washington, D.C.

USGS
1953 Aerial Imagery, Aerial Photo Single Frame. Entity ID No. AR1VBV000010043. Acquisition date: November 29, 1953. Flying height in feet: 10,000. Scale: 1:20,000. Electronic document, https://earthexplorer.usgs.gov/, accessed September 15, 2019.

Wall, Robert D., R.M. Stewart, and John Cavallo
1996 *The Lithic Technology of the Trenton Complex*. Trenton Complex Archaeology: Report 13. The Cultural Resource Group, Louis Berger & Associates, Inc., East Orange, New Jersey. Prepared for the Federal Highway Administration and the New Jersey Department of Transportation, Bureau of Environmental Analysis, Trenton.

Wall, Robert D., R.M. Stewart, J. Cavallo, and V. Busby
1996 *Area D Site (28Me1-D) Data Recovery*. Trenton Complex Archaeology: Report 9. The Cultural Resource Group, Louis Berger & Associates, Inc., East Orange, New Jersey. Prepared for the Federal Highway Administration and the New Jersey Department of Transportation, Bureau of Environmental Analysis, Trenton.

White, Shane
1995 Slavery in New York State in the Early Republic. *Australasian Journal of American Studies*, 14:1-29.

Williams, Lorraine E. and Ronald A. Thomas
1982 The Early/Middle Woodland Period in New Jersey (ca. 1000 B.C. – A.D. 1000). In *New Jersey's Archaeological Resources from the Paleo-Indian Period to the Present: A Review of Research Problems and Survey Priorities*, edited by Olga Chesler, pp. 103-138.

Addendum A – Agency Correspondence

ATTACHMENT Y-3 REPORT AUTHOR CURRICULUM VITAE

TETRA TECH

Robert Jacoby
Cultural Resources Specialist

EXPERIENCE SUMMARY

Mr. Jacoby has over ten years of experience as an architectural historian and 40 years of experience as an archaeologist. Responsibilities have included supervision of archeological research projects involving historic, prehistoric, and urban resources, and supervision of historic architectural surveys. Preparation of technical reports and artifact analyses for diverse public clients including, U.S. Army Corps of Engineers, U.S. Forest Service, and National Park Service, and private clients including Equitrans, Invenergy, NextEra Energy, CPV Energy, and Ridgeline Energy, among others.

RELEVANT EXPERIENCE

ARCHITECTURAL HISTORY

Architectural Historian, April 2022—present
Hampton Roads Sanitation District, Middlesex Interceptor Force Main Project, Middlesex, Mathews, and Gloucester Counties, VA
Principal Investigator for architectural history survey of proposed upgrades to force mains and pump stations. Inventoried 56 architectural resources within the project viewshed. Supervised and conducted survey, and reporting of findings and recommendations.

Architectural Historian--2020
Boralex, Greens Corners Solar Project, Jefferson County, NY
Principal investigator for historic architecture resources survey for 2200-acre solar project. Documented 20 NRHP historic properties and 119 previously unrecorded architectural resources. Recommended 8 newly recorded resources as NRHP-eligible. NY-SHPO concurred with work plan and recommendations.

Architectural Historian--2020
LS Power Grid New York LLC, Marcy to New Scotland Upgrade Project, Oneida, Herkimer, Montgomery, Schenectady, and Albany Counties, NY
Principal investigator for historic architecture resources survey for 93-mile electrical transmission corridor upgrade. Assessed 55 historic properties. NY-SHPO concurred with work plan and recommendations.

Architectural Historian--2020
Geronimo Energy, Rising Solar Site, Orange County, New York
Principal investigator for historic architecture resources survey for solar energy development. Identified historic properties within 0.5-mile indirect effects APE. NY-SHPO concurred with work plan and recommendations.

Architectural Historian--2019
Apex Energy, Lincoln Land Wind Project, Historic Architectural Resources Survey, Morgan and Sangamon counties, Illinois
Principal Investigator for historic architectural resources survey for wind energy development. Identified, photographed, and assessed over 500 structures within a 1.5-mile radius of the project area. IL-SHPO concurred with work plan and recommendations.

Publications

Reeve, Stuart A., Robert M. Jacoby and Sydne B. Marshall. 2021. Window on Precontact Settlement Patterns Across Southwestern Virginia. *Journal of Middle Atlantic Archaeology* 37:143-164.

Jacoby, Robert M. and Gerard Scharfenberger. 2004. Archaeology, Compliance and the Section 106 Process. *Environmental Law In New York* 15(9):179-183.

Jacoby, Robert M. 2000. Prey Selection and Prehistoric Settlement in the Susquehanna Valley: A Test of Protein Residue Analysis. *The Journal of Middle Atlantic Archaeology* 16:97-115.

EDUCATION

MA, Historic Preservation, Goucher College, 2009

BA, Anthropology, Northwestern University, 1976

TRAINING/CERTIFICATIONS

Registered Professional Archaeologist, Number 17249

OFFICE

Parsippany, New Jersey

YEARS OF EXPERIENCE

40 – Archaeology

10- - Architectural History

Julia Mates
Historian/Architectural Historian

EXPERIENCE SUMMARY

Ms. Mates has practiced the fields of history/architectural history and cultural resource management since 1999. She has serves as a principal historian on historical research investigations for federal, state and local governments. Her experience includes the inventory, recordation, and evaluation of historic resources using National Register of Historic Places and California Register of Historic Resources guidelines. Her environmental planning experience includes preparing reports for and making recommendations to federal, state, municipal and private entities regarding Section 106 review and compliance, including consultation with various State Historic Preservation Officers. She has extensive experience with Section 106 of the National Historic Preservation Act, National Environmental Policy Act (NEPA), and the California Environmental Quality Act (CEQA).

As a cultural resources project manager at Tetra Tech, she has served as a consulting historian, principal investigator, and resource author. Ms. Mates has conducted architectural surveys and cultural resources management projects in Alaska, Arizona, California, Colorado, Florida, Hawaii, Idaho, Louisiana, Massachusetts, Michigan, Minnesota, Nevada, New York, New Jersey, North Carolina, Puerto Rico, South Carolina, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and West Virginia. She has evaluated various types of historical resources for eligibility for National and State Registers, including those for dams, pipelines, culverts, bridges, roads, military structures, water conveyance systems, navigational aids, residences, and commercial and industrial buildings. Ms. Mates has written numerous technical reports and compliance documents, such as historic survey reports, findings of effect, determinations of eligibility and Historic American Buildings Survey / Historic Architectural and Engineering Record documentation. In addition to research, writing, and architectural recordation, Ms. Mates also has experience in conducting oral histories. Based on her level of education and experience, Ms. Mates exceeds the United States Secretary of the Interior's Professional Qualification Standards for Historian and Architectural Historian (as defined in 36 CFR, Part 61).

EDUCATION

BA, History, University of California, Los Angeles

MA, Public History, California State University, Sacramento, 2003

AREAS OF EXPERTISE

Exceeds US Secretary of the Interior's Professional Qualifications Standards for Historian & Architectural Historian

Section 106 of National Historic Preservation Act

California Environmental Quality Act (CEQA)

National Environmental Policy Act (NEPA)

US Secretary of the Interior's Guidelines for Historic Preservation

Recreation, Land Use, and Aesthetics Author for CEQA/NEPA

OFFICE

Oakland, California

YEARS OF EXPERIENCE

21

CONTACT

510-302-6300

julia.mates@tetratech.com

RELEVANT EXPERIENCE

California Department of Forestry and Fire Protection Management Plan for Historic Buildings Evaluation. Historian/Architectural Historian. 2021-Ongoing. Ms. Mates is part of a team of Historians who will prepare an inventory and evaluation project that will support the next update to *the California Department of Forestry and Fire Protection Management Plan for Historic Buildings and Archaeological Sites* (2012). Tetra Tech's historians will conduct intensive-level surveys of 321 buildings, constructed between 1946 and 1970) at 65 locations throughout 10 counties in California.

Oakridge Estate Historic Structures Report, City of Los Angeles, Department of Parks and Recreation, 2021. Ms. Mates served as a technical reviewer for the report which was prepared for the City of Los Angeles for this Historic-Cultural Monument, for public use and benefit.

Abraham Lincoln High School Initial Study/Mitigated Negative Declaration for the Comprehensive Modernization Project. Los Angeles Unified School District. Los Angeles, CA 2019-2021. Architectural Historian. Ms. Mates analyzed the proposed project activities on the high school campus, which was previously determined eligible for listing in the California Register of Historical Resources and is considered a historic resource under CEQA. Ms. Mates determined the level of impact, using CEQA guidelines and provided appropriate LAUSD Standard Conditions of Approval for to mitigate the significant impacts to the historic resource. Ms. Mates also addressed comments and concerns from stakeholders.

Wild Springs Solar Project Historic Architectural Survey. Pennington County, South Dakota. Architectural Historian. 2020- 2021. Ms. Mates evaluated farmsteads in the project area for eligibility for listing in the NRHP. The South Dakota SHPO concurred with her findings. Wild Springs Solar, LLC, a wholly owned subsidiary of National Grid Renewables, proposes to develop a solar facility on a 1,431-acre area. The project will interconnect with the WAPA-owned New Underwood Substation and is subject to review under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act.

Nolin Hills Wind Power Project. Umatilla County, Oregon. Architectural Historian. 2020-2022. Ms. Mates evaluated rural sheep ranching and agricultural-related historic farmstead buildings and structures adjacent to or within the project area for the construction of a 48,159 acre, 350 megawatt wind farm, constructed by Nolin Hills Wind, LLC. She prepared the architectural properties history and evaluation portions of the Cultural Resources survey and coordinated with the project sponsor and the Oregon SHPO in obtaining approval for the project from the Oregon Department of Energy.

Astoria East Tongue Point Cultural Resources Survey. Historian/Architectural Historian. 2020-Ongoing. On behalf of the US Coast Guard, Ms. Mates conducted a historic architectural resources investigation for the USCG in support of the construction of new waterfront and shore facilities to homeport and maintain two Fast Response Cutters and an associated Maintenance and Weapons Division at East Tongue Point in Astoria, Oregon. She evaluated buildings and structures within the APE that were formerly owned by the US Navy, now owned by the U.S. Department of Labor and the USCG to determine if they are eligible for listing in the NRHP individually or as a historic district per the National Historic Preservation Act 36 *Code of Federal Regulations* (CFR) 800.4. Examples of historic structures included in this survey are hangars, piers and docks, and barracks. Ms. Mates assisted with Oregon SHPO consultation and is assisting to prepare a Memorandum of Agreement and required mitigation for the demolition of a historic property as part of this project.

Historic Evaluation for NRHP Eligibility. Moss Landing Jetties, Monterey County, California. Historian/Architectural Historian. 2021-2022. Ms. Mates will evaluate the jetties at Moss Landing for the US Army Corps of Engineers, San Francisco District. The evaluation will be part of a Cultural Resources Survey, for which Ms. Mates will provide the historic context and evaluation for the jetties. The USACE plans to repair the jetties this Cultural Resources survey and evaluation will fulfill their NEPA and Section 106 regulatory requirement.

Cultural Resource Base Wide Surveys, Reporting, and Compliance Strategy, U.S. Coast Guard Training Center, Petaluma, CA. Principal Historian. 2019-2022.

Responsible for providing Section 106 of the NHPA compliance support, managing the architectural historian team to conduct a base-wide evaluation of architectural resources at the USCG Training Center (TRACEN), Petaluma, California. Tetra Tech thus performed an architectural survey and evaluation of all buildings and structures on the base 45 years or older, updating a previous base-wide survey. Tetra Tech's survey inventoried and evaluated all historic-age buildings and structures that had not reached 45 years of age during the previous evaluation. Thirty-nine buildings that met the age requirement and

comprised the survey population for this project. Tetra Tech assisted the USCG with consultation and coordination with Native American tribes and SHPO.

Sorenson Drain & Adventure Park Historic Resource Evaluation. Whittier, California. **2020.** Supervising Historian. Tetra Tech evaluated the Sorenson Drain and Adventure Park for their eligibility as Historic Resources CEQA. The drain was constructed in 1958 by the Los Angeles County Flood Control District and winds through Adventure Park, constructed in 1959.

Wyoming Rail Tie Wind Historic Properties Determination of Effect/Visual Analysis. Wyoming. Lead Architectural Historian. **2020-2021.** Ms. Mates prepared the Historic Properties Visual Impact Analysis to the Cultural Resources Evaluation Rail Tie Wind Project, prepared for ConnectGen Albany, LLC. The project proposes to construct up to 149 wind turbine generators on 26,000 acres of ranchland on private and state lands near Tie Siding. The Addendum provides all reviewing regulatory agencies with information on potential visual impacts of the Project upon Historic Properties listed or determined eligible for listing in the NRHP within the 10-mile Project Area of Potential Effect. She also participated in coordinating the effects determination with the Western Area Power Administration and the Wyoming SHPO.

Historic Property Evaluation of two Transmission Lines: Bonneville Power Administration (McNary to Roundup) 230kV Line Historic Property Evaluation & PacficiCorp (Pendleton to Herminston) 69 kV in Oregon. Lead Historian. 2020. Ms. Mates conducted an evaluation of two historic transmission lines was required for this project for the Cultural Resources Survey for the West End Solar Project for Eurus Energy America, LLC. The project that proposes to construct a solar farm within the are of the two transmission lines. She evaluated the transmission lines for their historic significance for listing in the NRHP and prepared text for the Cultural Resources Report.

Historic Architecture Study for Mulligan Solar Farm Project, Logan County, Illinois. Lead Historian. 2020. On behalf of Apex Clean Energy, Ms. Mates evaluated buildings and structures within and adjacent to the project boundary, 1598.1-acres, for listing in the NRHP. She coordinated with the Illinois Historic Preservation Office to obtain the necessary approvals for the project.

Historic Architecture Study for High Point Solar Farm Project, Stephenson County, Illinois. 2019-2020. On behalf of High Point Solar, LLC, Ms. Mates evaluated buildings and structures within and adjacent to the project boundary, a 1,910-acre footprint, which is located to the northwest of the City of Lena, Illinois, for eligibility for listing in the NRHP. She coordinated with the Illinois Historic Preservation Office to obtain the necessary approvals for the project.

Historic Architecture Study for Midland Wind Farm Project, Henry County, Illinois. 2019-2021. On behalf of Heartland Wind, LLC, a subsidiary of Avangrid Renewables. Ms. Mates evaluated buildings and structures within and adjacent to the project boundary, a 12,585-acre footprint located to the north and west of the City of Kewanee, Illinois, for eligibility for listing in the NRHP. She is coordinating with the Illinois Historic Preservation Office to obtain the necessary approvals for the project.

Goose Prairie Wind Power Project Historical Architectural Survey, Washington. 2019. Ms. Mates evaluated the Midway-Moxee Transmission line, a residence, and a barn for their historic significance and eligibility for listing in the NRHP. She also contributed to the associated Cultural Resources Report and submitted her findings to the Washington Department of Archaeology and Preservation.

Historic Architecture Study for Ford Ridge Wind Project, Ford County, Illinois. 2020. Ms. Mates evaluated buildings and structures within and adjacent to the project boundary, 13,812-acre footprint, which is located south/southeast of the Village of Sibley, Illinois, for eligibility for listing in the NRHP. She coordinated with the Illinois Historic Preservation Office to obtain the necessary approvals for the project.

Phase I Cultural Resource Assessment Report for RWE Solar Development, LLC's Janus Solar Project. 2020- 2021. Ms. Mates serves as the lead historian for this project which has both CEQA and Section 106 regulatory compliance. Ms. Mates evaluated the effect of the construction of a solar farm on the Colusa-Tehama Canal (on US Bureau of Reclamation Land) as well as the Project's impact on a historic-age transmission line and adjacent buildings and structures to fulfill Colusa County's CEQA regulatory compliance.

Camp Fire Incident, Governor's Office of Emergency Services (CalOES) Support. Butte County, California 2019-2020. CalOES, along with the California Department of Resources Recycling and Recovery (CalRecycle), along with other state and federal agencies, contractors, and consultants executed the state's debris removal program. Ms. Mates supported the Tetra Tech team with logistics and administrative tasks related to debris monitoring, environmental support, and overall reporting.

Northern States Power Company (Xcel Energy) Phase I Architectural l Resource Survey of its proposed Blazing Star 2 Wind Farm, Lincoln County, North Dakota, 2020. Architectural Historian. Project consists of installing up to 100 wind and construction of associated facilities including access roads, electrical collection systems and cabling, crane paths, laydown area, collection substation, and transmission line. The proposed Project will connect to the Brookings-Hampton 345 kilovolt (kV) transmission line. Role includes identifying and evaluating historic farmsteads within the APE for eligibility for listing in the NRHP on North Dakota Cultural Resources Survey Architectural Site Forms and preparation of associated report.

Environmental Services for the Harris County Community Services Department, Harris County, Texas, 2019 – 2021. Serving as the Cultural Resources Lead for environmental impact analysis of Community Development Block Grant – Disaster Recovery projects pursuant to the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58). Role includes coordinating cultural resources teams to review above ground (architectural) evaluations for all buildings and structures 45 years of age and older for historic significance and eligibility for the National Register of Historic Places, under Section 106 of the National Historic Preservation Act. Across the 13 buyout project areas, over 500 structures were reviewed and over 350 were documented in consultation forms submitted to the Texas Historical Commission. Tetra Tech is preparing 13 Environmental Assessments for the buyout program and 7 Environmental Assessments for the infrastructure program.

Environmental Review Records for the Rebuild Texas Program, Texas (2018 – 2021). Cultural Resources lead for environmental reviews being prepared in support of the Rebuild Texas program. These reviews are being conducted in accordance with the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58) and include Section 106 compliance. Tetra Tech's expected assignment is over 500 Tier 2 site-specific reviews.

Environmental Review Records for the Rebuild Florida, Florida (2018 – 2021). Cultural Resources for environmental reviews being prepared in support of the Rebuild Florida program. These reviews are being conducted in accordance with the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58) and include Section 106 compliance. Tetra Tech's anticipated assignment is over 6,000 Tier 2 site-specific reviews.

Environmental Review Records for the ReBuild NC: Single Family Housing Recovery Program (1-4 Units), North Carolina (2018 – present). Cultural Resources lead for environmental reviews being prepared in support of the Rebuild NC: Single Family Housing Recovery Program (1-4 Units). These reviews are being conducted in accordance with the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58) and include Section 106 compliance. Tetra Tech's assignments include 29 Tier 1 broad reviews, over 600 Tier 2 site-specific reviews, 2 Environmental Assessments, and 3 Categorical Exclusions.

Baldwin Lake Shoreline Rehabilitation Project Los Angeles County Arboretum and Botanical Garden Arcadia, California, 2018. Architectural Historian. The Arboretum was rehabilitating Baldwin Lake, located within the Arboretum and listed in the National Register of Historic Places. The existing retaining walls at Baldwin Lake were in a state of disrepair, some having collapsed entirely. The rehabilitation plan replaced these walls with permanent structures that will preserve the historical look of the original Baldwin stone retaining wall. Ms. Mates worked with the project engineers and architects to ensure the repairs, design, and stabilization activities maintained the historic visual integrity of the wall. She also conducted research and provided background information on the original appearance of the wall for this effort.

Environmental Review Records for the Restore Louisiana (2016 Unnamed Storms) Homeowner Rehabilitation, Reconstruction, and Reimbursement Program, Louisiana, 2017-2020. Cultural Resources lead for environmental reviews being prepared in support of the Restore Louisiana (2016 Unnamed Storms) Homeowner Rehabilitation, Reconstruction, and Reimbursement Program. These reviews are being conducted in accordance with the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58) and require Section 106 compliance. Tetra Tech has prepared over 26,000 Tier 2 environmental review records.

Class III Cultural Resources (Architectural) Survey, Red Butte Wind Farm, Oliver County, North Dakota 2016-2017. Architectural Historian. Conducted fieldwork to inventory and evaluate historic-era farmsteads within the APE and determine effects on historic properties. Prepared evaluations on NDCRS architectural site forms and prepared associated report for submittal for concurrence with the North Dakota Office of Historic Preservation.

Discretionary Well Permitting and Management Program EIR, Stanislaus County, California. Served as the lead historian for a Program Environmental Impact Report for Stanislaus County's implementation of a discretionary well permitting and management program pursuant to its Groundwater Ordinance, which was adopted in November 2014 to promote sustainable groundwater management in the unincorporated areas of the county. The purpose of the PEIR is to streamline the environmental review process for subsequent individual well permit applications, and to help refine the program and make it more robust through environmental analysis and assignment of program level mitigation.

Bellflower Water Capture Project at Caruthers Park, Phase I and II, 2019. Lead Historian. This project consists of the design and construction of a regional stormwater Project at the City of Bellflower's Caruthers Park. The project consists of a storm drain diversion structure, 7.5-acre-foot underground infiltration and storage facility, and pump station to the sewer and return flow to the storm drain. Ms. Mates prepared evaluation of the existing facility for its eligibility for the National Register of Historic Places under Criteria A though D in order for the project to complete the 404-permitting process. The project is intended to address the City of Bellflower's water quality actions stated under the Los Cerritos Channel Watershed and the Upper San Gabriel River Enhanced Watershed Management Programs.

City of Los Angeles, Bureau of Sanitation, TOS SN-61 Specialized Services for the Generation of CIMP Data, 2019. Lead Historian. Ms. Mates assisted the US Army Corps of Engineers Los Angeles District in consultation under Section 106 of the National Historic Preservation Act with the California State Office of Historic Preservation (SHPO) for this project to design and implement the installation of automated sampling equipment for 25 stations within the 4 major watersheds. Ms. Mates determined there would be No Adverse Effect on historic properties.

DR-4301 and DR-4305 Environmental and Historic Preservation Compliance Support, California (2018 – 2021). Serving as historic preservation cultural resources lead supporting the Federal Emergency Management Agency's analysis of 11 projects throughout California under declared disasters DR-4301 and DR-4305. The support services include documentation and agency consultation under Section 106 of the National Historic Preservation Act. The projects include structure elevation projects,

flood control projects, generator projects, soil stabilization projects, and tsunami evacuation structure and damage prevention projects. Coordinating the cultural resources teams, evaluating buildings for eligibility for listing in the National Register, applying Programmatic Agreement Allowances, and preparing determination of effects consultation with the State Historic Preservation Office. Projects are located in the following regions:

- Santa Venetia
- Sonoma
- Napa
- Santa Barbara
- San Carlos
- Santa Barbara
- Humboldt
- San Joaquin County
- Marin County
- Mendocino County

DR-4308 Environmental and Historic Preservation Compliance Support, California, 2018 – 2021. Serving Lead Architectural Historian supporting the Federal Emergency Management Agency's analysis of 12 projects (and up to 21) throughout California under declared disaster DR-4308. The support services include compliance and consultation under Section 106 of the National Historic Preservation Act. The projects include flood control projects, soil stabilization projects, aquifer recharge projects, and Brace and Bolt seismic retrofit projects. Projects included recordation, evaluation of historic significance, and consultation with the State Historic Preservation Office. Projects are located in the following regions:

- Sacramento
- Sonoma County
- San Joaquin County
- Bishop Paiute Reservation
- San Pasqual Band of Mission Indians Reservation
- Goleta
- San Luis Obispo
- Moraga
- City of Moreno Valley
- National City
- Contra Costa County
- Coachella Valley
- Chula Vista
- Martinez

DR-4240 Environmental and Historic Preservation Compliance Support, Federal Emergency Management Agency, California 2017 – 2021. Serving as the historic preservation historian cultural resources lead supporting the Federal Emergency Management Agency's analysis of 25 projects throughout California under declared disaster DR-4240 supporting National Environmental Policy Act documentation and agency consultation under Section 106 of the National Historic Preservation Act. The projects include structure elevation projects, flood control projects, generator projects, soil stabilization projects, and tsunami evacuation structure and damage prevention projects. Coordinating the cultural resources teams, evaluating buildings for eligibility for listing in the National Register, applying Programmatic Agreement Allowances, and preparing determination of effects consultation with the California State Historic Preservation Office. Projects were located in northern and southern California as well as Hawaii and Guam.

U.S. Coast Guard Housing, 1309 SW Bay Street Historical Evaluation, Newport, Oregon 2017. On behalf of the General Services Administration, evaluated the residence's historic significance and eligibility for listing under Section 106 of the NHPA, using all four criteria. The evaluation and report included research, fieldwork, identification of historic properties within the area, preparation of historic context, and consultation with the Oregon State Historic Preservation Office.

U.S. Coast Guard Housing, 2731 Chestnut Street Historical Evaluation, New Orleans, Louisiana 2017-2019. On behalf of the General Services Administration, assessed whether the residence retains sufficient integrity to continue to serve as a contributor to the Garden National Historic Landmark and National Register of Historic Places Garden District. The evaluation and report included fieldwork, identification of historic properties in the area, and an assessment of its historic character defining features.

U.S. Army, Rock Island Arsenal, Structure 57, National Register of Historic Places Nomination Form Addendum, Rock Island, Illinois 2017. Ms. Mates re-evaluated the stone bridge, constructed in the late 1880s, to assess its integrity for continued listing as a contributor to the Rock Island Arsenal Historic District. She prepared the addendum that detailed the historic character defining features and assessed whether modifications to the bridge impacted its historic significance and integrity, documenting the alterations on the appropriate U.S. Secretary of the Interior National Park Service Forms.

Environmental Reviews for the Restore Louisiana Disaster Recovery Program, Louisiana, 2017 – 2019. Serving as the lead cultural resources specialist for Louisiana's disaster recovery programs funded by CDBG-DR grants awarded for the unnamed storms of 2016. These reviews are being conducted for the Louisiana Office of Community Development, Disaster Recovery Unit pursuant to the HUD NEPA Regulations (24 CFR Parts 50 and 58). Tetra Tech's work to date in support of this program has been nearly 11,000 Tier 2 environmental reviews. This process includes identification of historic properties for inclusion in the National Register of Historic Places, communication and consultation with the Louisiana State Historic Preservation Office, and application of the Programmatic Agreement.

Environmental Review Records for the Single-Family Homeowner and Small Rental Rehabilitation Programs, Richland County, South Carolina, 2017 – present. Serving as the lead cultural resources specialist for environmental reviews being prepared in support of the Single-Family Homeowner and Small Rental Rehabilitation Programs for owners of manufactured housing units and single-family homes in Richland County, South Carolina. These reviews are being conducted in accordance with the HUD NEPA Regulations (24 CFR Part 58). Tasks include identification of historic properties inclusion in the National Register of Historic Places, communication and consultation with the South Carolina State Historic Preservation Office, and application of the Programmatic Agreement.

Historic Preservation Reviews for Hurricane Sandy Relief, Tier 2, ProSource and New York State Homes and Community Renewal, NY. Ms. Mates served as an architectural historian for the Tier 2 reviews of the rehabilitation of historic-age properties to meet requirements under Section 106 of the National Historic Preservation Act. Ms. Mates evaluated the project activities to determine if they met the allowances under the Programmatic Agreement of 2013 and evaluated properties for their eligibility for listing in the NRHP. Her team evaluated over 3,500 properties. The properties were located in several New York counties, including Nassau County, Bronx County, Queens County, Broome County, and Schoharie County. 2013-2014

Historic Preservation Reviews for New Jersey's CDBG-DR Grant Program, New Jersey. Ms. Mates serves as an architectural historian for historic preservation and Section 106 reviews being prepared in support of disaster recovery programs in New Jersey funded by CDBG-DR grants awarded under the Disaster Relief Appropriations Act, 2013 (Pub. L. 113-2, enacted January 29, 2013) for Hurricane Sandy, Hurricane Irene, and Tropical Storm Lee. These reviews are being conducted for New Jersey Department of Environmental Protection in accordance with the HUD NEPA Regulations (24 CFR Parts 50 and 58). 2014-2015

Architectural History Effects Investigation for 912 Baltimore Avenue, Kansas City, Jackson County, MO. Lead Architectural Historian. Verizon proposed to replace two antennas on an existing telecommunications two antenna arrays on the south side of the rooftop of the Carbide and Carbon Building. The project required a license from the Federal Communications Commission (FCC) and compliance with the National Historic Preservation Act (NHPA) of 1966. Ms. Mates conducted an investigation to assess the presence of NRHP eligible or listed APE for direct visual effects using the Nationwide Programmatic Agreement for Colocation of Wireless Antennas, effective March 2001 and the Nationwide Programmatic Agreement for Review of Effects on Historic Properties for Certain Undertakings Approved by the Federal Communications Commission, effective March 2005.

Architectural History Effects Investigation for 600 Broadway Boulevard Kansas City, Jackson County, MO. Lead Architectural Historian (2016). Ms. Mates conducted an effects to architectural resources study for the proposed KCYC 7th and Broadway cellular antenna project located at the Montgomery Ward & Company Building, a 70-foot tall building at 600 Broadway Boulevard, in Kansas City. Verizon Wireless proposed to replace five antennas on an existing telecommunications antenna array located on the southeast corner of the building's rooftop and add six antennas to a proposed second array located on the northwest side of the roof. Ms. Mates assessed project impacts on historic properties in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, the Nationwide Programmatic Agreement for Colocation of Wireless Antennas, effective March 2001 and the Nationwide Programmatic Agreement for Review of Effects on Historic Properties for Certain Undertakings Approved by the Federal Communications Commission, effective March 2005. This report assessed whether or not the proposed undertaking would result in direct or visual effects to historic properties APE, including the Project site at 600 Broadway, the Wholesale Historic District listed on the National Register of Historic Places (NRHP), and five individual historic properties.

Maintenance Dredging of Honolulu Harbor Environmental Assessment. Lead Historian. The U.S. Army Corps of Engineers, Honolulu District (POH) is proposing to conduct maintenance dredging and subsequent offshore disposal of the dredged materials within federally-managed areas of five commercial harbors in the state of Hawaii. The five harbors include Honolulu and Kalaeloa/Barber's Point Harbors, Island of O'ahu, Nawiliwili Harbor, Island of Kaua'i, Kahului Harbor, Island of Maui, and Hilo Harbor, Island of Hawai'i where the federally managed areas are the entrance channels and turning basins. Ms. Mates was the lead historian and prepared the Section 106 consultation between the USACE and The State of Hawaii Historic Preservation Division, which included identifying cultural resources studies and surveys within and adjacent to the five harbors, as well as determining the level of impacts to historic buildings, structures, and known archaeological sites within the project area. 2015

Historic Resource Survey Report of NASA Goldstone Deep Space Communications Complex, Fort Irwin, CA. Lead Historian/Architectural Historian. The Historic Resource Survey was conducted for the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory's Goldstone Deep Space Communications Complex (GDSCC or "Goldstone") at Fort Irwin in Southern California. The study's purpose was twofold: 1) to inventory and assesses whether any of the buildings and structures that have turned historic-age (using a 45 year cut-off date of 1970) are eligible individually for listing in the National Register of Historic Places (NRHP) and 2) to assesses the previously individually evaluated historic-age buildings and structures at the facility in surveys conducted in 2009 to determine if a historic district or districts are present at the Goldstone facility. Ms. Mates was the lead Historian/Architectural Historian for the project, conducted background research, recorded the buildings and structures at Goldstone, and evaluated them for eligibility for listing in the NRHP. The report was prepared for the Environmental Affairs Program Office of NASA/JPL. 2015

Historic Resources Survey for (Intensive) Cultural Resource Investigations, Mountain Valley Pipeline Project, EQT Midstream Partners, LP. West Virginia. Architectural Historian. The project was an architectural and historical resources survey for the Mountain Valley Pipeline. Approximately 195 miles of the 294.1 - mile pipeline will be constructed in West Virginia. The cultural surveys were designed to identify resources within the direct and indirect APE that are potentially eligible for listing in the NRHP. Ms. Mates conducted fieldwork, surveyed, recorded and evaluated over 250 architectural resources within the APE, including farmsteads, bridges, railroad segments, and cemeteries for eligibility for listing in the NRHP. Prepared state forms for West Virginia SHPO. 2014-2016

Brady I and Brady II Wind Energy Centers, Next Era Energy Resources, Hettinger, Slope, and Stark Counties, ND. Architectural Historian. Performed evaluations for eligibility in the NRHP for a Class III (Intensive) Survey of historic properties located within 2 miles of related wind farms in central ND. The

combined APE for the Project included 224 square miles. Resources included buildings, farmsteads, and cemeteries related to an important immigrant group in the area. 2015-2016

Dickinson Wind Energy Centers, Next Era Energy Resources, Hettinger, Slope, and Stark Counties, ND. Architectural Historian. Evaluated architectural resources for a Class III (Intensive) Survey of historic properties located within 2 miles of a proposed wind farms in central ND. The combined Area of Potential Effect (APE) for the Project included 115 square miles. Architectural resources included historic buildings, farmsteads, and cemeteries within the APE. These were documented on state site forms. 2014-2015

Force Main Replacement Project Environmental Information Document, Vallejo, California. Served as the lead historian for a U.S. Environmental Protection Agency Environmental Information Document for a sanitary sewer system improvement project. This Special Appropriations Act Project involves installing a new sewer force main to span the 2,800-foot-wide crossing beneath the Mare Island Strait to replace the existing force main. Coordinated the project team and reviewed and edited the draft deliverable and the Finding of No Significant Impact. 2018

United States Postal Service, Determinations of Eligibility, Various Locations. Lead Historian/Architectural Historian 2012-Ongoing. 201 Ms. Mates has evaluated (and re-evaluated) post office buildings for their eligibility for listing in the National Register of Historic Places. She has also prepared addendums that detail exterior and interior historic character defining features when existing documentation does not include this detail. Ms. Mates has prepared Determinations of Eligibility or addendums to the original NRHP Nomination forms for the following Post Offices:

- Morgan North Post Office, New York
- Morgan Annex, New York
- Red Bluff Main Post Office, California
- Santa Barbara Main Post Office, California
- Lihue Main Post Office, Hawaii
- Napa Franklin Station, California
- Broadway-Manchester Post Office, California
- International Service Center (ISC), California
- Burbank-Glen Oaks Post Office, California
- College Station, New York
- Provo Main Post Office, Utah
- Ponce Main Post Office, Puerto Rico
- James A. Farley Post Office, New York
- East Hartford Main Post Office, Connecticut
- Burbank-Glenoaks Station, CA
- Broadway-Manchester Station, CA
- Claremont Post Office, CA
- Worldway Postal Center at Los Angeles International Airport

United State Postal Service, Determination of Effect on Historic Properties, Various locations. Lead Historian/Architectural Historian, 2012-Ongoing. For several years, Ms. Mates has prepared Determinations of Effect using Section 106 criteria and the *US Secretary of the Interior's Standards for Rehabilitation.* She provides guidance to the USPS' architectural and engineering consultants to ensure maintenance, preservation, and rehabilitation activities do not alter or destroy historic character defining features on historic Post Offices. She conducts SHPO consultation on behalf of the USPS and is responsible for obtaining SHPO concurrence. She has prepared Determinations of Effect for the following Post Offices.

- James A. Farley Building Post Office, New York
- Redding Main Post Office, California
- Oxnard Main Post Office, California
- Pasadena Station, California
- Newark Main Post Office

Preparation of United States Postal Service Postal Historic Structure Reports, Principal Historian. 2008-2012. Tetra Tech was tasked by the United States Postal Service to conduct historic research and site documentation of over several main post offices that the Postal Service was going to sell to private buyers. Preparation of each of these reports included conducting a site visit and documenting historic features, completing Part 1 of the Historic Structures Report as outlined in *National Register Brief 43: The Preparation and Use of Historic Structure Report,* Documenting the USPS delineation of the Area of Potential Effect (APE) for future undertakings, preparing the Department of Parks and Recreation Form (DPR) Form 523A for the post office property; and developing a proposed List of Interested Parties. Ms.

Mates conducted the fieldwork for all eleven post offices, conducted research, and coordinated with the Postal Service for these highly visible projects. Ms. Mates worked with Tetra Tech historians to produce these reports in a very short time frame. These historic Post Offices were located in California, New York, and Massachusetts:

- Lenox Hill Station, NY
- Chelsea Station, NY
- Tompkins Square, NY
- Old College Station, NY
- Berkeley Post Office, CA
- Burlingame Main Post Office, CA
- Commonwealth Station (Fullerton) Post Office, CA
- Glendale Main Post Office, CA
- Huntington Beach Main Post Office, CA
- Palo Alto Post Office, CA
- Redlands Post Office, CA
- Mission San Rafael Station Post Office, CA
- Santa Barbara Main Post Office, CA
- Santa Clara Main Post Office, CA
- Santa Monica Main Post Office, CA
- Boston Processing & Distribution Center, MA

Section 106 Consultation Regarding the U.S. Environmental Protection Agency Special Appropriation Act Projects Grant Funding of the Vallejo Sanitation and Flood Control District's Mare Island Force Main Replacement Project, Vallejo, Solano County, California (2016). Lead Historian/Architectural Historian. Ms. Mates prepared the Section 106 consultation materials and conducted research to determine if any historic properties were located within the APE for this project that involved drilling a bore for installation of utilities beneath Mare Island Strait and in River Park and vacant City-owned property on Mare Island. As part of the project, Ms. Mates evaluated historic-age tracks associated with the Navy's activities on Mare Island to determine if they would be adversely affected by the project.

Carpenter's Church, 1309 Broadway Avenue, Seaside, CA, Historical Evaluation (2016). Lead Historian/ Architectural Historian. Ms. Mates evaluated the church, constructed in 1952, for eligibility for listing in the NRHP as part of a Verizon Wireless to construct and operate a new wireless cellular facility consisting of wireless antennas and associated equipment installed on the rooftop of the existing building. Ms. Mates evaluated the historic significance of the historic-age building as part of the project's National Environmental Protection Act compliance.

Bret Harte Apartments, 3535 Coolidge Avenue, Oakland, CA, Historical Evaluation (2016). Lead Historian/ Architectural Historian. Ms. Mates evaluated the post-World War II constructed apartment building for eligibility for listing in the NRHP as part of a Verizon Wireless to construct and operate a new wireless cellular facility consisting of wireless antennas and associated equipment installed on the rooftop of the existing building. Ms. Mates evaluated the historic significance of the historic-age building as part of the project's National Environmental Protection Act compliance.

1304 Echo Park Avenue, Echo Park Neighborhood, Los Angeles, CA, Historical Evaluation (2016). Lead Historian/ Architectural Historian. Ms. Mates evaluated the 1915 constructed apartment building for eligibility for listing in the NRHP as part of a Verizon Wireless to construct and operate a new wireless cellular facility consisting of wireless antennas and associated equipment installed on the rooftop of the existing building. Ms. Mates evaluated the historic significance of the historic-age building as part of the project's National Environmental Protection Act compliance.

809 Donohoe, East Palo Alto, CA, Historical Evaluation, City of East Palo Alto, 2016. Lead Historian/ Architectural Historian. On behalf of the Planning Department of East Palo Alto, for which Tetra Tech is a consultant, Ms. Mates evaluated this single-family residence for eligibility for listing in the NRHP.

Cultural Resources Services, Fort Hunter Liggett, Jolon, California, 2012 – 2013. Lead Historian. Ms. Mates conducted a Historic Buildings and Structures inventory and evaluation of 20 buildings and structures on base that were constructed between 1922 and 1970 for eligibility for inclusion in the National Register of Historic Places. Ms. Mates and her team conducted archival research to prepare historic context under which to evaluate the buildings and structures and documented and evaluated the buildings on California State eligibility forms (DPR 523) and prepared a report detailing the analysis and findings.

Historic Resources Survey, NASA/Jet Propulsion Laboratory, Pasadena, California. **Lead Historian/Architectural Historian.** The historic resource survey was conducted for the National Aeronautics and Space Administration's (NASA's) Jet Propulsion Laboratory (JPL) Pasadena facility Ms. Mates conducted the survey on behalf of NASA's JPL in order to determine if the buildings and structures that are historic-age (using a 45 year cut-off date), and not previously inventoried and evaluated, are eligible individually for listing in the National Register of Historic Places (NRHP). In addition, Ms. Mates analyzed whether the seven previously determined eligible buildings and structures at the JPL facility (and the 20 buildings and structures that are the subject of this survey) possess a linkage historically or aesthetically and retain their historic significance and integrity to merit listing in the NRHP as a historic district. 2015

1033 Polk Street Historic Resources Evaluation. Lead Historian/Architectural Historian. This project is to demolish the existing historic building (eligible for listing in the CRHR) and construct a new mixed-use residential building with ground-floor retail space with frontages along Polk and Cedar Streets. Ms. Mates worked with the City and County of San Francisco Planning Department and the project applicant in preparing the required documents for demolition of a historic property under CEQA. Ms. Mates prepared a Historic Resource Evaluation, which included conducting an inventory and historic district evaluation of the areas surrounding 1033 Polk Street. Ms. Mates also determined whether there are any cohesive or significant patterns in the neighborhood and provided an evaluation of whether a historic district is present. 2013-2015

Principal Historian, Cultural Resources Inventory, Lassen Lodge Hydroelectric Project, South Fork Battle Creek, Tehama County, California. Tetra Tech, Inc. (Tetra Tech) conducted a cultural resource inventory in support of the construction of Rugraw Incorporated's Lassen Lodge Hydroelectric Project. The project would construct a small hydroelectric project on private. Ms. Mates authored the architectural portion of the inventory and report needed for the final license application and comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA) of 1966. Ms. Mates identified cultural architectural resources located within the project Area of Potential Effect (APE); provided a cultural context for the APE; identified any adverse effects to historic properties or historic resources that may occur as a result of the proposed project; and developed recommendations to mitigate any adverse effects. 2013 - 2014

Preparation of Historic Properties Inventory, Portions of the Richmond Field Station, UC Berkeley, Richmond, California, Principal Historian. Ms. Mates served as the Principal Historian for this project which entailed the inventory, recordation, and evaluation of 25 buildings on the Richmond Field Station to determine eligibility of the buildings for listing in the CRHR and the NRHP. Many of the buildings date to the early twentieth century when the area was the California Cap Company. Ms. Mates served as the Project Manager, author, and evaluator of the report. 2013-2015

Preparation of Integrated Cultural Resources Management Plan for Joint Base Fort Lewis McChord, Architectural Historian. The Integrated Cultural Resource Management Plan (ICRMP) synthesized and updated the 2004 McChord Air Force Base Cultural Resources Management Plan and the 2005 ICRMP for Fort Lewis into a comprehensive ICRMP for Joint Base Lewis McChord (JBLM), located in south- central Washington State. Ms. Mates updated the ICRMP with the most current information pertaining to historic properties and ensured that the ICRMP was consistent with Army regulation (AR) 200 43 and Department of Defense Instruction 4715.3, and that the ICRMP is tailored to the specific requirements of what is now a joint base. The plan also presented updated goals and targets for cultural resource management that reference anticipated base project and mission needs.

Architectural Historian, Historical Resources Study for Buildings 46, 55, 63, and 64 at the Lawrence Berkeley National Laboratory. Ms. Mates was the Principal Historian for this Historical Resources Study which documented the evaluation of Buildings 46, 55, 63, and 64 at the Lawrence Berkeley National Laboratory (LBNL) for eligibility for listing in the NRHP and the CRHR. Tetra Tech concluded that Buildings 46, 55, 63, and 64 are not eligible for listing in the CRHR or the NRHP individually nor as a historic district. Ms. Mates served as Project Manager and oversaw the inventory, evaluation, and analysis process.

Preparation of Integrated Cultural Resources Management Plan for Parks Reserve Forces Training Area, Architectural Historian. Ms. Mates served as the architectural historian updating the five-year plan

of the ICRMP for this Army installation in Dublin, California. Ms. Mates was responsible for updating information that pertained to the management and current regulations of historic properties consistent with Army regulation (AR) 200-43 and Department of Defense Instruction 4715.3**.**

Principal Historian, Determination of Eligibility, Preparation of Inventory and Evaluation Forms, and Memorandums of Agreement for Loran-C System, US Coast Guard, Continental US - Present. Ms. Mates is the principal historian and project manager for this project which assists the US Coast Guard in fulfilling its Section 106 responsibility as it discontinues use of the Loran-C System of navigation. For this project, Ms. Mates prepared a Multiple Property Documentation Form for the Loran-C system within the continental US. She also prepared National Register of Historic Places nomination forms for Loran-C Stations that were determined to be eligible for listing in the NRHP as historic districts. The project continues as Ms. Mates works with the US Coast Guard and several State Historic Preservation Officers to determine appropriate mitigation measures to lessen the adverse effect of closing those stations determined eligible for listing. These mitigation measures will be included in Memorandums of Agreement, which Ms. Mates is assisting with in cooperation with individual SHPOs, the Coast Guard, and the Advisory Council on Historic Preservation.

Northern States Power Company (Xcel Energy) Phase I Architectural l Resource Survey of its proposed Blazing Star 2 Wind Farm, Lincoln County, North Dakota, 2020. Architectural Historian**.** Project consists of installing up to 100 wind and construction of associated facilities including access roads, electrical collection systems and cabling, crane paths, laydown area, collection substation, and transmission line. The proposed Project will connect to the Brookings-Hampton 345 kilovolt (kV) transmission line. Role includes identifying and evaluating historic farmsteads within the APE for eligibility for listing in the NRHP on North Dakota Cultural Resources Survey Architectural Site Forms and preparation of associated report.

Environmental Services for the Harris County Community Services Department, Harris County, Texas, 2019 – present. Serving as the Cultural Resources Lead for environmental impact analysis of Community Development Block Grant – Disaster Recovery projects pursuant to the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58). Role includes coordinating cultural resources teams to review above ground (architectural) evaluations for all buildings and structures 45 years of age and older for historic significance and eligibility for the National Register of Historic Places, under Section 106 of the National Historic Preservation Act. Across the 13 buyout project areas, over 500 structures were reviewed and over 350 were documented in consultation forms submitted to the Texas Historical Commission. Tetra Tech is preparing 13 Environmental Assessments for the buyout program and 7 Environmental Assessments for the infrastructure program.

Environmental Review Records for the Rebuild Texas Program, Texas (2018 – present). Cultural Resources lead for environmental reviews being prepared in support of the Rebuild Texas program. These reviews are being conducted in accordance with the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58) and include Section 106 compliance. Tetra Tech's expected assignment is over 500 Tier 2 site-specific reviews.

Environmental Review Records for the Rebuild Florida, Florida (2018 – present). Cultural Resources for environmental reviews being prepared in support of the Rebuild Florida program. These reviews are being conducted in accordance with the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58) and include Section 106 compliance. Tetra Tech's anticipated assignment is over 6,000 Tier 2 site-specific reviews.

Environmental Review Records for the ReBuild NC: Single Family Housing Recovery Program (1-4 Units), North Carolina, 2018 – present. Cultural Resources lead for environmental reviews being prepared in support of the Rebuild NC: Single Family Housing Recovery Program (1-4 Units). These reviews are being conducted in accordance with the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58) and include Section 106 compliance. Tetra Tech's assignments include 29 Tier 1 broad reviews, over 600 Tier 2 site-specific reviews, 2 Environmental Assessments, and 3 Categorical Exclusions.

Environmental Review Records for the Restore Louisiana (2016 Unnamed Storms) Homeowner Rehabilitation, Reconstruction, and Reimbursement Program, Louisiana. Cultural Resources lead

for environmental reviews being prepared in support of the Restore Louisiana (2016 Unnamed Storms) Homeowner Rehabilitation, Reconstruction, and Reimbursement Program. These reviews are being conducted in accordance with the U.S. Department of Housing and Urban Development National Environmental Policy Act regulations (24 CFR Part 58) and require Section 106 compliance. Tetra Tech has prepared over 26,000 Tier 2 environmental review records.

Class III Cultural Resources (Architectural) Survey, Red Butte Wind Farm, Oliver County, North Dakota 2016-2017. Architectural Historian. Conducted fieldwork to inventory and evaluate historic-era farmsteads within the APE and determine effects on historic properties. Prepared evaluations on NDCRS architectural site forms and prepared associated report for submittal for concurrence with the North Dakota Office of Historic Preservation.

Discretionary Well Permitting and Management Program EIR, Stanislaus County, California. Served as the lead historian for a Program Environmental Impact Report for Stanislaus County's implementation of a discretionary well permitting and management program pursuant to its Groundwater Ordinance, which was adopted in November 2014 to promote sustainable groundwater management in the unincorporated areas of the county. The purpose of the PEIR is to streamline the environmental review process for subsequent individual well permit applications, and to help refine the program and make it more robust through environmental analysis and assignment of program level mitigation.

U.S. Army, Rock Island Arsenal, Structure 57, National Register of Historic Places Nomination Form Addendum, Rock Island, Illinois, 2017. Ms. Mates re-evaluated the stone bridge, constructed in the late 1880s, to assess its integrity for continued listing as a contributor to the Rock Island Arsenal Historic District. She prepared the addendum that detailed the historic character defining features and assessed whether modifications to the bridge impacted its historic significance and integrity, documenting the alterations on the appropriate U.S. Secretary of the Interior National Park Service Forms.

Historian, Willamette Falls Locks Interim Engineering Design Report, United States Army Corps of Engineers, 2013. An engineering evaluation of these historic locks, listed on the National Register of Historic Places, resulted in the discovery affecting public safety, the severe corrosion of portions of the lock. Ms. Mates served as the architectural historian, authoring a section of a report that describes various interim alternatives and evaluating the associated benefits, impacts, risks and costs to the lock. Ms. Mates analyzed each alternative and its potential adverse impact on the historic property.

Cultural Resources Monitor, Formerly Used Defense Sites (FUDS), US Army Corps of Engineers, Fort Barry, Sausalito, California, 2010. This former Department of Defense site, Fort Barry, was found eligible for funding under the DERP-FUDS program of the US Army Corps of Engineers, and the remediation of specific areas of interest was required. Ms. Mates conducted monitoring to ensure preservation of cultural resources during boring and exploratory excavation. She was the report author, which was given to the US National Parks Service, and detailed the monitoring activities.

Resource Author, Environmental Assessment for Privatization of Army Lodging (PAL), US Army Corps of Engineers, Fort Huachuca, Fort Huachuca, Arizona, 2010. Tetra Tech is preparing an Environmental Assessment in compliance with the National Environmental Policy Act to address the privatization of Army lodging facilities at Fort Huachuca. The property includes multiple historical buildings and a new build site. Ms. Mates is the cultural resources author for the Environmental Assessment. Present.

Resource Author, Alice Griffith Environmental Impact Statement, Mayor's Office of Housing, San Francisco, California, 2010. Tetra Tech is preparing an Environmental Impact Statement for redevelopment of the Alice Griffith public housing site. Ms. Mates is analyzing the project activities on cultural resources within the project area and is authoring the cultural resources section of the EIS. The project is in compliance with the NEPA regulation and the Department of Housing and Urban Development.

Resource Author Camp Berryessa EA/IS at Lake Berryessa, Napa County Regional Park and Open Space District 2010. Ms. Mates analyzed the projects impacts on architectural resources section and the Visual/Aesthetics and authored each section of the Environmental Assessment/Initial Study. She

evaluated the potential impacts of creating a multi - use recreational facility to these resources on Bureau of Reclamation-managed lands at Lake Berryessa.

Principal Architectural Historian, Gray's Reef Light Station, Emmett County, Michigan 2010. Gray's Reef Light Station is located in Lake Michigan, owned by the US Coast Guard, and listed on the National Register of Historic Places. The US Coast Guard wished to remove the radio beacon tower, located on the cupola of the light station. This Undertaking was considered an adverse effect on the historic property. Ms. Mates served as the architectural historian, overseeing the removal of the radio beacon tower and advising the removal contractors in order to ensure preservation of the structure. After successful completion of the removal, Ms. Mates authored a report detailing the removal and the Section 106 process and submitted it to the US Coast Guard and Michigan State Historic Preservation Office.

Lost Isle Cultural Resources Research Investigation, Acker Island, Stockton, California, 2010. Serving as research investigator for background historical land use of the project area, Ms. Mates conducted records searches and interpreted historic maps to determine the potential for the presence of cultural resources within a one-mile radius of the Lost Isle construction project on Acker Island. Ms. Mates' research investigation memorandum was delivered to the Army Corps of Engineers, Sacramento District.

Resource Author, Supplemental Environmental Assessment for Construction of Combat Alert Cell at Hickam Air Force Base, US Air Force/HQ AFCEE, Oahu, Hawaii, 2010. Ms. Mates assisted with the impacts analysis of architectural resources to prepare a Supplemental Environmental Assessment for the United State Air Force and Headquarters Air Force Center for Engineering and the Environment. The Environmental Assessment will evaluate the environmental impacts of the proposed demolition of the existing Homeland Defense Fighter Alert Facility and construction of a New Homeland Defense Fighter Alert Facility at Hickam Air Force Base. Ms. Mates also authored the consultation communication from the base to the Hawaii SHPO.

Cultural Resources Author, Booker T. Washington Recreational Center, San Francisco Mayor's Office of Housing, San Francisco, California, 2010. Ms. Mates serves as the author for the cultural resources section of this Environmental Assessment for this project which involves demolition of the current building and construction of a new recreational center in its place. The building is eligible for the California Register of Historical Resources and the National Register of Historic Places under Criteria 2 and B, respectively. Ms. Mates analyzed the project activities on this historic resource, developed mitigation measures, conducted State Historic Preservation Office consultation as well as Native American and tribal consultation. The project is in compliance with the NEPA regulation and the Department of Housing and Urban Development.

Cultural Resources Author, Phelan Loop, Environmental Assessment, San Francisco Mayor's Office of Housing, San Francisco, California, 2010. Ms. Mates was the author for the cultural resources section of this Environmental Assessment for this project which entailed construction of a housing development at Phelan Loop. The project was in compliance with the NEPA regulation and the Department of Housing and Urban Development. Ms. Mates also conducted consultations with the State Historic Preservation Officer in compliance with Section 106 of the National Historic Preservation Act.

City and County of San Francisco Planning Department, As-Needed Historical Resources Consultant, San Francisco, California, 2008 - Present. Ms. Mates has been selected twice to be listed as a historical resources expert on the San Francisco Planning Department's list of historical specialists. The Planning Department provides this list to project proponents who require Historical Resources Evaluations and other historical resource documents to be completed in order to fulfill their environmental compliance requirements under CEQA. Ms. Mates has served as principal author and historian on large and small projects, authoring Historical Resources Evaluations and contributing to Environmental Impact as a result of her inclusion in this pool.

Supplemental Historic Information Reports, the San Francisco Planning Department, As-Needed Historical Consultant 2008 - Present. The San Francisco Planning Department's CEQA Review Procedures for Historic Resources require that supplemental historical information on a building be supplied by the applicant before any substantial exterior alteration are done to the exterior if the building is 50 years old or greater. Ms. Mates has completed the Planning Department's Supplemental

Information Form for Historical Resource Evaluation. Some recent Supplemental Information Reports include 463 Eureka Street and 671--673 26th Avenue.

Principal Historian/Architectural Historian, 20 Hoffman Avenue, Impacts Analysis, San Francisco, California, 2010. The owner of the residence at 20 Hoffman Avenue requested that Ms. Mates analyze the impacts of proposed alterations on his house, a historic resource under CEQA and eligible for listing on the California Register of Historical Resources. The house is also listed on local historical registers. Ms. Mates conducted an impacts analysis of the proposed project using California Register of Historical Resources guidelines. Her report was submitted to the City and County of San Francisco Planning Department who concurred with her findings.

Principal Historian/Architectural Historian, 2660 Harrison Street, Historical Resources Evaluation, San Francisco, California, 2010. Ms. Mates determined the eligibility of this industrial building in the Mission District of San Francisco for listing on the California Register of Historical Resources under CEQA as an individual resource and a contributor to an existing historic district. She authored a report discussing her findings of eligibility and analyzed impacts of the proposed project on the building. The report and determination were submitted by the owners of the building to the City and Planning Department of San Francisco, who concurred with Ms. Mates' findings.

Historian, Natural Areas Management Plan EIR, City and County of San Francisco Recreation and Park Department, San Francisco, California, 2010 - 2012. Ms. Mates is preparing a Historic Resources Evaluation Report for the City and County of San Francisco Planning Department's Major Environmental Analysis department. Ms. Mates recorded and evaluated the Sharp Park Golf Course in Pacifica and the Works Progress Administration-era walls and staircases at Mount Davidson. These features are within two of the Natural Areas owned by the City of San Francisco. She prepared a Historical Resources Evaluation, and recorded the resources on Department of Parks and Recreation DPR 523 forms, discussing the findings of historic significance for these resources under CEQA. Ms. analyzed the impacts of the project on these historic resources. Ms. Mates will also prepare mitigation measures to lessen the impacts, if any, on the WPA features and golf course.

Lead Historian and Project Manager, Preparation of Memorandums of Agreement for two United States Postal Service Disposals, US Postal Service, Culver City, and Santa Barbara, California, 2009 and 2010. Ms. Mates prepared two separate Memorandums of Agreement between the US Postal Service and the California State Historic Preservation Office. The Postal Service is selling its NRHP-eligible post office in Culver City and its NRHP listed post office in Santa Barbara to private entities. These actions are considered adverse effects under Section 106 of the National Historic Preservation Act (36 CFR, Part 800). Ms. Mates prepared the draft documents on behalf of the Postal Service and assisted the Postal Service and its legal department with negotiations, finalization, execution, and implementation of the Memorandums of Agreement.

Cultural Resources Author, San Francisco Mayor's Office of Housing, Hunters View Redevelopment Project Environmental Assessment, San Francisco, California, 2009 - 2010. Ms. Mates analyzed the impacts on cultural resources on the proposed project—the demolition and construction of a multi- building affordable housing development in Hunters Point in San Francisco—under NEPA guidelines. The EA was also written to address requirements of the California Environmental Quality Act. Ms. Mates wrote the Cultural Resources section of the document and assisted with tribal consultations.

Historian, California Environmental Quality Act Services for the Emergency Response and Earthquake Safety Bond Program, City and County of San Francisco, Department of Public Works, San Francisco, California, 2009 - 2010. Ms. Mates was the principal investigator and historian for a project involving the seismic retrofitting of the City and County of San Francisco's Auxiliary Water Supply System (AWSS), constructed from 1909 to 1913, and the significance evaluation of one of the first fire stations constructed in Mission Bay. Ms. Mates conducted an inventory and evaluation for the components of the AWSS and prepared a Historic Resources Evaluation Report for the 100 year - old AWSS system, evaluating it for its historical significance for listing on the National Register of Historic Places, on the California Register of Historic Resources, and on local registers. Ms. Mates also assessed impacts of the proposed project on the AWSS and recommended mitigation measures to avoid significant impacts. She prepared a Memorandum of Agreement for this project because one of the AWSS

properties is listed on the National Register of Historic Places and is located on federal land. The AWSS is San Francisco's high pressure water supply system dedicated to fire protection. It consists of a 135-mile pipeline network, high elevation reservoir and tanks, saltwater pumping stations, fireboats, underground water tanks, and bay water intakes. For the second element of the project, Ms. Mates evaluated the historical significance of a 1928 fire station as an individual resource for inclusion on the California Register of Historical Resources.

San Francisco Mayor's Office of Community Investment, Ongoing Consultant Contract, Historian, San Francisco, California, 2007 - 2011. Ms. Mates is the lead historian for architectural modifications and improvements to historic housing developments and complexes for the Mayor's Office of Housing, Office of Community Investment. Tetra Tech has an ongoing consultant services contract with the Mayor's Office of Housing and Mayor's Office of Community Development. Ms. Mates reviews the proposed alterations and their compatibility with the 2007 Programmatic Agreement between the City and County of San Francisco, the State Office of Historic Preservation in California and the American Council on Historic Preservation. Ms. Mates follows the standard Statutory Worksheet guidelines for historic preservation.

High Water Bridge EA and Permitting, Cultural Resources Author, US Army Corps of Engineers, Mobile District, Camp Roberts, California, 2009. The project entailed the preparation of an Environmental Assessment for replacing a historic bridge for the California Army National Guard at the Camp Roberts High Water Bridge. The EA was also written to address requirements of the California Environmental Quality Act. Ms. Mates analyzed the impact of project activities on cultural resources and wrote the cultural resources section.

Historian/Monitor, Formerly Used Defense Sites (FUDS), US Army Corps of Engineers, Fort Funston, San Francisco, California, 2011. This former Department of Defense site, Fort Funston, was found eligible for funding under the DERP-FUDS program of the US Army Corps of Engineers, and the remediation of specific areas of interest was required. Ms. Mates conducted monitoring to ensure preservation of former Nike Hercules Missile magazines, which are historic properties, during boring and exploratory excavation.

Historian, Environmental Assessment of Military Housing Privatization, Fort Richardson, Alaska, 2009 - 2010. Ms. Mates was the historian and cultural resources section author for the EA for this project, which would provide military family housing to meet Air Force housing standards and the ongoing and projected housing requirements for the installation. The project was needed to provide modern and efficient housing for military personnel and their dependents stationed at Fort Richardson, in accordance with Air Force guidelines for quality of life and floor space requirements. Ms. Mates wrote the cultural resources section of the EA, which identified, described, and evaluated the potential environmental impacts that were associated with MFH privatization.

Environmental Assessment Update for Equipment Removal at the Over - the - Horizon - Backscatter Radar Tulelake Station, Modoc County, California, 2009. Ms. Mates worked as the Cultural Resource Specialist, working with the US Air Force, Air Combat Command in Modoc County, California. This EA provided updated and additional information for removal of the Air Force's Cold War-era OTHB- R Tulelake facility within the Doublehead Ranger District of the Modoc National Forest. The previous EA could not achieve National Historic Preservation Act Section 106 concurrence by the California SHPO due to concerns regarding ground disturbance in an archaeologically sensitive area. Aspects regarding the Cold War-era facility itself were previously successfully documented through HABS/HAER. Ms. Mates conducted additional research and a reconnaissance of the previously recorded site locations within the 717-acre APE. Ms. Mates also assisted with Native American consultation and coordination with the Modoc National Forest Heritage Program Manager and Tribal Liaison to provide additional information regarding cultural resources and the potential of equipment removal to disturb those resources.

Historian, Phase I Cultural Resources Survey, Community Redevelopment Agency, Los Angeles (CRA/LA) Los Angeles, California, 2009. Ms. Mates was the historian on this project to identify, inventory, and evaluate historic buildings and structures next to the proposed project. Ms. Mates evaluated the historical significance of buildings within the proposed project area under CEQA guidelines and prepared the historic context under which to evaluate the historical architectural resources. Ms.

Mates also prepared a Historic Resources Evaluation Report, which included an impacts assessment of the proposed project on historic resources. The project entailed the redevelopment of a 2.5-acre parcel by the City of Los Angeles, approximately ten miles from downtown and required archaeological and architectural surveys.

Historian, Genesis Solar Energy Project, Riverside County, California, 2009. Genesis Solar, LLC proposed to develop a 250-megawatt solar thermal power generation project on an 1,800-acre site between Desert Center and Blythe, California, on land managed by the Bureau of Land Management. Ms. Mates was the historian for the project, conducting a survey for built- environment resources within the proposed project area and inventorying on DPR 523 forms the historic-era resources, a road, and a transmission line. Ms. Mates also conducted research and wrote the historical context within which to evaluate these potential resources.

Historian and Project Manager, Thematic Study of Historic Homestead Sites, Edwards Air Force Base, California, 2008 - 2010. Ms. Mates was the historian and project manager for a thematic study of ten historic homestead sites and associated refuse deposits on Edwards AFB, California. The project was conducted in compliance with Section 100 of the National Historic Preservation Act, and its goal was to expand on the regional understanding of homesteading in the western Mojave Desert by studying homesites on neighboring military installations. A secondary aspect of the project was to address the spatial and material relationship between the historic refuse deposits and historic homesites. Aside from conducting the research and writing the report, Ms. Mates' responsibilities included coordinating with the program manager and the Base Historic Preservation Officer. She oversaw all aspects of the project, including coordinating project meetings, drafting a work plan for approval by the BHPO, and coordinating evaluation of the homesites and refuse deposits.

Historian and Project Manager, Cultural Resources Evaluation of Selected Buildings and Structures, Edwards Air Force Base, California, 2008 - 2010. Ms. Mates was the project manager for the cultural resources' evaluation of selected buildings and structures for the Base Historic Preservation Officer at Edwards Air Force Base. The project included recording and evaluating 61 buildings and facilities, preparing inventory and evaluation documents (Department of Parks and Recreation 523 forms), and preparing the HABS/HAER recordation form. For over five years, Tetra Tech has been overseeing the inventory of main base buildings as new building's turn historic-age (50 years or older) under NEPA.

Historian, Natural Areas Management Plan EIR, City and County of San Francisco Recreation and Park Department, San Francisco, California, 2008 - 2012. Ms. Mates was the project historian/architectural historian for an EIR analyzing the effects of implementing a management plan for 31 natural areas in San Francisco and Pacifica. Ms. Mates also inventoried and evaluated two of the Natural Areas, the Sharp Park Golf Course in Pacifica and Mount Davidson's Work Progress Administration features, evaluating each for their historic significance and eligibility for listing on the California Register of Historical Resources. She assessed impacts of the proposed project on these two natural areas and recommended mitigation measures to avoid significant impacts. These natural areas encompass 1,105 acres and represent remnant native habitats within these urban areas. Both an Initial Study and EIR were prepared as part of the impact analysis process, and cultural resources were key issues.

Historian/Architectural Historian, Los Angeles Unified School District (LAUSD) Historical Resources Survey and Evaluation Report South Los Angeles, California, 2008. Ms. Mates was principal investigator for the project to construct a new school in a historic-era neighborhood of South Los Angeles. She conducted the historical resources inventory and survey to determine if the proposed project would impact historic resources under CEQA. Ms. Mates established the proposed project's area of direct and indirect impacts, inventoried and evaluated over 63 historic-age buildings for historical significance and integrity on DPR 523 forms, as individual resources and as a potential historic district under CEQA. Ms. Mates also wrote a stand-alone Historical Resources Evaluation Report to be submitted with the EIR.

Historian/Architectural Historian, LAUSD Historical Resources Survey and Evaluation Report for EIR, MacArthur Park Project, Los Angeles, California, 2008. Ms. Mates was principal investigator for this project to construct a new school in a historic-era neighborhood of South Los Angeles. Ms. Mates

conducted the historical resources inventory and survey to determine if the proposed project would impact historic resources under CEQA. She determined the proposed project's area of direct and indirect impacts and inventoried and evaluated historical resources for significance and integrity on Department of Parks and Recreation forms for inclusion on the state and national registers. Ms. Mates also wrote the cultural resources section of the EIR and analyzed proposed impacts on historic-age resources under CEQA.

Cultural Resources Specialist, Residential Communities Initiatives Environmental Assessment, Forts Wainwright and Greely, Fairbanks and Delta Junction, AK 2007. Ms. Mates conducted archival research and prepared the cultural report for environmental analysis. She assessed proposed activities at both installations and determined the effect on historical resources for the proposed action as well as its alternatives. Ms. Mates conducted field investigations and worked closely with installation historians to gather background information for analyzing the impacts of the proposed project on the Historic District and Historic Landmark at Fort Wainwright.

Consultant Historian/Architectural Historian, City and County of San Francisco Planning Department, Historical Evaluations of Residences San Francisco, California, 2007 - Present. Ms. Mates researches, inventories, and evaluates residences for the City and County of San Francisco (CCSF) Planning Department for significance and integrity under CEQA. She inventories and evaluates historic-era resources and makes eligibility recommendations to the City and County of San Francisco's Planning Department for the resource's inclusion on the California Register of Historical Resources, individually and as a historic district. Each historical inventory and evaluation entails close communication with Planning Department personnel and homeowners seeking construction approval.

City and County of San Francisco, Historian, Mayor's Office of Housing Environmental Review Services, Housing and Community Development Programs, San Francisco, California, 2007 - 2009. Ms. Mates analyzes historic preservation matters for the Mayor's Office of Housing (MOH) and the Mayor's Office of Community Development (MOCD) under NEPA and other federal regulations. She prepares historical architectural evaluations and reports, historic preservation consultations, correspondence, and program summaries as a part of the City's compliance with historic preservation laws and regulations. Ms. Mates attends meetings with MOH and MOCD staff, US Department of Housing and Urban Development, the State Historic Preservation Office (SHPO), other city agencies, and project sponsors to ensure that the potential impacts of proposed activities are fully investigated and that appropriate mitigations are incorporated into project design and implementation.

Cultural Resources Author, Aliso Viejo Incoming Mail Facility Environmental Impact Statement, Aliso Viejo, California, 2007 - 2008. Ms. Mates wrote the cultural resources section of the EIS for the proposed development of a US Postal Service regional mail sorting facility. She analyzed the impacts of the proposed project and its alternatives on cultural resources. She consulted the State Historic Preservation Office and assisted with Native American Heritage consultations for the project's alternatives and assisted with QA/QC for the final document.

Historian/Oral Historian, Cheyenne Mountain Oral History Project, Cheyenne Mountain Air Force Station, Colorado Springs, CO 2007 - 2008. Ms. Mates was the principal historian for this project, the objective of which was to interview Air Force and civilian personnel associated with Cheyenne Mountain Air Force Base, NORAD operations, and the transfer of the mission to private contractors. Ms. Mates identified relevant narrators to interview, conducted oral histories of each person, and wrote a written document chronicling the history of the Air Force on Cheyenne Mountain. The oral history document relied heavily on information gathered from the oral histories to be used as a unique historical perspective for future researchers

Historian, National Geothermal Programmatic Environmental Impact Statement, US Bureau of Land Management, US Department of the Interior, and US Forest Service 2007. As the historian for this project, Ms. Mates researched and wrote historic context for the National Programmatic Environmental Impact Statement for leasing specific lands with geothermal resources on Bureau of Land Management and Forest Service administered lands in the western United States, including Alaska.

Historian, Newlands Project Resource Management Plan and Environmental Impact Statement, US Bureau of Reclamation, Lahontan Basin Area Office, Various Locations, NV, 2007 - 2008. Ms.

Mates was the project historian and co-authored the cultural resources section of the EIS, which will guide management of approximately 442,000 acres of Reclamation- administered land in Nevada, predominantly in the Fallon and Fernley areas. No management plan existed for the Newlands Project lands that the Lahontan Basin Area Office administers, so an EIS was prepared for the RMP. Newlands is one of Reclamation's first projects and is primarily an irrigation project as set forth in legislation. The Newlands Project, constructed in 1903, provides irrigation water from the Truckee and Carson Rivers for about 55,000 acres of cropland in the Lahontan Valley near Fallon and bench lands near Fernley, Nevada. The purposes of the Newlands Project were expanded in 1990 under Section 209 of Public Law 101- 618. Ms. Mates researched cultural resources and historical archives and evaluated the effect on cultural and historical resources from the proposed project.

Cultural Resources Specialist, Bay Division Pipelines 3 and 4 Crossover Facilities CEQA Compliance, San Francisco Public Utilities Commission, South San Francisco Bay, California, 2007 - 2008. Ms. Mates was the principal investigator and historian for this project, which proposed additional crossover facilities at three locations in the South Bay to improve seismic reliability of the system and reduce the impact on customer deliveries in the event of a pipe break. Ms. Mates conducted research and field investigations and wrote the cultural resources report and the CEQA Initial Study document. She inventoried and evaluated Bay Division Pipeline No. 3 for significance under CEQA and assessed the proposed project activities' effect on historic and cultural resources in and near the project area.

Historian/Architectural Historian, Bay Division Pipelines 3 and 4 Seismic Upgrade CEQA Compliance, SFPUC, Fremont, California, 2008. Ms. Mates was the historian for this project, the goals of which were to seismically upgrade the Bay Division Pipelines 3 and 4 along the Hayward Fault to improve reliability of the system and reduce the impact on customer deliveries in the event of a pipe break. Ms. Mates determined the area of potential direct and indirect impacts the project may have on historic resources, conducted an inventory and survey of historic-age resources, and evaluated historical resources within the project area for their historical significance under CEQA. Ms. Mates also assessed the proposed project's effect on historical resources in and near the project area.

Author, Historic Context and Archaeological Properties Assessment, San Andreas Pipeline Number 3, Installation, San Francisco and San Mateo Counties, California, San Francisco Public Utilities Commission, San Francisco and San Mateo Counties, California, 2008. Ms. Mates researched and wrote the historic context section for the Historic Context and Archaeological Properties Assessment (HCAPA) for the SFPUC, assessing the types of historical archaeological properties likely to occur within the fully developed project area and the likelihood of those resources to occur. Research involved understanding the historic environment of the San Francisco Peninsula, types of historical archaeological deposits on the Peninsula, distribution of sites, and preservation of sites given the historic development of the area. The HCAPA was used to assess the potential impacts and provide recommendations for project implementation in the project's IS and EIR.

Principal Investigator/Historian, Historic Resources Survey for the US Highway, Oklahoma Department of Transportation County Improvement Roads and Bridges, OK 2008. Ms. Mates was the historian for the project, which satisfied NEPA compliance for six categorical exclusions prepared concurrently on a compressed schedule for the reconstruction of 12 bridges and over 30 miles of roadway overlays and improvements. Ms. Mates conducted all historical architectural surveys for historic-era bridges and roads and prepared documentation and evaluations for Oklahoma State Historic Preservation review.

Principal Investigator, Historic Resources Survey for the US Highway, Oklahoma Department of Transportation, Choctaw, OK 2008. Ms. Mates was the principal historian on the project, which consisted of reconstructing a three - mile portion of Interstate 40 in eastern Oklahoma City. Ms. Mates researched archives, conducted all historical architectural surveys on historic-age buildings and structures (bridges, residences, and commercial buildings) within the project area, and prepared structure record identification forms and the report. Ms. Mates also assessed impacts on cultural and Section 4(f) resources and advised the client on possible resource impacts and mitigations.

Oklahoma Department of Transportation US Highway 70 Categorical Exclusion, Principal Investigator/Historian, Oklahoma Department of Transportation, Durant, OK, 2008. ODOT

proposed replacing the 432- foot- long, 36- foot-wide, US Highway 70 bridge spanning the Union Pacific Railroad and making necessary roadway and intersection improvements nearby. Ms. Mates inventoried and recorded all historic-age architectural resources, researched historic records at the Oklahoma Archaeological Survey and State Historic Preservation Office, researched archives and literature, reviewed national and state registers, examined historic maps, conduct a field survey, documented structures older than 45 years that retained historic integrity, and evaluated those structures for National Register eligibility.

Historian, National Geothermal Programmatic Environmental Impact Statement, Bureau of Land Management and Forest Service, US Department of the Interior 2008. Ms. Mates researched and wrote historic context for a document to produce a National Programmatic Environmental Impact Statement for leasing specific lands with geothermal resources on BLM and Forest Service administered lands in the western United States, including Alaska.

Peer Reviewer/Cultural Resources Specialist, Moccasin Penstocks Relining and Replacement Project, San Francisco Public Utilities Commission, Moccasin, California, 2007. The San Francisco PUC proposed to recoat, reline, and possibly replace portions of the Moccasin Penstocks, which consist of four pipes delivering water from Priest Reservoir to the Moccasin Powerhouse (part of the Hetch Hetchy Water Delivery System). Ms. Mates assisted the sub consulting historian in the architectural survey of the penstocks and the project area and peer reviewed the subsequent findings report to the SFPUC. Ms. Mates also assisted in the pedestrian archaeological survey of the project area and access routes and relocated historic railroad ties associated with the historic Hetch Hetchy Railroad. She made preliminary suggestions to the client on necessary cultural resources studies that would be needed to comply with CEQA.

Historian, Levee Maintenance on Brannan Island, Brannan - Andrus Levee Maintenance District/ACOE Sacramento, California, 2007. Ms. Mates surveyed and evaluated a sunken barge, an unexpected discovery, at Brannan - Andrus Levee. The purpose of this project was to restore the levee to the original level of protection of lives and property along Highway 160. The emergency levee repair work is necessary to prevent or reduce risks and to prevent possible severe economic losses. Ms. Mates researched maritime activities in the area and prepared all documentation for SHPO, which concurred with her findings.

EMPLOYMENT HISTORY

2007 – Present	Historian/Architectural Historian, Tetra Tech, Inc., Oakland, California
2001 – 2006	Staff Historian, JRP Historical Consulting, LLC, Davis, California