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Sunrise Wind New York Cable Project

Appendix 4-D

Phase 1A Archaeological Survey

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Sunrise Wind Farm Project

Phase IA Archaeological Survey Sunrise Wind Onshore Facilities

December 2020

Prepared by:

Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.

Submitted to:

Bureau of Ocean Energy Management
New York State Department of Public Service

MANAGEMENT SUMMARY

NYSHPO Project Review Number:	19PR00055
Involved State and Federal Agencies:	Bureau of Ocean Energy Management (BOEM); National Park Service (NPS); U.S. Fish and Wildlife Service (USFWS); New York State Energy Research and Development Authority (NYSERDA); New York State Department of Public Service (NYSDPS); New York State Historic Preservation Office (NYSHPO)
Phase of Survey:	Phase IA
Location Information:	Town of Brookhaven, Suffolk County, New York
Survey Area:	
Project Description:	The construction and installation of onshore electrical and ancillary components to connect an offshore wind farm to New York State's high-voltage electrical transmission network.
Project Area:	Preliminary Area of Potential Effect measures approximately 341.7 acres (138.3 hectares)
USGS 7.5-Minute Quadrangle Map:	*Bellport, NY; Moriches, NY; Patchogue, NY; Pattersquash Island, NY*
Archaeological Resources Overview:	Two Native American sites overlap with portions of the Preliminary Area of Potential Effect. An additional 10 sites have been previously recorded within 0.25 miles (0.4 kilometers) of the Preliminary Area of Potential Effect, consisting of four Native American sites, four historic-period sites, and two multiple component Native American and historic-period sites
Report Authors:	Matthew Victor Weiss, RPA; Nicole Fragnito
Date of Report:	August 2020 December 2020, includes minor revisions to Section 1.2 (Introduction) for updated Project description

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1.0 INTRODUCTION

1.1 Purpose of the Investigation

On behalf of Sunrise Wind LLC (Sunrise Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), and Stantec, Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C. (EDR) has prepared this Phase IA archaeological survey for the proposed Sunrise Wind Farm Project (the Project). This survey pertains only to terrestrial archaeology, and as such is only concerned with the Onshore Facilities associated with the Project, which are located entirely within the Town of Brookhaven, Suffolk County, New York. The Phase IA survey pertaining to marine archaeology is being prepared under separate cover. The purpose of this Phase IA archaeological survey is to determine whether previously identified terrestrial archaeological resources are located in the Project's Onshore Facilities' Preliminary Area of Potential Effect (PAPE), and to evaluate the potential for previously unidentified terrestrial archaeological resources to be located within the PAPE. The information and recommendations included in this report are intended to assist the New York State Historic Preservation Office (NYSHPO), the Bureau of Ocean Energy Management (BOEM), and other state and/or federal agencies in their review of the Project's Onshore Facilities under Article VII of the New York State Public Service Law, the New York State Environmental Quality Review Act (SEQRA), Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law, and/or Section 106 of the National Historic Preservation Act, as applicable.

The Phase IA archaeological survey was conducted under the supervision of an archaeologist who meets the U.S. Secretary of Interior's Standards for Archaeology and Historic Preservation (36 CFR 61) and is a Registered Professional Archaeologist (RPA). The survey was conducted in accordance with the New York Archaeological Council's (NYAC's) *Standards for Cultural Resources Investigations and the Curation of Archaeological Collections in New York* State (the *NYAC Standards*; NYAC 1994) and the NYSHPO's *Phase I Archaeological Report Format Requirements* (NYSHPO 2005), as appropriate.

BOEM will consult with Native American tribes and other parties to determine an appropriate approach for the identification and protection of cultural resources that may be present within the PAPE.

1.2 Onshore Facilities Location and Description

Sunrise Wind proposes to construct, own, and operate an offshore wind farm (the Project) to be located in federal waters on the Outer Continental Shelf (OCS), approximately 18.5 statute miles (mi) (16 nautical miles [nm]/30 kilometers [km]) southwest of Martha's Vineyard, Massachusetts, and approximately 30 statute mi (26 nm/48 km) east of Montauk, New York. Project components will be located in federal waters on the OCS, in state waters of New York, and onshore in the Town of Brookhaven, Suffolk County, New York. The proposed interconnection location is the Holbrook Substation, which is owned and operated by the Long Island Power Authority (LIPA).

As stated above, this Phase IA archaeological survey pertains only to terrestrial archaeology, and as such is only concerned with the Project's Onshore Facilities, which are located entirely within the Town of Brookhaven, Suffolk County, New York (see Figure 1.2-1). The Onshore Facilities will consist of electrical and ancillary components to connect the offshore Sunrise Wind Farm to the high-voltage electrical transmission network (grid) in New York. For the purposes of this Phase IA survey, a PAPE was determined based on the maximum

horizontal limits of ground disturbance associated with the Onshore Facilities, as the Project is still in its early stages. This PAPE serves as the bounds within which the Phase IA archaeological survey was conducted. It is anticipated that the vertical limits of disturbance for construction of the Onshore Facilities will range from approximately 3-ft (0.9-m) to 15-ft (4.6-m) in depth, based on the respective component.

The Project's offshore components are not considered part of the PAPE for terrestrial archaeological resources given their location in the marine environment. The Project's Onshore Facilities are expected to consist of the following:

- Onshore Transmission Cable;
- Onshore Converter Station [direct current] (OnCS–DC);
- Onshore Interconnection Cable; and
- Fiber Optic Cable (co-located with the Onshore Transmission Cable).

The Project's primary Onshore Facilities consist of the Onshore Transmission Cable, the OnCS–DC, and the Onshore Interconnection Cable. The Onshore Transmission Cable will extend from the landfall site within Smith Point County Park on Fire Island to the proposed OnCS–DC and connect to the Holbrook Substation via an Onshore Interconnection Cable (see Figure 1.2-2). The Onshore Transmission Cable is proposed to be installed within a trench within public road rights-of-way. Wherever possible, the Onshore Transmission Cable will run underneath existing paved sections of active roadways. Portions of the Onshore Transmission Cable and Onshore Interconnection Cable will be installed via horizontal directional drilling (HDD), or other trenchless crossing. The approximate footprint of activities

associated with these processes have been identified and are represented in Figure 1.2-2. Two routes have been evaluated for the Onshore Transmission Cable from Fire Island to the OnCS–DC.

- **Onshore Transmission Cable – Long Island Expressway (LIE) Service Road Route**, which measures approximately 17.5 mi (28.2 km) long and has a PAPE of 228.4 acres (92.4 hectares [ha]). From Fire Island to the OnCS–DC, this Onshore Transmission Cable route is proposed to be buried beneath the Smith Point County Parking Lot, East Concourse, William Floyd Parkway, Montauk Highway, Yaphank Avenue, Horse Block Road, Manor Road, North Horse Block Road, the LIE Service Road, Nicolls Road, Long Island Avenue, Middle Avenue, Union Avenue, and Long Island Avenue (see Figure 1.2-2).
- **Onshore Transmission Cable – Peconic Avenue Route**, which measures approximately 16.9 mi (27.2 km) long and has a PAPE of 192.9 acres (78.1 ha). From Fire Island to the OnCS–DC, this Onshore Transmission Cable route is proposed to be buried beneath the Smith Point County Parking Lot, East Concourse, William Floyd Parkway, Montauk Highway, Yaphank Avenue, Horse Block Road, Peconic Avenue, North Ocean Avenue, Long Island Avenue, Middle Avenue, Union Avenue, and Long Island Avenue (see Figure 1.2-2).

In addition to these two routes, variations to the Onshore Transmission Cable are also being evaluated, which collectively have a PAPE of approximately 9.5 acres (3.8 ha). These variations include the:

- **Mastic Boulevard West to Francine Place Variation**, which measures approximately 0.4 mi (0.6 km) long and will be buried beneath Mastic Boulevard West and Francine Place (see Figure 1.2-2);
- **Northern Boulevard to Mastic Boulevard West Variation**, which measures approximately 0.7 mi (1.1 km) long and will be buried beneath Northern Boulevard, Mastic Boulevard West, and Ashley Place (see Figure 1.2-2); and

- **Waverly Avenue Variation**, which measures approximately 0.4 mi (0.6 km) long and will be buried beneath Waverly Avenue (see Figure 1.2-2); and
- **Surrey Circle Variation**, which measures approximately 0.2 mi (0.3 km) long and will be buried beneath Surrey Circle (see Figure 1.2-2).

Two sites are currently under consideration for the location of the OnCS–DC. Sunrise Wind is in discussion with the owners of these properties regarding acquisition or lease of the properties for the OnCS–DC. For the purposes of this report, both sites are evaluated, and are referenced as the "Union Avenue Site." These sites include the:

- **Union Avenue North Site**, which is located on the north side of Union Avenue and has a PAPE of approximately 8 acres (3.2 ha). This site is bound to the north by woodland and industrial development; to the east by woodland; to the west by a New York Power Authority generation facility; and to the south by Union Avenue and commercial development (see Figure 1.2-2).
- **Union Avenue South Site**, which is located on the south side of Union Avenue and also has a PAPE of approximately 8 acres (3.2 ha). This site is bound to the north by Union Avenue and woodland; to the east by commercial development; to the south by the Long Island Rail Road (LIRR) and industrial development; and to the west by industrial development (see Figure 1.2-2).

Electricity generated by the offshore wind farm will connect to the grid via an Onshore Interconnection Cable, which will connect the OnCS–DC with the Holbrook Substation. Several potential routes for the Onshore Interconnection Cable are being explored (see Figure 1.2-2). Portions of the Onshore Interconnection Cable will be installed via HDD, or other trenchless crossing, the approximate footprint of activities associated with which have been identified at this time (see Figure 1.2-2). The PAPE of the Onshore Interconnection Cable, and associated trenchless crossing footprints, measures approximately 38.9 acres (15.7 ha).

Although not an Onshore Facility itself, portions of Smith Point County Park on both Fire Island and Long Island have been included within the Landfall/Intercoastal Waterway (ICW) Study Area. Although this area is much larger than the extent of proposed ground disturbance within Smith Point County Park, it is included here for consistency with reports concerning wetlands and ecological habitats. Ground disturbance within the Landfall/ ICW Study Area will be associated with the Onshore Transmission Cable and HDD activities within the Landfall Work Area, on Fire Island, and the ICW Work Area on both Fire Island and Long Island (see Figure 1.2-2). The exact location of the landfall site is still being determined but will occur somewhere within the Smith Point County Park parking lot. The PAPE for the Landfall and ICW Work Areas measures approximately 6.5 acres (2.6 ha) and 7.3 acres (3.0 ha), respectively.

The following terms are used throughout this report:

- **The Project**: The proposed construction and operation of an offshore wind farm, as well as all associated offshore and onshore facilities.
- **The Preliminary Area of Potential Effect (APE)**: The maximum spatial limits of ground disturbance associated with the Project's Onshore Facilities, which have the potential to impact terrestrial archaeological resources.
- **The Onshore Transmission Cable**: The electrical transmission cable that will run from the landfall site to the OnCS–DC. The Onshore Transmission Cable will connect to the Sunrise Wind Export Cable via a transition joint bay (underground vault) at the landfall site, which will be reached via

HDD to avoid disturbance to ground features. The proposed landfall site is approximately 700 feet (ft) (213 meters [m]) from the shoreline on Fire Island.

- **Onshore Converter Station (OnCS–DC)**: The interconnection between electricity generated by the offshore wind farm and the existing LIPA electrical transmission system.
- **Onshore Interconnection Cable**: The transmission cables interconnecting the OnCS–DC to the existing Holbrook Substation.
- **Landfall and Intercoastal Waterway (ICW) Work Areas**: The areas within which HDD activities will occur associated with the transition from the Sunrise Wind Export Cable to the Onshore Transmission Cable (Landfall Work Area) and the crossing of Narrow Bay (ICW Work Area).

1.3 Report Organization

This Phase IA archaeological survey report is organized into the following sections:

- **Section 2.0 – Background Research**: This report section documents the background research conducted in order to determine whether archaeological resources may be physically impacted by Onshore Facility construction. Section 2 documents the environmental setting of the PAPE (Section 2.1), details previous identified archaeological sites and previously conducted archaeological resource surveys located within and adjacent to the PAPE (Sections 2.2 and 2.3), describes the historic context of the region (Sections 2.4 and 2.5), and documents existing conditions within the PAPE (Section 2.6).
- **Section 3.0 – Archaeological Sensitivity Assessment**: This report section assesses the archaeological sensitivity of the PAPE, which is informed by Section 2. This sensitivity is divided broadly into pre-European contact Native American archaeological sensitivity (Section 3.1) and post-European contact archaeological sensitivity (Section 3.2). Prior disturbance and its effect on where archaeological resources may be encountered within the PAPE are also discussed (Section 3.3).
- **Section 4.0 – Archaeological Resources Survey Research Design**: This report section provides an overview of the recommended Phase IB archaeological testing strategy to be implemented prior to Onshore Facility construction. This section documents the locations and extent of the PAPE to be submitted to Phase IB survey, based on the results of archaeological reconnaissance (Section 4.1), as well as the methods to be carried out during the survey (Section 4.2).
- **Section 5.0 – Summary and Conclusions**: This report section summarizes the findings and recommendations of this Phase IA archaeological survey. A summary of the Phase IA archaeological assessment relating to previously identified archaeological sites, archaeological sensitivity, and prior ground disturbance is discussed (Section 5.1). This section also summarizes the recommended Phase IB archaeological testing strategy to be implemented prior to Onshore Facility construction in order to identify potential archaeological resources within the PAPE (Section 5.2).

2.0 BACKGROUND RESEARCH

2.1 Environmental Setting and Soils

The proposed Project's Onshore Facilities are located across south-central Suffolk County, stretching from Fire Island on the Atlantic Ocean shoreline to the interior of Long Island, approximately 5 mi (8 km) from its southern shore. The Onshore Facilities are located within the Atlantic Coastal Plain physiographic province, which is a very low-lying, low-relief area that was formed from sea level rising and falling events over the past 150 million years. Therefore, the bedrock in this physiographic province is derived predominately from marine and littoral sediments. More recent deposits consist of large terminal glacial moraines and associated outwash plains formed during the Pleistocene Epoch (approximately 12,000 to 2.6 million years ago) (National Park Service [NPS] 2017).

Bedrock under Suffolk County varies in depth from approximately 400 ft (122 m) below sea level on the North Shore at Lloyd Neck to approximately 2,200 ft (671 m) below sea level in the south-central portion of the county, in the vicinity of the Onshore Facilities. The bedrock is overlain by Cretaceous Period (66 to 145 million years ago) sediments consisting primarily of sands and clays which are overlain by various Pleistocene-aged gravels (representing glacial deposits) and marine clays (representing marine deposits from interglacial periods when sea levels were higher). However, most topographic features and surface sediment in eastern Long Island were formed during the Wisconsin Glaciations. The last glacial maximum, which occurred between approximately 33,000 and 20,000 years ago, produced the Ronkonkoma Moraine, which is a prominent roughly east/west-trending ridge that runs the length of the island from the northwest end near Oyster Bay to the southeast end at Montauk Point (Balco et al. 2015). During the retreat of the ice sheets, the Harbor Hill Moraine was formed across the north-central portion of Long Island. The eastern ends of the Harbor Hill and Ronkonkoma Moraines form the North and South Forks of Long Island, respectively (Fuller 1914; SCS 1975). The Onshore Facilities are located south of the Ronkonkoma Moraine.

Following the glacial advances, as the receding glaciers melted, streams and rivers flowing off the melting ice sheet eroded and redeposited both the Ronkonkoma and Harbor Hill Moraines, creating flat to gently south-sloping sandy glacial outwash plains on the south sides of the moraines (SCS 1975). Portions of eastern Long Island south of the Ronkonkoma Moraine, including the vicinity of the Onshore Facilities, contain multiple dry valleys, some of which intersect kettle holes or kettle ponds (see Figure 2.1-1). These landscape features are characteristic of "stagnant ice" terrain formed by stranded blocks of ice and ground water sapping of thawed permafrost during the final stages of the last glaciation. The net result of glacial and deglacial processes is a hillier and rockier North Shore and a low-lying sandy and gravelly South Shore (Fuller 1914; Merguerian and Sanders 2010; SCS 1975).

Topography in the vicinity of Onshore Facilities is predominately flat to gently-sloping with elevations ranging from sea level to approximately 120 ft (37 m) above sea level (see Figure 2.1-1). Due to this low relief and permeable soils, there are relatively few perennial streams on Long Island (SCS 1975). The two largest rivers, by catchment basin, the Peconic and the Carmans Rivers, drain the central portion of the island, the latter of which bisects the Onshore Facilities (SCS 1975). In addition to the Carmans River, the Onshore Facilities' vicinity is drained by numerous small streams which flow into Great South Bay as well as surface runoff directly into the Atlantic Ocean.

Pleistocene glaciation created significantly lower sea levels than are present in the modern day, due to the massive amount of water trapped within the ice sheets. Sea levels were as much as 394 ft (120 m) lower than the present day at points during the Pleistocene (Gornitz 2007). As these ice sheets melted during the terminal Pleistocene and early to middle Holocene (between approximately 20,000 and 4,000 years ago), global sea levels rose. However, this rise was slightly mitigated by the fact that the land once covered (and compressed) by glaciers was slowly rising as the weight of the ice was removed. This process, which lasted for several thousand years in eastern North America, is called isostatic rebound.

The surficial geology of the Onshore Facilities' vicinity is depicted on Figure 2.1-2 and consists of outwash sand and gravel (portion of PAPE on Long Island) and barrier island deposits (portion of PAPE on Fire Island), both of which are composed of sandy and gravelly sediments. Twenty mapped soil units are located within the PAPE; however, only four soil units individually compose more than 5 percent of the PAPE (Environmental Systems Research Institute [ESRI] and Natural Resources Conservation Service [NCRS] 2020; NRCS 2020). These soil units consist of glacially-deposited fluvial and deltaic sediments that range widely between sandy, loamy, and gravelly sediments (NRCS 2020). These soils range from well to excessively drained. Although collectively only composing 11.1 percent of the PAPE, five soil units (Cut and fill land, gently sloping [CuB]; Cut and fill land, sloping [CuC]; Fill land, dredged material [Fd]; Recharge basin [Rc]; Urban land [Ur]) of anthropogenic origin are present within the PAPE. A summary of typical characteristics for the four mapped soils that individually compose 5 percent or more of the PAPE are provided in Table 2.1-1.

Table 2.1-1. Major Mapped Soil Units within the PAPE (ESRI and NRCS 2020; NRCS 2020; SCS 1975).

Name	% of PAPE	Soil Horizon Depth (inches)	Color[1]	Texture, Inclusions[2]	Slope %	Drainage	Landform
Carver and Plymouth sands, 0 to 3% slopes (CpA)	11.5	*Carver* • 0 to 3 • 3 to 8 • 8 to 14 • 14 to 22 • 22 to 31 • 31 to 60 *Plymouth* • 0 to 4 • 4 to 10 • 10 to 17 • 17 to 27 • 27 to 58	*Carver* • Dk Gry • Gry or Lt Gry • Brn • StrBrn • Lt YBrn to BYlw • Lt YBrn *Plymouth* • VDk GBrn • YBrn • YBrn • Brn • YBrn	*Carver* • Md and Cs Sa • Md and Cs Sa • Cs and Md Sa • Cs Sa • Cs Sa • Cs and Pbs *Plymouth* • LoSa • LoSa • LoSa • LoSa • Grl Cs Sa	0 to 3	*Carver* • Excessively drained *Plymouth* • Excessively drained	*Carver* • Moraines, outwash plains *Plymouth* • Outwash plains, moraines
Carver and Plymouth sands, 3 to 15% slopes (CpC)	9.4	*Carver* • 0 to 3 • 3 to 8 • 8 to 14 • 14 to 22 • 22 to 31 • 31 to 60 *Plymouth* • 0 to 4 • 4 to 10 • 10 to 17 • 17 to 27 • 27 to 58	*Carver* • Dk Gry • Gry or Lt Gry • Brn • StrBrn • Lt YBrn to BYlw • Lt YBrn *Plymouth* • VDk GBrn • YBrn • YBrn • Brn • YBrn	*Carver* • Md and Cs Sa • Md and Cs Sa • Cs and Md Sa • Cs Sa • Cs Sa • Cs and Pbs *Plymouth* • LoSa • LoSa • LoSa • LoSa • Grl Cs Sa	3 to 15	*Carver* • Excessively drained *Plymouth* • Excessively drained	*Carver* • Moraines, outwash plains *Plymouth* • Outwash plains, moraines

Name	% of PAPE	Soil Horizon Depth (inches)	Color[1]	Texture, Inclusions[2]	Slope %	Drainage	Landform
Plymouth loamy sand, 0 to 3% slopes (PlA)	24.7	• 0 to 4 • 4 to 10 • 10 to 17 • 17 to 27 • 27 to 58	• VDk GBrn • YBrn • YBrn • Brn • YBrn	• LoSa • LoSa • LoSa • LoSa • Grl Cs Sa	0 to 3	Excessively drained	Moraines, outwash plains
Riverhead sandy loam, 0 to 3% slopes (RdA)	26.9	• 0 to 12 • 12 to 27 • 27 to 32 • 32 to 35 • 35 to 40 • 40 to 65	• Brn to Dk Brn • StrBrn • YBrn • YBrn • Brn to Dk Brn • VPl Brn	• SaLo • SaLo • LoSa • Grl LoSa • Sa • Cs and Md Sa	0 to 3	Well drained	Moraines, outwash plains

[1] Lt = Light; Dk = Dark; Pl = Pale; V = Very; / = Mottled; Brn = Brown; Blk = Black; Gry = Gray; Wht = White; Ylw = Yellow; Olv = Olive; GBrn = Gray Brown; StrBrn = Strong Brown; RBrn = Red Brown; YBrn = Yellow Brown; OBrn = Olive Brown; BGry = Brownish Gray; BYlw = Brownish Yellow; RGry = Reddish Gray
[2] Fn = Fine; Md = Medium; Cs = Coarse; V = Very; Cl = Clay; Si = Silt; Sa = Sand; Lo = Loam; Grl = Gravel; Cbs = Cobbles; Pbs = Pebbles; Chn = Channery; Rts = Roots

2.2 Previous Archaeological Resource Investigations

EDR consulted NYSHPO's online Cultural Resource Information System (CRIS) database and NPS records to determine if previous archaeological surveys have been conducted within, or within 0.25 mi (0.4 km) of, the PAPE and Landfall/ICW Study Area.

Seven previous archaeological surveys/investigations overlap with the PAPE and the Landfall/ICW Study Area (see Table 2.2-1; see Figure 2.2-1). They consist of two Phase IA surveys in support of municipal sewer and natural gas transmission improvements (HAA 2005; LBG 2016), two Phase IB surveys in support of municipal sewer and natural gas transmission improvements (CAC 2018; SUNY SB 2008), one combined Phase IA/IB archaeological and architectural survey in support of road improvements (NYSM 2010), and two archaeological management plans for the Fire Island National Seashore (GP 2005; WMCAR 2016) (see Table 2.2-1; see Figure 2.2-1). For five out of these seven, no archaeological testing (i.e., shovel testing, pedestrian surface survey, etc.) conducted for these surveys overlaps with the PAPE. A review of the technical report for Survey 10SR60344 (NYSM 2010) indicates that shovel testing conducted for this project overlaps [redacted]. No archaeological resources were identified by this survey.

In addition, 11 previous archaeological surveys/investigations have been conducted within 0.25 mi (0.4 km) of the PAPE and Landfall/ICW Study Area (see Table 2.2-1; see Figure 2.2-1). [redacted]. This survey is a combined Phase IA/IB marine remote sensing survey (PC 1999; PC 2003) (see Table 2.2-1; see Figure 2.2-1). The remaining 10 surveys within 0.25 mi (0.4 km) of the PAPE consist of one Phase IB survey in support of natural gas transmission improvements (AKRF 2009), seven combined Phase IA/IB surveys in support of

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residential and retail development and bicycle/pedestrian path construction (RBAG 2012; SUNY SB 2006; TAS 2002; TAS 2003a; TAS 2003b; TAS 2004; TAS 2009), one combined Phase IA/IB and Phase II survey in support of recreational trail development (PAL 2011), and one combined Phase IA archaeological and architectural survey in support of mixed use development (HP 2010) (see Table 2.2-1; see Figure 2.2-1).

Table 2.2-1. Previous Archaeological Resource Investigations within 0.25 mi (0.4 km) of the PAPE.

Year	Survey Number	Report Name	Sites Identified/ Investigated[1,2]	Distance from PAPE	Reference
2005	N/A	Archeological Overview and Assessment of the Fire Island National Seashore	USN 10302.001580	[redacted]	GP 2005
2005	05SR55940	Phase IA Archeological Sensitivity Assessment, IGTS Brookhaven Lateral Project	-		HAA 2005
2008	08SR58279	A Stage 1B Archaeological Survey for the Proposed KeySpan/National Grid Caithness Gas Transmission Main, Holtsville and Commack-Brentwood Segments	-		SUNY SB 2008
2010	10SR60344	Cultural Resources Reconnaissance Survey Report, PIN 0059.08, NYS Route 27 from NYS Route 112 to Wading River Road	USN 10302.002928; USN 10302.002929		NYSM 2010
2016	N/A	Archaeological Survey and Assessment of Coastal Resources, Fire Island National Seashore	USN 10302.001580		WMCAR 2016
2016	16SR00867	Phase IA Archaeological Sensitivity Assessment, Forge River Watershed Sewer Project	-		LBG 2016
2018	18SR56022	Phase IB Field Test Report, Forge River Watershed Sewer Project	-		CAC 2018
2004	04SR54386	Phase I Archaeological Investigations for the Proposed ACE Builders at Southaven Subdivision	-		TAS 2004
2009	09SR58930	Phase I Archaeological Investigation for the Proposed Colony Preserve Subdivision	-		TAS 2009
2010	10SR60244	Phase IA Archaeological and Historic Resources Assessment, Yaphank County Center, Areas A, B, C, D, E and F	-		HP 2010
2003	03SR53618	Phase I Archaeological Investigation for the Proposed Harry Jensen Subdivision	-		TAS 2003a
2009	09SR59132	Phase 1B Archaeological Field Testing Report Addendum, National Grid Caithness Gas	-		AKRF 2009

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Year	Survey Number	Report Name	Sites Identified/ Investigated[1,2]	Distance from PAPE	Reference
		Transmission Main, Holtsville Segment			
1999; 2003	99SR50466; 03SR54137	Remote Sensing Survey, Tidal Zone and Near Shore Project Area, Atlantic Coast of Long Island, Fire Island Inlet to Moriches Inlet, Fire Island	-	[redacted]	PC 1999; PC 2003
2012	12SR61205	Phase I Archaeological Survey, River Road Path	-		RBAG 2012
2003	03SR53710	Phase I Archaeological Investigation for the Proposed Farmingville Retail Expansion	-		TAS 2003b
2002	02SR52348	Phase I Archaeological Investigation For The Proposed Aspen Creek Estates	-		TAS 2002
2011	11SR61077	Archaeological Phase I Survey and Limited Phase II Testing, Trails and Viewing Platforms, Wertheim National Wildlife Refuge	-		PAL 2011
2006	06SR56476	A Stage 1 Archaeological Survey for the Mercado Property	-		SUNY SB 2006

[1] For surveys extending outside the 0.25 mi (0.4 km) search radius, only archaeological sites within 0.25 mi (0.4 km) of the PAPE are included in this table.
[2] This table does not include potential submerged archaeological sites within 0.25 mi (0.4 km) of the PAPE.

2.3 Previously Identified Archaeological Resources

A review of the CRIS database indicates two Native American sites (NYSM 4897 and 7550) overlap portions of the PAPE [redacted]. It should be noted, however, that New York State Museum (NYSM) sites depicted in CRIS typically indicate areas of elevated archaeological sensitivity and should not be considered equivalent to formally tested and delineated archaeological sites. An additional 10 sites have been previously recorded within 0.25 mi (0.4 km) of the PAPE and Landfall/ICW Study Area. They consist of four Native American sites, four historic-period sites, and two multiple component Native American and historic-period sites (see Table 2.3-1; see Figure 2.2-1).

Two of the historic-period sites (USN 10302.001587 and 10302.002928) are located [redacted]:

- The Southaven Circle Site (USN 10302.002928) consists of an early to mid-nineteenth century, possibly also late eighteenth century, subsurface scatter of architectural and domestic debris associated with one or more former structures at this location. The site encompasses a relatively small area and [redacted] Artifacts include ceramic vessel and bottle fragments, faunal remains, brick, mortar,

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window glass, nails, and various other items. The site was submitted to Phase I testing in 2010 and was recommended for Phase II testing to determine its S/NRHP-eligibility.

- The South Haven Presbyterian Church Site (USN 10302.001587) includes the location of a church that was formerly situated [redacted].

Table 2.3-1. Previously Identified Archaeological Resources within 0.25 mi (0.4 km) of the PAPE.

Site Number	Site Name	S/NRHP-Eligibility	Time Period	Description	Distance from PAPE
NYSM 4897	Unkuchaug	Undetermined	Pre-European Contact Native American	Undated village	[redacted]
NYSM 7550	None provided	Undetermined	Pre-European Contact Native American	None provided	
USN 10302.002928	Southaven Circle Site	Undetermined	Historic-Period	18th and 19th century architectural and domestic artifact scatter	
NYSM 5596	Mastic Neck - Unkechaug	Undetermined	Pre-European Contact Native American	None provided	
USN 10302.001587	South Haven Presbyterian Church Site	Undetermined	Historic-Period	19th century architectural debris associated with former church moved from this location in 1960 (associated with cemetery)	
NYSM 5595	Yaphank	Undetermined	Pre-European Contact Native American	Undated lithic scatter	

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Site Number	Site Name	S/NRHP-Eligibility	Time Period	Description	Distance from PAPE
USN 10302.001570	Hawkins-Carman-Husband Site	Undetermined	Historic-Period	18th century architectural debris scatter	[redacted]
USN 10302.001130	Carmans Mill and Homestead Site	Undetermined	Historic-Period	18th century saw/grist mill and house/tavern/general store, both of which were removed	
NYSM 4896	None provided	Undetermined	Pre-European Contact Native American	Undated burial(s)	
USN 10302.002929	Oak Site	Undetermined	Pre-European Contact Native American	Undated lithic scatter	
USN 10302.000026	Carman House Historic Site	Undetermined	Pre-European Contact Native American and Historic-Period	Undated lithic scatter; 19th century architectural and domestic artifact scatter	
USN 10302.001580	Smith Point Coast Guard Station	Undetermined	Pre-European Contact Native American and Historic-Period	Undated isolated quartz flake; 19th century architectural remains of coast guard station	

2.4 Pre-European Contact Native American Historic Context

The following cultural context summarizes the pre-European contact period Native American settlement of eastern Long Island as it relates to cultural resources which may be present within the PAPE. Table 2.4-1 provides a summary of Native American cultural periods for Long Island that are typically recognized by archaeologists.

Table 2.4-1. Native American Cultural Periods for Long Island.

Time Period	Environment	Settlement Pattern & Subsistence Strategy	Artifact Assemblage	Comments
Paleoindian Period (Prior to 10,000 BP)	Non-forested plains; Pleistocene megafauna present along the coast; low sea level causes coastline to be miles out to sea from its current location	Mobile hunting and gathering	Fluted points	Sites along coastlines now inundated under the Atlantic Ocean; low population density; sites are extremely rare; very few sites dating to the Paleoindian Period are known from Long Island

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Time Period	Environment	Settlement Pattern & Subsistence Strategy	Artifact Assemblage	Comments
Early Archaic Period (10,000-8,000 BP)	Warmer and wetter conditions relative to previous period; sea level begins to rise	Mobile hunting and gathering (but somewhat decreased mobility)	Bifurcated points	Sites along coastlines now inundated under the Atlantic Ocean; low population density; sites are extremely rare; very few sites dating to the Early Archaic Period are known from Long Island
Middle Archaic Period (8,000-6,000 BP)	Continuation of warm and wet conditions; sea level rise and coast stabilizes near current extent; pine and oak dominated forests give way to mixed deciduous forests	Mobile hunting and gathering; seasonal exploitation of resources; initial exploitation of marine resources at the end of this period	Sylvan Lake Phase; Sylvan Lake stemmed projectile points, notched atlatl weights, biface knives, drills, side scrapers, hammerstones, and choppers	Small seasonal sites utilizing a majority of terrestrial fauna for subsistence; marine shellfish were utilized but not deposited in great numbers due to high mobility; very few sites dating to the Middle Archaic Period are known from Long Island
Late Archaic Period (6,000-3,500 BP)	Continuation of warm and wet conditions	Somewhat high residential mobility, likely on a seasonal basis; exploitation of marine resources (not widely represented)	Snook Kill Phase; Wading River and Snook Kill projectile point types; cremation burials in shallow pits; stone toolkit	Larger population sizes than the previous period; small settlements seasonally located on upland landforms and sandy plateaus
Transitional Period (4,000-3,000 BP)	Cooling trend; mixed deciduous forests persist	Somewhat high residential mobility, likely on a seasonal basis; small scale exploitation of marine resources	Orient Phase; small shell middens; cemeteries; Orient fishtail projectile points (quartz); soapstone vessels	Shellfish exploitation in seasonal camps leaving middens; burials in cemeteries
Early Woodland Period (3,000-2,300 BP)	Cooler temperatures persist; mixed deciduous forests persist	Terrestrial foraging coupled with intensive exploitation of marine resources	Middlesex Phase; large shell middens/rings; presence of ceramics	Increased sedentism leads to larger communities developing leaving more material traces
Middle Woodland Period (2,300-1,000 BP)	Warming and drying trend (Medieval Climatic Anomaly); mixed deciduous forests persist	Terrestrial foraging coupled with intensive exploitation of marine resources; introduction of agriculture	Northbeach and Clearview Phases; lithic toolkits including quartz projectile points; shell-tempered and stamped ceramics	Large communities exploiting all available resources; introduction of agriculture
Late Woodland Period (1,000-400 BP)	Warm and dry conditions persist; mixed deciduous forests persist	Sedentary villages supported by agriculture; seasonal camps targeting large and small game, plants, riverine, and marine resources	Sebanoc, Bowmans Brook, Clasons, Shanlok and Niantic Phases; wide variety of projectile point types; high frequency of projectile points, including quartz; highly decorated ceramics	Large communities exploiting all available resources, including agriculture; relationships with surrounding populations result in consistent trade

Time Period	Environment	Settlement Pattern & Subsistence Strategy	Artifact Assemblage	Comments
Contact Period (400 BP)	Cooler and wetter conditions (Little Ice Age); mixed deciduous forests persist	Sedentary villages supported by agriculture; seasonal camps targeting large and small game, plants, riverine, and marine resource	Similar technology to Late Woodland Period, as well as European trade goods; shell wampum	Relationships with the English and Dutch reveal a mixture of pre-European contact and post-European contact material culture/technologies; large manufacture of wampum to facilitate political interests

Sea levels along the east coast of North America reached their late Pleistocene nadir during the Last Glacial Maximum, between approximately 26,500 and 20,000 years ago. Deglaciation began in the Northern hemisphere at approximately 20,000 years ago and in Antarctica at approximately 14,500 years ago. Although physically distant, the timing of deglaciation in Antarctica is relevant to conditions on Long Island as it introduced a large volume of water into the oceans, drastically increasing the rate of global sea level rise between approximately 14,500 years ago and 10,000 years ago. The significantly lower sea levels during glaciation meant that large expanses of the eastern North American continental shelf were exposed, providing habitat for plants and animals, as well as humans (Clark et al. 2009).

In eastern North America, rising sea levels gradually inundated the coastal plain between approximately 20,000 and 10,000 years ago (with the rate of sea level rise increasing between approximately 14,500 and 10,000 years ago), temporarily creating a biotically rich estuarine environment, which was also eventually inundated. Sea levels along the east coast of North America have continued to rise throughout the last 10,000 years, although at a much reduced rate compared to the period between approximately 20,000 and 10,000 years ago. Sea level was approximately 66 ft (20 m) below modern levels approximately 10,000 years ago. Sea level has risen since this time with more rapid periods of rise between approximately 10,000 and 4,000 years ago and within the last 100 years (Engelhart et al. 2011; Stanford and Bradley 2012).

The earliest people to occupy Long Island would likely have focused their subsistence along the coastal plains and estuaries which are now submerged under the Atlantic Ocean. Therefore, due to rising sea levels, many of the earliest archaeological sites in the region are now underwater. In fact, archaeological sites representing the Paleoindian, Early Archaic, and Middle Archaic Periods (i.e., the period between approximately 13,000 and 6,000 years ago) are rare on Long Island. However, two fluted projectile points (one identified as Clovis and one identified as Folsom) are held in the collections of the Southold Indian Museum. The points were reportedly both found on the North Fork of Long Island (Barcell 1999).

Any Pre-Clovis (i.e., pre-13,000 year old) archaeological sites in the area would also likely be located on the now-submerged continental shelf off the south shore of Long Island or within Long Island Sound. It is also possible that the earliest sites dating to the Paleoindian and Archaic (and possibly Pre-Clovis) periods, if they exist on modern-day terrestrial Long Island, have been overlooked because they often consist of relatively small, low density lithic scatters. This is reflective of the fact that these earliest human groups were highly mobile, existed in relatively low population densities, and did not use ceramic technology, which is sometimes more visible in the archaeological record than lithic artifacts (Braun 1974; Ritchie 1959; Ritchie and Funk 1973; Salwen 1962; Stanford and Bradley 2012; Wyatt 1977).

The Late Archaic Period on Long Island is characterized by somewhat high residential mobility, which was likely patterned seasonally. Population density was higher during this period than during previous periods and settlement was characterized by small, seasonally occupied settlements located on upland hills and ridges as well as sandy plateaus. This settlement pattern took advantage of the wide variety of natural resources, including marine resources that were available on Long Island after the stabilization of sea levels. Diagnostic artifacts and features that indicate a Late Archaic period occupation include Wading River and Snook Kill projectile point types, as well as evidence of cremation burials in shallow pits, and a stone toolkit (Braun 1974; Wyatt 1977).

The Transitional Period is defined by somewhat high residential mobility, likely on a seasonal basis to pursue small scale exploitation of marine resources, especially shellfish, during certain periods and terrestrial resources during others. Coastal camp sites dating to the Transitional Period often contain associated shell middens. This period is characterized by the material culture associated with the Orient Phase, which includes small shell middens, formal cemeteries, and distinctive Orient Fishtail projectile points which were often made of quartz. An important technological change from the Late Archaic Period was the appearance of soapstone vessels (Braun 1974; Ritchie and Funk 1973).

The Early Woodland Period is characterized by a foraging tradition combined with an intensive exploitation of marine resources. Increased sedentism during this period resulted in large communities converging within more permanent settlements. These large, semi-permanent settlements leave a more distinct material culture trace, and as a result are more archaeologically visible than the smaller campsites dating to earlier periods. Material culture dating to this period on Long Island is most often included in the Middlesex Phase, which includes the first appearance of early ceramic technology, large shell middens/shell rings, and large villages. Early woodland ceramics tend to be coarser and more unrefined in construction and are rarely decorated extensively (Tuck 1978).

The Middle Woodland Period includes a tradition of foraging and intensive exploitation of marine resources, but also the first appearance of horticulture on Long Island. Horticultural economies may have allowed large communities to remain sedentary for much of the year, utilizing all available resources peripheral to these settlements. Material culture traditions that are prominent during the Middle Woodland Period include the Northbeach and Clearview Phases, which consist of lithic toolkits including various styles of quartz projectile points, as well as shell-tempered and stamped ceramics (Fitting 1978).

During the Late Woodland Period, groups on Long Island occupied large villages and engaged in intensive marine and riverine resource exploitation, as well as terrestrial hunting. Archaeological evidence, including exotic trade goods, indicates complex relationships with both surrounding and more distant cultures which facilitated the spread of technologies and cultural practices. The Sebanoc, Bowmans Brook, Clasons, Shanlok and Niantic Phases are all hallmarks of this period. These phases include a wide variety of projectile point types and a high frequency of projectile points made of quartz. Large shell rings, middens, and highly decorated ceramics are also prevalent during this period. Late Woodland Period settlement and subsistence patterns are discussed in additional detail below in the context of observations by contact period European settlers (Bernstein and Lenardi 2005; Lightfoot and Cerrato 1988).

2.5 Post-European Contact Historic Context

Archives and repositories consulted during EDR's historical research for the Onshore Facilities included the online digital collections of the Library of Congress, New York State Library, New York Heritage, David Rumsey

Map Collection, and the United States Geological Survey (USGS), as well as EDR's in-house reference materials. Additionally, EDR reviewed the *Gazetteer of the State of New York* (French 1860), *Historical and Descriptive Sketches of Suffolk County...From First Settlement by Europeans* (Bayles 1874), *History of Suffolk County, New York with Illustrations, Portraits, & Sketches of Prominent Families and Individuals* (Munsell 1882), and *The History of Long Island, From Its Earliest Settlement to the Present Time* (Ross 1902). Historic maps reviewed included the 1780 Covens et al. *Connecticut and Parts Adjacent* (Covens et al. 1780), the 1804 Bradley et al. *Map of the United States, Exhibiting the Post-Roads, the Situations, Connections & Distances of the Post-Offices, Stage Roads, Counties & Principal Rivers* (Bradley et al. 1804), the 1804 DeWitt *A Map of the State of New York* (DeWitt 1804), the 1829 Burr *Map of the County of Suffolk* (Burr 1829), the 1839 Burr *Map of New York Exhibiting the Post Offices, Post Roads, Canals, Rail Roads &c.* (Burr 1839), the 1840 Burr *Map of the County of Suffolk* (Burr 1840), the 1858 Chace et al. *Map of Suffolk Co., L.I., New York* (Chace et al. 1858; see Figure 2.5-1), the 1873 Beers *Atlas of Long Island, New York* (Beers 1873), the 1902 USGS *Setauket, NY* and 1904 USGS *Moriches, NY* 1:62500 Topographic Quadrangles (USGS 1902, 1904), the 1915 and 1917 Hyde *Atlas of a Part of Suffolk County, Long Island, New York* (Hyde 1915, 1917), the 1919 USGS *Setauket, NY* and 1926 USGS *Moriches, NY* 1:62500 Topographic Quadrangles (USGS 1919, 1926; see Figure 2.5-2), the 1947 USGS *Bellport, NY* and *Patchogue, NY* 1:24000 Topographic Quadrangles (USGS 1947a, 1947b), the 1956 USGS *Bellport, NY, Patchogue, NY,* and *Pattersquash Island, NY* 1:24000 Topographic Quadrangles (USGS 1956a, 1956b, 1956c; see Figure 2.5-3), the 1957 USGS *Moriches, NY* 1:24000 Topographic Quadrangle (USGS 1957; see Figure 2.5-3), and the 1967 USGS *Bellport, NY, Moriches, NY, Patchogue, NY,* and *Pattersquash Island, NY* 1:24000 Topographic Quadrangles (USGS 1967a, 1967b, 1967c, 1967d).

At the time of contact between Native Americans and Europeans in southern New England and New York, the Montaukett Indian Nation inhabited all of Long Island east of the approximate location of the modern-day Queens County Line. Due to extensive notes and manuscripts from early European settlers throughout Long Island and New England, there is a wealth of knowledge about native populations at the time of contact. Settlement patterns in southern New England and Long Island were focused around a residential village which was occupied for much of the year, with seasonally occupied logistical camps at fishing stations, wild plant collection areas, or other areas of high natural resource richness such as tidal marshes and forests. Typically, summers were spent harvesting natural resources as they came into season as well as growing and harvesting agricultural staples such as corn, beans, and squash; whereas during the winters, populations subsisted on preserved food stores and hunted game. On Long Island specifically, the main locus of occupation was at the cornfields. Hunting and fishing sites were utilized throughout the year, and utilized heavily outside of harvest seasons, but evidence supporting a predictable seasonal cycle has not been discovered. Houses within the main residential village were abandoned after the death of their inhabitants, and entire villages would relocate if the local firewood supply became depleted (Montaukett Indian Nation 2015; Salwen 1978a).

Technological traditions at this time which could be represented archaeologically include ceramic jars, usually very large, which were left at village and camp sites to be seasonally accessible as groups cycled throughout the year. The bow and arrow was the primary tool for hunting at the time of contact. According to ethnohistorical accounts, bows were most often made from witch-hazel and were 5 to 6 ft (1.5 to 1.8 m) long. Projectile points were made from animal products such as bone, antler, eagle claws, and horseshoe crab tail, as well as chipped or ground stone, and by sharpening wooden arrow shafts into points. Following contact with European colonists, native populations quickly adopted the use of more durable brass and iron, obtained through trade, for use as projectile points. Watercraft played an important role in the tool kit of the populations in this region, with the dugout canoe being the most common type of boat used by the native residents of Long Island. These canoes were usually made of pine, oak, or chestnut and could be up to 50 ft (15 m) long. The largest of these canoes could transport 40 people safely (Salwen 1978a).

Foodways for native populations in southern New England and Long Island consisted of a variety of land and sea based protein sources. Deer, bear, turtle, waterfowl, and fish species are all represented in the faunal assemblages throughout the region. Large quantities of shellfish are also prevalent in coastal contexts. Large camps and villages in later periods cultivated corn, bean, squash, Jerusalem artichoke, and tobacco plants. Cultivation tools were commonly made from horseshoe crab carapace and clam shells and included hoes for weeding. Although the native residents of Long Island hunted whales during the contact period, there is no archaeological evidence that these sea mammals were regularly hunted in southern New England prior to European contact. However, it does appear that when individual whales washed ashore or became beached, they would be butchered by the residents of the closest village (Salwen 1978a).

Socio-political structure in southern New England and Long Island consisted of village units with a single leadership role called a sachem. The sachem was not a monarch, however, and many important decisions were made in consultation with the elder men of the village. According to historical accounts, certain lineages were more likely to become sachems, due to past generations filling that role within the village structure. This political structure was simplified by historical witnesses to represent a European style of succession, but the reality of the system was likely more complicated. In some cases, “squaw sachems” appear in the seventeenth century. These women were not widows, but rather descendants of previous sachems and inherited rights to land and deeds drawn in cooperation with English colonists in addition to their title. The village sachem structure fit into a large regional political structure by creating and maintaining alliances. These village alliances are often termed “tribes” by historical figures attempting to map out the political landscape of southern New England during the seventeenth and eighteenth centuries (Salwen 1978a, 1978b).

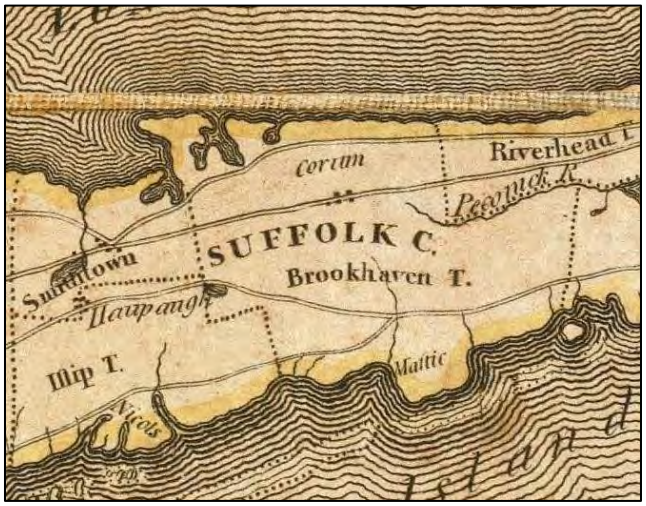
Several Native American groups were recorded during the establishment of English towns in the vicinity of the Town of Brookhaven, including the Setalcott (or Setauket), Secatogue, Patchogue, Unquachog (or Unkechaug), Shinnecock, and Montaukett. The Setauket’s territory was primarily along the north shore at the Long Island Sound, while the latter groups lived on the south shore and South Fork. The Montauketts reportedly occupied the South Fork east of the Shinnecock territory, although their own history indicates that they occupied all of Long Island east of the modern-day Queens County line, as noted above. English historical accounts describe a sachem for each group who served as a leader. These sachems were described as brothers; however, this status was likely cultural rather than familial affiliation. Their groups would occasionally converge under duress from war or for particularly important cultural gatherings (Ales 1993; Montaukett Indian Nation 2015; Wunderlich 2005a).

Early in the seventeenth century, the Dutch and English rivalry included alliances with local Native American groups. Growing tensions between the Pequot alliance of tribes in Connecticut and western Long Island and the English colonists and allied tribes (including the Montaukett) in Massachusetts and eastern Long Island erupted into protracted violence. This conflict was later called the Pequot War, which lasted from 1636 to 1638. The Montauketts and their surrounding groups had courted an alliance with the English in order to achieve favorable trade and peace. This alliance served them well during the Pequot War, but did not last long as the English soon turned their eyes toward the rich lands of eastern Long Island (Ales 1993; Salwen 1978a).

English colonization on Long Island began under the authority of the Plymouth Colony following the defeat of the Pequot nation. In 1639, Lion (also, Lyon) Gardiner established the first English settlement in what would become New York State on Gardiner’s Island. In 1648, a royal British charter established Long Island as a colony distinct from New York and Connecticut, which resulted in the Montaukett’s sale of much of the island to English settlers (Ales 1993; French 1860).

The Town of Brookhaven was established in 1655 when six settlers from New England and Long Island purchased land from the Setauket nation in exchange for tools, gunpowder, lead, wampum, and other supplies. They initially settled along the Long Island Sound at Setauket, named after the original inhabitants. The government in Brookhaven was largely independent and run by town meetings; however, the town was briefly under the protection of the Colony of Connecticut from 1659 to 1662. In 1664, King Charles II of England granted New Amsterdam and Long Island to his brother, James, Duke of York, which would become the Colony of New York following the expulsion of the Dutch. Shortly afterwards, Governor Nicolls issued a patent in 1666 confirming title to the land already purchased in the colony. In 1686, Governor Dongan instituted the "Dongan Patent," which formally established the Town of Brookhaven's government, provisions, and procedures (Munsell 1882; Ross 1902; Town of Brookhaven 2020a, 2020b).

From the 1650s to the 1790s, the Town of Brookhaven's borders continually evolved as additional land, beachfront, and natural resource rights were acquired. The town's Puritan proprietors were particularly selective regarding the status and moral character of settlers who wished to purchase land in Brookhaven. Extensive tracts, most notably the Smith Purchase (Manor of St. George), Winthrop's Patent, Halsey's Manor, and the Moriches Patent, were annexed in 1770 and transformed Brookhaven into the largest town in Suffolk County, with territory extending from the Long Island Sound to the north and Fire Island, Great South Bay, and the Atlantic Ocean to the south. Despite its size, most of the settlements were localized along three primary thoroughfares that ran along the north, center, and south of the town. In 1797, Brookhaven attempted to define and map its boundaries; however, its formal borders and those of its neighboring towns were hotly disputed until the mid-nineteenth century (see Insets 2.5-1 and 2.5-2) (Bayles 1874; Johnson 2005; Munsell 1882; Ross 1902).



Inset 2.5-1. 1804 DeWitt *A Map of the State of New York* *(left).*
Inset 2.5-2. 1873 Beers *Atlas of Long Island, New York* *(right).*
Despite ongoing land disputes with neighboring towns until the mid-nineteenth century, the Town of Brookhaven's boundaries presented in 1804 and 1873 have remained nearly unchanged to the modern day (Beers 1873; DeWitt 1804).

Brookhaven's economy during the British colonial period focused on the export of wheat, corn, various livestock, and whale oil to Europe and the West Indies in return for sugar, molasses, and rum. As early as 1668, the town's inhabitants acquired the rights from the Unkechaug to any whales that washed ashore or entered the bounds of Brookhaven's beaches. The residents offered the Unkechaug "three fathoms" for alerting them to the presence of a whale and "ten fathoms" for capturing and bringing in the whale for processing.

Coastal whaling was a profitable endeavor for local farmers to supplement their winter incomes and an opportunity for Native Americans to trade labor for food and supplies. In the early to mid-eighteenth century, whaling boats were redesigned to accommodate offshore whaling and on-boat processing due to the lack of available whales near the shore. As a result, the larger boats were no longer able to dock on the beaches of Long Island's South Shore, and were instead required dock at harbors farther east (Bayles 1874; Munsell 1882; Wunderlich 2005a, 2005b) (Palmer 1959; Welch 2005; Wright 2005).

Most of the labor for commercial whaling was initially supplied by Native Americans residing on Long Island, although by the end of the seventeenth century the labor demand had grown sufficiently to encourage Native Americans from New England to travel south to Long Island for work (Salwen 1978b; Wright 2005). Whaling accommodated the traditional division of labor within the nuclear family for local Native Americans where women had been in charge of real estate management, maintaining the household, and political and social maneuvering, and men had traditionally ranged far afield hunting and fishing to provide protein for the family (Button 2014; Salwen 1978b). The removed lifestyle of the whaler left many families without fathers, husbands, and brothers for months at a time. Euro-American families struggled with this due to Victorian values of separate spheres of interaction for women and men, inside and outside of the home. It was much more difficult for women in Euro-American households to break cultural norms to facilitate the needs of their household outside of the home sphere. Due to a long history of social and political agency within Native American culture, women within Native households took to these roles with a greater ease (Button 2014).

Acculturation of Native American populations in eastern Long Island was intrinsically tied to the whaling industry and its effect on the region between the eighteenth and twentieth centuries. At the start of this period, the resistance to English practices, including European-style agriculture and housing was staunch. Many Native Americans rented out tribal lands to English populations for farming and made a living off the rent received in-lieu of practicing European farming methods themselves (Salwen 1978b). Due to consistent expansion of European settlements, as well as land use restrictions imposed on Native populations, many of the subsistence and settlement patterns they had practiced in preceding periods were no longer feasible. In response to this economic climate many Native American men in the area turned to wage-earning occupations like whaling and fishing.

During the late-eighteenth, and through the mid-nineteenth century, whaling was one of the most profitable industries in southern New York (including Long Island) and New England. The whaling industry peaked around 1850 and steadily declined after that. Overhunting and less expensive replacements for many of the products produced by whaling rendered the industry both unsustainable and obsolete. Despite the regional importance of whaling, the Town of Brookhaven was not among the elite whaling communities on Long Island. Instead, the town's economy was primarily supported by shipbuilding and repairs, sail making, deep-sea fishing, and shellfish fishing (oysters, clams, etc.). Farming, cordwood, and small industries constituted Brookhaven's remaining economic sectors. Agricultural production in Brookhaven, and throughout Suffolk County, was integral to New York City's geographic and population expansion. Brookhaven farmers supplied New York City with fresh vegetables, fruit, and milk as well as grains, hay, and straw. In the nineteenth century, large machinery and new fertilizers were implemented in local agriculture to meet New York City's demand (Munsell 1882; Ross 1902; Wunderlich 2005a, 2005b).

By the 1870s, Long Island's coast, from the South Shore to Montauk, became "a watering place, and a popular resort for the over taxed, over-heated, and over-stimulated people of New York and other cities, during the heat of the summer." Estates and resorts were built along the coast and the rise in yachts briefly reignited Brookhaven's shipbuilding sector. While most of this seasonal tourism was centralized in 'the Hamptons,' the

village of Patchogue in Brookhaven was hailed as "the Queen City of the South Shore" for its "general air of wealth and refinement." Although sparsely populated, Brookhaven's stretch of Fire Island, a barrier island along the South Shore, was also host to several seasonal resort communities (discussed below) (Bayles 1874; Ross 1902).

Following the completion of major thoroughfares and the rise of the automobile, Suffolk County was inundated with vacationers and new residents. Many farms were subdivided into development tracts for housing, shopping, and other amenities. After World War II, the G.I. Bill's low-rate mortgage spurred suburbanization; Brookhaven became a commuter community for the middle-class working in western Long Island and New York City. The Brookhaven National Laboratory in Brookhaven and the Calverton Naval Weapons Industrial Reserve Plant in Riverhead were major regional employers until the end of the Cold War. In the 1960s, the Brookhaven National Laboratory widened its focus to not only include nuclear energy research, but also biomedical and environmental sciences research. By the twenty-first century, both the county and town have become primarily service based with higher education institutions, hospitals, and technology industries. Although no longer a predominantly agrarian county, local farmers continue to supply the region with produce, plant nurseries and greenhouses, and sod farms (Crease 2005; Johnson 2005; Wunderlich 2005a, 2005b).

2.5.1 History of Roadways

Due to the proposed installation of both the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes underneath roadways within the Town of Brookhaven, the following presents a brief history of roadways and transportation on Long Island. Additional details regarding the LIE will be provided as the Onshore Transmission Cable – LIE Service Road runs along this roadway.

On Long Island, like the rest of what would become the United States, dirt roads during the eighteenth century were locally maintained and typically in poor condition. In 1704, three commissioners for each of Long Island's counties were appointed to lay out a road that extended from Brooklyn to East Hampton. Due to the road's location along the center of Long Island, it became the primary east-west thoroughfare and was later called the Country Road (also, the Middle Country Road). In 1707, the Town of Brookhaven ordered that "every freeholder should work two days in clearing the commons and highways of undergrowth." Two parallel routes to the Country Road were later added; one ran along the North Shore while the other ran along the South Shore. By 1733, these roads had been named the North and South Country Roads, respectively. The state legislature mandated higher standards of road clearing and construction of additional roads in 1724. Munsell's 1882 *History of Suffolk County, New York* lists nearly twenty main and interconnecting routes developed in the Town of Brookhaven throughout the mid- to late-eighteenth century (Bayles 1874; Munsell 1882; Wunderlich 2005a).

Following the American Revolution, improvements to roads generally consisted of levelling only the areas that contained extremely rough terrain, removing boulders and tree stumps, and only roads near major cities were ditched or constructed with gravel. In 1794, the first turnpike in the United States was opened for public use, starting a boom of turnpike construction in the country and greatly improving infrastructure as well as increasing trade and revenue in communities along the routes. This turnpike, the Philadelphia to Lancaster Road was required by charter to be excavated to a depth that would ensure a level and solid foundation, and to be constructed with gravel, stone, or wood. By 1812, turnpike and major road construction regularly incorporated these methods, and roads began to be stone-surfaced with drainage ditches alongside. Additionally,

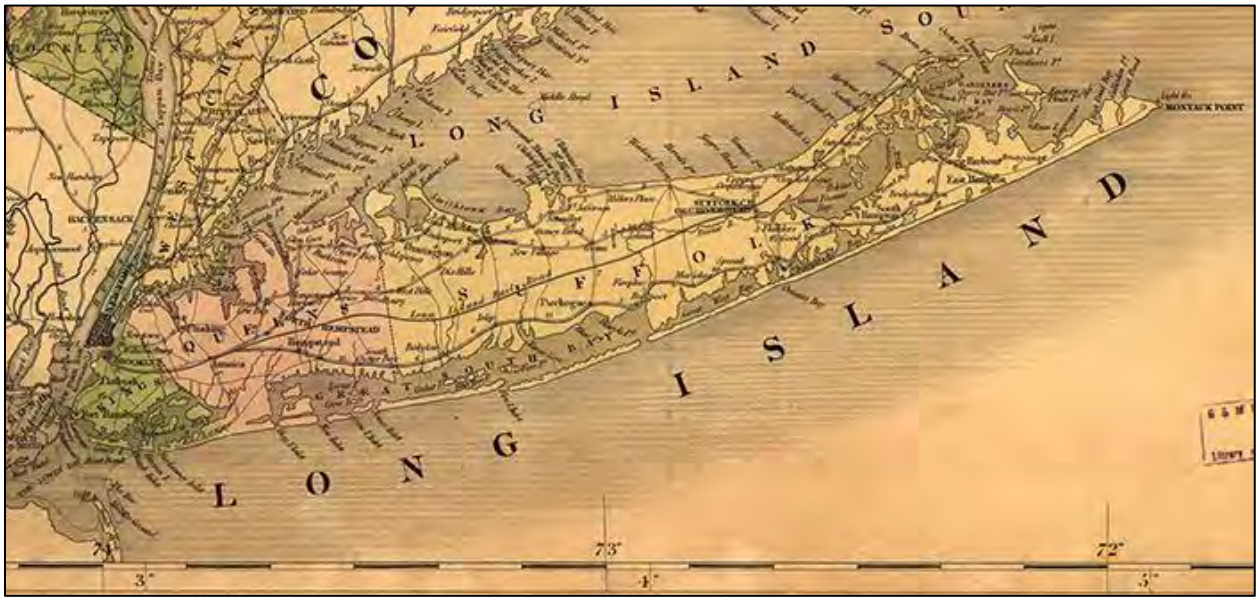
> "…roadbuilders placed a layer of heavy foundation stones, laid on edge, with the interstices packed solidly with smaller stones rammed in place by hammering. Above this course, by hand they placed successive layers of broken stone, course by course, compacted and filled

so that the stones interlocked with each other. The top 3 inches were of hard, specially selected stone, broken with hammers to walnut size" (Klein and Majewski 2008; USDOT 1976).

These larger thoroughfares were privately-run, fee-based roadways, with tollgates containing spiked barriers (called pikes) which would turn aside to let the traveler pass once the toll had been paid. Hence the routes were referred to as "turnpikes." Initial funding for construction was often raised through private investment while tolls collected during its use were intended to pay for maintenance of the road and dividends to investors, although turnpikes frequently proved to be unprofitable investments (Klein 1990; Klein and Majewski 2008).

The 1804 Bradley et al. *Map of the United States, Exhibiting the Post Roads, the Situations, Connections & Distances of the Post-Offices, Stage Roads, Counties & Principal Rivers* (see Inset 2.5-3) illustrates dirt postal roads and stagecoach roads on Long Island at the beginning of the nineteenth century. Although these earliest roads were little more than dirt tracks, by the 1820s, road construction techniques were improved based on the principles of John L. McAdam. This consisted of laying down an up to 10-inch-thick layer of broken, angular stones on top of native soil, "interlocked into a dense mass." These roads were referred to as "macadamized." Historical maps depict roads on Long Island varying from "one-horse" to "four-horses" wide and connecting many of the smaller towns and more rural areas by 1839 (Bradley et. al 1804; Burr 1839) (see Inset 2.5-4).

Inset 2.5-3. 1804 Bradley et al. *Map of the United States, Exhibiting the Post Roads, the Situations, Connections & Distances of the Post-Offices, Stage Roads, Counties & Principal Rivers*.
This map depicts major dirt stagecoach and postal roads extending as far as east as Sag Harbor on the South Fork (Bradley et al. 1804).



Inset 2.5-4. 1839 Burr *Map of New York Exhibiting the Post Offices, Post Roads, Canals, Rail Roads, &c*.
This map depicts the expansion of Long Island's road network since the turn of the nineteenth century (see Inset 2.5-3; Burr 1839).

In the mid-nineteenth century, infrastructure began shifting from dirt to graveled and later planked roads. No other substantive transportation improvements were made until the LIRR was built between 1836 and 1844 between Jamaica in Queens and Greenport, 15 mi (24 km) north of East Hampton. The LIRR was constructed to reduce travel time between New York City and Boston but was soon made obsolete by the New Haven Railroad in 1850. The LIRR faced periodic insolvency for nearly 30 years before a court-mandated corporate-restructuring consolidated the various lines on Long Island under LIRR's management (Wunderlich 2005b).

In Ross's 1902 *A History of Long Island*, the Village of Patchogue was described as "the Queen City of the South Shore" and praised for its roads, which were "among the best on Long Island, its streets are macadamized and lighted by electricity..." This accessibility augmented Patchogue's status as a highly regarded summer resort. Shortly after, road construction methods and materials shifted from macadamized to concrete. The first concrete road constructed on Long Island was the Long Island Motor Parkway, built between 1908 and 1911, which connected Queens to Lake Ronkonkoma, a distance of approximately 50 mi (80 km). It was the first road constructed exclusively for automobiles in the country (see Inset 2.5-5). Thereafter, Robert Moses built a network of modern transportation routes connecting New York City with the rest of Long Island (Adcock 2018; Ross 1902; Wunderlich 2005a, 2005b).

Inset 2.5-5. 1908 photograph depicting construction of the Long Island Motor Parkway through the Hempstead Plains in Nassau County (Kroplick and Kroplick 2012a).

Many roads and other infrastructure on southern and eastern Long Island were damaged or destroyed by the hurricane of September 1938. Fire Island and the beachfront near Patchogue were severely impacted. The winds and storm surge from the hurricane uprooted many trees and washed out large swathes of dunes along the southern coast of the island, causing significant earth disturbance. Following the storm, many roads, curbs, gutters, and co-located utilities had to be repaired both along the coast and inland, producing significant earth disturbance as these areas were excavated and re-graded in many cases. Clowes describes the process of re-establishing demolished dunes along the coast by piling brush and stumps in washed out areas to catch blowing sand. Old automobiles were dumped into blown-out inlets and dredges pumped sand on top of the vehicles. Therefore, many of the dune and beach landforms along the south coast of Suffolk County, were formed during the fall of 1938 and winter of 1938/1939 following this hurricane. Following reconstruction after the hurricane, most roads were rebuilt in their prior locations and have been maintained in their current state/alignments with occasional expansion and/or rebuilding as needed on a case-by-case basis (Clowes 1939; Suffolk County 1954).

Running from the Queens-Midtown Tunnel on the western end of Long Island to Riverhead in eastern Long Island, the LIE, designated as I-495 in 1983, represents one of Long Island's most economically and socially important roadways and one of the island's most substantial construction projects. The LIE was constructed from west-to-east in stages over the course of several decades (see Inset 2.5-6). The first section of the LIE was completed in 1940, connecting the Queens-Midtown Tunnel with the Brooklyn-Queens Expressway. The LIE was constructed eastward, up to the Nassau County border by 1958, through Nassau County by 1963, and

to its terminus in Riverhead, Suffolk County by 1972, a total of 71 mi (114 km). From the onset, the LIE became the primary east-west passenger and commercial vehicle transportation route on Long Island due to its strategic central location. The LIE was originally constructed with at least six lanes (three in each direction) throughout its entire length, with additional lanes at major intersections in Queens, and nearly continuous service roads extending as far eastward as Exit 63 (Farmingville, Suffolk County). While the LIE provided greater mobility on Long Island, it also incurred halting congestion from weekday commuters and weekend vacationers, resulting in the need for various improvements, such as park-and-rides, bus lanes, minimum and maximum speed postings, bridge widening, interchange reconstruction, additional service roads, and streetlights, to facilitate better traffic flow. Perhaps the most significant of these improvements consisted of the High Occupancy Vehicle (HOV) Program which began in the early 1990s. Between 1994 and 2005, east and westbound HOV lanes were added within the median of the LIE between Exits 32 (Little Neck, Queens) and 64 (Medford, Suffolk County) to combat vehicular congestion. Improvements along the LIE continue to the modern day (Eastern Roads 2018; Goodman 2005; NYCDPR 2001).

Inset 2.5-6. 1956 photograph depicting construction of the Long Island Expressway through Lake Success, NY in Nassau County (Kroplick and Kroplick 2012b).

2.5.2 Wertheim National Wildlife Refuge

The following presents a brief history of the Wertheim National Wildlife Refuge (the Refuge), as both the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes are proposed to be installed underneath Montauk Highway, which borders and passes through the Refuge. Montauk Highway largely

borders the northern boundary of the Refuge but also passes through small portions of the Refuge in the vicinity of its intersection with Smith Road and Old South Country Road.

The Refuge is located at the outlet of the Carmans River into Great South Bay on Long Island's South Shore, between the Hamlets of Shirley and Brookhaven within the Town of Brookhaven. The Refuge is managed by the U.S. Fish & Wildlife Service (USFWS) and consists of 2,250 acres (911 ha). The refuge serves as the headquarters and visitor center for the Long Island National Wildlife Refuge Complex (USFWS 2020).

During Long Island's early colonial period, the land that would become the Refuge was purchased from the Unkechaug and owned by Samuel Terrill and Colonel William Tangier Smith. By the late-eighteenth century, the Carman family had become the significant landholders in the area. Throughout the eighteenth and nineteenth centuries, the neighboring Hamlet of Shirley, formerly known as Fire Place, was a predominantly agrarian community. Early historical maps depict the Carmans (also spelled Carmens) River as the "Connectiquot" or "Connecticut" River (Van Lith 2014).

In the 1820s, prominent political leaders and businessmen primarily from New York City, including Martin Van Buren and Daniel Webster, regularly met at Sam Carman's Inn. By the 1850s, this informal group built a clubhouse and incorporated as the "Suffolk Association of the City and County of New York." From 1860 to 1866, the male-only sportsman club (hunting and fishing) reincorporated twice; first as the "Suffolk County Society," and next as the "Suffolk Club." By the early-twentieth century, the Suffolk Club was outstripped by a relatively new male-only sportsman club, the "Carmans River Club" (1895), which catered to a younger generation of wealthy men (Van Lith 2014).

The Tangier Smith Corporation and the Hawtonhurst Corporation (previously the Carman River Corporation) each purchased thousands of acres along the Carmans River in the 1910s. The former corporation went bankrupt and its holdings returned to the mortgagees or to auction. Conversely, the director of the Hawtonhurst Corporation, Ed Tolfree, owned nearly all of the company's land holdings. These parcels (totaling approximately 750 acres [304 ha]) were later acquired in 1938 by Maurice Wertheim, president of the Hawtonhurst Corporation and namesake for the Refuge (Van Lith 2014).

Maurice Wertheim was a prominent businessman, philanthropist, and environmentalist. He started his own investment banking firm, Maurice Wertheim & Company, in 1927 and purchased *The Nation*, hailed as the oldest liberal magazine in the country. Following his initial land purchases along the Carmans River, Wertheim continue to acquire nearby parcels and amassed a private game preserve for fishing and fowl hunting. Prior to his death in 1950, Wertheim donated approximately 1,800 acres (728 ha) to the U.S. in 1947, which became the foundation for the Refuge (Van Lith 2014).

Throughout the mid- to late-twentieth century, the Refuge acquired additional land. The inclusion of the Carmans River in the 1974 New York State *Wild, Scenic and Recreational Act* afforded the area increased environmental protections. The Nature Conservancy purchased approximately 400 acres (162 ha) of adjacent land, which it later donated to the Refuge in 1983. Local resident, Lucille Wellington left her home, outbuildings and nearly 200 acres (81 ha) to the refuge in 1981. Following the incorporation of the Friends of the Wertheim National Wildlife Refuge in 1998, 128 acres (52 ha) were acquired along the Yapahank Creek and an additional 20 acres (8 ha) were acquired in 1999. The Refuge's original headquarters were based at the Brookhaven National Lab before being moved to Maurice Wertheim's personal hunting lodge, the "Stealaway." In 2012, the headquarters and visitor center relocated to the newly constructed Long Island National Wildlife Refuge Complex, built within the Refuge itself (Van Lith 2014).

2.5.3 Fire Island National Seashore

The following presents a brief history of the Fire Island National Seashore (FINS), as the Landfall and ICW Work Areas and Onshore Transmission Cable are proposed to be sited within Smith Point County Park on Fire Island. The Onshore Transmission Cable will begin within the Landfall Work Area within the large county park parking lot before traversing southwest to the ICW Work Area. From the ICW Work Area, the Onshore Transmission Cable will traverse to the northwest across Narrow Bay to reach Smith Point on Long Island.

Fire Island is a 32-mi-long (51.5-km-long) barrier island off of Long Island's southern shore, separated from Long Island by Great South Bay, Narrow Bay, and Moriches Bay. The island runs roughly southwest/northeast, extending from Fire Island Inlet on its western end to Moriches Inlet on its eastern end. Formed in 1964, the FINS encompasses 26 mi (41.8 km) and 19,579 acres (7,923.3 ha) of the island. The FINS also includes several bay islands, between Fire and Long Islands, and approximately 15,000 acres (6,070 ha) of Great South Bay and the Atlantic Ocean (NPS 2020).

Prior to the formation of the FINS, Fire Island had a long maritime, agricultural, and residential history. As discussed in Section 2.4 above, Native American occupation of Long Island has been ongoing since the Paleoindian Period. However, the current landform of Fire Island is no older than 8,000 years, indicating that its earliest use by Native Americans could have occurred in the Middle Archaic Period. Being located proximate to barrier island bays and the Atlantic Ocean, Fire Island and the South Shore of Long Island would have been attractive areas for settlement and extraction of marine-based resources by Native Americans (Fletcher and Kintz 1979; GP 2005; Sanders and Kumar 1975). See Section 2.4 above for detailed information pertaining to the Native American occupation of Long Island.

The earliest use of Fire Island by Euro-Americans occurred in the mid-seventeenth century when the first English governor of the colony of New York, Richard Nicolls, issued land patents in 1666 within what would become the Town of Brookhaven, including what would come to be known as Fire Island. From the onset of Euro-American occupation of the area, the coastal setting of Fire Island proved to be of great value for the extraction of marine resources, with fishing, shellfishing, and whaling composing important facets of the local economy. Use of Fire Island for offshore whaling ventures continued into the nineteenth century, during which time shellfish exploitation reached its peak. Following the Revolutionary War, use of Fire Island for agricultural purposes began to increase in importance. The island was used for grazing cattle and collecting salt hay, both of which continued into the twentieth century (Fletcher and Kintz 1979; GP 2005).

The first lighthouse constructed on Fire Island was built in 1826 at the western end of the island and stood 74 ft (22.6 m) tall. Its construction was intended to curtail the consistent pace of shipwrecks that had been occurring within the hazardous waters off Long Island's southern shore since the mid-seventeenth century. However, the continuation of shipwrecks in the area led to the federal government appropriating funds for the establishment of life saving patrols and stations on the shores of New Jersey and Long Island, seven of which were established along the length of Fire Island. Due to its insufficient height, the Fire Island Lighthouse was replaced in 1858 with the 166-ft-tall (50.1-m-tall) lighthouse that still stands today (Bang 1981; Cox 1998; Fletcher and Kintz 1979; Gonzalez 1982; GP 2005; NPS 2020).

By the early-nineteenth century, no permanent settlements had yet occurred on Fire Island, with the island's few visitors consisting of fishermen, diggers for shellfishing, and farmers and herdsman for cattle grazing and collecting salt hay. The mid-to-late-nineteenth century saw the establishment of hotels, processing plants for

converting fish into oil and fertilizer, and resort communities on the island. During this time, much of Fire Island's beach property was purchased by absentee urban landowners who would visit seasonally or for vacations. Vacationers and resort-goers by New York City's upper class became commonplace, particularly across the western side of Fire Island, while the eastern side of the island was primarily used by Long Island residents for vacationing. The early-twentieth century witnessed both the decline of fish processing factories and the establishment of several communities as developers purchased land and constructed homes for summer and permanent residents. The trend of seasonal occupation by absentee landowners continues to the modern day who reside within the 18 communities that have sprung up on the island (Fletcher and Kintz 1979; Goggins 1952; GP 2005; Ruff 2005).

During the twentieth century, the majority of Fire Island was acquired for use as public land by federal, state, and county governments. The majority of the island is contained within the FINS, which is managed by the NPS. Fire Island's eastern end is contained within Smith Point County Park which, despite falling within the bounds of the FINS, is owned by Suffolk County. The island's western end is contained within Robert Moses State Park, which is managed by New York State. As a result, the majority of Fire Island today is used for recreational opportunities including swimming, boating, hiking, camping, nature and wildlife viewing, fishing, hunting, and visits to the Fire Island Lighthouse and FINS visitor centers (NPS 2020).

2.6 Existing Conditions

Existing conditions within the PAPE were observed and photographed during archaeological reconnaissance, which was conducted by two EDR archaeologists between March 10 and 13, 2020. The reconnaissance included walking or driving along/across the proposed locations of the Onshore Transmission Cable routes, the Union Avenue North Site, and the Landfall and ICW Work Areas to record existing conditions, primarily for documenting the extent of previous disturbance within the PAPE. Observations of existing conditions within the PAPE are depicted on Figure 2.6-1 and in Appendix A, and include the following:

- The PAPE is located along the South Shore of Long Island, stretching from Fire Island on the Atlantic Ocean shoreline to the interior of Long Island, approximately 5 mi (8 km) from its southern shore. Being located in the Atlantic Coastal Plain physiographic province, the Onshore Facilities are located across a low-lying area of minimal relief. The PAPE is located across gently undulating outwash plain terrain that varies from flat to gently sloping. Elevation increases from east to west as the Onshore Transmission Cable runs from Fire Island on the Atlantic Ocean shoreline to the OnCS–DC, within Long Island's interior, just south of the Ronkonkoma Moraine. Only a few portions of the PAPE intersect with relatively steep terrain (i.e., in excess of 12 to 15 percent slope). The PAPE is bisected by a number of streams which drain the Onshore Facilities' vicinity, the largest of which is the south-flowing Carmans River which bisects the eastern portion of the PAPE within the Hamlet of Shirley.
- Onshore Facilities occur within a heavily developed area of Suffolk County. This development is largely suburban in nature as the PAPE passes through, or near, a number of residential communities including the Hamlets of Mastic Beach, Shirley, Medford, Farmingville, and Holtsville. These communities are characterized by uniformly subdivided neighborhoods consisting of tightly-spaced homes situated along rectilinear road networks. Outside of these residential areas, development is largely commercial in nature with numerous stores, businesses, and companies that sustain the residents of these communities. The heavily developed nature of the Onshore Facilities' vicinity has caused extensive disturbance throughout the PAPE. See Section 3.3 below for a more detailed discussion of prior ground disturbance within the PAPE.

- Although, large tracts of undeveloped land are becoming increasing scare in the vicinity of the Onshore Facilities, portions of the eastern half of the PAPE remain relatively undeveloped. Much of this land is contained within the bounds of the Wertheim National Wildlife Refuge and is characterized by mixed deciduous and coniferous forests bisected by the Carmans River and its tributaries, which flow through a complex of fresh and saltwater wetlands. Outside of the Refuge, vegetation within the PAPE largely consists of residential and commercial lawns and landscaped gardens, grassy and scrubby roadside shoulder areas, and small patches of undeveloped mixed deciduous and coniferous woodland.

3.0 ARCHAEOLOGICAL SENSITIVITY ASSESSMENT

3.1 Native American Archaeological Sensitivity Assessment

As described in Section 2.3 above, there are eight previously identified archaeological sites with Native American components located within 0.25 mi (0.4 km) of the Onshore Facilities' (see Table 2.3-1; see Figure 2.2-1). Little information regarding these sites is available in CRIS, as most have not been formally investigated or are reported on in little detail. These sites consist of a village (NYSM 4897), a burial (NYSM 4896), and lithic scatters (or presumable lithic scatters due to a lack of information; NYSM 5595, 5596, and 7550; USN 10302.000026, 10302.001580, and 10302.002929), indicating occupation of the landscape at both a transient and intensive scale. [redacted]. It should be noted, however, that NYSM sites depicted in CRIS typically indicate areas of elevated archaeological sensitivity and should not be considered equivalent to formally tested and delineated archaeological sites. See Section 2.3 above for more information related to these sites.

[redacted].

Due to the presence of several previously identified Native American archaeological sites [redacted], the PAPE should be considered to have an elevated sensitivity for the presence of Native American archaeological resources. [redacted]

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[redacted]. Furthermore, historic maps indicate that as late as the mid-twentieth century, much of the Landfall/ICW Study Area was a tidal marsh or inundated by Narrow Bay (see Figures 2.5-2 and 2.5-3). It is not known how long the ICW Work Area on Long Island has been prone to tidal inundation, but it would have been dry land during the terminal Pleistocene and early Holocene.

3.2 Euro-American Archaeological Sensitivity Assessment

As described in Section 2.5 above and illustrated on historic maps (see Figures 2.5-1 to 2.5-3), the surrounding area has an historic-period occupational history since at least the mid-seventeenth century. There are six previously recorded archaeological sites with historic-period components located within 0.25 mi (0.4 km) of the Onshore Facilities (see Table 2.3-1; see Figure 2.2-1). These sites, all of which are associated with former structures (i.e., houses, tavern/store, mill, church, and coast guard station), consist of domestic and/or architectural artifact scatters/remains (USN 10302.000026, 10302.001130, 10302.001570, 10302.001580, 10302.001587, and 10302.002928), ranging from the eighteenth to the twentieth centuries. See Section 2.3 above for more information related to these sites.

[redacted].

During the mid-nineteenth century, although local road networks and rail lines provided greater mobility throughout the Town of Brookhaven, most settlements remained clustered along the North, Middle, and South Country Roads, which ran along the North Shore, interior, and South Shore of the island, respectively. The 1858 Chace et al. *Map of Suffolk County, Long Island, New York* depicts heavily wooded tracts between these three main routes, with cleared land for agriculture surrounding structures and settlements (see Figure 2.5-1). The expanded LIRR, improved roads, and rise of the automobile resulted in an influx of summer visitors to the town's coasts, thereby increasing architectural development such as second homes, resorts, and supporting commercial buildings (Chace et al. 1858; see Figure 2.5-1).

The 1902 *Setauket,* 1904 *Moriches,* 1919 *Setauket*, 1926 *Moriches, NY* USGS 15-minute topographic quadrangle maps depict a similar, scattered pattern of settlement as present during the mid-nineteenth century (see Figure 2.5-2). However, these early-twentieth-century maps indicate increased population density, albeit still relatively light, and the development of a more complex road system over the past half century. These maps also illustrate that during the first quarter of the twentieth century, areas outside of established communities, were sparsely populated with isolated homes located within pockets of cleared land amongst a heavily forested landscape (USGS 1902, 1904, 1919, 1926; see Figure 2.5-2). By the turn of the twentieth century, the majority of roads along which both Onshore Transmission Cable routes are proposed to be sited already existed (USGS 1902, 1904); the main exceptions being the LIE (and LIE Service Road) and William Floyd Parkway.

The 1915 and 1917 Hyde *Atlas of a Part of Suffolk County Long Island, New York* illustrates the Town of Brookhaven's transition from an agricultural community to a burgeoning suburb. While most of the parcels

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remained primarily as family farms, small pockets of uniformly subdivided neighborhoods were scattered throughout the town, such as the Schwenck Land & Investment Co., M.G. Babcock Co., Lakeview Park, Lake Ronkonkoma Estates, and Richton Realty Co. Although the streets were laid out and named, most of these subdivisions lacked residents at this time (Hyde 1915, 1917).

Following World War II, the G.I. Bill's low mortgage rates incentivized home ownership. The popularity of these early, affordable subdivisions is corroborated by the Town of Brookhaven's population spike from 21,847 in 1920 to 109,900 in 1960 and is reflected in mid-twentieth century maps. The *1947 Bellport* and *Patchogue*, *NY* USGS 7.5-minute topographic quadrangle maps depict significant expansion of these residential subdivisions in both scale and density, particularly along the South Shore and the western portion of the Onshore Facilities in the vicinity of Holtsville and Medford. Suburbanization increased rapidly over the next few decades, as illustrated by the 1956 USGS *Bellport, NY, Patchogue, NY,* and *Pattersquash Island, NY* 1:24000 Topographic Quadrangles (see Figure 2.5-3), the 1957 USGS *Moriches, NY* 1:24000 Topographic Quadrangle (see Figure 2.5-3), and the 1967 *Bellport*, Moriches, *Patchogue,* and *Pattersquash Island NY* USGS 7.5-minute topographic quadrangle maps, which depict significant expansion of existing subdivisions and the development of new subdivisions, particularly across the eastern portion of the Onshore Facilities in the vicinity of the Hamlets of Shirley and Mastic Beach. Despite this significant increase in population and density, however, large areas of intervening agricultural and undeveloped land remained in the central portion of the town at this time (USGS 1947a, 1947b, 1956a, 1956b, 1956c, 1957, 1967a, 1967b, 1967c, 1967d; Wunderlich 2005a; see Figure 2.5-3). [redacted] vicinity of the Onshore Facilities, the exception being the Wertheim National Wildlife Refuge.

The historic map review indicates that [redacted], the PAPE should be considered to have an elevated sensitivity for the presence of historic-period archaeological resources. [redacted]. Due to suburbanization, historic-period archaeological sites most likely to be encountered within the PAPE would be associated with early to mid-twentieth century residences. [redacted]. However, relative to the remainder of the PAPE, the Landfall/ICW Study Area (including the Landfall and ICW Work Areas) possesses somewhat reduced historic-period archaeological sensitivity due to the geologically active nature of this coastal setting, [redacted]. Furthermore, as stated above, historic maps indicate that as late as the mid-twentieth century, much of the Landfall/ICW Study Area was a tidal marsh or inundated by Narrow Bay (see Figures 2.5-2 and 2.5-3). It is likely that these conditions extend back to the time of European contact, making it unlikely that historic-period archaeological sites exist in these areas.

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3.3 Prior Ground Disturbance

Previous ground disturbance throughout the Onshore Facilities' vicinity has been intense over the past century, during which a largely wooded environment with scattered farms, villages, and hamlets has transformed into a densely populated and commercially developed sprawling suburban landscape. This transformation occurred relatively quickly and deliberately as developers purchased large tracts of land during the early and mid-twentieth century and constructed uniformly subdivided neighborhoods for a rapidly growing commuter population of middle-class Americans. Development throughout the Onshore Facilities' vicinity continues to the modern day as new residences and businesses are constructed within interstitial pockets of undeveloped land. This development would have significantly disturbed, if not destroyed, any archaeological sites that may have been present within now-developed areas. Limited to the PAPE specifically, this disturbance is predominately the result of road construction and maintenance.

The *NYAC Standards* (NYAC 1994) indicate that Phase I archaeological survey is not necessary in delineated wetlands, inundated terrain, previously disturbed areas, and areas where slopes exceed 12 to 15 percent. Slope is not a significant factor in the archaeological sensitivity of the PAPE as the Onshore Facilities are predominately located across flat to gently sloping terrain.

Prior ground disturbance within the PAPE was recorded by two EDR archaeologists between March 10 and 13, 2020, which included walking or driving along/across the proposed locations of the Onshore Transmission Cable routes, the Union Avenue North Site, and the Landfall and ICW Work Areas to record existing conditions, which were documented by photographs, field notes, and GPS data. The primary goal of the reconnaissance was to identify those areas adjacent to the existing roadway along both Onshore Transmission Cable routes where visible prior ground disturbance (e.g., engineered/artificial landforms, grading, cut and fill, and/or buried utility markers) was evident (and therefore would not require archaeological testing), as well as those areas that appear undisturbed (and therefore would require archaeological testing). Observations of existing conditions within the PAPE are depicted on Figure 2.6-1 and in Appendix A.

Subsequent to the archaeological reconnaissance of the Onshore Transmission Cable routes, Union Avenue North Site, and Landfall and ICW Work Areas, the PAPE for the Onshore Transmission Cable was modified and several new components were added to the Onshore Facilities. These include the Union Avenue South Site, the Onshore Interconnection Cable (and associated trenchless crossing footprints), four Onshore Transmission Cable route variations (and associated trenchless crossing footprints), and trenchless crossing footprints associated with the Onshore Transmission Cable, particularly those for the crossing of the Carmans River. Existing conditions within these additions to the PAPE were determined via desktop assessment based on a combination of historic and modern aerial imagery, digital elevation model (DEM) data, NRCS soil data, and Google Street View, as well as field observations noted within the vicinity of the conducted archaeological reconnaissance fieldwork. Evaluation of the trenchless crossing footprints was not conducted independently as they fall within the PAPE of their associated Onshore Facilities (i.e. Onshore Transmission Cable and Onshore Interconnection Cable).

Existing conditions within the PAPE have been divided into each of the Onshore Facilities and are discussed below. Note that with the one exception, the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes follow the same roads (East Concourse, William Floyd Parkway, Montauk Highway, Yaphank Avenue, Horse Block Road, Long Island Avenue, Middle Avenue, and Union Avenue), overlapping for approximately 12.1 mi (19.5 km). Differences in their routes are located where the Onshore Transmission Cable – LIE Service Road is sited along Manor Road, North Horse Block Road, the LIE Service Road, and

Nicolls Road, while the Onshore Transmission Cable – Peconic Avenue is sited along Peconic Avenue, North Ocean Avenue, and Long Island Avenue instead. This has resulted in similar findings for the two routes.

3.3.1 Onshore Transmission Cable – LIE Service Road

Results of the archaeological reconnaissance and desktop assessment for the 17.5-mi-long (28.2-km-long) Onshore Transmission Cable – LIE Service Road are summarized as follows:

- The large majority of this Onshore Transmission Cable route's PAPE was found to have been previously disturbed, and as such does not warrant archaeological testing (see Figure 2.6-1). In addition to the construction of the roadways themselves that this Onshore Transmission Cable route is sited along, disturbance was also noted in the form of modified/made land associated with road cuts and berms, grading, paving, drainage ditches, buried utilities, rail lines, sidewalks, noise walls, and excavations for groundwater recharge basins (Appendix A: Photographs 1-6). Much of this disturbance is the result of the cable route lying adjacent to the LIE.
- In addition to field observations, the portion of the PAPE running along the LIE Service Road was investigated with historic aerial imagery (Suffolk County 2020) to better determine the extent of prior ground disturbance, particularly within the interchange areas. The Onshore Transmission Cable – LIE Service Road extends from Exit 62 (Nicolls Road interchange), in the west, to Exit 65 (Horse Block Road interchange), in the east, along the LIE. As discussed above, the Suffolk County section of the LIE was constructed between 1963 and 1972. A review of 1978 aerial imagery indicates that relatively little change has occurred across the Exit 62 to 65 stretch of the LIE since its construction. Since this time, the alignment and extent of the LIE, the southern LIE Service Road between Exits 62-63 and 64-65, and Exits 62-64 have remained largely unchanged. Notable alterations since this time include the construction of the southern LIE Service Road between Exits 63 and 64, the widening of the North Ocean Avenue overpass at Exit 63, the addition of ramps to the Exit 65 interchange, and the addition of east and westbound HOV lanes between Exits 62 and 64. However, as discussed above, the expansion of the LIE for the addition of HOV lanes occurred within the median, and as such, did not result in additional ground disturbance within the PAPE. As such, most prior ground disturbance within the PAPE associated with the LIE occurred during its original construction.
- Based on currently available information and observations noted during archaeological reconnaissance, approximately 203.4 acres (82.3 ha) of the PAPE for the Onshore Transmission Cable – LIE Service Road has been previously disturbed, is inundated, or is located on slopes in excess of 12 to 15 percent (much of which is also disturbed). The remaining portions of the PAPE are potentially undisturbed, consisting of undeveloped, or lightly developed, terrain adjacent to existing roadways along this route (Appendix A: Photographs 7-9). See Section 4.1 below for a breakdown of potentially undisturbed terrain.

3.3.2 Onshore Transmission Cable – Peconic Avenue

Results of the archaeological reconnaissance and desktop assessment for the 16.9-mi-long (27.2-km-long) Onshore Transmission Cable – Peconic Avenue are summarized as follows:

- The large majority of this Onshore Transmission Cable route's PAPE was found to have been previously disturbed, and as such does not warrant archaeological testing (see Figure 2.6-1). In addition to the construction of the roadways themselves that this Onshore Transmission Cable route is sited along, disturbance was also noted in the form of modified/made land associated with road cuts

and berms, grading, paving, drainage ditches, buried utilities, rail lines, and sidewalks (Appendix A: Photographs 1-4, 10, and 11).

- Based on currently available information and observations noted during archaeological reconnaissance, approximately 170.4 acres (69.0 ha) of the PAPE for the Onshore Transmission Cable – Peconic Avenue has been previously disturbed, is inundated, or is located on slopes in excess of 12 to 15 percent (much of which is also disturbed). The remaining portions of the PAPE are potentially undisturbed, consisting of undeveloped, or lightly developed, terrain adjacent to existing roadways along this route (Appendix A: Photographs 7, 8, and 12). See Section 4.1 below for a breakdown of potentially undisturbed terrain.

3.3.3 Onshore Transmission Cable Variations

The Onshore Transmission Cable variations (and associated trenchless crossing footprints) were added subsequent to the archaeological reconnaissance. As such, a desktop assessment was conducted to determine the extent of prior disturbance within this area. Historic and modern aerial imagery, DEM data, and Google Street View indicate that the large majority of these variations' PAPE has been previously disturbed, and as such does not warrant archaeological testing (see Figure 2.6-1). In addition to the construction of the roadways themselves that these variations are sited along, disturbance was also noted in the form of grading, paving, buried utilities, rail lines, and sidewalks. Based on currently available information, approximately 7.7 acres (3.1 ha) of the Onshore Transmission Cable variations' PAPE have been previously disturbed or are located on slopes in excess of 12 to 15 percent slope. The remaining portions of the PAPE are potentially undisturbed, consisting of undeveloped, or lightly developed, terrain adjacent to existing roadways along the route of these variations. See Section 4.1 below for a breakdown of potentially undisturbed terrain.

3.3.4 Union Avenue Site

- **Union Avenue North Site:** Restricted access in the vicinity of this site, due to a nearby New York Power Authority generation facility, prevented archaeological reconnaissance across most of the proposed Union Avenue North Site, which is bound to the north by woodland and industrial development; to the east by woodland; to the west by a New York Power Authority generation facility; and to the south by Union Avenue and commercial development (see Figure 2.6-1). A desktop assessment was therefore conducted to supplement field observations. Historic and modern aerial imagery and DEM data reveal that approximately 4.1 acres (1.7 ha) of the proposed Union Avenue North Site have been previously disturbed by earthmoving activities associated with the adjacent generation facility (see Figure 2.6-1). The remaining 3.8 acres (1.5 ha) of the proposed Union Avenue North Site have largely remained as undeveloped woodland since at least the mid-twentieth century (Appendix A: Photograph 13), [redacted]. As such, this area is potentially undisturbed (see Figure 2.6-1).
- **Union Avenue South Site:** This site was added subsequent to the archaeological reconnaissance. As such, a desktop assessment was conducted to determine the extent of prior disturbance within this area, which is bound to the north by Union Avenue and woodland; to the east by commercial development; to the south by the LIRR and industrial development; and to the west by industrial development (see Figure 2.6-1). Aerial imagery reveals that the entirety of the 8-acre (3.2-ha) Union Avenue South Site has been previously disturbed. This location appears to have been used for agricultural purposes as late as the mid-twentieth century before undergoing commercial development in the late twentieth century (Suffolk County 2020). Currently, the Union Avenue South Site is entirely

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covered by large buildings and asphalt or concrete pavement, as well as construction equipment and materials (see Figure 2.6-1).

3.3.5 Onshore Interconnection Cable

The Onshore Interconnection Cable (and associated trenchless crossing footprints) were added subsequent to the archaeological reconnaissance. As such, a desktop assessment was conducted to determine the extent of prior disturbance within this area. Historic and modern aerial imagery, DEM data, and Google Street View indicate that the large majority of the PAPE for the Onshore Interconnection Cable (and associated trenchless crossing footprints) has been previously disturbed, and as such does not warrant archaeological testing (see Figure 2.6-1). Disturbance was noted in the form of modified/made land associated with the LIE and substations, as well as roadways, access roads, grading, paving, buried and overhead utilities, sidewalks, and noise walls. Based on currently available information, approximately 25.9 acres (10.5 ha) of the PAPE for the Onshore Interconnection Cable (and associated trenchless crossings) have been previously disturbed or are located on slopes in excess of 12 to 15 percent slope (see Figure 2.6-1). [redacted], the remaining 12.0 acres (4.9 ha) of the proposed PAPE have largely remained as undeveloped woodland since at least the mid-twentieth century, with the exception of scrubby areas within an overhead powerline corridor (Suffolk County 2020). As such, this area is potentially undisturbed (see Figure 2.6-1).

3.3.6 Landfall and ICW Work Areas

The entirety of the PAPE for both the Landfall and ICW Work Areas on Fire Island and Long Island was found to be previously disturbed (see Figure 2.6-1). On Fire Island, the Landfall and ICW Work Areas have been disturbed by extensive grading activities associated with the construction of the large Smith Point County Park parking lot, William Floyd Parkway, Fire Island Beach Road, and athletic fields (Appendix A: Photographs 14 and 15). Historic maps and aerial imagery indicate that as last as 1956 (USGS 1956c), much of the Landfall Work Area was inundated by Narrow Bay and much of the ICW Work Area on Fire Island was a tidal marsh, indicating that sediment was deposited across this area for construction of the Smith Point County Park parking lot and athletic fields. This is indicated by soil mapping which depicts the large majority of the Landfall Work Area and ICW Work Area on Fire Island as “Fill land, dredged material (Fd)” and “Urban land (Ur)” (ESRI and NRCS 2020). Grading disturbance associated within this construction is visible in 1962 aerial imagery (Suffolk County 2020). Furthermore, one of the archaeological management plans completed for the FINS indicates that the entirety of the Landfall and ICW Work Areas on Fire Island have been extensively disturbed by the deposition and grading of dredged spoil materials and construction of parking lots, buildings, and the William Floyd Parkway Bridge (GP 2005:63, 71-72).

The ICW Work Area on Long Island was also found to be extensively disturbed by grading activities and the construction of a parking lot and road (Appendix A: Photograph 16). This disturbance is likely the result of transforming this former tidal marsh into dry land, which appears to have been achieved through the deposition of dredged spoil material, as evidenced by anthropogenic alteration of this landform and its shoreline as depicted in historic maps (USGS 1956b, 1967d) and the soil mapping of this area as “Fill land, dredged material (Fd)” (ESRI and NRCS 2020). Aerial imagery from 1962 to 2001 depicts grading disturbance across the entire ICW Work Area on Long Island (Suffolk County 2020). Large spoil piles along the eastern margin of East Concourse and parking lot within the ICW Work Area on Long Island corroborate the extensive amount of spoil deposition and grading activities that occurred throughout this area.

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4.0 ARCHAEOLOGICAL RESOURCES SURVEY RESEARCH DESIGN

4.1 Phase IB Archaeological Survey Recommendations

As discussed in Section 3.3 above, the results of the archaeological reconnaissance indicate that the large majority of the PAPE has been previously disturbed. However, portions of the PAPE for the Onshore Transmission Cable, Onshore Transmission Cable variations, Union Avenue North Site, and Onshore Interconnection Cable are located on potentially undisturbed terrain. In order to identify any archaeological sites that could be disturbed by Onshore Facility-related construction, a Phase IB archaeological survey is proposed only in those areas which have been identified as potentially undisturbed (see Figure 2.6-1). Note that the archaeological testing plan presented herein is preliminary in nature and is based on available sources of information that have been reviewed to date, in addition to observations noted in the field. To further refine the evaluation of areas where Phase IB archaeological survey (i.e., shovel testing) may be appropriate, EDR anticipates reviewing additional sources of information, such as utility data shapefiles, and/or as-built road plans to further refine evaluation of prior disturbance within the PAPE. Therefore, the anticipated scope of Phase IB archaeological survey fieldwork will continue to be refined concurrent with potential refinement of the Onshore Facility designs and revisions to the APE.

To evaluate and define potential Phase IB fieldwork efforts (i.e., number of shovel tests), areas identified as potentially undisturbed within the PAPE were classified as either "Linear" or "Block." Portions of the PAPE classified as "Linear" consist of narrow (50 ft [15 m] or less) areas along existing roadways between the edge of pavement and road right-of-way boundary, while portions of the PAPE classified as "Block" consist of wider (more than 50 ft [15 m]) and/or irregular areas along existing roadways between the edge of pavement and road right-of-way boundary. "Linear" areas would be surveyed via a single transect of shovel tests spaced every 50 ft (15 m) if only one side of the roadway was deemed potentially undisturbed or if both sides were deemed potentially undisturbed but were more than 50 ft (15 m) apart. "Linear" areas would be surveyed on a single staggered-transect on either side of the roadway (i.e., spaced every 100 ft [30 m] on a single side of the road) if both sides of the roadway were deemed potentially undisturbed and less than 50 ft (15 m) apart. "Block" areas would be surveyed via a grid of shovel tests at 50-ft (15-m) intervals, or 16 shovel tests per acre. Table 4.1-1 presents the amount of potential "Linear" and "Block" testing relative to the Onshore Facilities.

Table 4.1-1. Potential Phase IB Fieldwork Efforts by Onshore Facility.

Onshore Facility	Linear (Feet/Meters)	Block (Acres/Hectares)
Onshore Transmission Cable – LIE Service Road	36,847 / 11,231[1]	4.0 / 1.6[2]
Onshore Transmission Cable – Peconic Avenue	33,818 / 10,308[1]	4.0 / 1.6[2]
Onshore Transmission Cable Variations	4,379 / 1,335	0.3 / 0.1
Union Avenue North Site	N/A	3.8 / 1.5
Union Avenue South Site	None planned	None planned
Onshore Interconnection Cable	5,127 / 1,563	7.4 / 3.0
Landfall Work Area	None planned	None planned
ICW Work Area	None planned	None planned

[1] Approximately 24,237 linear ft (7,387 m) are located within overlapping portions of the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes.
[2] All 4.0 acres (1.6 ha) are located within overlapping portions of the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes.

No archaeological survey is recommended for those portions of the PAPE that overlap with Phase IB archaeological testing conducted for prior surveys. [redacted].

4.2 Phase IB Archaeological Survey Methodology

Because the Onshore Transmission Cable is proposed to be buried underneath active, public roadways, archaeological testing will be conducted within unpaved portions of the road rights-of-way, along shoulder areas adjacent to the pavement as removing the pavement to conduct archaeological testing prior to construction is not feasible, given the expenses and logistical arrangements that would be required (e.g., the need for re-routing traffic and potentially emergency vehicles). Phase IB archaeological survey will be limited to shovel testing as no portions of the PAPE are suitable for pedestrian surface survey. Shovel testing is only proposed for those areas identified during the archaeological reconnaissance and desktop assessment as potentially undisturbed. These areas do not include wetlands, inundated terrain, or slopes in excess of 12 to 15 percent slope, as these areas are not required under the *NYAC Standards* (NYAC 1994). The archaeological fieldwork is anticipated to include the following:

- As noted above, the archaeological testing plan presented herein is preliminary in nature and is based on currently available sources of information and observations in the field. Prior to commencement of fieldwork, additional sources of information will be reviewed as they become available and appropriate revisions made to the necessary fieldwork effort (i.e., number of shovel tests).
- Prior to initiating the archaeological fieldwork, New York 811 will be contacted to request a utility mark-out. The utility mark-out will enable the archaeologists to avoid excavation in the area of existing utilities and help identify previously disturbed areas where no archaeological work is necessary.
- The archaeological survey will consist of the hand excavation of shovel test pits at 50-ft (15-m) intervals adjacent to one or both sides of roadways along the Onshore Transmission Cable routes and Onshore Transmission Cable variations, as well as the Union Avenue North Site and Onshore Interconnection Cable, within areas that have been identified as potentially undisturbed. If both sides of a roadway are potentially undisturbed and less than 50 ft (15 m) apart, shovel test pits will be staggered on either side of the road (i.e., not directly across from one another) to increase coverage. For portions of the PAPE for the Union Avenue North Site, Onshore Interconnection Cable, Onshore Transmission Cable routes, and Onshore Transmission Cable variations which are wider than 50 ft (15 m), shovel tests will be excavated on a 50-by-50-ft (15-by-15-m) grid.
- Shovel tests will measure approximately 12 to 20 inches (30 to 50 centimeter [cm]) in diameter and be excavated to a depth of at least 4 inches (10 cm) into a sterile subsoil stratum or to the limits of practical hand excavation (typically 3 to 4 ft [0.9 to 1.2 m] below the ground surface). No machinery or heavy equipment will be use during excavation. Each shovel test will be identified with standard

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provenience information consisting of a Survey Area number followed by a period and sequential shovel test number (e.g., Shovel Tests A.01, A.02, B.01, B.02, etc.). The locations of all shovel tests will be recorded with professional-grade GPS equipment and noted on field maps. Stratigraphic profiles, including depth, soil color, and texture, for all shovel tests will be recorded on standardized field record forms.

- All soils excavated from shovel tests will be screened through 0.25 inch (0.6 cm) mesh hardware cloth over tarps (to avoid leaving soil piles) to allow for the identification of artifacts. The presence of clearly modern materials, such as plastic fragments, modern bottle glass fragments, or twentieth-century architectural materials in shovel tests will be noted on field forms, but these materials will not be collected for subsequent analysis. If any Native American or potentially significant historic-period artifacts are recovered from shovel tests, these finds will be placed in plastic bags labeled with standard Project and provenience information. All shovel tests will be backfilled immediately upon completion. The backfilled soils will be hand-tamped to match the pre-existing grade to minimize any post-excavation settling. All shovel tested areas will be restored to match pre-existing conditions.
- Shovel test excavation within residential yards will be avoided to the greatest extent practicable. However, if shovel tests must be excavated within residential yards (but still within road rights-of-way), sod caps will be removed in one piece and then placed back on top of the backfilled shovel test following excavation to minimize visible disturbance to yard areas and, to the extent possible, return them to their original condition.
- If artifacts or other archaeological materials (e.g., lithic artifacts/stone tools, projectile points, pottery sherds, indications of a former building) are recovered from shovel tests, then additional shovel tests at closer intervals may be excavated within adjacent portions of road rights-of-way, to determine if an archaeological site is present. If Native American artifacts are recovered from an isolated shovel test, then up to eight additional shovel tests will be excavated at 3- and 10-ft (1- and 3-m) intervals around the original shovel test to determine whether the artifacts represent an isolated find or may indicate the presence of a more substantial archaeological site. If any archaeological finds are observed, these will be collected and returned to the archaeologists' laboratory facility where they will be washed, rebagged in labeled, clean, 4-mil. archival quality plastic bags, and inventoried accordance with the *NYAC Standards* (NYAC 1994).
- A complete inventory of all archaeological finds will be included in the Phase IB archaeological survey technical report, which will be provided to appropriate federal, state, and/or local agencies and interested parties. This technical report will be marked "confidential – not for public disclosure" if it contains locational information for archaeological resources that may be placed at risk by disclosure. If requested by the Town of Brookhaven and Section 106 consulting parties, non-confidential, public versions of the report will be made available. The report will be prepared in accordance with applicable portions of the NYSHPO's *Phase I Archaeological Report Format Requirements* (NYSHPO 2005).
- Following the acceptance of the Phase IB archaeological survey technical report, the artifacts will be permanently curated at the facilities of The Public Archaeology Laboratory, Inc. (PAL) located at 26 Main Street, Pawtucket, Rhode Island 02860.

5.0 SUMMARY AND CONCLUSIONS

5.1 Summary of Phase IA Archaeological Survey

Relative to the potential for archaeological sites to be located in the PAPE, the results of the Phase IA archaeological survey can be summarized as follows:

- [redacted].
- [redacted].
- [redacted].
- [redacted] PAPE should be considered to have an elevated sensitivity for the presence of historic-period archaeological resources.
- An archaeological reconnaissance and desktop assessment of the Onshore Facilities was conducted to determine the extent of previous disturbance within the PAPE. This reconnaissance and desktop assessment found that the large majority of the PAPE, including the entirety of the Union Avenue South Site, Landfall Work Area, and ICW Work Area, has been previously disturbed by road construction and maintenance, modified/made land associated with road cuts and berms, grading, paving, drainage ditches, buried utilities, rail lines, sidewalks, noise walls, and excavations for groundwater recharge basins.
- The archaeological reconnaissance and desktop assessment identified portions of the PAPE for the Onshore Transmission Cable, Onshore Transmission Cable variations, Union Avenue North Site, and Onshore Interconnection Cable which are potentially undisturbed, as they are located on undeveloped, or lightly developed, terrain.

5.1 Summary of Phase IB Archaeological Survey Research Design

Based on the results of the archaeological reconnaissance, it is the opinion of EDR that the majority of the PAPE does not warrant archaeological testing due to prior ground disturbance. EDR recommends that archaeological testing only be conducted within those portions of the PAPE that have been identified as potentially undisturbed and have not been submitted to shovel testing by previous archaeological surveys.

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Please note that the Onshore Facility designs may be revised based on site selection and final design; as such, the anticipated scope of Phase IB archaeological survey fieldwork will continue to be refined concurrent with further development of the Onshore Facility designs and revisions to the PAPE.

Based on the current Onshore Facility designs, it is anticipated that the Phase IB archaeological survey will include:

- The excavation of shovel tests along approximately 36,847 linear ft (11,231 linear m) of roadside areas and across 4.0 acres (1.6 ha) of potentially undisturbed terrain adjacent to existing roadways for the Onshore Transmission Cable – LIE Service Road.
- The excavation of shovel tests along approximately 9,581 linear ft (2,920 linear m) of roadside areas for the Onshore Transmission Cable – Peconic Avenue, where this route does not follow the same route as the Onshore Transmission Cable – LIE Service Road.
- The excavation of shovel tests along approximately 4,379 linear ft (1,335 linear m) of roadside areas and across 0.3 acres (0.1 ha) of potentially undisturbed terrain adjacent to existing roadways for the Onshore Transmission Cable variations.
- The excavation of shovel tests across 3.8 acres (1.5 ha) of potentially undisturbed terrain for the Union Avenue North Site.
- The excavation of shovel tests along approximately 5,127 linear ft (1,563 linear m) and across 7.4 acres (3.0 ha) of potentially undisturbed terrain for the Onshore Interconnection Cable.
- Preparation of a Phase IB archaeological survey report (or reports), to be submitted to NYSHPO via the CRIS website. The report (or reports) will be prepared in accordance with applicable portions NYSHPO's *Phase I Archaeological Report Format Requirements* (NYSHPO 2005).
- Submission of site information for any identified archaeological sites via the CRIS website.

Note that the archaeological testing plan presented herein is preliminary in nature and is based on available sources of information that have been reviewed to date, in addition to observations noted in the field. To further refine the evaluation of areas where Phase IB archaeological survey (i.e., shovel testing) may be appropriate, EDR anticipates reviewing additional sources of information, such as utility data shapefiles and/or as-built road plans, to further refine evaluation of prior disturbance within the PAPE prior to commencement of Phase IB testing. Therefore, the anticipated scope of Phase IB archaeological survey fieldwork will continue to be refined concurrent with potential refinement of the Onshore Facility designs and revisions to the PAPE.

EDR provided this research design to NYSHPO in advance of conducting the Phase IB archaeological survey to confirm the anticipated field methodology for the Onshore Facilities and to ensure that the proposed scope of the survey is consistent with NYSHPO's expectations.

6.0 REFERENCES

Adcock, S. 2008. "The Age of the Auto." *Newsday* online edition. November 22, 2008. Available at https://web.archive.org/web/20081122144254/http:/www.newsday.com/community/guide/lihistory/ny-history-hs701a%2C0%2C6567870.story. (Accessed September 2017).

AKRF, Inc. (AKRF). 2009. *Phase 1B Archaeological Field Testing Report Addendum, National Grid Caithness Gas Transmission Main, Holtsville Segment, Town of Brookhaven, Suffolk County, New York.* Report prepared for National Grid Energy by AKRF, New York, NY.

Ales, M. 1993. "A History of the Indians of Montauk, Long Island." In *The History and Archaeology of the Montauk, Volume Three, Second Edition*, Gaynell Stone, ed. Stony Brook, NY: Suffolk County Archaeological Association and Nassau County Archaeological Committee.

Balco, Greg, Paul Bierman, and Joerg Schaefer. 2015. "Intercalibrated Radiocarbon and Exposure-Age Chronologies for the Last Glacial Maximum and Initial Deglaciation in Southern New England." Paper presented at the Annual Conference of the Northeast Section of the Geological Society of America. March, 2015. Available at http://noblegas.berkeley.edu/~balcs/transfer/Balco-2015-03-NEGSA.pdf. (Accessed September 2017).

Bang, H.R. 1981. *The Story of…the Fire Island Light*. H.R. Bang, Long Island, New York.

Barcell, E. 1999. *17th Century Indian Forts: Southern New England and Coastal New York*. Exhibit on display at the Southold Indian Museum, Southold, NY.

Bayles, R.B. 1874. *Historical and Descriptive Sketches of Suffolk County, and Its Towns, Villages, Hamlets, Scenery, Institutions, and Important Enterprises; With A Historical Outline of Long Island, From Its First Settlement by Europeans*. Richard M. Bayles, Port Jefferson, NY.

Beers, F.W. 1873. *Atlas of Long Island, New York*. Beers, Comstock & Cline, New York. David Rumsey Historical Map Collection. Available at https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~217374~5503560:New-York-?sort=Pub_List_No_InitialSort%2CPub_Date%2CPub_List_No%2CSeries_No&qvq=w4s:/where%2FNew%2BYork;q:New%20York%20State;sort:Pub_List_No_InitialSort%2CPub_Date%2CPub_List_No%2CSeries_No;lc:RUMSEY~8~1&mi=20&trs=420#. (Accessed March 2020).

Bernstein, D.J. and M.J. Lenardi. 2005. "Glacial Erratics as Sources of Lithic Raw Material: The McGregor Site on Long Island, New York." *Lithic Technology* 30(2):145-154.

Bradley, A., W. Harrison, and W. Barker. 1804. *Map of the United States, Exhibiting the Post-Roads, the Situations, Connections & Distances of the Post-Offices, Stage Roads, Counties & Principal Rivers*. Abraham Bradley, Philadelphia. Library of Congress, Geography and Map Division, Washington, D.C. Available at https://www.loc.gov/item/2015591091/. (Accessed March 2020).

Braun, D.P. 1974. "Explanatory Models for the Evolution of Coastal Adaptation in Prehistoric Eastern New England." *American Antiquity* 39(4):582-596.

Burr, D.H. 1829. *Map of the County of Suffolk*. David H. Burr, New York. David Rumsey Historical Map Collection. Available at https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~20008~510004:Suffolk-County-?sort=Pub_List_No_InitialSort%2CPub_Date%2CPub_List_No%2CSeries_No&qvq=w4s:/who%2FBurr%25252C%2BDavid%2BH.%25252C%2B1803-1875%2Fwhere%2FNew%2BYork;q:new%20york%20state;sort:Pub_List_No_InitialSort%2CPub_Date%2CPub_List_No%2CSeries_No;lc:RUMSEY~8~1&mi=8&trs=65. (Accessed March 2020).

Burr, D.H. 1839. *Map of New York Exhibiting the Post Offices, Post Roads, Canals, Rail Roads &c.* David H. Burr, London. Library of Congress, Geography and Map Division. Available at https://www.loc.gov/item/98688518/. (Accessed March 2020).

Burr, D.H. 1840. *Map of the County of Suffolk*. Stone and Clark Republishers, Ithaca, NY. David Rumsey Historical Map Collection. Available at https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~296700~90068099:Map-of-the-County-of-Suffolk--New-Y. (Accessed March 2020).

Button, E. 2014. "A Family Affair: Whaling as Native American Household Strategy on Eastern Long Island, New York." *Northeast Historical Archaeology* 43.

Chace, J., J. Douglass, and R.P. Smith. 1858. *Map of Suffolk Co., L.I., New York*. John Douglass, Philadelphia. Library of Congress, Geography and Map Division. Available at https://www.loc.gov/item/2013593235/. (Accessed March 2020).

Chrysalis Archaeological Consultants, Inc. (CAC). 2018. *Phase IB Field Test Report, Forge River Watershed Sewer Project, Town of Brookhaven, (Suffolk County), New York*. Report prepared for Governor's Office of Storm Recovery by CAC, Brooklyn, NY.

Clark, P.U., A.S. Dyke, J.D. Shakun, A.E. Carlson, J. Clark, B. Wohlfarth, J.X. Mitrovica, S.W. Hosteltler, and A.M. McCabe. 2009. "The Last Glacial Maximum." In *Science* 325(5941):710-714.

Clowes, E.S. 1939. *The Hurricane of 1938 on Eastern Long Island*. Hampton Press, Bridgehampton, NY.

Covens Et Mortier Et Covens, Jr., H. Klockhoff, and B. Romans. 1780. *Connecticut and Parts Adjacent*. Amsterdam. Library of Congress, Geography and Map Division, Washington, D.C. Available at https://www.loc.gov/item/73691554/. (Accessed March 2020).

Cox, J.L. 1998. *Research on Shipwrecks in the Near Shore Area Fire Island Inlet to Montauk Point Long Island, Suffolk County, New* York: Interim Project Fire Island Inlet to Moriches Inlet. Unpublished client report, The Greeley-Polhemus Group, Inc. and Dolan Research, Inc., Philadelphia

Crease, Robert. 2005. "Brookhaven National Laboratory." In *The Encyclopedia of New York State*. Peter Eisenstadt, ed. Syracuse, NY: Syracuse University Press. pp. 218.

DeWitt, S. 1804. *A Map of the State of New York*. S. DeWitt, New York. David Rumsey Historical Map Collection. Available at https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~2487~220057:A-Map-of-the-State-Of-New-York-?sort=Pub_List_No_InitialSort%2CPub_Date%2CPub_List_No%2CSeries_No&qvq=w4s:/who%2FDeWitt%25252C%2BSimeon;q:new%20york%20state;sort:Pub_List_No_InitialSort%2CPub_Date%2CPub_List_No%2CSeries_No;lc:RUMSEY~8~1&mi=1&trs=2. (Accessed March 2020).

Eastern Roads. 2018. *Long Island Expressway Historical Overview*. Available at http://www.nycroads.com/roads/long-island/. (Accessed May 2020).

Engelhart, S.E., B.P. Horton, and A.C. Kemp. 2011. "Holocene Sea Level Changes Along the United States' Atlantic Coast." *Oceanography* 24(2):70-79.

Environmental Systems Research Institute (ESRI) and Natural Resources Conservation Service (NRCS). 2020. SSURGO Soil Data Downloader: Southern Long Island Subbasin Soils. Available at https://landscapeteam.maps.arcgis.com/home/webmap/viewer.html?webmap=e28dd05eb144481b90d39e9ec573ad92. (Accessed April 2020).

Fletcher, L. and E. Kintz. 1979. *Historic Resource Study: Fire Island National Seashore, Long Island, N.Y.* Prepared by Fletcher and Kintz for the National Park Service, North Atlantic Regional Office, Division of Cultural Resources.

French, J.H. 1860. *Gazetteer of the State of New York: Embracing A Comprehensive View of the Geography, Geology, and General History of the State, and A Complete History and Description of Every County, City, Town, Village, and Locality*. Pearsall Smith, Syracuse, NY.

Fitting, J.E. 1978. "Regional Cultural Development 300 B.C. to A.D. 1000." In *Smithsonian Handbook of North American Indians Vol 15 Northeast*, pp. 44-57, Bruce Trigger, ed. Smithsonian Institution Press, Washington, D.C.

Fuller, Myron L. 1914. *The Geology of Long Island, New York*. Professional Paper 82, Department of the Interior, United States Geological Survey, Washington, D.C.

Goggins, Francis V. 1952. The Great South Beach before 1910. Mimeograph in the files of the Marine Museum, West Sayville, NY.

Gonzalez, E.B. 1982. *Storms, Ships & Surfmen: The Life-Savers of Fire Island*. Eastern National Park & Monument Association, NY.

Goodman, L. 2005. "Long Island Expressway." In *The Encyclopedia of New York State*. Peter Eisenstadt, ed. Syracuse, NY: Syracuse University Press. pp. 925-926.

Gornitz, Vivien. 2007. "Sea Level Rise, After the Ice Melted and Today." National Aeronautics and Space Administration, Goddard Institute for Space Studies, Science Briefs. Available at https://www.giss.nasa.gov/research/briefs/gornitz_09/. (Accessed September 2017).

Gray & Pape, Inc. (GP). 2005. *Archeological Overview and Assessment of the Fire Island National Seashore, Suffolk County, New York*. Report prepared for Vector Resources, Inc. by GP, Richmond, VA.

Hartgen Archeological Associates, Inc. (HAA). 2005. *Phase IA Archeological Sensitivity Assessment, IGTS Brookhaven Lateral Project, Towns of Brookhaven, Islip, and Smithtown, and the Village of Islandia, Suffolk County, New York*. Report prepared for Iroquois Gas Transmission System by HAA, Albany, NY.

Historical Perspectives, Inc. (HP). 2010. *Phase IA Archaeological and Historic Resources Assessment, Yaphank County Center, Areas A, B, C, D, E and F, Yaphank, Town of Brookhaven, Suffolk County, New York*. Report prepared for Cameron Engineering & Associates, LLP by HP, Westport, CT.

Hyde, M.B. 1915. *Atlas of a Part of Suffolk County, Long Island, New York.* E. Belcher Hyde, New York. New York Public Library Digital Collections, Lionel Pincus and Princess Firyal Map Division, NY. Available at https://digitalcollections.nypl.org/items/510d47e4-3ade-a3d9-e040-e00a18064a99. (Accessed March 2020).

Hyde, M.B. 1917. *Atlas of a Part of Suffolk County, Long Island, New York.* E. Belcher Hyde, New York. New York Public Library Digital Collections, Lionel Pincus and Princess Firyal Map Division, NY. Available at https://digitalcollections.nypl.org/items/510d47e4-3b2f-a3d9-e040-e00a18064a99. (Accessed March 2020).

Louis Berger Group (LBG). 2016. *Phase IA Archaeological Sensitivity Assessment, Forge River Watershed Sewer Project, Town of Brookhaven, Suffolk County, New York*. Report prepared for Governor's Office of Storm Recovery by LBG, Albany, NY.

Johnson, S. 2005. "Brookhaven." In *The Encyclopedia of New York State*. Peter Eisenstadt, ed. Syracuse, NY: Syracuse University Press. pp. 218.

Klein, D. 1990. "The Voluntary Provision of Public Goods? The Turnpike Companies of Early America." In *Economic Inquiry* Vol. XXVIII: 788-812.

Klein, D. and J. Majewski. 2008. "Turnpikes and Toll Roads in Nineteenth-Century America." In *Economic History Association EH.Net Encyclopedia*, Robert Whaples, ed. Available at http://eh.net/encyclopedia/turnpikes-and-toll-roads-in-nineteenth-century-america/. (Accessed March 2020).

Lightfoot, K.G. and R.M. Cerrato. 1988. "Prehistoric Shellfish Exploitation in Coastal New York." In *Journal of Field Archaeology* 15(2):141-149.

Kroplick, Howard and Dana Kroplick. 2012a. "Mystery Friday Foto #45 Still Open for Discussion: A Motor Parkway Bridge Built on a Curve". *Vanderbilt Cup Races*. Available at https://www.vanderbiltcupraces.com/blog/article/mystery_friday_foto_45_a_motor_parkway_bridge_built_on_a_curve. (Accessed May 2020).

Kroplick, Howard and Dana Kroplick. 2012b. "Exclusive: 1956 Aerial Views of the Construction of the Long Island Expressway in Lake Success". *Vanderbilt Cup Races*. Available at https://www.vanderbiltcupraces.com/blog/article/construction_of_the_long_island_expressway_in_lake_success_in_october_1956. (Accessed May 2020).

Merguerian, Charles and John E. Sanders. 2010. *Trips on the Rocks Guide 13: Glacial Geology of Long Island New York*. Trip 15: November 17-18, 1990 and Trip 39: June, 1996. Duke Geological Laboratory, Durham, NC.

Montaukett Indian Nation. 2015. *History Overview*. Available at http://montaukett.org/?page_id=22. (Accessed September 2017).

Munsell, W.W. 1882. *History of Suffolk County, New York, with Illustrations, Portraits, & Sketches of Prominent Families and Individuals*. W.W. Munsell & Co., New York, NY.

National Park Service (NPS). 2017. *Geology of the Atlantic Coastal Plain*. NPS, Washington, D.C. Available at https://www.nps.gov/cue/geology/geo_coastalplain.htm. (Accessed September 2017).

NPS. 2020. *Fire Island*. NPS, Washington, D.C. Available at https://www.nps.gov/fiis/index.htm. (Accessed May 2020).

Natural Resources Conservation Service (NRCS). 2020. *Web Soil Survey*. United States Department of Agriculture, Washington, D.C. Available at https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. (Accessed April 2020).

New York Archaeological Council (NYAC). 1994. *Standards for Cultural Resources Investigations and the Curation of Archaeological Collections in New York* State. New York State Historic Preservation Office, Waterford, NY.

New York City Department of Parks & Recreation (NYCDPR). 2001. *Long Island Expressway*. NYCDPR, New York, NY. Available at https://www.nycgovparks.org/about/history/historical-signs/listings?id=12404. (Accessed May 2020).

New York State Historic Preservation Office (NYSHPO). 2005. *New York State Historic Preservation Office (NYSHPO) Phase I Archaeological Report Format Requirements*. NYSHPO, Waterford, NY.

New York State Museum (NYSM). 2010. *Cultural Resources Reconnaissance Survey Report, PIN 0059.08, NYS Route 27 from NYS Route 112 to Wading River Road, Town of Brookhaven, Suffolk County, New York, Volume I: Archaeological Reconnaissance Survey*. Report prepared for NYSDOT by NYSM, Albany NY.

Old South Haven Presbyterian Church. 2012. *The History of the Old South Haven Church*. Old South Haven Presbyterian Church, Brookhaven, NY. Available at http://oldsouthhavenchurch.org/history/history.htm. (Accessed April 2020).

Palmer, W.R. 1959. “Early American Whaling.” In *The Historian* 22(1):1-8.

Panamerican Consultants, Inc. (PC). 1999. *Remote Sensing Survey, Tidal Zone and Near Shore Project Area, Atlantic Coast of Long Island, Fire Island Inlet to Moriches Inlet, Fire Island, Suffolk County, New York, Interim Project, Draft Report*. Report prepared for U.S. Army Corps of Engineers by PC, Memphis, TN.

PC. 2003. *Remote Sensing Survey, Tidal Zone and Near Shore Project Area, Atlantic Coast of Long Island, Fire Island Inlet to Moriches Inlet, Fire Island, Suffolk County, New York, Interim Project, Final Report*. Report prepared for U.S. Army Corps of Engineers by PC, Memphis, TN.

Parker, A. C. 1922. *The Archaeological History of New York State, Part 2*. New York State Museum Bulletin Nos. 237 and 238. The University of the State of New York, Albany, NY.

Public Archaeology Laboratory, Inc. (PAL). 2011. *Archaeological Phase I Survey and Limited Phase II Testing, Trails and Viewing Platforms, Wertheim National Wildlife Refuge, Brookhaven, New York*. Report prepared for U.S. Fish and Wildlife Service by PAL, Pawtucket, RI.

RBA Group, Inc. (RBAG). 2012. *Phase I Archaeological Survey, River Road Path, Town of Brookhaven, Suffolk County, New York*. Report Prepared for Town of Brookhaven by RBAG, Melville, NY.
Ritchie, W.A. 1959. "The Stony Brook Site and Its Relation to Archaic and Transitional Cultures of Long Island." In *New York State Museum and Science Service Bulletin 372*. The University of the State of New York, Albany, NY.

Ritchie, William A. 1959. The Stony Brook Site and Its Relation to Archaic and Transitional Cultures of Long Island*. New York State Museum and Science Service Bulletin 372*. The University of the State of New York, Albany, NY.

Ritchie, W.A. and R. Funk. 1973. *Aboriginal Settlement Patterns in the Northeast*. The University of the State of New York, New York State Museum & Science Service, Albany, NY.

Ross, P. 1902*. A History of Long Island, New York, From Its Earliest Settlement to the Present Time*. Lewis Publishing Company, New York, NY.

Ruff, J. 2005. "Fire Island." In *The Encyclopedia of New York State*. Peter Eisenstadt, ed. Syracuse, NY: Syracuse University Press. pp. 565-566.

Salwen, B. 1962. "Sea Levels and Archaeology in the Long Island Indians." In *American Antiquity* 28(1):46-55.

Salwen, B. 1978a. "Indians of Southern New England and Long Island: Early Period." In *Smithsonian Handbook of North American Indians Vol 15 Northeast*, pp. 160-176, Bruce Trigger, ed. Smithsonian Institution Press, Washington, D.C.

Salwen, B. 1978b. "Indians of Southern New England and Long Island: Late Period." In *Smithsonian Handbook of North American Indians Vol 15 Northeast*, pp. 177-189, Bruce Trigger, ed. Smithsonian Institution Press, Washington, D.C.

Sanders, J. E., and N. Kumar. 1971. *Washover Erosion: Important Process in Creating Bays of Digitate Spit, Democrat Point, Fire Island, Long Island, New York*. Geological Society of America Abstracts with Programs 3:53-54.

Soil Conservation Service (SCS). 1975. *Soil Survey of Suffolk County, New York*. United States Department of Agriculture, SCS, Washington, D.C.

Stanford, D.J. and B.A. Bradley. 2012. *Across Atlantic Ice: The Origin of America's Clovis Culture.* University of California Press, Berkeley, CA.

State University of New York at Stony Brook (SUNY SB). 2006. *A Stage 1 Archaeological Survey for the Mercado Property, Shirley, Town of Brookhaven, Suffolk County, New York*. Report prepared by SUNY SB, Stony Brook, NY.

SUNY SB. 2008. *A Stage 1B Archaeological Survey for the Proposed KeySpan/National Grid Caithness Gas Transmission Main, Holtsville and Commack-Brentwood Segments, Towns of Brookhaven, Islip, and Smithtown, Suffolk County, New York.* Report prepared by SUNY SB, Stony Brook, NY.

Suffolk County. 1954. *Historic Aerial Photography*. Suffolk County New York Government, Hauppauge, NY. Available at http://www.suffolkcountyny.gov/Departments/Planning/Divisions/CartographyandGIS/HistoricalAerials.aspx. (Accessed September 2017).

Suffolk County. 2020. *GIS Viewer*. Suffolk County New York Government, Hauppauge, NY. Available at https://gis3.suffolkcountyny.gov/gisviewer/. (Accessed May 2020).

Town of Brookhaven. 2020a. *Establishment of Brookhaven*. Town of Brookhaven, Farmingville, NY. Available at https://www.brookhavenny.gov/525/Establishment-of-Brookhaven. (Accessed March 2020).

Town of Brookhaven. 2020b. *Growth of Brookhaven*. Town of Brookhaven, Farmingville, NY. Available at https://www.brookhavenny.gov/527/Growth-of-Brookhaven. (Accessed March 2020).

Tracker Archaeology Services, Inc. (TAS). 2002. *Phase I Archaeological Investigation for the Proposed Aspen Creek Estates, Yaphank, Township of Brookhaven, Suffolk County, New York*. Report prepared for Kaywood Properties, Ltd. by TAS, North Babylon, NY.

TAS. 2003a. *Phase I Archaeological Investigation for the Proposed Harry Jensen Subdivision, Yaphank, Township of Brookhaven, Suffolk County, New York*. Report prepared for Insula-Dome Skylights by TAS, North Babylon, NY.

TAS. 2003b. *Phase I Archaeological Investigation for the Proposed Farmingville Retail Expansion, Farmingville, Township of Brookhaven, Suffolk County, New York*. Report prepared for Nelson, Pope & Voorhis, LLC by TAS, North Babylon, NY.

TAS. 2004. *Phase I Archaeological Investigations for the Proposed ACE Builders at Southaven Subdivision, Southaven, Town of Brookhaven, Suffolk County, New York*. Report prepared for Cramer Consulting Group by TAS, North Babylon, NY.

TAS. 2009. *Phase I Archaeological Investigation for the Proposed Colony Preserve Subdivision, Shirley, Town of Brookhaven, Suffolk County, New York*. Report prepared for Nelson, Pope & Voorhis, LLC by TAS, North Babylon, NY.

Tuck, J. A. 1978. “Regional Cultural Development 3000 to 300 B.C.” In *Smithsonian Handbook of North American Indians Vol 15 Northeast*, pp. 28-43, Bruce Trigger, ed. Smithsonian Institution Press, Washington, D.C.

United States Department of Transportation (USDOT). 1976. *America's Highways: 1776-1976. A History of the Federal-Aid Program.* United States Department of Transportation, Federal Highway Administration, Washington, D.C.

U.S. Fish & Wildlife Service (USFWS). 2020. *Wertheim National Wildlife Refuge: About the Refuge*. USFWS, Shirley, NY. Available at https://www.fws.gov/refuge/Wertheim/about.html. (Accessed March 2020).

United States Geological Survey (USGS). 1902. *Setauket, NY*. 1:62,500-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1904. *Moriches, NY*. 1:62,500-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1919. *Setauket, NY*. 1:62,500-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1926. *Moriches, NY*. 1:62,500-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1947a. *Bellport, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1947b. *Patchogue, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1956a. *Bellport, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1956b. *Patchogue, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1956c. *Pattersquash Island, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1957. *Moriches, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1967a. *Bellport, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1967b. *Moriches, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1967c. *Patchogue, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

USGS. 1967d. *Pattersquash Island, NY*. 1:24,000-scale Topographic Quadrangle. USGS, Department of the Interior, Washington, D.C.

Van Lith, M. 2014. "A History of Wertheim National Refuge." Presentation by Marty Van Lith to the Fire Place History Club & Brookhaven Village Association, Brookhaven, NY. November 2014. Available at http://brookhavensouthhaven.org/Presentations/WertheimRefugeHistory/WertheimRefugeHistoryNov2014.pdf. (Accessed March 2020).

Welch, Richard, 2005. "Piracy and Privateering." In *The Encyclopedia of New York State*. Peter Eisenstadt, ed. Syracuse, NY: Syracuse University Press. p. 1206.

William and Mary Center for Archaeological Research (WMCAR). 2016. *Archaeological Survey and Assessment of Coastal Resources, Fire Island National Seashore, Suffolk County, New York*. Report prepared for National Park Service by WMCAR, Williamsburg, VA.

Wright, J. 2005. "Whaling." In *The Encyclopedia of New York State*. Peter Eisenstadt, ed. Syracuse, NY: Syracuse University Press. p. 1692-1694.

Wunderlich, R. 2005a. "Suffolk County." In *The Encyclopedia of New York State*. Peter Eisenstadt, ed. Syracuse, NY: Syracuse University Press. pp. 1497-1501.

Wunderlich, R. 2005b. "Long Island." In *The Encyclopedia of New York State*. Peter Eisenstadt, ed. Syracuse, NY: Syracuse University Press. pp. 923-924.

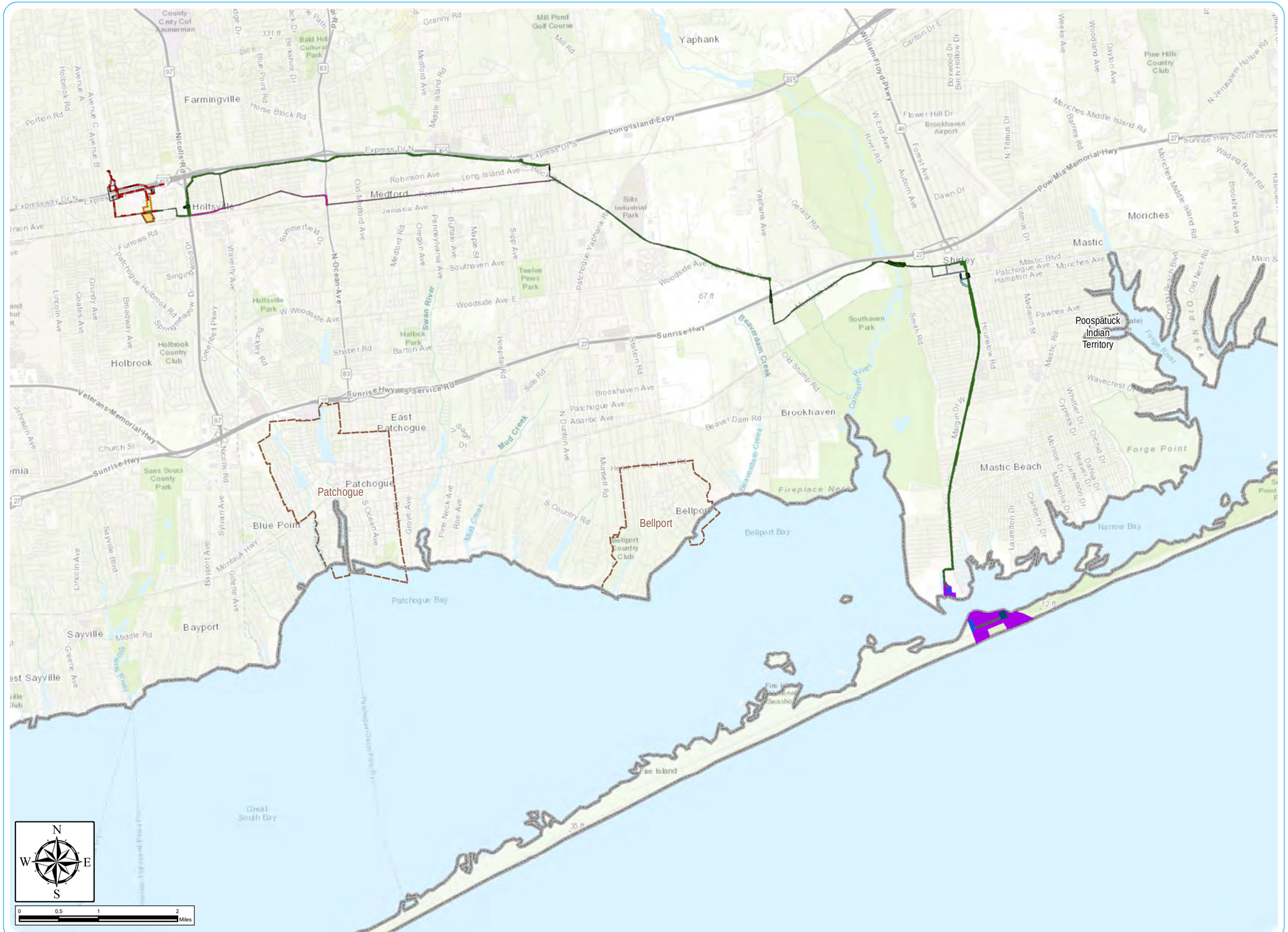
Wyatt, R. J. 1977. "The Archaic on Long Island." In *Annals of the New York Academy of Sciences, Vol 288.* 400-410.

Figures

Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-1: Regional Onshore Facilities Location



Onshore Interconnection Cable

Onshore Interconnection Cable Corridor

Onshore Transmission Cable Corridor

LIE Service Road

Peconic Avenue

Onshore Transmission Cable Variation Corridor

Mastic Blvd W to Francine Pl

Northern Blvd to Mastic Blvd W

Waverly Avenue

Surrey Circle

OnCS-DC

Union Avenue North Site

Union Avenue South Site

Trenchless Footprint

ICW Work Area

Landfall Work Area

Landfall/ICW Study Area

Notes: 1. Basemap: ESRI ArcGIS Online "World Topographic Map" map service. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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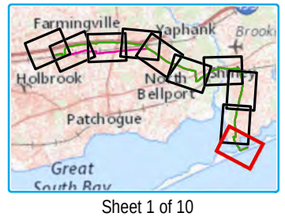
Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities

Onshore Transmission Cable Corridor

- LIE Service Road
- ICW Work Area
- Landfall Work Area
- Landfall/ICW Study Area



Sheet 1 of 10

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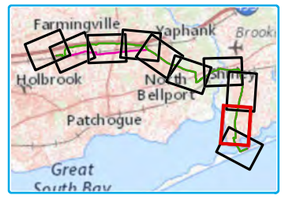
Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities

Onshore Transmission Cable Corridor
- LIE Service Road
- ICW Work Area
- Landfall/ICW Study Area



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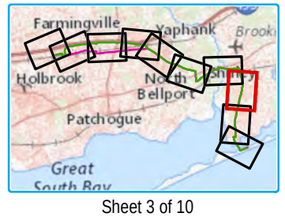
Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities

Onshore Transmission Cable Corridor
- LIE Service Road

Onshore Transmission Cable Variation Corridor
- Northern Blvd to Mastic Blvd W
- Surrey Circle
- Trenchless Footprint



Sheet 3 of 10

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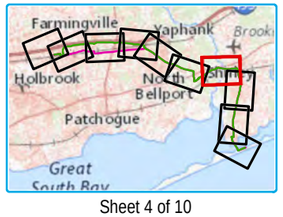
Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities

Onshore Transmission Cable Corridor
- LIE Service Road

Onshore Transmission Cable Variation Corridor
- Mastic Blvd W to Francine Pl
- Northern Blvd to Mastic Blvd W
- Surrey Circle
- Trenchless Footprint



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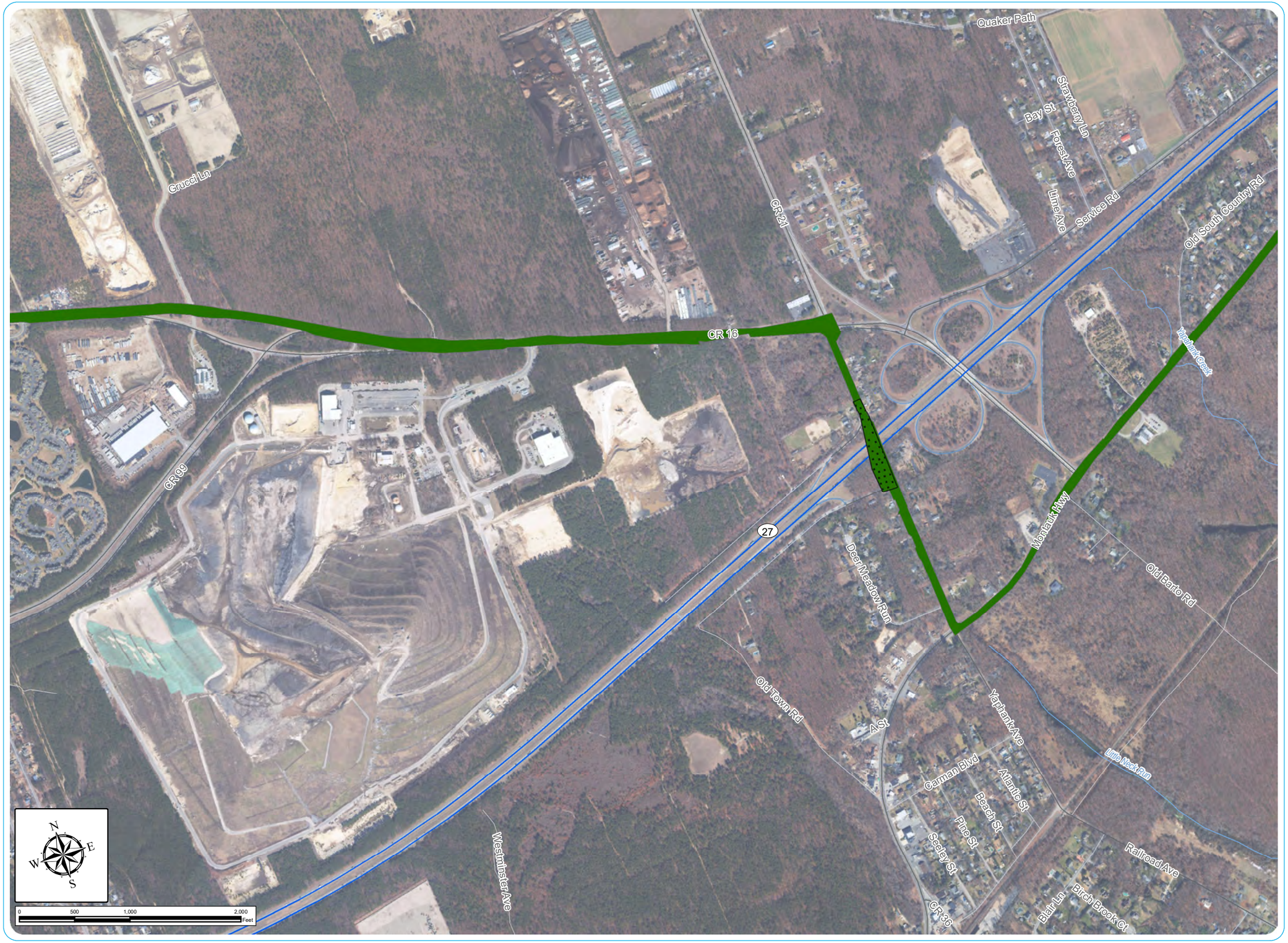
Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities



Onshore Transmission Cable Corridor

LIE Service Road

Trenchless Footprint

Sheet 5 of 10

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery (Clarity)" map service. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities

Onshore Transmission Cable Corridor
- LIE Service Road
- Peconic Avenue
- Trenchless Footprint

Sheet 6 of 10

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery (Clarity)" map service. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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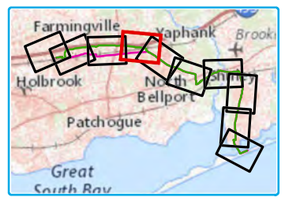
Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities

Onshore Transmission Cable Corridor
- LIE Service Road
- Peconic Avenue
- Trenchless Footprint



Sheet 7 of 10

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Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities

Onshore Transmission Cable Corridor
- LIE Service Road
- Peconic Avenue

Sheet 8 of 10

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery (Clarity)" map service. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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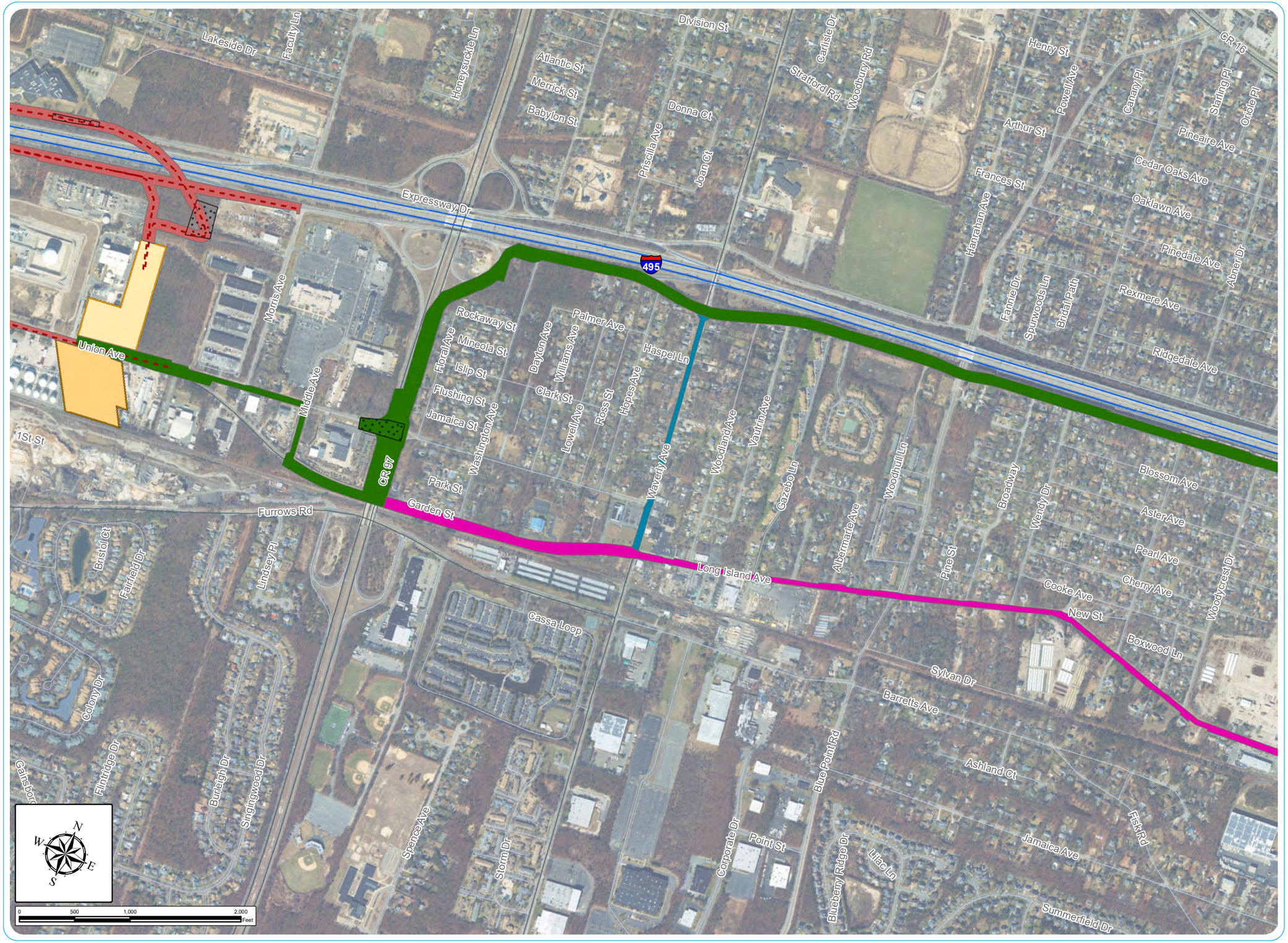
Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities



- Onshore Interconnection Cable
- Onshore Interconnection Cable Corridor

Onshore Transmission Cable Corridor

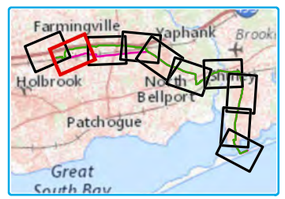
- LIE Service Road
- Peconic Avenue

Onshore Transmission Cable Variation Corridor

- Waverly Avenue

OnCS-DC

- Union Avenue North Site
- Union Avenue South Site
- Trenchless Footprint



Sheet 9 of 10

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Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 1.2-2: Proposed Onshore Facilities

- Onshore Interconnection Cable
- Onshore Interconnection Cable Corridor

Onshore Transmission Cable Corridor

- LIE Service Road
- Peconic Avenue

OnCS-DC

- Union Avenue North Site
- Union Avenue South Site
- Trenchless Footprint

Sheet 10 of 10

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery (Clarity)" map service. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 2.1-1: Onshore Facilities Topography

- Onshore Interconnection Cable
- Onshore Interconnection Cable Corridor

Onshore Transmission Cable Corridor

- LIE Service Road
- Peconic Avenue

Onshore Transmission Cable Variation Corridor

- Mastic Blvd W to Francine Pl
- Northern Blvd to Mastic Blvd W
- Waverly Avenue
- Surrey Circle

OnCS-DC

- Union Avenue North Site
- Union Avenue South Site
- Trenchless Footprint
- ICW Work Area
- Landfall Work Area
- Landfall/ICW Study Area

Notes: 1. Basemap: ESRI ArcGIS Online "USA Topo Maps" map service. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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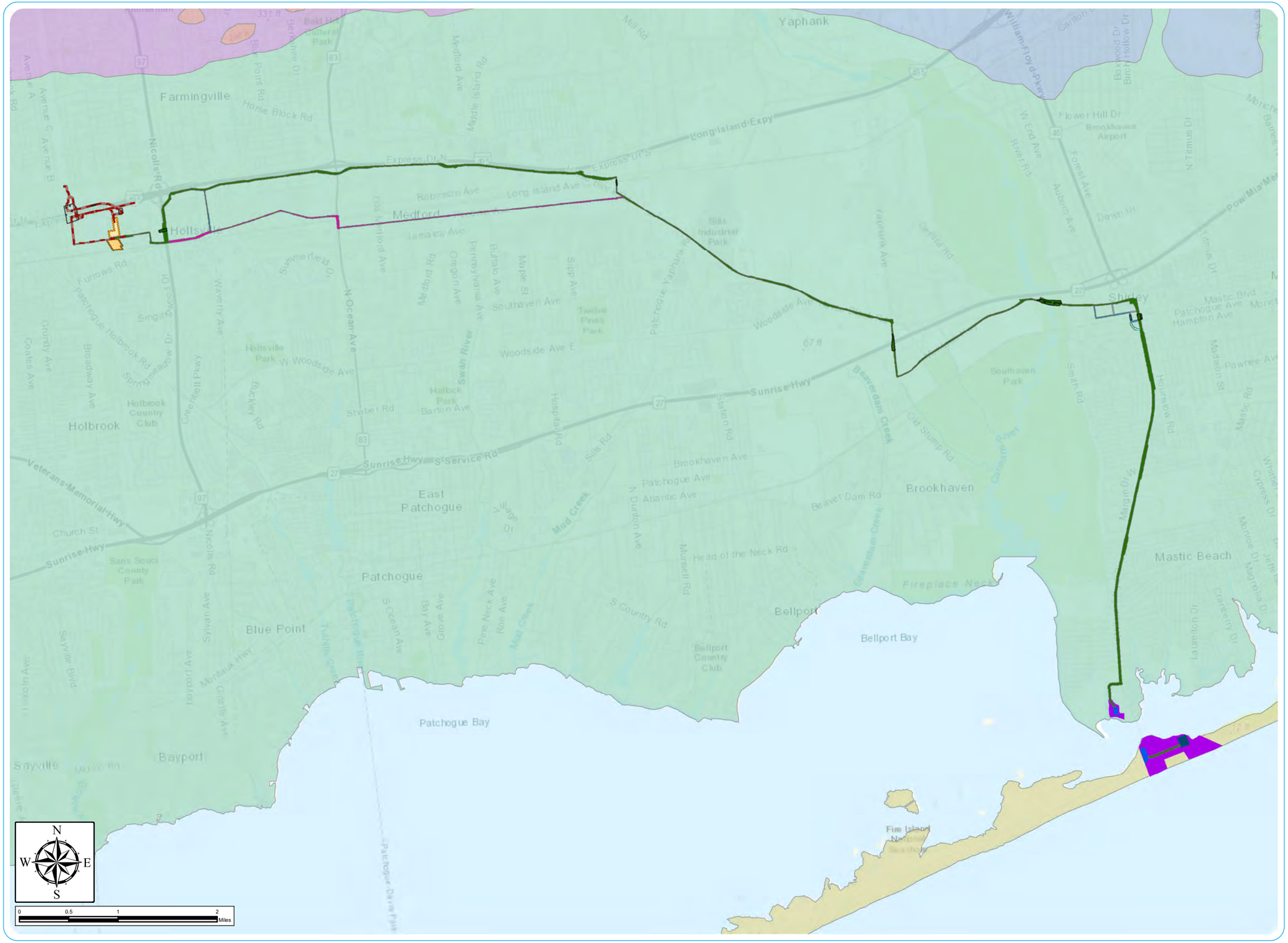
Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 2.1-2: Onshore Facilities Surficial Geology



- Onshore Interconnection Cable
- Onshore Interconnection Cable Corridor

Onshore Transmission Cable Corridor

- LIE Service Road
- Peconic Avenue

Onshore Transmission Cable Variation Corridor

- Mastic Blvd W to Francine Pl
- Northern Blvd to Mastic Blvd W
- Waverly Avenue
- Surrey Circle

OnCS-DC

- Union Avenue North Site
- Union Avenue South Site
- Trenchless Footprint
- ICW Work Area
- Landfall Work Area
- Landfall/ICW Study Area

Surficial Geology

- Till Moraine Deposits
- Kame Deposits
- Kame Moraine Deposits
- Outwash Sand and Gravel
- Barrier Island Deposits

Notes: 1. Basemap: ESRI ArcGIS Online "World Topographic Map" map service. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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Note: This historic map has been geo-referenced with modern map features. Potential sources of error inherent in this process include cartographic inaccuracies, differences in scale, and changes in the modern landscape. The geo-referenced map therefore presents approximate locations of historic map-documented features, and is not intended to depict survey-accurate information.

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Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 2.5-1: 1858 Chace et al. *Map of Suffolk Co., L.I., New York*

- Onshore Interconnection Cable
- Onshore Interconnection Cable Corridor

Onshore Transmission Cable Corridor
- LIE Service Road
- Peconic Avenue

Onshore Transmission Cable Variation Corridor
- Mastic Blvd W to Francine Pl
- Northern Blvd to Mastic Blvd W
- Waverly Avenue
- Surrey Circle

OnCS-DC
- Union Avenue North Site
- Union Avenue South Site
- Trenchless Footprint
- ICW Work Area
- Landfall Work Area
- Landfall/ICW Study Area

Notes: 1. Basemap: 1858 Chace et al. *Map of Suffolk Co., L.I., New York*. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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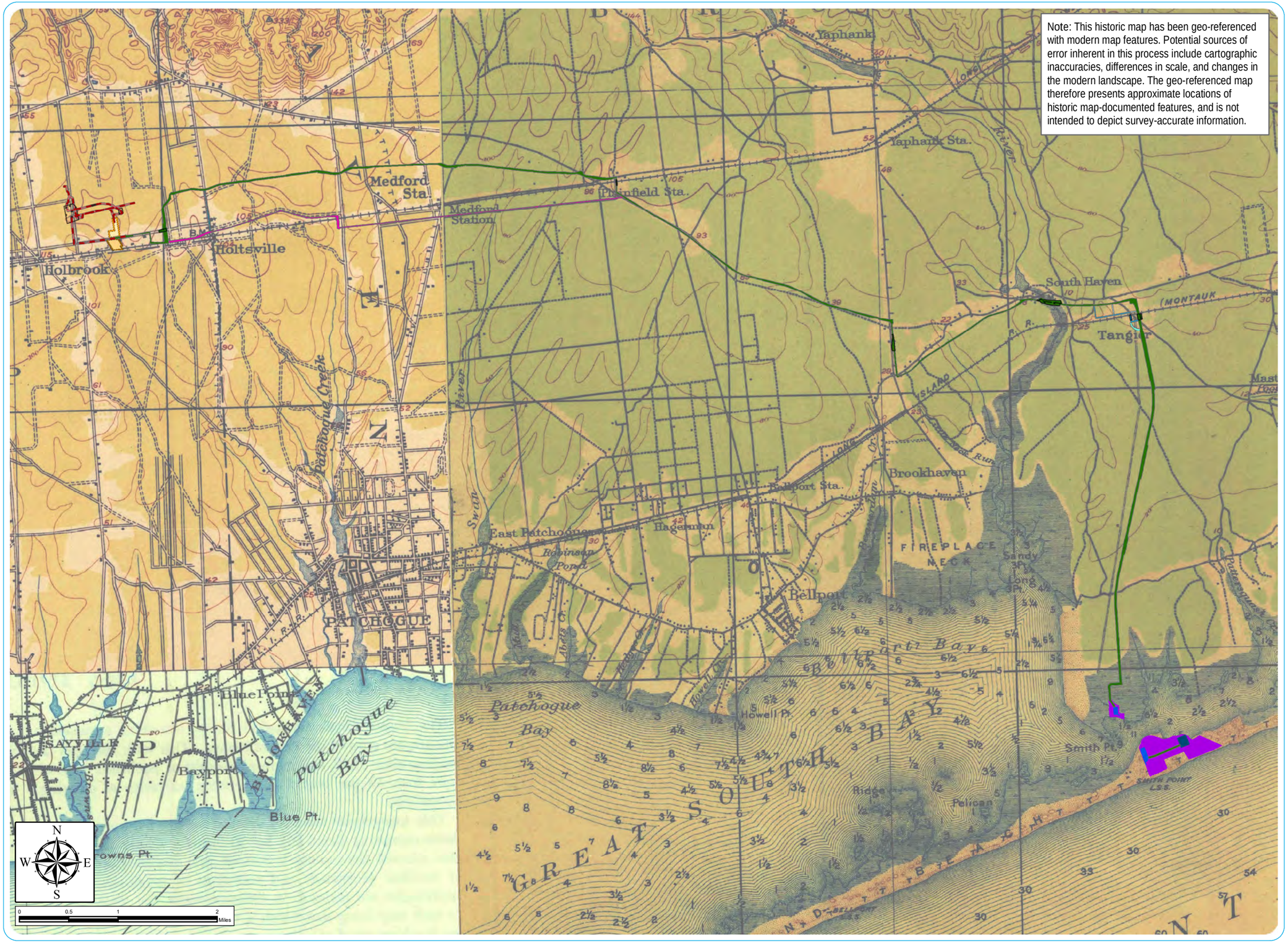

Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 2.5-2. 1919 USGS *Setauket, NY* and 1926 USGS *Moriches, NY* 1:62500 Topographic Quadrangles

- Onshore Interconnection Cable
- Onshore Interconnection Cable Corridor

Onshore Transmission Cable Corridor

- LIE Service Road
- Peconic Avenue

Onshore Transmission Cable Variation Corridor

- Mastic Blvd W to Francine Pl
- Northern Blvd to Mastic Blvd W
- Waverly Avenue
- Surrey Circle

OnCS-DC

- Union Avenue North Site
- Union Avenue South Site
- Trenchless Footprint
- ICW Work Area
- Landfall Work Area
- Landfall/ICW Study Area

Notes: 1. Basemap: 1919 USGS *Setauket, NY* and 1926 USGS *Moriches, NY* 1:62500 Topographic Quadrangles. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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Note: This historic map has been geo-referenced with modern map features. Potential sources of error inherent in this process include cartographic inaccuracies, differences in scale, and changes in the modern landscape. The geo-referenced map therefore presents approximate locations of historic map-documented features, and is not intended to depict survey-accurate information.

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Sunrise Wind Farm

Town of Brookhaven, Suffolk County, New York

Figure 2.5-3. 1956-1957 USGS *Bellport, NY, Moriches, NY, Patchogue, NY,* and *Pattersquash Island, NY* 1:24000 Topographic Quadrangles

- Onshore Interconnection Cable
- Onshore Interconnection Cable Corridor

Onshore Transmission Cable Corridor
- LIE Service Road
- Peconic Avenue

Onshore Transmission Cable Variation Corridor
- Mastic Blvd W to Francine Pl
- Northern Blvd to Mastic Blvd W
- Waverly Avenue
- Surrey Circle

OnCS-DC
- Union Avenue North Site
- Union Avenue South Site
- Trenchless Footprint
- ICW Work Area
- Landfall Work Area
- Landfall/ICW Study Area

Notes: 1. Basemap: 1956-1957 USGS *Bellport, NY, Moriches, NY, Patchogue, NY,* and *Pattersquash Island, NY* 1:24000 Topographic Quadrangles. 2. This map was generated in ArcMap on August 10, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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Appendix A:
Photographs

Photograph 1

Road and drainage ditch disturbance within the Preliminary APE of the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes. View to the north.

Photograph 2

Road, sidewalk, utility, and commercial disturbance within the Preliminary APE of the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes. View to the east-northeast.

Photograph 3

Road berm and culvert disturbance within the Preliminary APE of the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes. View to the northeast.

Photograph 4

Road cut, sidewalk, and utility disturbance within the Preliminary APE of the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes. View to the east-southeast.

Photograph 5

Road and noise wall disturbance within the Preliminary APE of the Onshore Transmission Cable - LIE Service Road. View to the east.

Photograph 6

Road cut, sidewalk, and utility disturbance within the Preliminary APE of the Onshore Transmission Cable - LIE Service Road. View to the east-northeast.

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Photograph 7

Potentially undisturbed terrain within the Preliminary APE of the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes. View to the west-northwest.

Photograph 8

Potentially undisturbed terrain within the Preliminary APE of the LIE Service Road and Peconic Avenue Onshore Transmission Cable routes. View to the west-northwest.

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Photograph 9

Potentially undisturbed terrain within the Preliminary APE of the Onshore Transmission Cable - LIE Service Road. View to the northeast.

Photograph 10

Road, sidewalk, and utility disturbance within the Preliminary APE of the Onshore Transmission Cable - Peconic Avenue. View to the east.

Photograph 11

Road, utility, and commercial disturbance within the Preliminary APE of the Onshore Transmission Cable - Peconic Avenue. View to the west-southwest.

Photograph 12

Potentially undisturbed terrain within the Preliminary APE of the Onshore Transmission Cable - Peconic Avenue. View to the south.

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Photograph 13

Potentially undisturbed terrain within the Preliminary APE of the Union Avenue North Site. View to the north.

Photograph 14

Dredged spoil fill, grading, and paving disturbance within the Preliminary APE of the Landfall Work Area on Fire Island. View to the north-northwest.

Photograph 15

Dredged spoil fill and grading disturbance within the Preliminary APE of the ICW Work Area on Fire Island. View to the north-northwest.

Photograph 16

Dredged spoil fill, grading, and paving disturbance within the Preliminary APE of the ICW Work Area on Long Island. View to the northwest.

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